Journal of the Madras Agricultural Students union.

V16. no.9. September 1928.

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

THE JOURNAL

OF

The Madras Agricultural Students' Union.

Vol. XVI] SEPTEMBER 1928. [No. 9.

EDITORIAL.

Symposium on crops.—At the last conference of this Union a symposium on paddy was presented; this was commended as indicative of the spirit of team work that animates members of this department in the solution of agricultural problems and the suggestions of Mr. R. D. Anstead, the Director, that symposiums on other crops might form one of the main items of the proceedings in future years was therefore appreciated by the whole audience.

The time allowed however at the July meeting to authors of the papers was, as could be judged, far too short and we are sure all points which each author wished to bring out could not be effectively and exhaustively dealt with.

We hope the Committee will take early steps and include a symposium on cholam or cotton or sugarcane for the next conference. Cholam is the most important crop in the Deccan and deserves equal attention with paddy. The problems connected with it are far more intricate and difficult of treatment and a fairly full treatment of the subject would involve much more time and care and presupposes the co-operation of workers and frequent consultations amongst them. Cotton is a crop in world-wide demand and its treatment would gain greater recognition. Sugarcane on the other hand was the first crop on which rearch was started in Madras and has attracted universal notice since 1912.

A Curb to Unbridled Enthusiasm.—Dr. Kunhikannan in his contribution extracted in this issue describes the conditions obtaining in India, compares them with those of other countries both in the West and the East and draws lessons for this land. He states that the Western countries have not been put to the same necessity of practising economies in agriculture as the Eastern nations realise and this accounts for the enormous differences in their agricultural methods and outlook.

Dr. Kunhikannan rightly lays emphasis on the fact that European countries have had "vast areas in their colonies for their surplus population and human labor there being far short of the requirements" of the boundless tracts of land in their possession that deficiency has had to be made good by the invention of implements and machinery for extensive rather than intensive farming. "Industrial opportunities being no less, there has been an equally great development in that field and the results of action and reaction between the two have been such as to necessitate the application of scientific processes to agriculture which can only be adopted with difficulty in countries where small holdings predominate." Nevertheless we would consider it time wasted to advise the ryot alone to summon patriotism and not adopt all feasible measures for augmenting his income while other members of the community who ought to know better lead a luxurious life and do not evince real concern for his welfare.

Dr. Kunhikannan would warn our reformers against the wholesale introduction of western methods but would advise zealots to make an intelligent discrimination between method and method and adopt only such methods as may not cause serious dislocation in the methods and practices which embody the experience of several centuries.

His appreciation, however, of the lines of advance which science has laid down in the control of pests and diseases and in the creation of new or better types of crops is welcome relief to all workers in the field.

The Malaria Problem. That an appreciable percentage of population annually falls a prey to malaria with the slow devitalising tendency induced in offspring and children of malaria-stricken parents has been known for several years. Several conscientious workers have labored hard in the solution of this question and Government have ungrudgingly been spending vast sums of money in adopting preventive or ameliorative measures as dictatedby the teachings of modern science. In spite of quinine and the discovery of similar drugs for stamping out the scourge, it has remained as bad as ever, appearing in new tracts and reducing the vitality of people who through other causes are unable to protect themselves. Some public men have opined that it is due to the enormous breeding grounds provided in jhils and stagnant pools which have become necessitated by the obstuction caused by the railway lines to the natural drainage of the waters of the country. Others point to the ever-increasing poverty amongst the poorer classes which denies them even the necessaries of life. Whatever the causes be, it is the duty of wellwishers of the countryside to find ways and means for controlling malaria by taking into consideration facts as they are and not by exaggerating their effects or by minimising their seriousness. It is therefore refreshing to find that in countries similarly situated certain practices have been in vogue for several centuries which seem to point to the conclusion that if they were adopted in this country also, India would be free from this dread-enemy. There would seem to be a simple remedy which is within the reach of every cultivator. It is nothing else than growing in an increasing measure legumes and clover which have been rightly considered by medical men as the chief cause for malaria not being present in any form in Egypt or Argentine. To all those interested in public health we would commend therefore a perusal of the extract on this subject published elsewhere in this issue.

A trying Fertilizer.—It is well known that apart from the increasing demand for cattle manure its supply has been fast diminishing. Cakes and bones are difficult to get because the foreign competitor can and does snatch them away by offering even prohibitive prices. Greenleaf is not easily obtainable and the culture of green manure crops is not always attended with success or can at best be only limited to favourable situations. Fresh fields have therefore to be explored if the present yields of crops are to be kept up or to be improved. Fertilisers are welcome but the use and effect of each should be carefully examined before they can be safely recommended for universal adoption. Trials with these which have been made by the local agricultural department have yielded useful results but vary in their scope for unqualified advocacy. But generally they have not proved so effective when applied alone and the advice which Mr. Anstead has been giving to all who seek it that a combination of leaf and fertilizer is more economical and more effective seems to convince the ryots of the futility of either manure alone and point to the safe guidance which the department has embarked on giving to the cultivator. Several fertilisers have been put on the market and the need for understanding the causes of failure or success has become acute. Of these manures calcium cyanamide is one which has given conflicting results. We therefore welcome the article on "Calcium Cyanamide as a manure for South Indian soils" which Mr. S. Kasinath read at the last Union conference in July as it sets at rest the doubts which have been entertained in the recent past and indicates the right lines which account for the failure of this fertiliser in several trials. We are sure that a perusal of this paper will benefit the reader.

The Child's Mainstay.—In all western countries, child welfare has attacted most notice and the question of milk supply has engrossed the attention of the public to a greater degree than any other question. 'Care of the mother', 'production of cheap milk', 'supply of clean milk and in sufficient quantities' are problems which are daily discussed in the Press and on the platform. An agricultural country raises its own supply while the industrial nations secure sufficient from their neighbours but the case is entirely different with the stoical Indian who has at best been indifferent to this aspect of national wellbeing. The question of production of clean milk is as important as the allied and inseparable question of the production of sufficient and cheap milk. Our readers are therefore indebted to Mr. R. W. Littlewood for a very readable and interesting article on production of clean milk in this number of the journal. In his characteristic way he puts it down that to produce clean milk model buildings and equiqment are not so essential though desirable but the chief point is good and reliable milkmen. A second necessary is the provision of hygienic and sanitary conditions both for the cow in the first instance and the operator and products later. The useful suggestions he gives and the practical hints he has thrown would, we are sure, be welcometo all interested in the subject.

Out of the Rut.—Quite in conformity with the announcement which the Director Mr. R. D. Anstead made at the July conference this year, the Research Engineer has been appointed

and Mr. N. G. Charley, B. E. of Sydney University, Australia, has joined the post on a five-year contract. We welcome him among our midst and hope that coming from one of the youngest of British colonies and a rising agricultural province like New South Wales Mr. Charley would be free from certain associations which would hamper an old-country worker. The Madras Presidency is in several cases similar to Australia in regard to the production of agricultural raw products and any attempts at introducing a useful and cheap innovation in agricultural implements and tools will be largely appreciated and improvements taken up with very great enthusiasm by the cultivator. As instances we may point to the hand maizesheller designed by Mr. Hayman and the cane seed coverer of Mr. Milligan and the immense popularity these have gained amongst thousands of cultivators with no pressure or advertisement. The Government's decision not to overburden the Research Engineer with administrative work is most welcome and we are sure will afford him full scope for making researches in his line.

Sidelines.—During the past 20 years the provincial agricultural departments have set to themselves the task of imparting agricultural education and the care of soils and crops. Recently however greater attention has been sought to be paid to the improvement of cattle. The Royal Commission that recently sat opened out wider fields of research aad the attention of all eyes has now been turned to rural reconstruction and the rural dweller. And the present signs of varied activities on the part of diverse men in trying to attack rural problems are, we hope, indicative of the leaven that has spread into larger strata of society as the effect of diffusion of democratic ideas, impact of world visitors to this country and their pronouncements on the general conditions of India. Will the questions of compulsory education, living wage, adequate and balanced foodsupply, which are fundamental, be seriously taken up by workers ?

Production of Clean Milk

By R. W. Littlewood, N. D. A.

Deputy Director of Agriculture Livestock, Hosur.

Clean milk does not mean milk from which all visible dirt is absent or has been extracted but rather raw milk from healthy cows which has been produced under hygienic conditions and which contains only a small number of bacteria and which will remain sweet for a day or so in the hot weather and longer in the cold weather.

A large number of people imagine that to produce clean milk, one must have model buildings and equipment; this is not so, although they are desirable; the chief point is good and reliable milkmen. At the Reading Institute for Research in Dairying, cows have been milked in an old wooden cow byre with a thatched roof, the walls and roof are regularly swept down and the walls whitewashed. The results of the bacteriological examination of the milk produced in this shed are as follows :—

Age of milk in hours.	Temperature when tested.	Number of organisms per 1 c. c.	Presence or absence of bacillus coli.
5	50 F	270	...
5	54 F	510	...
5	54 F	1250	...
6	53 F	820	...
8	55 F	1140	...
8	53 F	400	...
7	60 F	930	...

Granted that it is possible to produce clean milk as above in buildings of this type, it should be less difficult to produce clean milk in modern cowsheds.

The quality of the milk should be as uniform as possible and this is only attained by constant attention to details with good supervision.

The necessary operations should be scrupulously carried out twice a day and this amounts to strict routine.

For an ideal dairy farm in India, it is advisable to erect a milking shed and to keep this specifically milking and feeding. Also enclose a field of two or three acres with wirefence and erect in this a covered shed open at the sides and which ends with a feeding trough down the middle for feeding long fodder in during the day and night; the erection of a water trough is also recommended in this paddock, so that the animals have access to water at all times.

The best floor for the milking shed is cement concrete as this is impervious. On the plains there is only need for end walls, the sides can be left open, double sliding doors at each end are advisable. The mangers should be made of concrete and the ground level. The floor of the standing should slope towards the gutter at the rear of the cow, so that the floor can be easily washed and facilitate easy drainage. Separate standings are advisable since the cows are not so liable to foul the floor by lying on or standing across it. The gutter at the rear of the cows should have a slope and this should run into a liquid manure tank at the outside of the shed away from the milking shed, the top of which is ground level, this should be covered with a movable wooden top. The gutter should be wide and deep, about 18 inches wide, and the depth near the standing about 6 to 8 inches deep and that farthest away from the standing 4 inches; this prevents splashing.

The liquid manure tank should be emptied once or twice a day as occasion arises; dung should be removed immediately if possible or at least twice per day and stored a good distance away from the milking shed, as dung attracts flies. The milking shed should be lime-washed frequently and the floors washed with disinfectant occasionally.

Near the end of the milking shed, a milk receiving room can be erected, a room about 10 feet square is sufficient, the bottom portion of this shed consisting of a brick wall with cement plastering about 3 feet high and the roof supported on pillars, the space in between the pillars being covered with thin wire gauze; this keeps out all flies and the room gets plenty of fresh air and light which is essential. Doors can be made of wire gauze with springs on them to keep them always closed. There should be no crevices in the floor of this shed as these harbour dirt, the walls should be faced with cement and painted so that they can be washed down.

A milk funnel with a strainer inside can be erected outside the milk room and connected with the inside by a pipe. The milk is poured into the funnel from each cow and this runs into the bucket of the herd recorder in the milk-room; the attendant notes the yield and empties this into the milk churn. In this method the milk room is kept closed during the whole process of milking and so there is less chance of dirt or flies getting into the room.

It is most essential that all milk cans, buckets, churns &c. should be properly sterilised after use and put in the sun to dry, this decreases the bacterial content of the milk more than anything else. Souring of milk is often caused through placing milk in cans which have not been properly sterilised. Utensils which are never properly cleaned and sterilised are good breeding grounds for bacteria, as they contain small quantities of milk residues which are constantly being added to. At the Reading Institute *the bacteriological condition of empty milk churns which were supposed to be clean and fit for use revealed:*—

Condition of churns on inspection.	Number of bacteria. per c. c. of washings.	Bacillus coli found in:—
A. Apparently clean and dry ...	6,200,000	1/1,000 c. c.
B. Apparently clean but wet ...	4,100,000	1/100 c. c.
C. Milky water present ...	18,400,000	1/1,000 c. c.
D. Milk present ...	30,300,000	1/100,000

Each churn was rinsed with 1000 c.c.s. of sterile water, a portion of which was used for estimating the number of bacteria. All these churns were assumed to be in a condition fit for use. The latter brings out incidentally the futility of assuming that the mere presence of steam is sufficient to guarantee the necessary cleanliness, since the churns mentioned above came from premises which were in a position to give adequate sterilisation. That this had not been done is evident from the figures which are only one illustration of the conditon into which all the other utensils quickly fall when they are not properly cleansed and sterilised.

The following table shows the results of the examination of other places of apparatus found on farms of good type where the workers were honestly endeavouring to do their best.

Apparatus.	Count per c. c. of washings.	Presence of B. Coli in.	Remarks.
Cooler ...	80,000	1/11,000 c.c.	Appeared clean, washed in hot and cold water.
Cooler ...	11,000	1/100 c.c.	Appeared clean, washed in hot water and cold water and steam sprayed on surface.
Cooler ...	1,464,000	1/1000 c.c.	Greasy, washed in hot and cold water.
Receiver ...	3,870,000	1/100 c.c.	Washed in cold water only.
Receiver ...	53,200	1/100 c.c.	Washed cold and hot water.
Strainer (Metal) ...	96,000	1/10,000 c.c.	Appearence clean.
Milking pail ...	3,000,000	1/10,000 c.c.	Washed in cold water.

Each piece of apparatus was washed with 500 c. c. s. of sterile water, a portion of which was used for making the counts.

These examples suffice to show that any efforts made in cleaning the cows and in improving the methods of milking are stultified by failure to appreciate the necessity for thoroughly cleansing and sterilising the utensils.

All milk utensils must first of all be thoroughly rinsed and scrubbed in cold water inside and outside to remove any milk residue which is left. If this is not done immediately after milking etc. all of them, including the cooler, should be thoroughly rinsed or left to soak in cold water.

On no account should hot water be used for this preliminary rinsing as the albumen in the milk is liable to be coagulated and to stick to the vessel making subsequent washing more difficult.

After the utensils have been washed in cold water, they should be washed in hot water and well scrubbed. If the cans are greasy, a little soda added to the water assists; if the soda is used, a second rinsing in hot water is necessary.

After washing utensils, they can be left to drain for a time and then sterilised by steam. *There is no substitute for steam on the dairy farm.*

Scalding utensils by means of boiling water is satisfactory if steam is not available, but it is not half so efficient as steam.

The following table gives some idea of the keeping qualities of milk when placed in washed vessels, scalded vessels and vessels which are sterilised by steam.

The scalding was done under ideal conditions which could scarcely be equalled in practice, so that the figures given are probably better than would normally be obtained.

Keeping qualities of milk in churns treated in different ways.

Date.	Number of days sweet at 60 F. Control.	Washed.	Scalded.	Steamed.
28-11-1922 ...	4	1½	2	4
5-12-1922 ...	3½	1½	2	3½
9-12-1922 ...	3½	1½	2	3½

The control milk remained in the sterile vessel into which it was milked.

It will be noticed that washing is particularly ineffective and in the Indian climate, milk would not keep half this period.

A properly steamed churn should be *dry*. After the churn is removed from the steam jet, it should be laid for a short time on its side to allow the steam to escape and there should be sufficient heat left in the metal to evaporate the small amount of condensation water. If condensation water is noticed in the churn after sterilisation, it should on no account be wiped out with a cloth but placed in the sun to dry.

Milk utensils should be washed and sterilised after each milking in order to get uniformly good milk.

The following table brings this out; the morning milk was taken in utensils which had not been steamed.

Date.	Age in hours.	Temperature tested.	Number of organisms per 1 c. c.
4-1-23 Evening ..	19	48 F	21,000
5-1-23 Morning ...	4	48 F	200,000
10-1-23 Evening ...	20	47 F	31,000
11-1-23 Morning ...	5	48 F	88,000
31-1-23 Evening ...	19	56 F	46,000
1-2-23 Morning ...	4	64 F	72,000

Pails, cloths and brushes which are used in washing the cows should be washed after milking and steamed daily.

Coolies' overalls should be changed once or twice per week and should not be allowed to get into a dirty condition.

Milking.—The first point to notice in this is to see that the cow is clean. The cow should be groomed with a stiff brush and rubbed down with a cloth; all dung should be removed from the body and the udder and the flanks should be washed with lukewarm water and dried with a clean cloth just before milking. The milkman should see that no water is left on the udder which might drop into the milk.

A wash basin, soap and towel should be provided so that the milkman can wash his hands before commencing to milk. Clean milking pail or part of his body cloth may be blown into the milk whilst milking.

Overalls serve the double purpose of preventing contamination of the milker's hands from his clothes and also of fostering that spirit of cleanliness which is so essential in the worker on a clean milk farm.

The first milk drawn from the teat at the commencement of milking should be allowed to run to waste as it has been found that the teat canal has always a little milk remaining in it and this milk becomes contaminated between milkings by bacteria when the cow lies on the ground.

The practice of wetting the hands before milking with either water or milk is to be condemned as drippings from the hand are sure to drop into the milk. The teats if necessary, can be smeared with a little butter in order to facilitate easy milking.

All dung and soiled litter should be removed from the milking shed before milking.

Milk-pails.—The covered type of milking pail is strongly recommended; the opening at the top should be as small as practicable and nearly vertical. An opening 4 inches by 7 inches is the usual size. The object of the covered pail is to prevent contamination from dirt falling into the milk.

Calcium Cyanamide as a manure for South Indian Soils.

By Kasinathan, B. A.,

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It is well-known that the plant-food to which crops react generally readily is nitrogen. The soil surveys of the various districts have pointed to a general deficiency of this ingredient. The natural supplies are mainly Farm Yard Manure and green leaves. These sources are far too poor to supply the demands and the need for chemical manures is great. Of these, the most important ones are Nitrate of Soda, Sulphate of Ammonia, and Calcium Cyanamide. The first is as much a natural manure as Farm Yard Manure since it is dug out of the natural deposits in Chili. Its supply is certainly not inexhaustible and Scientists are entertaining serious fears of its extinction. Till very recent times, Ammonium sulphate was a by-product of the coal-gas industry and its price was rather very high and its future was not much brighter than that of Sodium Nitrate. These and other immediate causes led to the discovery of a method of harnessing atmospheric nitrogen and thus to put up the last link in the world's nitrogen cycle. The first marketable product of nitrogen fixation was calcium cyanamide. The manufacture of calcium cynamide from atmospheric nitrogen was first patented in 1905 and is within easy reach of any country where electric power is cheap. In view of the great possibilities of its development in this country it was thought likely that calcium cyanamide should be capable of being made cheap and available to the ordinary ryot. It was therefore considered desirable to investigate its value as a fertiliser for the various crops of this presidency.

One of the earliest attempts to test the value of Calcium cyanamide as a fertiliser is reported in the Journal of Agricultural Science—Vol. I Part I (pp. 89—91). It was not an exhaustive investigation and resulted in no positive conclusions; but it certainly indicated the great possibilities of this new product. Since then, numerous investigations have been carried out and Calcium cyanamide is firmly established as a serious rival to the more costly Nitrate of Soda or Ammonium Sulphate. The experience of this country has, however, been slightly different. For the first time, it was tried in a number of farms in the year 1916-17 and is being tried even to-day.

By far the most exhaustively tried crop was paddy. At Samalkot, Manganallur and at the Central Farm, the manure was tried either alone or in combination with green leaf. It was found not quite suitable for delta land; of the northern districts while at Manganallur the manures had received better praise. In the words of the report, "In all cases were Cyanamide is compared with Ammonium Sulphate the yields are markedly in favour of Ammonoium Sulphate." This does not state that cyanamide is not a useful source of nitrogen for paddy. It merely shows that per unit of Nitrogen it is not so good as Ammonium Sulphate. At the Central Farm, the results were again erratic; the smaller dose of 1 cwt being more effective, perhaps less toxic than the longer dose of 2 cwt. The manure has been tried with dry crops both at Koilpatti and at the Central Farm. The results are of the same nature. With tenai (Setaria Italica) alone, cyanamide gave significant increases, while Ragi did not fare well. It was effective in the case of a fodder crop. Cotton did not benefit by the application at all. The results of these trials may be summed up in the words of M.R.Ry. D. Balakrishnamurti Garu, as follows:-The results are thus favourable in some cases and unfavourable in others. In most cases, the results whether positive or negative cannot be said to be conclusive as the trials were made in single or duplicate plots.

The reasons assigned for the erratic behaviour of the manure have been of a varied kind-some attributing it to incomplete incorporation of the manure leading to high salt concentrations, others attributing it to the want of interval between its application and planting that is considered essential for the disappearance of certain toxic substances. But all are agreed that the differences are due to the visible set-back that planted seedlings experience in the initial stages of its life. This has created a strong prejudice against the manure and certain dogmas have crystallised themselves regarding the usefulness of calcium cyanamide.

(1) That a certain interval of time is necessary between the application of manures and sowing so as to allow for the disappearance of the toxic substances found by the decomposition of cyanamide.

(2) Under certain conditions, not well defined, the toxic substances persist in the soil permanently damaging the crop.

(3) Cyanamide is not therefore a safe manure.

These views are widely divergent from opinions held in the West and it was therefore thought advisable to investigate how far they are correct. As a first step, laboratory and pot experiments were conducted to find out whether calcium cyanamide gave rise to toxic substances in the soil and if so what its fate is, whether it persists for long in the soil or gets changed into other substances. The results of these experiments are described in detail in the Memoirs of the Department of Agriculture and I shall here briefly outline the conclusions. It was found that of the decomposition products of cyanamide, only dicyanodiamide has been proved to be indirectly toxic to plants and when this is tested for in soils treated with cyanamide, very little of it was found to exist-too little to be of any account. Further nitrification tests also showed that cyanamide nitrifies as smoothly and as well as Sulphate of Ammonia and should therefore be quite as safe a manure. In some of the field experiments examined in the previous paragraph, the higher dose of cyanamide, was found to be much less effective than the smaller dose of 1 cwt. and this was attributed to the nitrogen of the manure becoming too suddenly available for the plant to utilise them all properly. As a result a general tendency to run to leaf was observed without corresponding increases in grain yields. Laboratory experiments hardly justify these assumptions; in fact, if anything, cyanamide takes a longer time to nitrify in soil than ammonium sulphate and in this respect is nearer to organic manures than to Ammonium Sulphate in point of view of its availability.

Pot experiments were also largely in a line with the results of laboratory investigations. Calcium cyanamide was applied to a number of pots so as to give 100 mg. of Nitrogen per kilo of soil. Ragi plants were transplanted in the various pots after varying intervals —one day and one, two or three weeks after manuring. Similar experiments were conducted with paddy also. The results show that there was hardly any difference whether we allowed only a day's interval or three weeks' interval. In every case large increases were obtained over the control pots.

The next step was therefore to repeat some of the experiments already conducted on the various farms. To begin with, it was decided to confine our attention to the cereal crops leaving out the economic crops like sugarcane and groundnut. Experiments were conducted with cholam at Hagari, with Ragi and Paddy at the Central Farm and with Cumbu at Koilpatti. The manure was tried in two doses of one and two cwt. and as the soils of the presidency were generally deficient in phosphoric acid a combination with super phosphate was also included in the series.

A few precautions dictated by the conditions under which toxic products were likely to be formed were insisted on. As has already been remarked, Dicyanodiamide is the only decomposition product that is toxic and the conditions most favourable to its formations from cyanamide are high temperatures or large concentrations of alkali or acid. Unlike Ammonium sulphate, calcium cyanamide contains a large percentage of free lime. This is certainly a definite advantage in the acid soils of the West; but in the soils of this country, it is likely to produce quite different results. Incomplete dispersal of the manure, but more than that its indifferent incorporation with the soil would produce numerous localities of high alkali concentrations. This is a circumstance which would convert the manure into the toxic and as well as inert dicyanodiamide. It was therefore made as one of the essentials, that the manure should be thoroughly incorporated in the soil. Top dressings were therefore avoided and the manure was always applied prior to sowing or transplanting and by suitable cultural operations intimately mixed with the soil. Further, it is well known that when cyanamide is mixed with super phosphate, a lot of heat is developed and this, as has already been remarked, will also induce the formation of the toxic substance. Mixing of the two manures was therefere avoided by applying the phosphate after transplanting as a top-dressing, but, when given as a basal dose, a certain interval between the two applications has been invariably insisted on.

It is not proposed, in this short paper, to discuss the crops individually. Some general features of the scheme may however be noted here. The experimental plots were specially laid out long and narrow with a view to bring down experimental error. About four to five replications were provided in each case.

The results are tabulated in Table I and are examined statistically. Error calculations are made according to Students' method as modified by Engledow. A 30/1 chance is considered significant. The results of individual years are examined separately and together and statistical estimates of the variations caused by differing weather conditions as well as that due to substratum heterogeneity are obtained.

The most outstanding feature of the experiments of all the years is their consistency. Far from being erratic in its action, calcium cyanamide has been found to be quite a reliable manure. The experiments were originally intended to be carried on for five seasons; but that was considered superfluous as the general indications after 3 years were almost of the same kind. The conclusions of the experiment are detailed in page 370.

TABLE No. I.

Statement of grain and straw yields of cyanamide experiments.

Names of crops.	Year.	Control. Grain.	Control. straw.	1 N Grain.	1 N straw.	2 N Grain.	2 N straw.	1. P Grain.	1. P straw.	1 N 1 P Grain.	1 N 1 P straw.	2 N 1 P Grain.	2 N 1 P straw.	Probable error of mean difference.	Effective error.
Cumbu ...	1923–24	28·5	96·2	34·6	116·0	38·0	122·0	27·0	96·8	32·8	116·4	40·6	140·2	0·8	...
	1924–25	32·9	131·0	38·6	145·0	44·0	161·0	32·4	137.0	44.8	176·0	53·2	194·0	1.8	...
	1925–26	27·6	82·2	37·4	99·3	40·8	115·4	28·2	81·6	37·4	97·7	48·0	126·0	0·3	...
		29·7	103·1	36·9	120·1	40·9	132·8	29·2	105·1	38·6	130·0	47·2	153·4	...	3.1
Paddy ...	1923–24	136·2	90·3	...	...	162·2	122·3	125·2	83·9	...	...	171·0	130·5	5·4	...
	1924–25	143·8	99·4	...	...	155·4	148·5	145·5	105·8	...	...	175·3	151·0	7·1	...
	1925–26	133·9	180·8	...	...	167.6	285·0	140·8	234·0	...	...	167·8	297·0	5.4	...
		138·0	126·5	...	...	161·7	185·3	136·5	174·6	...	...	171.4	192·8	...	9·7
Paddy ...	1924–25	2793	2181	2561	2077	...	...	2599	2233	3533	3105	3385	1924	137	...
	1925–26	2331	3100	2712	3662	...	...	2662	3762	3125	5650	3487	7650	187	..
		2562	2640	2636	2866	...	...	2630	2997	3329	4377	3436	4787	164·7	...
Ragi ...	1922–23	121·7	172	128·5	197	146·4	238	131·9	182	138·2	193	1331	217	4·6	...
	1924–25	86·9	175	98·3	220	113·2	258	84·6	165	105·6	234	118·2	258·4	2·1	...
	1925–26	64·8	273	72·8	347	76·2	382	59·2	245	75·6	350	80·8	397	1·1	...
		91·1	207	99·9	255	111·9	293	91·9	197	106·5	259	110·7	291	...	4.6

TABLE II

STATEMENT OF PROFIT AND LOSS.

	Ragi. N	Ragi. N P	Ragi. 2 N	Ragi. 2 N P	Paddy. N	Paddy. N P	Paddy. 2 N	Paddy. 2 N P	Combu. N	Combu. N P	Combu. 2 N	Combu. 2 N P
Increase over control ...	...	17·1	23·1	21·5	...	...	...	...	24·0	29·0	37·3	58·3
Increase per acre ...	...	308	416	392	...	563	...	668	144	174	224	350
Value of the increase ...	...	Rs. 15·4	20·8	19·6	...	35·2	...	43·0	9	10·9	14	21·9
Cost of manure applied ...	Rs. 7·5	11·75	15	19·25	...	11·75	...	19·25	7·5	11·75	15	19·25
Profit per acere ...	...	Rs. 3.65	5·8	0.35	...	21·2	...	21·5	2·5	0·85	1	2·75

Cost of cyanamide is Rs 150 per ton.—Cost of superphosphate is Rs. 90 per ton.

The cereals are valued as under:—Paddy at 16 lb. per rupee.—Ragi at 20 lb. per rupee.—Cumbu at 16 lb. per rupee.

(1) In the case of dry crops, like cumbu, cyanamide is a useful manure. Even the smaller dose of 1 cwt. has given significant increases

(2) In the case of irrigated crops like ragi, the smaller dose is effective under certain conditions but does not however stand the vicissitudes of varying seasons.

(3) With the exception of paddy, the higher dose of 2 cwts. has been effective in all cases i. e., under normal variations of climate and soil.

(4) In the case of paddy, however, even the higher dose has failed to give an increase sufficiently significant.

(5) While superphosphate by itself has not given .any increase, it has enhanced the value of calcium cyanamide, when applied together. Even the smaller dose becomes effective as in the case of ragi and paddy. This action of super phosphate calls for a comment. It is remarkably inert when applied alone and its activity when used along with nitrogen cannot therefore be attributed to a simple soil deficiency in phosphates. It improves the effect of the dose of nitrogen.

The economics of the manuring is found worked in Table II which is self explanatory. Except in the case of paddy, the profit obtained is nowhere attractive. Along with super phosphate, calcium cyanamide in either dose has given almost the same net profit of Rs. 20 to 25 and considering the advantage of a smaller outlay, the one cwt. dose may be recommended. In the case of cumbu, there is no point in advising the highter doses as proportionate increases are difficult to obtain. The smaller dose of one cwt. has given a net profit of Rs. 2½ but it should be remembered that this is the value of the net increase over a very rich "control" plot; and it would be fair to expect under normal circumstances a great profit; for being then under poorer auspices the effect of the manure would be more fully exerted. Further, a net profit of Rs. 3 is not negligible under circumstances where a six rupee increase is considered a fair margin.

Botany of Some Useful Pants—IV.

By T. S. Ramakrishnan M. A. and S. N. Chandrasekhar M. A.

(Continued from July issue)

Trigonella foenum—graecum.—The Fenugreek (Tamil Menthiyam or Venthayam) is an indigenous plant growing wild in many parts of Upper India. Its cultivation extends throughout India usually grown near wells or on tank beds but sometimes it follows cotton or cholam in garden lands. The seeds are usually sown in February and the crop is ready for harvest by April. It is capable of being cultivated in other seasons also the supply of sufficient water being the limiting factor.

It is a herbaceous annual growing to a height of 10 to 12 inches. The stem is rounded or slightly ridged and covered with hairs. The leaves are pinnately trifoliolate, petiolate and stipulate with 2 greenish white stipules. The petiole is grooved on the upper suface and is jointed just above the attachment of the stipules. The leaflets are obovate, dentate, obtuse, obscurely pinnate—reticulate, succulent and with a few hairs on the veins on the undersurface. The terminal leaflet has a jointed stalk.

The flowers are produced from the upper portions of the plants and are axillary and solitary. They open in the morning but by the evening all of them wither away. Bracts and bracteoles are absent. The calyx is tubular and hairy with 5 linear-lanceolate teeth. The corolla is yellowish in colour; the standard is big, ovate and yellowish with green dots on the surface; the wings are half as long as the standard, clawed and provided with a prominent spur; the keel petals are half as large as the wings and united except at the apex. There are 10 stamens, diadelphous, united for the major part of the length and with orange-coloured oblong anthers. The ovary is sessile covered with long silky hairs, with a short style and blunt stigma. The pod is hairy, compressed, 3—4 inches long and 1/6 inch broad with many seeds. The seeds have their long axes parallel to the suture. The seeds when wetted develop a mucilaginous envelope.

The young plant is used as a pot herb. The young pods are also sometimes cooked and eaten as vegetable. The seeds are largely employed as a condiment to flavour the curries. Both the entire plants and the seeds are rather bitter to the taste.

The seeds are largely used in the Indian and Muhammadan systems of medicine as a carminative, tonic or aphrodisiac. A poultice made from the seeds is applied to the skin as a cosmetic. Nurses are sometimes advised to take a gruel made by using the seeds in order to increase the flow of milk. The leaves are also made into a poultice and applied to reduce external swellings.

As a fodder the plant is held in great esteem since it is believed to have properties of increasing the yield of milk. The seeds are often mixed with the food of cattle. Musty hay is often flavoured by mixing fenugreek seeds to make it palatable to the cattle. The seeds yield a dye.

Pisum sativum:—The garden pea (Tamil. Pattani) is extensively cultivated throughout India. It has been in existence in Northern India from very remote times but some consider it to be probably a native of South Western Asia. In Madras the cultivation of this pea is more or less restricted to the cooler parts being common in the hill stations on the Nilgris and Pulney hills. In Mysore province also it is widely grown. Numerous varieties of peas exist differing widely in the colour of the flower, the colour, size and form of the seeds. In Northern India this is sown as a field crop in the months of October-November and harvested by February–March. However as the name indicates this is mostly grown as a garden crop. On the hill stations the pods come to the market during mostly from February to November.

This is an annual herbaceous climber climbing by means of tendrils. The stem is angular, herbaceous, fistular and glabrous and slightly glaucous. The leaves are pinnately compound and stipulate; stipules are large, leafy and auricled with dentate margins; usually 2 pairs of leaflets develop, the upper 2 to 3 pairs and the terminal leaflets being modified into tendrils. The leaflets are ovate-elliptic, with very short stalks, dentate, mucronate pinnate—reticulate, glabrous and glaucous.

The flowers are in axillary long peduncled racemes with minute bract and bracteoles. The calyx is campanulate with 5 lanceolate lobes. The standard is large, orbicular, clawed and of various colours; the wings are slightly clawed and with a prominent spur; the keel petals are united and broader than the wings.

ıens are 10 in number, diadelphous with uniform oblong ers. The ovary is glabrous and flattened with a sharply bent ened style, densely bearded on the inner surface. The pod is ted with a varying number of globular seeds. The latter are er wrinkled or smooth and vary in colour in the different eties.

The young green pods are cooked as a vegetable or roasted consumed. The green immature seeds are made into soups or ies or roasted and eaten. The ripe seed is used either as it is plit or ground into a meal. The familiar 'pattani kadalai' sold azaar is prepared from the ripe seeds roasted and spiced. erfectly cooked peas are believed to cause intestinal disorders ting in flatulence or sometimes in diarrhoea. The entire t is used and valued as a fodder for cattle.

Historically this plant is famous. The famous experiments ybridization by Gregor Mendel were carried out with the en pea and from these experiments he formulated certain laws rding the behaviour of the hybrids, which go by the name of del's laws.

SUBORDER—CAESALPINEAE.

This comprises shrubs and trees and very few herbs. The es are mostly compound but rarely simple leaves also occur. flowers are formed either in the axils of leaves or the apices anches and are mostly borne on racemes or very rarely ose. The flowers are hermaphrodiate and irregular (very y regular). The calyx is made up of 5 or 4 (by the fusion e upper two into one) lobes. The lobes are separate very ly to the base except in some in which the calyx is gamosens. Petals usually number 5 or fewer and the upper most is innermost in the bud and is usually smaller or more antly coloured. This petal is usually termed as the 'Odd l.' The aestivation is imbricate and as distinguished from in Papilionatae is termed as 'ascending imbricate' since posterior petal is the innermost in the bud. There are lly ten stamens sometimes less and mostly free or rarely d. The pods are dehiscent or indehiscent.

Tamarindus indica.—The tamarind (Tam. Puli) is common ıghout India being found as far north as the Jhelum. It is said to be indigenous to South Africa but it is found wild in parts of South India also. This tree is sometimes planted but is more commonly selfsown. The tamarind is rare or absent in the cooler parts of the country and is very common in the hotter plains.

It is a perennial large-sized tree growing to a height of 40-60 feet with many spreading branches, but leaving a thick trunk up to 15 feet in height. The leaves are pinnately compound, parripinnate, with 10-16 pairs of leaflets. petiolate with the petiole grooved on the upper surface, and stipulate with small deciduous stipules. The leaflets are opposite subsessile, oblong, retuse to emarginate, entire, pinnate reticulate, glabrous, sour to the taste.

The flowers are in terminal racemes at the ends of branchlets. Orange or pink coloured large bracts and bracteoles are present. The pedicels are jointed. The calyx tube is shallow with 4 imbricate lobes the posterior lobe being the largest and yellowish (slightly petaloid). The corolla consists of 3 petals, the upper 3 alone being present. The petals are orange coloured with prominent reddish forking veins. The upper-most petal (the odd petal) is the smallest. The two anterior petals are represented by 2 hair like processes. There are 3 well developed stamens united to form a sheath (monadelphous) on the anterior side splitting above half the length and curving upwards with 4 bristle like staminodes alternating with the stamens; the anthers are oblong. The ovary is compressed and provided with a short stalk and a hairy style and subcapitate stigma. The number of ovules vary from 1 upwards. The pod is indehiscent and varies in size and shape from a small one—seeded oval one to a long straight or curved slightly compressed many seeded structure. When young it is greenish but with age a hard brown epicarp develops forming a shell. The meso-carp is fleshy and acid to taste, and the endocarp is lethery. The seeds are separated by the development of false septa, and are hard, shiny black and flattened with truncate ends.

The tamarind is one of those trees which are very useful almost all parts of it being made of. The fleshy mesocarp of the fruit is used in the preparation of soups and other curries. Young

immature pods are made into chutneys. It is the ripe fruit however that is generally used. The pods are dried in the sun for a day or two and the shells removed. The fleshy portions are again exposed to the sun for a day and then the seeds and fibre are removed by beating with a wooden mallet. The pulpy meso-carp portion is again exposed to the morning dew for 2 days and then stored for future use. The older the pulp the greater is the value. It forms such an important constituent of the food that most of the people of South India cannot continue without tamarind for even a short time. Poor people utilise the seeds in the preparation of their food. The kernels are roasted and ground into flour or boiled and consumed. The seedlings are sometimes cooked as vegetable and young leaves and flowers are made into chutneys.

Various medicinal properties are attributed to the different parts of the tree and the different parts of the plant are valued both in Indian systems of medicine and in western Pharmacopias. The pulp is considered to be a refrigerant, digestive, carminative and laxative and is said to be beneficial in diseases caused by deranged bile. As a poultice the pulp is applied on inflammatory swellings and for sorethroat a gargle made of tamarind water is recommended. The leaves are also made into a poultice, and applied to reduce inflammations. The bark is employed as a tonic and astringent.

A strong wood cement is prepared from the seeds after powdering and boiling with glue, A size is also made from the seeds and is used to dress blankets. The pulp is daily used to polish copper and brass vessels in Indian households. Silverware can be polished by the use of an infusion of the fruit. The leaves flowers and fruits are used as auxillaries in dyeing.

The tree supplies good timber. The heart wood, though rather small in size is very hard, durable and difficult of working and is used for parts intended to withstand heavy strain or pressure. Mallets, rice pounders, oil and sugar mills and wheels are ordinarily made from the heart wood of tamarind. This tree supplies good fuel which is much prized whereever great heat is required as in brickmaking. Gunpowder charcoal is also prepared from this.

Tamarind is generally planted as an avenue tree. Though it gives good shade the acid exhalations emanating from this are believed to be injurious to health and people are generally advised not to sleep in the shade of a tamarind or enjoy for a long time the breeze wafted past tamarind trees. It is said to have a baneful influence on crops or plants either growing under it or in close vicinity. Clothes of tents remaining long under this tree are known to perish sooner than otherwise. In Indian mythology this tree is supposed to be haunted by ghosts and devils and women and children are warned against going alone near these trees especially during nights.

SUB-ORDER MIMOSOIDAE.

This comprises mostly trees and shrubs and very few herbs. The leaves are compound and more often bi-pinnate. The flowers are regular hermaphrodite sometimes polygamous and clustered together into globose heads or cylindric spikes or rarely into short racemes or umbels. The calyx is usually gamosepolous with 5 valvate lobes.

The corolla is gamopetalous or sometimes polypetalous with valvate lobes or petals equalling in number those of the calyx. The stamens are usually exserted, free or monadelphous or adnate to the base of the corolla. The stamens are equal in number to the petals or in multiples or more often indefinite. The pod is dehiscent or indehiscent sometimes developing into a lomentum. The seeds are sometimes arillate.

Pithecolobium dulce.—The Korukapuli is a native of tropical America but is found in many parts of India either as a hedge plant or avenue tree and often run wild. In Madras it is seen in the districts of the plains.

When allowed to grow it reaches the size of a good sized tree. The leaves are bi-pinnate, each pinna being provided with one pair of leaflets and stipulate, stipules being transformed into spines. The leaflets are oblong and entire.

The flowers are borne in heads on elongated terminal panicles and are hermaphrodite with minute bracts and bracteoles. The gamosepalous calyx is greenish in colour with 5 teeth. The corolla is also greenish, gamopetalous with 5 valvate lobes. The stamens are indefinite in number and are monadelphous and much exserted with small anthers. The ovary is many ovuled with a filiform style. The pod is twisted and coriaceous and the seeds are provided with a white or pinkish out-growth called aril.

The plants when grown thick form a strong fence and are used often for this purpose. The aril is much relished by the poorer people and is consumed in the ripe stage. The pods and leaves supply fodder for cattle and goats. The wood is used as fuel.

EXTRACTS.

Principles and Promise of the Co-operative Movement*

BY K. T. PAUL, O. B. E.

Preamble.—We have come together to celebrate the continued prosperity of a great world-wide Movement. We are proud to realise not merely that this movement has spread over the wide world but even more that its universal success is due to the spontaneous response of many nations who constitute the one Human Family. We recognise in the fact that this movement holds certain secrets which are fundamental to human nature in that aspect of it which makes for human society. We realise in this phenomenon that Man has after all arrived at the discovery of a method which is so normally constructive that all previous methods of social relationship and social organisation are shown up as defective—as holding, in a real measure, elements of conflict and eventual destruction. Therefore it seems to be appropriate that, on this occasion, I should refrain from entering into any of the problems which attend the practical application of the co-operative method and venture to set out the ethical values of co-operative movement. The practical problems are numerous—even the most outstanding of them; and they are being dealt with all the time in the Press and on the Platform. Some of them will be dealt with on this occasion by others who are competent to speak on them with authority and experience. To me the obvious duty is to lift before you at the outset the radiant splendour of the inner spiritual secrets of what is one of the most divine things with which it is our privilege to be associated.

Fundamentally an Ethical Movement.—Here in South India our introduction to this movement has been in close connection with money. But we have not needed a long acquaintance with the movement to realise that instead of it being soiled by filthy lucre, it in its turn proves to be the magic which turns finance into a missionary enterprise and a business into a benefaction. It was no unmeaning rhetoric when the late Justice Sadasiva Ayyar said, "Co-operation is Religion." With his

*Presidential address at the Celebration of the International Co-operator's Day in Madras City on July 7, 1928.—with acknowledgements to the Young Men of India for August.

incisive discernment he looked below cash and credit, beneath purchase and sale, underneath production and distribution, and saw that in this matter the human genius had reached to the secret springs of all true social instincts. Hitherto the social experiments had been based on surface channels whose muddy waters meandered in shallow beds which were frequently choked up with selfishness and personal greed. But now the springs far beneath have been reached, and thence the waters are gushing forth in creative purity.

Cooperation vs Competition.—The significance of this can be more strikingly perceived if we contemplate the alternative to Cooperation. What has been the alternative to Cooperation in all the nations, both East and West? It is Competition. Contrast the one with the other. Cooperation is "Each for All and All for Each." Competition is "Self for Self and the rest for Self." Competition *qua* competition can have no contribution to any who are unequal in the race, those who fall behind in the race, as it progresses. Competition has no room nor time for the weak or the underprivileged, and it assumes that they must, sooner or later, go to the wall. Generosity, humanity, philanthropy do come in as remedial measures. But Competition, even at its best, is only required by public opinion to observe certain negative qualities: it is expected to refrain from unfair methods in the race and in the use of the Rest for the advantage of Self. At its worst, Competition is no other than self-aggrandizement at the expense of everything that can be brought under use.

The value of Competition.—We are not forgetting that Competition also does hold certain ethical features which are of undoubted value to the Individual and in some measure also to the Group. Competition is also based on certain fundamental human instincts which are healthy and creative, such as the desire to excel and the desire to please. Much of what is precious in human nature usually comes into play through these instincts and desires. But at the same time Competition is related to certain other instincts and desires which are destructive and unsocial. And we do claim that Cooperation is based on yet other human instincts and desires, equally fundamental, but of far higher ethical values, for they are out of all comparison more constructive in their social potency.

Nature Red in Tooth and Claw.—It is sometimes alleged that the evolution of species has been worked out by heartless Nature under a relentless law of Competition. Nothing can be more unscientific and untrue. Under any such process it is impossible to conceive the evolution of group-life among beasts or men and much less the evolution of anything in Man that we call higher and finer in his nature. Every inner instinct which now impels or enables man and woman to do or to think above self-interest and self-gratification is indicative of certain processes which have through long ages operated in all sentient creatures sublimating self and lifting it constantly to that plane where it could find its best satisfaction when it does something for others and sees others happy. What is there greater in human achievement than Motherhood? Not all the achievements of Napoleon can be said really to excel the self-giving of the simplest village mother in Corsica where he was born. And this which is the divinest in Man has its roots in the earliest of species which first came on the scene millions of years ago. Each of these species, as the ages rolled onward, have struggled and suffered, lost and won, in a great never-ending war between self-taking and self-giving. The record has been one of victories and defeats all along the line and in every stage of the process. It is these victories of self-giving over self-taking that have in due time brought into being this marvellous crown of the whole process—Man—who is so essentially a social and spiritual personality that he could never find himself unless he gets out of himself and reaches out to help misery and wretchedness on the one hand and to the sublime and beautiful on the other.

Self-taking in terms of Self-giving.—But this interminable war between self-giving and self-taking which has brought the great species into being and ennobled them in ever higher degree from stage to stage was not a simple process even among the simplest of species. It was and it is never a straight issue between self-giving and self-taking. The secret is deeper. It is a fight to understand that there is no real self-taking except in terms of self-giving, and it is a fight to practise that principle in every-day activity. Nothing less than such a discernment operating almost automatically as an instinct ensures the continuance and even more the quality of the group and of the individual,—both *at the* *same time.* That individual attains nearest to perfection who most habitually does his taking in terms of giving , that group race or species attains nearest to perfection which has the largest number of such individuals. If the individuals who give never take, that would mean the suicide of all the best individuals and eventually of the group. If the individuals who took never gave, that would mean a few vampires for whom all the rest live, and eventually it will be just one super-vampire and such a degradation of the rest that the whole group is laid at the mercy of any other group which has pursued a better course. These are no theories. We are quite familiar with a state of affairs which in its extreme form was illustrated when a crate of snakes were sent from South America to the London Zoo. The number of snakes consigned were over a dozen. When the crate was opened in London, there was just one huge reptile which had swallowed all the other snakes and had also eaten up every particle of the food which the caretaker had been rationing out every day for the whole lot. Which of us have contemplated with equanimity the phenomenon of the Steel Magnate or the Oil King or the Super-Trust that is thrown up by modern industrialism ?. Mass production on a gigantic scale when it is worked out on the competition method implies the aggregation of wealth in the hands of a few toward which an ever increasing number of human creatures contribute their powers to the utmost possibility. We have also seen in our own day the eventual collapse of not a few of such monopolies, whether they are based on class or caste, on capital or birth. The most tragic of such collapses is, of course, Russia where a continental population was thrown for a decade into the devastations of anarchy. Is it not significant that in that universal ruin of everything in Russia the one really steadying agency has been the Cooperatives?. The one challenge which Moscow has found it necessary to deal with and finally to accommodate has come in steady silence from the farmers, and to the farmers the one source of strength is the Cooperative Movement.

He that Loseth his life shall save it and he that saveth his life shall lose it. Consider for a moment those parodoxes wherewith the Great Teacher revealed some of the verities of Human Personality. "He that loseth his life shall save it." said He, and He did not hesitate to lay down the opposite which goes even farther—

"He that saveth his life shall lose it.'. To elucidate these great truths He used certain homely illustrations "Ye are the salt of the earth" was one of them. Every man, woman and child anywhere in the world knows the properties of salt. It gives taste and zest to every kind of food, and what is more, it is the one universal agency to preserve what will otherwise rot and decompose. These are very great qualities. Salt brings out what is the essential savour of other things; and salt saves everything into which it enters from destruction. But it does all this at the expense of itself. Imagine *rasam* without salt. It is entirely insipid, no matter how many other ingredients you put into it. Put in a pinch of salt and the savour of all other things in the *rasam* are immediately brought out. But where is the salt which has worked this miracle? It is still there, but it is no longer by itself. It is now in the *rasam*, part and parcel of it, finding its own fulfilment by enabling the other things to express themselves in their own best qualities. So also consider what happens to a lime fruit or a mango when left alone. It rots and becomes unfit for man or beast. Let salt have a chance with it and the fruit is preserved for years and becomes excellent food for kings. But the salt which saved the fruit from death, has done it by losing itself. The salt is not lost; it is where its glory is to be, in the very heart and substance of what it has saved. Another pregnant parable was used by the Master when he said, "Ye are the Light of the World." Here again is the appeal to a thing that is perfectly familiar to every human being, however humble in life and circumstances. Be it a palace or hut, be it a great city avenue or a crooked village lane, the darkness of night is dispelled not by any elaborate processes but by the simple device of lighting a lamp. One match is struck and the darkness of the whole area is instantly dispelled. But a light is of little use unless it keeps going and so the light which is working this wonder is all the time burning itself out. The wick must be trimmed and the oil replenished, or in modern conditions, the battery must be recharged constantly, for the light is a process of self-giving on the part of the thing which is giving light. Here again the fulfilment of the very purpose of existence and the glory of it all is in the fact of losing one's separate entity in the service of the world. This same truth the Master carried forward into its fuller and deeper significance in the famous parable of the Vine. "I am the Vine and ye are the branches" was His message. The Vine does not live unto itself; it exists for others It bears fruits not in its stem but in its branches: and the branches cannot bear fruit except when they abide in the stem. Such an interdependence is indispensable for fruit bearing. Again the peculiarity of the Vine is that it is relentlessly cut down almost to its roots every single season. It has to give up its glory and its possessions year after year. And because of that treatment it comes out in greater glory and in more abundant possession of branches every spring. And in all its limbs its life-blood courses bodying itself in luscious grapes which is most wonderful to see and most delicious to eat. But all that beauty and sustenance are forthwith given away. They are not for the Vine or its branches; they are meant to be consumed, to be enjoyed and assimilated by others. And so in many another imagery the Master reiterated this Law of Life ever bringing out a fresh aspect of its application.

Reproduced from "Young Men of India" August, 28 Vol. 40 No. 8

(To be continued).

Chinese Agriculture and its Lessons for India.

By Dr. K. Kunhi Kannan, M. A., Ph. D.

The achievements of Scientific Agriculture in the West are of such magnitude that we in India are apt to look to the West almost exclusively for inspiration and guidance in the matter of improvement of our Agriculture. While this attitude is for the most part justified there are other directions also to which we may turn with advantage. Agriculture in the Far East has important analogies with that of India not only because in the Far East as well as in India Agriculture dates back forty centuries but also because the pressure on land in India, if it has not already reached, is likely to reach before long the same degree it has in China and Japan. It is true that even these countries look to the West for development of their agriculture on scientific lines, but investigations have shown that the essential principles of many a discovery of agricultural science have been grouped very early in China and an unfailing practice built upon them. Indeed in certain departments it is the West that has to learn from China and Japan more than these centuries have to learn from them.

For all the scientific agriculture in the West, the people there have not been subject to the necessity of practising the same severe economies which overgrown populations have to practise in tilling their land. European countries have had vast areas and the pressure on land has not reached anything like the level it has reached in the Far East. Human labour in European colonies being far short of the requirements of boundless tracts of virgin land the settlers have had to make good the deficiency by the invention of agricultural machinery which has made for extensive rather than intensive farming. Industrial opportunities being no less there has been a development as great in that field and the action and re-action between the two has resulted in a marked increase in the standard of equipment, in facilities of transport and organisation and in the application of scientific processes to agriculture which are adopted with difficulty in countries whose populations are rural and where small holdings predominate. The application of machinery and science to agriculture is more a result than a cause of extensive farming and large scale production. For farming on a small scale the methods and equipment of scientific agriculture have to be modified and investigations have shown that farm equipment and machinery tend to exceed the requirements of holdings progressively with decrease in their size.

Without in any way disparaging the value of science in Agriculture, the fact has therefore to be admitted that the application of one to the other in over-populated countries has to proceed on lines which have regard to the vast supplies of human labour, to the absence of adquate capital for investment among small farmers who usually form the bulk of the agricultural population in these countries. Viewed from this standpoint, Far Estern Agriculture has lessons not only to India, which presents much the same conditions as China and Japan as regards the main features of agriculture, but also to the West, where a century or two hence the same conditions may be reproduced.

The most striking feature of Far Eastern Agriculture is the utilisation of waste of every description to maintain soil fertility. The use of human excreta as a soil fertiliser is a special feature of the agriculture of Mongolian Races. An analysis of night soil has shown that for every 2000 pounds of it there are 12·7 pounds of nitrogen, 4 lb. of potassium and 1·7 pounds of phosphorous. On the basis of an average of 40 oz. of excreta for the adult, the average annual production per million of adult population is

57,94,300 lb. of nitrogen, 18,25,000 pounds of potassium and 7,75,000 pounds of phosphorous carried in 4,56,250 tons of excrta. In Japan the annual output was estimated some years ago at 24 million tons.

Fully to realise the importance of this practice one has to consider the gradual depletion of soil fertility in America in lands which have been barely 100 years under the plough in spite of the use of costly mineral fertiliser while by elaborate and expensive methods as hydraulic sewage the human excreta is swept into rivers and the sea. The double wastage involved in the western method stands further condemned by the recent advances made in Bacteriology which indicate that foecal matter and human refuse are best destroyed by returning them to a clean soil.

Besides the human excreta, both the Chinese and the Japanese use composts on an extensive scale into the composition of which enter every form of suitable silt from canal beds, green manure collected from forests and green manure specially grown for the purpose. The dressing of canal mud applied to the fields which may be as much as 2 to 70 tons per acre helps to prevent the growth of weeds and the silting up of beds in the canals. In the neighbourhood of villages the reverse process may take place, of soil from the fields being thrown into the canals, of course to be taken back as soon as it has absorbed in sufficient quantity the minerals dissolved in the water. The silt is not the only earth that goes back to the soil in the fields. Even the earth from the floor of houses is removed from time to time as soon as a sufficient amount to nitrification has taken place in it. For an equally good reason the bricks used for chimneys are replaced and the old ones broken up and thrown into compost pits. An exchange of soil between mulberry and rice fields is considered to be of mutual advantage to the crops and is effected in most parts of China.

Apart from these economies, the Chinese and Japanese have so well adapted their methods to the climate and soil that they are able to take no less than four crops during the year and as many as three of them may be found at the same time in the same field, one near maturity, another in the seedling stage and the third in the stage when its demands on the soil are at their maximum. Almost invariably two crops are taken from the rice fields, the system of transplanting universally adopted giving more time for the maturing of winter crops. The use of green manure grown

as a crop in the field or brought from mountain slopes is a very old practice in the Far East as it is in India, and it helps to restore to the soil the nitrogen removed by the crops. These are among the more important features of Agriculture in the Far East. It will have been observed that a number of these are shared in common by Indian Agriculture. The use of human excreta as a fertiliser is not unknown in India, the silt from tank beds is taken to enrich the soil in the fields. So is green manure grown. But these features are confined to certain tracts and have not extended to others where conditions are by no means against the employment of these methods. While this is in part to be explained by caste or social prejudices and conservatism, there is reason to believe that the fondness to imitate practices adopted in Western countries has arrested the spread of useful practical methods better adapted to Indian conditions. At any rate the costly method of sewage disposal adopted in large towns in India and the preferential use of commercial fertilisers in imitation of the West have not had a little to do with the increasing aversion to the employment of foecal matter for the purpose of restoring soil fertility.

Full allwance being made for features which are common to India and the Far East however, the Mongolian races are still ahead of Indians in regard to the attention and care they bestow on the crops, in the yields they secure per acre and in the yields they secure per acre and in the correct adjustment of crops to soil and soil to crops. In these as in many others India would do well to imitate Far Eastern rather than Western methods.

It may seem a strange advice to give. We are so impressed by the work on a large farm of several hundred acres in the West by the machinery employed for various operations by its electric lights, sewage disposal, by the large ploughs and tractors and sowing and harvesting machines. But cut up that farm into holdings of a few acres, imagine each has to support a large family and the ploughs and tractors and the sowing and threshing and harvesting machines look impossible and we turn more kindly to the simpler devices of the Chinese farmer perhaps slower in work and cruder to the eye but capable of utilising the human labour of which there is always a surplus. Then, too, we appreciate better the severe economy he practises, his careful almost religious utilisation of all waste and his patient and painstaking methods of tending his crop.

It is by no means suggested that Science has no place *in petite culture*. In the control of posts and diseases and in the creation of new varieties of crops, Science has for the first time laid down lines of advance which the East as well as the West may follow. But in Agriculture proper, the methods and practices of the Far East embody the experience of 40 centuries and may not without causing serious dislocation be replaced by those of the West with its vast resources of capital and virgin land and limited population. To India at any rate, which is fast reproducing the very conditions of overgrown populations and limited land which China and Japan have had to face, their methods and practices have lessons which it would be foolish to neglect or to ignore.

(*The Madras Mail—September 15*). G. N. R.

How to check decimation of the Countrysideby Malaria An example from Egypt.

In December last, the great Irrigation Engineer, Sir William Willcocks, delivered at Cairo a lecture entitled, "Why is cultivated Egypt Immune from Mafaria?", and any new information on such subject must obviously be of interest to Malaria-stricken India. If there is a country which by reason of its climatic and other conditions should be eaten up by malaria, it might well be thought that it would be Egypt. Yet the cultivated Nile valley from Aswan to the Mediterranean is immune. There are places on the edge of the cultivation like Ismailia and the Khanka desert farm where malaria occurs but they are not cultivated Egypt. It was shortly after the construction of the sweet water canal to Ismailia that marshes formed in the depressions northeast of the town, and Ismailia was decimated by malaria. It was after some years of irrigation at the Khanka farm that clear seepage water showed itself in the low-lying land, and there was a severe out break of malaria. There is nothing in the climate or physical conditions of Egypt to keep the scourge in check, it can be as bad in Egypt as anywhere else where the conditions are favourable to mosquito life, but there is no malaria in cultivated Egypt. Sir William Willcocks says that during all the long years he slept in a tent or in the open between rice fields, surrounded by marshes, and travelled about the delta on foot or in a boat, he never had a touch of fever. It was not that he was himself immune, he wen to Grece to report on the reclamations of Lake Copais and in spit of every form of screened protection he suffered badly, he suffere

in other places but not in Egypt. Neither he nor the men who accompanied him on his tours contracted the disease, nor did they ever see anyone with it.

In these circumstances Sir William had with no success tried for years to solve the problem of the immunity of Egypt from malaria. But a comparatively few months ago, Dr. Bateman of the old Cairo hospital, read him some extracts from Dr.d'Herelle's work, "Immunity in natural infectious diseases", in which he gave reasons for the immunity from malaria of certain districts in the Argentine and reclaimed areas in Holland and Dr. Bateman added " It is our clover which protects us ". He then went to Mr. Gray, Director of the Chemical laboratory of the Ministry of of Agriculture, and consulted him. Mr. Gray replied that on the face of it, it was clover. With this clue, Sir William carried his studies further. Egypt has, in a wild or cultivated forn. a wealth of clover and leguminous plants. All over the irrigated areas, ideal breeding grounds for mosquitoes exist, throughout the year where there are swamps, stagnant pools, sluggish drains, there are also the clover fields "like sentinels over the health of the perennially irrigated delta," and in addition to the clover there are extensive areas of legumes, beans, lentils, lupins, fenugreek, chickpeas (Indian gram) and ordinary peas with a strong contingent of wild clovers, vetches and peas. Countries which are neighbours of Egypt, have poor leguminous crops and have been plagued with malaria from time immemorial. Alenxandar the Great died of malaria while trying to reclaim the marshes of Babylonia; during thc war, our men suffered in Palestine, Salonica and elsewhere; but apparently from the earliest antiquity, Egypt has been protected by its wealth of leguminous crops especially of clover. There is every opportunity for the malaria mosquito to propagate malaria and there is no malaria. In Dr. Herelle's book it is said that the greater part of the Argentine is completely free from malaria though mosquitoes abound and in all the free regions there is a wilds cented clover, on the juice of which containing *coumarin* malaria mosquitoes feed; and the author suggests that *coumarin* may play a role in the insect comparable to that which quinine plays in man. The mosquitoes which cause malaria in man are carriers of malaria, to give malaria they must have malaria to carry and if they are themselves free from malaria their bites cannot induce the disease. There would therefore appear to be something in the leguminous plants, particularly in certain kinds of clover, which makes mosquitoes immune.

If that is the case in Egypt, there would seem to be no reason y appropriate action should not be taken elsewhere. The dition of different countries vary, but there is a very wild range :lovers and leguminous crops and it should be possible by experints to select suitable leguminous plants for the purpose in view. identally, clover has other values, it is not cultivated in Egypt ensibly to stamp out malaria. it is a valuble fodder crop for le, and in Egypt and Uganda it is alternated with an exhaus- crop like cotton in order to maintain the yield. Sir William lcocks concluded his lecture with the words " It would pay any aria ridden country to write to Washington and get informa- from people who have first hand information and are ready to it, to buy the hardy sweet clover from local seedsmen in the stern States and begin operations in suitable gardens and series; to send specialists to collect the seeds of the "trebol de " and local clovers in the Argentine; to get the wild clovers ch grow under lupins and in the open in Northern Europe Southern Egypt; to get the seed of the fodder crops in pt and to get coumarin beans and seeds from Guiana and zil and plant them. . . . Malaria is such a terrible curse its suppression over the face of any country by changing gnant malaria mosquitoes into benign ones would be such a sing that no one responsible for regions where malarial fevers the common heritage of the people should find it possible to en plate cultivated Egypt's immunity from malaria and shrug houlders and do nothing." It is only very briefly that Sir Wiliam lcock's presentation of his case has been given here, the whole ir merits the attention of the authorities in India, and it is id that the notice of the medical officers and agricultural irts will be drawn to it.

(From Indian Engineering—28th January 1928).

NOTES.

The kinema in Engineering.-Apart from its use as an attractive means of advertisement the kinema has found a use, although a somewhat limited one, as a method of investigating the motions of mechanism at high speeds, and also as an aid to the motion study of workers performing definite operations. For the study of mechanism at high speeds the kinema offers advantages over the strobostic method of examination, as a permanent record is obtained which can be repeatedly examined and can be filed away for comparison with other records obtained at a later date. Of course, when used in this connection, the so-called " slow-motion" film is employed. The ordinary film conforming to this designation is taken at about 160 exposures per second, but shown at the usual speed of 16 per second; but for the examination of very high-speed machinery a much more rapid rate of exposure is necessary. In this connection interest has been aroused by the introduction of a camera by which photographs can be taken at rates upto 3000 exposures per second. In describing this "chromoteine" camera at a recent meeting of the Society of Automotive Engineers, Mr. C. F. Jenkins explained that the film is moved continuonsly past a permanently open shutter, the individual views being obtained by a series of matched lenses mounted in a large rotating disc moving between the shutter and the film. As no time is lost due to the closing of the shutter, the exposures are relatively longer than those obtained with the normal apparatus, while it is stated that it is even possible slightly to merge one view into the next.

(The Mechanical world and Engineering Record, August 31, 1928.)

Y. R. R.

X-Rays and eggs:—A news item is at hand which tells of the work of Dr. William H. Deffenbach of the Flower Hospital, New York, in producing female chicks only from hatching eggs that were treated with X-rays. One explanation suggested by scientists is that the powerful rays succeeded eventually in destroying the male producing chromosome with in the fertilised egg. This sounds like additional proof that the female is hardier than the male.

He has been experimenting along this line for the last 3 years and has produced chicks with marked peculiarities. Exposures to the X-rays up to several hours have produced chicks with deformities, such as the absence of wings.

(From the Philippine Agriculturist, Sept. 1928.)

Y. R. R.

Nonfood uses of Sugar:—"Facts about Sugar" June 16, 1928 quotes B. Ptacok as referring to innumerable nonfood uses to which sugar is put. Chief among them are:—as a solvent for phosphorous containing calcium carbonate; for deliming hides; as a binder for Chinese cement and lustrous Plaster of Paris; as a raw material for an explosive; as a filler in shoe polishes and transparent soaps; in the fabrication of sugar centon and artificial diamonds; in copying ink; in tanning and dyeing; in the silvering of glass; in the manufacture of alcohol and various organic acids; illuminating and heating gas, artificial silk and vanillin and in the paper industry.

Y. R. R.

Unmerited Slur:—The idea of bringing together a group of experts each to present his general experience without too much detail has attracted attention in recent years, and the result will be a summary that will help the agricultural lecturer to keep up to date. It has long been a reproach that lecturers in agriculture have usually lagged behind the times and have not been modified by the progress made either in research institutes or by the body of workers who are studying cost accounts. In extenuation it must be recoginsed that a lecturer would have an almost impossible task if he tried to keep pace with the great output of agricultural literature. Summaries are therefore essential and should be invariably resorted to.

Over-production of Sugar:—The sugar industry in its economic aspect as the International Sugar Journal says, is in the melting pot just now. Cuba seems to be the worst sufferer having in stock a large surplus. The Cuban government is said to be trying to arrange a conference of sugar producers of the world in Paris under Colonel Tarafa and effect an agreement to curtail production for the next year or two. Whether it succeds or not, we may rest assured that the price of sugar in India is bound to go down as Cuba will be forced to find new markets in British India and the far East, for her huge surplus.

Cuba and Java:—**Cuba is the greatest sugar exporter and it is only by the sugar trade that the people and the state exist but the cost of production is comparatively high. Java is the second largest exporter but here the cost of production is lowest. This is due to the great advance made in cultivation and production of sugar and to availability of cheap native labour.**

Sugar from Jerusalem Artichokes:—**It is said that sugar made from this crop is superior to ordinary granulated sugar. The plant grows well even in poor soils and easily gives more than 20 tons of tubers per acre. Besides producing sugar, it is said that the tubers can be used for making "artichoke flakes" dried fruit and can also be pickled or converted into flour.**

S. V. D.

New Guinea:—**Papua is reported to grow a large number of sugarcane varieties and by exploring the country in an aeroplane Dr. E. W. Brandes of the U. S. Department of Agriculture was, according to "Facts about sugar" able to collect as many as 167 kinds; with a view to find out if amongst them there are any which are resistant to damage by mosaic and it is interesting to note that of them one-a hard straight cane grows to a height of nearly 33 feet and is said to be a new species. In this connection we may state that Mr. D. Balakrishnamurthi Garu several years ago collected-one cane from Katravulapalli East Godavari district which was over 28 feet and this was a thick cane.**

K. K. Rao.

Rat prevention:—**From the Bulletin of Miscellaneous. Information Kew No. 9 of 1928 it is understood that the Wasakuma tribe in the Shinyanga district, Tanganiyika territory store their food stuffs as millet and maize in large Lindos or circular grain stores made from *mtama* stalks or long grass plastered with cow-dung and built either inside the houses or under a separate roof. The Lindos are raised 2 or 3 feet from the ground on stones and vary in size according to the wealth in grain of the owner.**

Over the top of the grain in the open mouths of the Lindos are placed dry spikes of *Setaria Verticilla P. Beauv* which is called Makalamatta or in the Swahili language Marramatta. This very effectively prevents rats from gaining access, as the bristly spikes of the grass fix themselves to the fur of the rats and create an irritating sensation.

In the Madras presidency also grains are stored in a similar way but the use of Setaria Verticillata is not known. We have however seen zizyphus and other thorns replacing this plant.

S. S.

Purity of milk in the United Kingdom.—The consumption of milk per head of population is less than half a pint per day and is considered to be too low. This relatively low consumption is said to be due to lack of confidence in the purity of milk obtained. But the Ministery of Health states that in 1921, no less than 25 per cent of the samples of milk contained tubercular bacilli, in 1925, only 2·4 per cent. and in 1227 not a single sample contained tubercular bacilli. This is remarkable indeed and indicates the efficiency of the Health department in this line.

Dairy utensils:—During the last Dairy Congress, it was stated that the best metals to be used in the dairy equipment were superascoloy (chromium nickel steel), tin and nickel, while tinned iron, iron and zinc were placed last on the list.

Mammoth Dairy Laboratory:—It is stated that a German Dairy Company deals with 40 to 50 thousand gallons of milk daily and has a laboratory staff consisting of a chief, two doctors, six laboratory workers in the chemical and bacteriological departments three samplers in the dairy and three others in the country,

Future of Fertilizers:—F. G. Cottrell speaking before the National Fertilizers Association of America, points out that ere long artificial nitrogenous manures produced synthetically from atmospheric nitrogen will become so cheap as to control the prices of the Chilean Nitrates in the market.

Back to their dear Home:—Mr. A. M. Richards, Lecturer in Animal Hygiene and Officer in charge of the hospital attached to the College went home to Jaffna on twenty-seven. months' leave preparatory to retirement. Mr. Richards is a graduate of the Bombay Veterinary College and has been Lecturer at the Agricultural College for ten years. Prior to coming to Coimbatore, he had worked in several places, chiefly in Madras, South Kanara, Nilghiris, and Trichinopoly.. Mr. and Mrs. Richards and children endeared themselves to the residents of the estate so much that the parting was accompanined by more than a conventional regret. The happy family were entertained by the whole estate and for several days by different sections of the residents. Friends felt sure that Mr. Richards' departure would be long remembered here and his determination to continue to spend the remaining years of his life in farming in which he had made a beginning even while in service will secure sufficient recompense. We hope that his connection with Madras will not cease as Mr. Richards himself has a number of friends out here and his son is a student for the London B. Sc. in Agriculture and may follow his father's career in the mainland.

The late Rajah of Ramnad:—On the 6th of August passed away at Ramnad, one of our patrons in the person of Sri Muthuramalinga Sethupathi after an illness of over ten weeks. The late rajah was an enlightened zamindar and a worthy son of an erudite father. He was a progressive nationalist, conservative by temperament and bold in action. As the President of the Tamil University Committee he did immense service to the Tamil land. We offer our condolences to his sons and hope that they will follow the path of righteousness and secure for the Zamin its rightful place amongst the landed estates in the southern country.

DEPARTMENTAL NOTIFICATIONS.

GAZETTED APPOINTMENTS:—Mr. R. Chockalingam Pillai, Upper Subordinate, is appointed as Assistant Cotton Specialist, Coimbatore on probation; Mr. S. Sitarama Patrudu is confirmed as Assistant Director of Agriculture.

NON-GAZETTED:—*Promotions, appointments, transfers etc.*—Mr. N. Krishna Menon, assistant, V grade from 1st September. The following promotions are ordered with effect from 15th September:—Mr. Jogi Raju from II grade to I grade; Mr. V. S. Narayanaswami Ayyar from III grade to II grade; Mr. E. Kunhappa Nambiyar from IV grade to III grade and Mr. K. Govindan Nambiyar from V grade to IV grade. Mr. M. C. Krishnaswami Sarma, assistant demonstrator, transferred from IV circle to VIII circle; Mr. V.K. Kunhunni Nambiyar demonstrator, to Taliparamba agricultural Station; Mr. A. P. Balakrishna Menon, demonstrator, from Palghat to Ponnani; Mr. Kunhikoran Nambiyar to Palghat for district work.

Leave:—

FIRST CIRCLE:—Mr. D. Bapayya, manager, L. A. P. for one month from 8th September; Mr. D. Panakala Rao, demonstrator, L. A. P. on medical certificate for 3 motnhs from date of relief.

SECOND CIRCLE:—Y. Venkatesa Rao, assistant demonstrator, L. A. P. for one month from 28th September.

THIRD CIRCLE:—Mr. A. Krishnaswamy Ayyar, demonstrator, extension L. A. P. for 15 days from 31st August.

SIXTH CIRCLE:—Mr. P. R. Subramanya Ayya, assistant demonstrator, extension of L. A. P. on medical certificate for 3 months from 15th; Mr. S. Bhima Raju, assistant demonstrator, L. A. P. on medical certificate for 2 months from date of relief.

SEVENTH CIRCLE:—Mr. A. Gopalan Nayar, demonstrator, L. A. P. for 3 weeks from 10th September. Mr. V. K. Kunhunni Nambiyar, demonstrator, L. A. P. for one month from 18th September.

EIGHTH CIRCLE:—Mr. V. S Ramaswami Ayyar, demonstrater, L.A.P. for 2 months from date of relief; Mr. D. S. Subramanya Ayyar, assistant demonstrator, L.A.P. on medical certificate for 15 days from 30th August. Mr. M. C. Krishnaswami Sarma, assistant demonstrator, L. A. P. on medical certificate for 6 weeks from 7th September.

LIVE STOCK:—Mr. M. V. Narasimha Sastri demonstrator extension of L.A.P. for 11 days.

PRINCIPAL'S SECTION:—Mr. A.M. Richards, Veterinary Assistant Surgeon, Coimbatore combined leave for two years, two months and eleven days preparatory to retirement; Mr.G.Krishnaswami Mudaliar is posted to the hospital from 1st September. Mr. K. K. Raghavan, Manager L. A. P. for 28 days from 6th September.

P. S's SECTION:—Mr. S. Jobitha Râj assistant L.A.P. for 28 days from 8th.

G.M's SECTION:—Mr. P. Vishnu Jomayajulu assistant L.A.P. for 17 days from 3rd September.

G. S. B's SECTION:—Mr. M. Ratnavelu sub assistant, L.A.P. for 6 days from 24th September.

G. A. C's SECTION:—Mr. T. S. Ramasubramanya Ayyar, assistant, extension of L A.P. for one month from 2nd September. Mr. M.R.Balakrishnan, assistant, L.A.P. for one month and 6 days from 2nd August and L.A.P. on medical certificate for 4 months in continuation.

NOTE.—L. A. P. means Leave on Average Pay.

The Ramasastrulu-Munagala Prize 1929.

1. The Prize will be awarded in July 1929.

2. The Prize will be in the form of a Medal and will be awarded to the member of the Union who submits the best account, of original research or enquiry, carried out by him on any agricultural subject.

3. The subject matter shall not exceed in length twelve foolscap pages type-written on one side.

4. Intending competitors should notify the Secretary of the Madras Agricultural Students' Union not later than the 15th May the subject of the paper which they propose to submit and the paper should be sent in so as to reach the Secretary, Madras Agricultural Students' Union not later than the 1st June 1929, with a covering letter showing full name and address of the sender. The author's name should not be shown on the paper which should be entered under a *nom-de-plume.*

5. Four type written copies of the essays should be sent in.

6. The name of the successful competitor will be announced and the prize awarded at the time of the Conference.

7. The Union reserves to itself the right of publishing all or any of thepapers.

8. All references in the paper to published books, reports or papers by other workers must be acknowledged.

9. Papers submitted will become the property of the Union.

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

OFFICE-BEARERS FOR 1927—28.

The Council (25 Members.)

President.

President (Ex-officio) Principal—C. Tadulingam F. L. S

Vice-Presidents (4)

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Mofussil:—C. Ramaswami Nayadu, Guntur.
,, K. T. Alwa, Bellary.
,, G. Rajagopala Nayadu, Periapalayam.
,, K. Unnikrishna Menon, Tellicherry.

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,, U. Vittal Rao ,,
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,, C. S. Namasivayam Pillai, (Usilampatti.)
,, M. U. Vellodi, (Nileshwar).
,, V. S. Narayanaswami Ayyar (Salem)
,, V. G. Dhanakoti Raju, (Hosur.)
,, K. G. S. Bhandari (Ootacamund).
,, T. Paramanandam, (Anakapalle.)

Working Committee (14 Members).

The resident Vice-President and the ten resident members with the following student members form the Working Committee.

Student-Members (3)

C. Annamalai of class III
Kerala Varma ,, II
K. Venugopal ,, I

AUDITORS:—S. N. Venkataramanan.
C. V. Sankaranarayanan.

Editorial Board (as per resolution passed in July).

T. V. Rajagopalachari.
M. C. Cherian.
V. Muthuswami Ayyar,
P. N. Krishnan.
G. Renga Rao (Student)
S. V. Duraisami Ayyar

...ting Works, Tower Building, Coimbatore.