

Journal of the Madras Agricultural
Students Union.

Vol. 16. No. 7. July 1928.



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Vol. XVI. **THE JOURNAL** No. 7

OF THE MADRAS AGRICULTURAL STUDENTS' UNION

REGD. NO. M. 158-2015

JULY 1928

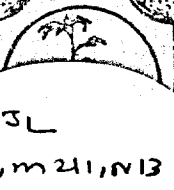
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The Madras Agl. Students' Union,
Agricultural College,
Lawley Road P O,
9-10-1928 COIMBATORE.


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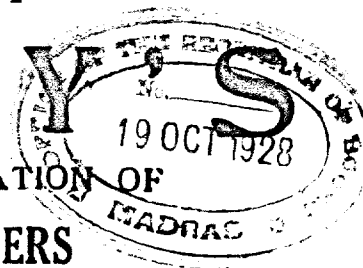
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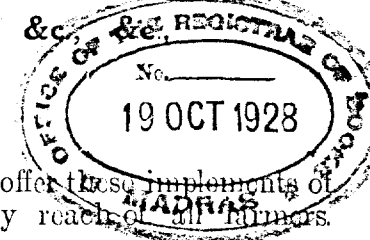


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farming will never be a success unless the farmer
had more voice in the disposal of
his produce—P. Morrel.

THE JOURNAL OF The Madras Agricultural Students' Union.

Vol. XVI] JULY 1928. [No. 7.

EDITORIAL.

The Report of the Royal Commission on Agriculture:—
The report of the Linlithgow Commission has just been published. It is a very bulky volume covering a wide field. By its magnitude and the wealth of details it has marshalled this report stands unique amongst similar documents issued in this country during the last few years.

In many quarters its publication has been hailed with all glee while politicians of one or two schools of thought have mostly characterised it as unsatisfactory and not helpful in the solution of pressing rural problems.

These apart, one has to consider the viewpoint of the cultivator and we regret to have to note that the majority of critics of the report have ignored his existence.

There is no gainsaying the fact that he is laboring under most adverse conditions. It matters little to him what duties have been assigned to this department or that, whether agriculture is a transferred or a central subject, whether research is conducted at Pusa, Poona or Periapalayam, or whether orders emanate from Whitehall, Delhi or Madras. He wishes to be left in peaceful possession of such portion of the fruits of his labour as will keep him and his family above want.

Whereever this is guaranteed, he conducts himself like any other member of the community and an emphasis on this human element in a ryot's character is what distinguishes the report and compels admiration for the authors.

Most of the recommendations are capable of very wide application in order to yield useful results but need the whole-hearted support of the Governments and the willing co-operation of both the Governments and the communities.

We are sure that a calm and cool survey of the recommendations will disclose to any one the urgent nature of the reforms needed in Indian-Agricultural methods if this country has to save itself from ruin and we propose to deal with important issues as occasion arises.

The College day and Conference :—Special importance attaches to this year's celebrations of the College Day and Conference in that they were held in the immediate wake of the publication of the Linlithgow report and that His Excellency Viscount Goschen was able and graciously pleased to preside on the Opening Session.

Nature was also partial, no inclement weather was experienced the whole week nor were the guests and visitors few. The number of papers given was large and the discussions on each were very friendly and informing.

A notable deviation from the usual procedure was in the giving of a symposium on paddy, the agriculturist, the breeder, the chemist and the plant doctors attacking the problem each from his own point of view.

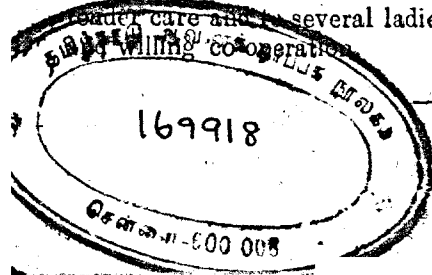
This opportunity was also availed of by officers of the "Nitrams" Limited to be present and take part in the discussions.

Sports and entertainments as usual formed a very prominent feature. Prizes were kindly given away by Mrs. Anstead and the Director himself spent a most strenuous time during the whole week in presiding over the second and third sessions and in attending to all the other items of the programme.

His heartfelt and moving vote of thanks to His Excellency the Governor and Viscountess Goschen for their august presence and helpful guidance and the tactful and ingenious way in which he introduced the question of rumoured curtailment by Government of the sphere of usefulness and activities of the Union evoked praise and a sympathetic and encouraging reply from His Excellency.

This year's sessions form a notable landmark in the history of the Union and our readers will find a useful summary of the whole proceedings in the quarterly account of the Union's activities appearing in the August issue. The Union's thanks are due to Mr. Anstead and Mr. C. Tadulingam for their watchfulness and

leader, care and several ladies and gentlemen for their active



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Symposium on Paddy.

WHAT THE RYOT WANTS.

By D. G. MUNRO B. Sc.

Dy. Director of Agriculture, Coimbatore.

The paddy ryot wants good crops and a sufficient return to enable him to obtain the necessities of life and a certain surplus to devote to things which he may desire after his necessary wants are satisfied.

The paddy ryot deserves a certain amount of sympathy. In swamp paddy areas which constitute the greater part of the total paddy area he is largely tied down to a type of cultivation which affords little opportunity for growing other and more profitable crops, while the garden land ryot on the other hand has great opportunities for varying his crops and taking fuller advantage of market fluctuations. At the same time rice is one of the staple food crops and there is always a steady demand for it.

In the second place he deserves our sympathy for the amount of rent which he has to pay. Land in this country is extremely expensive and the size of the population and the paucity of industries tend to make it more so. The result is over-capitalisation and very small holdings and these causes together with fragmentation tend to limit the possibilities of even the most industrious. Were there more industries to absorb surplus capital and population there would be more scope for those left on the land.

It is therefore seen that the solution of agricultural poverty lies not wholly in the hands of the Agricultural Department although a great deal is being done to mitigate it.

After land, the first necessity for the ryot is water. The great deltas, where the greater part of the paddy growing area lies, are comparatively well supplied with water and the attention of the Department has been largely turned to the production of strains which will make the best use of the water supplies and in most cases they are of the same duration as the varieties now being grown by the ryots.

In other cases where supplies of water fail owing to paucity of rain attention is turned to the production of shorter duration strains which in their yielding capacities will equal those of longer duration which they are designed to replace, e. g., in Tanjore a strain of 10 days shorter duration is replacing a local variety and these 10 days saved are of the utmost importance in realising a full crop. In the Salem District last year a short duration variety yielded 1200—1500 lb. of grain in various cases where the longer duration local variety failed to ripen up any grain worth mentioning.

The quest for high yielding strains of "dry" paddy has also started. In the case of these the amount of water required will be more of the order of that required by ragi and so they will be most suitable for growing under wells and in places where water supplies have to be conserved.

Thus although the Department cannot tackle the problem of water supply directly it is doing so indirectly and meeting the needs of the ryot by the production of strains capable of producing economic crops by the use of such supplies as there are. More will be heard in later papers on the subject of breeding not only for quantity but also for quality and disease resistance.

One point which may be mentioned here is the necessity for keeping strains pure, after they have been produced. Some ryots are careless, others make mistakes and the new strains often get mixed with the local strains. Hence there is a necessity on our part to take steps to ensure that the ryot can obtain pure seed of any given strain when required.

The next necessity for the production of good crops is cultivation and manuring. Cultivation practice varies from district to district according to the conditions and the type of soil. This question is one of extreme importance; for, the growing of a green manure crop, for instance, done at the wrong time may greatly interfere with the following paddy crop even though by itself it is a good thing. As regards manuring the ryot is generally willing to spend considerable sums of money in manuring to the best of his knowledge and ability. Cattle manure, green leaf manure, and the poonacs were in the past his main standbys but the

quantity and quality of these are often insufficient except in favoured spots to maintain fertility. Bulky organic manures are a necessity for swamp cultivation not only for the supply of plant food but also, and, more important still, from the point of view of maintaining the physical condition of the soil. If green leaf or cattle manure is not available in sufficient quantity, the growing of green manure crops is advocated to supply the necessary organic matter and the use of chemical fertilisers, to increase the supply of available plant food. These points will be dealt with in greater detail by the Chemist.

Meantime I would point out that while the principles of cultivation and manuring may be well understood, the application of these principles varies according to the conditions met with in different localities. In all demonstration experiments which we carry out the extra cost, if any, involved in the improved method is put against the value of the extra yield obtained on the experimental plots over the control plots. This gives us a fair idea as to whether the improvements suggested are economic or not—a most important point in commercial crop production.

The simplest type of manuring improvement which is met is that where one element is definitely lacking in the soil, e. g., at Mettupalayam last year it was found that an application of 2 cwt. superphosphate raised the crop from 8 salagais per acre to 14 salagais per acre—a 75 per cent increase. While 2 cwt. may have been the optimum dose it is quite probable that a dose of 5 cwt. or more per acre would have been economic. For although the law of diminishing returns comes into operation yet the price of the manure is comparatively low and a very much smaller increase than 75 per cent for the third cwt. would have left a considerable profit per acre after deducting the cost of manure.

In another part of my district of Coimbatore I found the ryots were top-dressing with Sulphate of Ammonia one month or more after transplanting and were using 100 lb. Sulphate of Ammonia per acre. Knowing that early application should give the best results I offered to demonstrate this point to them and to show that a greater yield could be obtained by early application. I accordingly laid out 3 plots, each receiving a basic dressing of green leaf and phosphates. To the first I gave the same dressing of

Sulphate of Ammonia as the ryots had used for top dressing viz. 100 lb. per acre and that was applied at the time of transplanting. To the second I gave the same dose 15 days later and to the third 30 days later.

The grain yield results are as follows :—

	1st plot. lb.	2nd plot. lb.	3rd plot lb.
	2842	3784	3043
Showing a profit over the			
control of	Rs. -9½	Rs. 53	Rs. 4.

From a casual consideration of these results one would come to the conclusion that the best time of application was at 15 days after transplanting but an examination of the crop just before harvest showed that the earliest application had the greatest effect on vegetative growth. The crop was so heavy that it lodged at an early stage and so reduced the yield of grain. During the coming season the effect of a smaller early dose against a larger later dose will be tried, and if the results are equal a definite saving in expenditure on manures will be shown.

These points are mentioned to bring out the importance of the proper selection of varieties and manures and method of cultivation to get the best out of any soil. The ryot is generally illiterate for acquiring and using the knowledge which is available as a result of modern research. Such knowledge has got to be brought to his notice but before it can be put into practice successfully a correct diagnosis of the limiting factor or factors of yield in each place has got to be made. What the ryot really wants then is a friend who can interpret to him modern scientific reasoning in connection with his local practices, introduce new improvements to him and educate him in their proper use and energise him sufficiently to take advantage of them.

The next item in the production of crops is labour both human and bovine and the paddy crop is wasteful of this factor. At planting time and at harvest time there is a great rush of work whereas during the remainder of the year there is comparative idleness.

Where labour is at all scarce, both at harvest and transplanting high wages are paid and are detrimental to the ultimate profits from the crop. In comparison with garden land cultivation, where labour is kept regularly employed for the greater part of the year, paddy cultivation is at a distinct disadvantage. The solution of this problem is not yet. It may lie in part time industries or it may lie in a complete revolution of the present methods of growing paddy. Were dry paddies evolved which could, under conditions similar to ordinary garden cultivation, successfully compete with paddy grown under swamp conditions then the day might come when areas now under swamp conditions will be thoroughly drained and paddy grown in rotation with other crops.

Finally there is the question of getting the best possible return on the crops produced. Very little can be done at the present time in districts where the produce is used mainly for local consumption. In large exporting areas like the great deltas however the position is markedly different. Condition being similar over large areas, a standard type of grain for export could be produced and then it is only a question of finding markets. At present the merchants in view of their expert knowledge have control of these, and if producers' organisations have to find their markets, expert marketing officers will have to be found to take the place of the merchants.

HOW THE PLANT BREEDER CAN HELP THE RYOT.

By R. O. ILIFFE, M.A. DIP-AGRI. (Cantab).—*Paddy Specialist.*

The problem of crop improvement is not a simple question of ultimate yield. It is complicated by local conditions, which demand, let us say, a stiff straw, or a fine grain, or a variety which matures early or late, or resistance to disease or salinity, etc. Consequently the breeder's choice of material must embody high yielding capacity with some other feature. To take a simple case from the West Godavari delta region; one important variety *garikisannavari*, flowers very unevenly and the grain sheds easily. If the crop is left to become dead ripe, many of the early tillers will drop their grain, making it impossible to harvest the maximum yield at any stage. The department is endeavouring to introduce a green manure crop into the rotation and there is often too short an interval between paddy harvest and next sowing to mature a green crop. To meet these two problems we have made selections in *garikisannavari* and have isolated types of different, but fixed, growing periods, and it should soon be possible for the ryot to choose one of our types whose duration has been suitably curtailed with no reduction of yield. He may then sow his crop a little late—thereby allowing full time for the green manure to mature—and yet harvest his paddy before the closure of the canals.

The variety *akkullu* of the first crop in the same tract has come to such a state of mixture that it is frequently referred to on the market as *keli-akkullu*, meaning full of mixtures. From this conglomeration we have produced, by a modified process of mass selection, seven distinct types, all free from red rice.

The early type so purified has been christened *punasa akkullu* and is better by 20% than the unselected bulk. At the other end of the scale the two types isolated for lateness are below the standard of the unselected bulk, showing that in this case the early types produce the best yield. As this is the most important variety of the coastal taluks of the two Godavari districts, and is also found in the Collair Lake tract and under tanks in the uplands, the benefit to the ryot should eventually be not inconsiderable.

In the large Tanjore—Trichinopoly paddy area, water supply towards the close of the *kuruvai* or short term season is often short. It is therefore of great importance to have a variety which may be relied upon to mature before the advent of this dangerous period of water shortage. At the Aduturai Paddy Breeding Station a strain of *kuruvai* has been isolated and purified which matures a crop of 2000 lb. of cleaned grain in 95 days from sowing to harvest. Another selection from the same variety matures a crop of 2300 lb. of cleaned grain in 105 days and this is preferred in regions where water shortage is less acute.

An important problem of this same tract is the incidence of that devastating disease called blast, or *Piricularia oryzae*. In years when this disease is serious the entire crop is lost, and nothing remains to the cultivator. One variety which is badly affected is *korangu samba*, which is extremely popular and gives a good yield. The Mycologist has demonstrated that certain crops show a high degree of immunity to attack, and one of our strains, GEB. 24, is amongst them. We are attempting to transfer this immunity from GEB. 24 to *korangu samba* by the process of hybridisation and at Aduturai and Coimbatore we now have second generation material ready to be bombarded with the disease to test its immunity. If successful this will mean the difference between a good crop and no crop at all in certain seasons.

I have time to deal with only one strain evolved at the Coimbatore Paddy Breeding Station but this strain is probably our greatest success and is an excellent example of the ability of the trained eye to recognise valuable material in the midst of a medley. In a field of *konamini*, a variety from the Circars, grown on the Central Farm in 1913-14, my predecessor noticed a single plant which he recognised as different from the main type. It stood out on account of its early flowering; the straw was stiff and fine; the panicle was curiously open and spreading in habit; and the yield was obviously above the average. In all probability this plant arose as the result of a natural cross. Since then, the progeny of this single plant has been zealously guarded, purified and multiplied, and it was distributed to the ryot for trial as strain GEB. 24, ten years ago. Now I need hardly labour the point that selection work of any kind must be done in the district for which it is intended. But in strain GEB. 24 we have a remarkable

exception to this rule. GEB. 24 grown at Coimbatore takes 149 days to mature a crop. On the Central Farm the average weight of cleaned grain from an acre is nearly 3600 lb but in a good year on the same farm it has reached 5000 lb whereas the average crop in the ryots' fields round Coimbatore certainly does not exceed 2500 lb. This strain has been tried under a multitude of conditions elsewhere. It has been successfully grown as a first crop and a second crop; under tank, stream, and channel irrigation and even under well irrigation as a garden crop. It will stand intensive manuring without detriment to grain or undue lodging of straw. It has, in short, turned out to be an excellent short duration *samba* variety which enjoys favour throughout the Presidency. Though it does best on well drained soils of the lighter class, it will tolerate heavier conditions and is reputed to be salt—and drought—resisting to a certain extent and is remarkably resistant to plant diseases. It may be looked upon as one of the lucky chances that would have been missed but for the breeder.

For most general problems, straight selection is sufficient. Occasion will arise, however, when it is desired to combine in one plant characteristics that are found separately in other plants. For instance, a rich soil capable of raising a bumper crop may produce large and heavy plants that become badly lodged with consequent loss of grain. A plant with a stiff straw is less likely to lodge and judicious crossing of a stiff strawed parent on to the existing plant will probably segregate out a type combining the features of good yield with stiff straw.

At the Aduturai Station a variety known as *poonkar* has resisted our efforts at improvement by selection. It is apparently a very stable type with remarkably little variation. We are at present trying to induce variation by over stimulation following intensive manuring with blood meal, sulphate of potash, and superphosphate. The effect is not expected to be lasting and crossing will almost certainly have to be resorted to eventually to "break the type."

Considering now the gain to the ryot of these improvements. We aim at a flat rate of 10% increase. Taking the one district of Tanjore—Trichinopoly served by the Aduturai Station, there are about 20 lakhs of acres under paddy. We estimate that over 2

lakhs are already under our strains but this figure probably falls far short of the truth. Could we reach half the total area with our strains we should increase the annual revenue to the ryot by over sixty lakhs of rupees. If in 10 years we could spread our strains over a half of the Kistna-Godavari deltas, it would mean a gain of 54 lakhs of rupees per year. It therefore remains to be seen whether the ryot can be imbued with the will to receive improvement and whether he is prepared to reap the full benefit of our labours.

And so to my last point. A cultivator once told me that two meals a day of GEB. 24 did not satisfy his hunger and that he could not afford three. This raises a very large question which, unfortunately, I have not the means of investigating. Feeding trials are rather beyond the scope of the breeder but I have definite hopes that the question will eventually be taken up through another source. However, there is one nutritional point which is now engaging our attention. In the laboratory we noticed that the process of parboiling resulted in extrusion of the embryo. The slightest handling or pounding then causes a complete loss of embryo. As one instinctively connects *vitamins* with the embryo, this loss assumes a magnitude of great importance. Certain sections of the community prefer parboiled rice whilst others will not tolerate any but raw rice. It seems therefore that any attempt that could be made to modify the methods of preparation for table so as to retain the all important *vitamins* would go far towards improving the physique of the people. Fortunately there is a counterbalancing feature that the proteins are retained to a higher degree in parboiled rice than in raw rice. The question opens up a large field for research, in which the chemist, the nutrition expert, and the breeder must eventually combine.

THE PRINCIPLES OF MANURING PADDY.

BY

B. VISWA NATH, F. I. C.,

Government Agricultural Chemist.

Paddy is one of the principal food crops of South India and occupies the largest proportion of the cultivated area. This crop has been, therefore, the first to receive the attention of the Department since the institution of Agricultural Research in this Presidency.

On the chemical side the study of the soil, and the crop, the inter-relationships that exist between soil conditions and crop growth, the mode of action of different manures and the influence of manuring on the quality of the crop have been under investigation. In discussing briefly the results of these investigations I have endeavoured to bring the findings of laboratory researches in a line with those of field experiments and to direct attention to the practical value of the results obtained and the problems of the future from the point of view of the ryot.

In any system of cultivation, the necessity for returning to the soil at least what has been taken out of it must be realised.

An acre of normal paddy crop takes from the soil 48 pounds of nitrogen, 23 pounds of phosphoric acid and 41 pounds of potash. If we visualise the soil as a bank it is obvious that, unless what is withdrawn is returned, the account will soon be over-drawn. But wise Nature has foreseen man's greed and in her infinite wisdom has provided against his sins of omission and commission by setting up in the soil a mechanism for the indefinite supply of the bare minimum requirements ordinarily termed 'minimum' cropping capacity'. So that, if the few pounds of the manurial constituents taken off are not returned there will not be an absolute cessation of crop growth but there will result crops poor in quality and quantity, an insufficiency of food and a devitalised population which falls an easy prey to all sorts of diseases.

That such a state of affairs exists to a certain extent is revealed by our soil surveys of the paddy tracts, carried out with a view to ascertain the extent to which the soils are in immediate need of manurial treatment.

Name of the tract.	Percentage of soils deficient in	
	Nitrogen.	Phosphate.
Godavari.	40	23
Kistna.	33	55
Guntur.	80	33
Tanjore.	87	80
Periyar.	nil.	90
Malabar.	nil.	90

This being the position in the chief paddy tracts it is obvious that intensive methods of cultivation and the introduction of heavier yielding strains will impoverish the fields still more if they are not properly manured.

Our recent research work has shown that a poor soil or inadequate manuring produces grain of poorer "seed quality" and lower nutritive value than a rich or well manured soil.

Recent work in England has shown that mineral deficiency in cattle foods brings about certain diseases among cattle.

It is therefore clear that, for securing increased yields, for keeping up the quality of improved strains and obtaining a crop with the maximum nutritive value, we must return to the soil all that is taken out and something more by adequate and judicious manuring.

From a study of the chemistry of the nutrition of the paddy plant it would appear that the most vigorous and consequential absorption of nitrogen is in the seedling stage, that of potash till about the flowering stage and that of phosphoric acid almost throughout the life of the plant. By about the flowering time the absorption of the food material is considerably reduced and the

energies of the plant are directed more towards the elaboration and translocation of the absorbed material.

The practical value of these observations is that dressings of nitrogenous manures after transplanting the crop are of little value but that similar dressings of phosphates are of benefit.

Our experiments have shown that of the three more important manurial constituents, namely, Nitrogen, Phosphoric acid and Potash, the last named does not appear to be necessary except perhaps where it is indicated to counteract disease. Nitrogenous and phosphatic manures are in general need and are responded to when applied either singly or together but their effect when combined is greater. Phosphatic manures have been found to stimulate the assimilation of nitrogen which would otherwise be not utilised and also to enrich the composition of the crop in this constituent thus enhancing the nutritive and seed value of the grain.

The results of a large number of pot cultures and field experiments on our experiment stations at Coimbatore, Samalkot, Sirvel, Nandyal, Manganallur and Palur show that all the artificial nitrogenous and phosphatic fertilisers are more or less beneficial to paddy but that they are generally economical when applied in conjunction with bulky organic manures like cattle manure and green manures. Of the latter class of manures, green manures, stand out prominently as most suitable for paddy. This is a fortunate circumstance as cattle manure will then be available for the other systems of cultivation.

The relative merits of the different systems of manuring may be expressed in numerical values taking green manure as the unit of standard.

Artificial	No manure	... 0.33
	Phosphate alone	... 0.50
	Nitrogen alone	... 0.70
	Nitrogen plus phosphate	... 0.90
	Green manure	... 1.00
Artificial with organic manures.	Green manure <i>plus</i> phosphate...	1.20
	Green manure <i>plus</i> nitrogen	... 1.33
	Green manure <i>plus</i> phosphate <i>plus</i> nitrogen	... 1.60

It is seen that artificial manures are not as efficient as green manure and that the efficiency of either class of manure can be considerably improved by combining them. Our researches indicate that organic manures supply in plant nutrition some substance analogous to *vitamins* in animal nutrition and that for our soils organic manures are therefore essential. The importance of organic manures to crop growth and the limited nature of their supply at once raises the question as to the most satisfactory proportions in which artificials and organics should be used. This aspect of the problem is under investigation but in so far as the Coimbatore soils are concerned it would appear that twenty pounds of artificial nitrogen and thirty pounds of organic nitrogen make a suitable combination for paddy. It is to be remembered that the fullest benefit of puddling in green manure cannot be realised unless the toxic products resulting from its decomposition are drained off or sufficient interval is allowed between the puddling and transplanting. It is true that this is not always in the control of the ryot and his scheme of operations is regulated largely by the availability of water.

The value of green manure lies more in the physical benefits it confers in inducing optimum drainage which is very important for the proper growth of paddy. Where the heavy nature of the soil is an impediment to quick drainage and consequent removal of the toxic products, application of lime may meet the situation.

In regard to the question whether it is advisable to apply green leaf from outside or to grow green manure *in situ* the former course is undoubtedly better as it adds extra manurial constituents in the shape of phosphoric acid and potash even if the nitrogen may not be available. Where, however, green leaf cannot be had, green manures may be grown *in situ* and puddled in. The opinion held in some quarters that this practice tends to reduce yields does not appear to be correct as our experimental evidence points to the contrary. Any observed fall in yields may be due to deficiencies in other directions.

I have so far dealt with manuring in relation to plant nutrition. There is the question of human and animal nutrition raised by Mr. Iliffe and I will briefly state the findings of our experiments.

The soils of the Godavari and Kistna deltas are relatively richer than those of the Tanjore delta and we find that rice grown in the former delta soils, is more nutritious than rice from Tanjore. It has also been ascertained that the vitamin value increases with the phosphate content of the grain which is influenced not only by the soil on which it is grown but also by the method of preparing rice. Parboiled rice has lesser nutritive value but it is superior to raw polished rice which loses a considerable amount of minerals and fat, containing vitamins, while being polished.

In regard to suggestions for future work, the desirability of growing green manure in the place of a short duration variety of paddy in double crop lands may be looked into but here again the ready money that will come to the ryot from the sale of the short duration crop, will be an obstacle even if its sacrifice is not found to be a financial loss in the long run.

The evil effects of ploughing lands in which sugarcane crop is introduced in a 3- or a 5-year rotation as noticed in some parts of the Godavari delta will have to be investigated.

Another problem for investigation is to see whether the manure bill cannot be reduced by transplanting seedlings raised from a properly manured seed bed and cutting down the quantity of artificial manures for the bulk area.

OUR PRESENT POSITION IN SOUTH INDIA WITH REGARD TO THE
CONTROL OF PADDY PESTS.

BY RAO SAHIB Y. RAMACHANDRA RAO, M. A.

Government Entomologist, Coimbatore.

My predecessors in this short symposium have dealt with Paddy from the aspect of cultivation, breeding and nurture respectively. Paddy, as a living organism, is subject to the influences of its environment. Consequently it is liable to the attacks of herbivorous animals including insects and to infection by parasitic fungi. The losses sustained on the aggregate by the paddy crop, from insect pests and fungus diseases, are enormous and unless the crop can be protected from these injurious organisms, the work of improvement effected by the Breeder, the Agriculturist and the Chemist is liable to be greatly wasted or at least very much handicapped. It is the function of the Entomologist and the Mycologist to do what they can to protect the crop from them and minimise the damage.

The Insect pests of Paddy in South India:—In the Madras Presidency more than 30 different species are known to attack paddy. Fortunately, however, more than half of them occur only occasionally or in such small numbers as to be of little more than academic interest. The really serious pests are not many, but when they do appear, they appear in such numbers that their attacks prove disastrous.

How they affect the crop:—Some of the pests attack the crop when young—especially when it is in the nursery stage. Of these the most important is the Army Worm of Paddy—*Spodoptera mauritia*. It appears all on a sudden in its thousands and sometimes in its tens or hundreds of thousands and wipes out whole areas. The other pests of nurseries are the Black spined beetle—*The Rice Hispa*—found throughout the Presidency and the blue-black beetle (*Leptispa*) peculiar to Malabar, both of which are capable of seriously damaging young paddy.

Then there are others which appear after the crop has been transplanted. The Silver shoot disease is an instance of this kind. Soon after transplanting, the affected seedling produces a long tubular out-growth, which is a gall caused by a fly maggot. In bad cases even the tillers may be similarly attacked. Another such insect is the Rice Mealy Bug, which hides in crowded masses under the shelter of the leaf sheaths, and sucks the sap of the stems, affected plants becoming stunted and discoloured.

There is a third class of pests which attacks the earheads. The stem borer (*Schoenobius incertellus*) is one of this type. The young caterpillar bores into the stalk of the young earhead, causing it to wither and dry up. The Paddy Grasshopper also causes similar damage by biting into the stalks of the earheads. Another serious pest which sucks the grains in the milky stage and converts them into chaff, is the Rice Bug (*Leptocoris acuta*).

The present stage of investigation:—It is now nearly 25 years since the first beginnings of Entomological work were made in this Province and a great amount of work has been done. The pioneer work has all been completed. All the major pests of the Province have been noted, and observations made as to the part of the year they are likely to occur and the nature of the damage they cause. In the case of the more important of them, a detailed investigation of the life-history and habits has been completed and a general knowledge of the weak points of their life-cycle gained, with a view to devise suitable control measures. Much of this work, however, does not interest the ryot. All that he asks for, are effective, practicable control measures.

But effective, practicable measures are not so easy to devise, as one may suppose. Although a study of the life-history of the pest concerned may give an indication of the kind of measures that may be adopted, yet a successful application of the measures demands a very full knowledge of the conditions under which the pest occurs, so as to modify them, where necessary, to suit particular conditions and to ensure a thoroughness of treatment. Before making a general recommendation of remedies, the Department has to try these measures under its own supervision, find out the defects of the methods advocated and after a thorough trial make sure of the conditions that may make for efficiency of control. It is only thereafter that a demonstration of remedies could be undertaken.

There are, however, various difficulties that handicap the Entomologist in this work. (1) Firstly, the actual presence of the pest is a *sine qua non* for trying any experiments: and this is a factor, of which one cannot always be certain, since it may not make its appearance every year. (2) Secondly, Paddy is generally a crop grown on a very extensive scale, and in case any widespread attacks of pests are noticed, it would be a sheer impossibility to deliver a direct frontal attack, by spraying, dusting or hand-netting, by reason of the very magnitude of the task and also of the general low economic condition of the ryot. The only possible way would probably be to try and see if the pest could be checked by introducing a change in the local practices.

The present position with regard to the control of some of the pests:—The difficulties of the problem may probably be best illustrated by a reference to the present position of the Department in regard to some of the major pests of this province.

The Army Worm of Paddy (Spodoptera mauritia) may serve as an illustration to show the handicaps of the economic entomologist in regard to successful pest control. This is an insect, which appears all on a sudden in enormous numbers on nurseries or young broadcast paddy chiefly in Malabar. Usually the ryot notices its presence only when the crop has already been partly devastated and by the time he reports the matter to the village authorities and the news eventually trickles down to the Entomologist through the usual official channels, the pest is usually found to have done its havoc and disappeared.

Since, year after year, in spite of various efforts the Entomological Section found itself in a position of helplessness whether for making observations or for trying remedial measures, owing to such belated receipt of reports, it was decided to try a different plan of action. A campaign was instituted in the various taluks of Malabar under the joint efforts of the Deputy Director of Agriculture, Seventh Circle and the Entomologist and one officer from their staffs was posted for each taluk during the months of April-May when the pest was due to appear. These officers visited village after village, met the ryots, explained to them the life-history of the pest and the nature of the remedies to be adopted, and instructed them to post an addressed card the moment an attack was discovered. In this way during the last four years,

the greater part of the Malabar District has been covered. Some of the out-breaks were detected in time, and last year, especially, it was found possible to save the greater part of the affected area in Kottayam Taluk. Similar success has also attended the work in Ponnani this year.

Again, observations made regarding the area in the neighbourhood of Cannanore, where the largest number of outbreaks has been noted in the past, have shown that there is a close relationship between the outbreaks occurring on Paddy nurseries in the valleys in May and those noted in October–November on hill grasses on the laterite hills of this area. If the services of an experienced officer were available for keeping this area under observation throughout the year for one or two seasons, valuable information may be gathered not only as regards factors governing outbreaks of this pest, but also as to the possibility of prognosticating future attacks.

The Paddy Stemborer is another of the major pests of paddy. In ordinary years, it is hardly of consequence, as careful counts taken in fields attacked have shown that the damage is only about 1 to 3%, but in certain seasons, the infestation leaps up to 10 to 25% or more. Continued observation for a series of years has revealed the fact that the sudden jump in the damage is to be traced to abnormal rainfall received in the preceding hot season, which has kept the wild paddy or the aftermaths from harvested fields, green, and thus sheltered the borer larvae. Further it has been noted that in places where two crops are raised in rapid succession or where wild paddy is found in abundance the infestation, even in ordinary years, is definitely greater than in other places. It is hoped further investigations on these lines may give a clue to the control of this pest.

The Paddy Grasshopper is a big problem in some of the paddy areas. The eggs are laid in the bunds and remain there till the monsoon breaks, at which time the hoppers emerge from the soil and feed on the paddy blades. It is however when the ears are produced that the greatest harm is done. The winged grasshoppers fly from plant to plant, cut the base of earheads and cause a great amount of loss of crop. The pest can be checked by hand-netting the young ones as they emerge from the bunds and by scraping out the eggmasses in the bunds before the hot weather begins. These measures are still under investigation.

The Silver Shoot is a disease familiar to the ryot and considered by him to be caused by unseasonable rainfall. While usually it does not cause much damage, in certain years losses up to 75% have been recorded. Investigations have shown that generally the pest is effectively kept in check in nature by a small parasite (*Polygnotus* sp.) and that outbreaks are accompanied by the disappearance of this parasite. Further work may probably show that the pest could be checked by the introduction of colonies of this insect at the right time.

Lines of future work :—Experience of Pest Control work in the past has shown the great importance of a continuity of effort. What appears to be needed at present is an intensive study of the pest year after year, not only for taking note of the effect of the climatic and other conditions on the prevalence of the pest, but also for testing the control measures thoroughly till they can be confidently recommended to the ryots. In my opinion the best scheme would be to set apart one man for work on a particular major pest, such as the Army Worm, and make him responsible for results.

Secondly, the policy of concentrating all the staff on one pest at a time in order to obtain conclusive results quickly, does not lend itself to the nature of Entomological work, for in many cases one cannot be sure of the appearance of the particular pest on which work is desired to be done. On the other hand such a concentration may lead to the neglect of other important pests that may turn up unexpectedly. What is needed is a sufficiently large and fairly mobile staff that should be in readiness to tackle at a moment's notice any pests that may be reported and make use of such opportunities to advance our knowledge of control methods.

Thirdly, a study of local conditions of the utmost importance in devising satisfactory remedies for pests. A method that may prove successful for a pest under the conditions of a particular tract, may be utterly unsuitable for controlling the same insect in a different agricultural area of the same province. This points to the necessity of decentralising staff to a certain extent and opening substations in typical tracts for Entomological study.

HOW TO KEEP OFF THE "INVISIBLE FOES."

BY S. SUNDARARAMAN, M.A.,

Government Mycologist.

It is common knowledge that insects and several other members of the animal kingdom cause ravages on our crops. Drought, floods, extremes of temperature, heavy winds, excessive rain, improper drainage, toxins in the soil and a variety of unexplained or partially explained causes are also known to take their toll of crop plants. Besides the above, crop plants are subject to several diseases caused by parasitic fungi. Fungi are members of the vegetable kingdom representing a low order of creation, and are ordinarily too small to be visible to the naked eye but they could be made visible with the aid of a microscope.

Most parasitic fungi have a partiality for one important organ of a crop plant. Some attack roots, some attack the stem, some attack leaves, while some attack the flowers and fruits. Fungi with less restricted tastes attack more than one organ and are consequently more dangerous. Root parasites attack the most vulnerable portion of the plant and cause the wilting or complete death of the plant. Stem parasites weaken the frame work and dislocate the transportation of food materials. Leaf parasites partially or completely stop the preparation of food in the leaves. Parasites of flowers and fruits reduce the yield and incidentally restrict reproduction.

Quite a large number of fungi have been recorded on paddy (*Oryza sativa*). Fortunately, however the number of parasites among them is small and the number of diseases caused by such parasites in South India is smaller still.

By far the most serious of the diseases of paddy known in this Presidency is 'Blast.' It is caused by a fungus *Piricularia oryzae* which has been recorded from almost all the rice growing countries of the world.

Our knowledge of the existence of this disease in South India is very recent. It was only in 1918 that the first record of this

disease was made when there was a serious outbreak in the Tanjore delta.

(1) The outbreak of the disease is closely linked up with the weather conditions prevailing during the cropping period of paddy. The fungus requires a warm humid atmosphere for its development and when such conditions prevail, it develops and spreads like wild fire till the whole crop in the neighbourhood of the source of infection is affected.

(2) The attack ordinarily begins on the leaves on which brown linear or oval spots are formed. These spots gradually enlarge and produce a grey centre where several spores are formed. If the weather conditions are favourable at the flowering period the whole earhead may get chaffed, either by the glumes getting diseased, or the neck of the head getting choked by the fungus. But if the attack takes place after the grains have passed the milk stage, the loss to the crop is not serious. In the plot of Korangu samba raised on the Central Farm during 1927, the loss from this fungus was estimated to be 69 per cent while in the varietal plot the loss was estimated at 90 per cent.

(3) The spores of the fungus are viable under dessication, up to a period of six months, a period long enough for the fungus to bridge over the off season. The infected straw, stubbles and even the underground portions of the plant are known to harbour the mycelium of the fungus which under favourable weather conditions give rise to a crop of fresh spores.

(4) The fungus has been proved to infect cereals like wheat, barley and oats, but morphologically indistinguishable fungi which cause the blasts of ragi, Italian millet and some wild grasses have never been known to infect paddy.

(5) There is a wide range of variation among several varieties of paddy in their resistance to *Piricularia*. In most cases the short duration and the coarse varieties are more resistant than the long duration and fine varieties. The following table gives the percentage of disease among ten popular varieties of the Southern districts grown for comparison in Coimbatore.

No.	Variety.	Percentage of disease.
1	E. B. 24	Nil.
2	Co 1	... 5.7
3	Sadai samba	... 18.2
4	Nellore samba	... 37.0
5	Co 3	... 37.3
6	Co 2	... 42.4
7	A.D.T.1	... 51.2
8	A.D.T.2	... 54.0
9	T 283	... 86.1
10	Korangu samba	... 89.3

(6) Other conditions being equal heavy vegetative growth and the free use of nitrogenous manures tending to produce excessive vegetative growth have been found to produce a high susceptibility to disease.

Control measures. The disease is not amenable to direct treatment. The chief avenue of disease control therefore lies in the utilisation of disease-resistant varieties. Exhaustive trials made in Coimbatore have revealed the existence of resistant varieties. Attempts are being made by the Paddy Specialist to utilise such varieties to breed new strains which combine in them disease resistance with other desirable qualities.

Besides the avoidance of highly susceptible varieties, the manurial aspect of growing paddy requires special attention. Any condition which encourages excessive vegetative growth has also been known to bring in its train susceptibility to disease. When allowed to develop an abnormal vegetative growth, even the most resistant variety has been known to suffer from the disease. The control of the disease may therefore be summed up in the words 'Resistant varieties and well-balanced manuring.'

The disease next in importance is *Helminthosporium oryzae*.

In this Presidency it is found wherever paddy is raised, but has seldom if ever taken an epidemic form. The disease is characterised by small brown linear spots occurring on leaves and may under favourable conditions cause the blackening of the nodes, neck and grains. The earheads are sometimes affected and

they fail to emerge from the sheath. Individual grains are often attacked and such grains become either partial or total loss. The existence of the disease was first brought to the notice of this Department in 1918-19 when the paddy fields in the Deltaic regions of Godavari and Kistna were affected and a heavy damage to the crop was reported. Investigation showed that the disease was present on a crop which was in a very weakened condition due to a variety of causes.

The fungus spreads through spores which are borne on the leaves, stalk and grains. The fungus is also able to live as dormant mycelium in the seed and is carried from season to season. Seedlings raised from infected grains are often subject to a seedling blight. The dead seedlings form the medium for the saprophytic development of the fungus and the spores blown about in the wind serve as secondary sources of infection.

Control.—Fortunately the fungus is not a virulent parasite and attacks only plants which are weakened from other causes. The chief method of control lies in good farming. General sanitary practices such as destruction of infected stubble, clean cultivation, disinfection of seed and the importation of seed from non-infected localities go a good way in preventing epidemic outbreaks.

The next disease is one of the minor diseases of paddy and is caused by a fungus called *Sclerotium oryzae*. It has been noticed only in a few of the paddy growing areas of this Presidency and is not known to cause any appreciable damage to the crop. The disease escapes the notice of the ryots in its early stages when the infected plants can be differentiated from the healthy ones by the peculiar phenomenon of 'tillering,' i. e., the development of fresh green shoots at the base of the infected culms. Infected culms turn yellow and die. Grains are poorly developed and the glumes are in most cases empty. In many of the localities where the disease has been noticed the disease appears late in the season when the crop approaches maturity.

The disease develops mostly in water-logged localities and is rather rare in well-drained fields.

The sclerotic of the fungus are capable of living in the soil for several years but the question of the application of chemicals aimed at killing them is out of consideration in the case of a crop like paddy.

A sure and permanent method of controlling the disease lies in the breeding of disease-resistant varieties. The following general preventive measures based on general sanitary principles are usually recommended.

- (1) As soon as the disease is detected in the fields remove the infected plants and burn them.
- (2) Do not plant too thickly, but allow plenty of aeration.
- (3) Do not carry straw from infected fields to uninfected ones.

Another disease of paddy ordinarily met with in South India is caused by a fungus called '*Ustilaginoidea virens*,' and is known as 'Nelpazham' in Tamil and 'Varipandu' in Telugu. It appears on the earheads of paddy as large yellowish green bodies which are more than twice the diameter of the normal grains. As a rule, the fungus appears only in years of bumper crop.

Attempts to reproduce the disease have failed so far. The life history of the fungus is not known.

Fortunately, the disease is not severe in India and occurs once in several years and the fungus is not known on any other plant.

There is yet another interesting disease of paddy which is occasionally met with as a curiosity in South Indian fields. The plant is to all intents and purposes quite healthy but at flowering time, the ears instead of being a loose panicle bearing healthy glumes, is converted into a black solid cylindrical spike on which spores are borne in profusion. All attempts made in Coimbatore to study the life history of the fungus have failed. Fortunately, the disease is so rare and has never been known to cause any appreciable damage to the crop.

Co-operative Organisation in Ireland. *

By

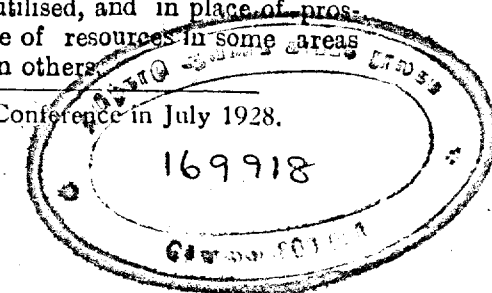
SAADAT-ULLA-KHAN, M. A., (CANTAB, BAR AT-LAW.)

The Co-operative movement in Ireland has attracted the attention of the whole world. It is a practical attempt to deal with some of the more fundamental Irish problems. It is primarily concerned with the economic welfare of the country.

In the year 1889 the Co-operative movement was inaugurated in Ireland by Sir Horace Plunkett, and three Co-operative Societies were established in that year. According to the census of 1891 the proportion engaged in Agriculture to that of the definitely employed population amounted to about 50 % in comparison with 19 % in England, 33 % in the United States and 41 % in Germany. Yet, agriculture, the basis of the economic life of the nation, was unorganised and undeveloped.

Ireland can boast of a fertile soil and its potential productivity is hardly equalled in the continent of Europe. Yet these splendid resources have never been properly utilised, and in place of prosperity, there has been much waste of resources in some areas combined with poverty and distress in others.

* Paper read at the M. A. S. U. Conference in July 1928.



Many years ago, land in Ireland became the property of a comparatively small number of alien land-lords, and the original Irish owner remained an occupier, under a system of yearly rents or leases. This manorial system which worked admirably in England was never accepted by the Irish people. The lack of security of tenure, bitterly impressed by evictions for the non-payment of rent, had completed the rousing of national resentment against the system of land tenure. Vast stretches of fertile land were used for grazing purposes, and in 1891 more than two-thirds of the land suitable for cultivation was used as pasture. Such a system of agriculture was unsuited to the support of a large population.

The economic situation thus stated has been largely responsible for the excessive emigration which has so profoundly affected the recent history of Ireland. The loss of these people is in itself a great injury to a country, though in the case of Ireland, emigration was for some time the only alternative to starvation. Last, but not least, in importance was the absence of a satisfactory educational system.

Reforms in the laws affecting land tenure were slowly carried out, but it was not until 1903 when tenancy was made secure through a system of land purchase that the land agitation began to subside. State action alone, however, could not remedy Ireland's troubles. Organised self-help among the people was even more necessary. The success and tragic failure of the Ralahine community in 1831 is among the romances of Social and Co-operative history. Although, after two years of most encouraging development, this little Co-operative Commonwealth on the Shannon finally failed, its short history illuminated for a moment the possibility of an Irish self-help movement.

In this state of stagnation, in which Ireland was immersed, and for which land legislation could be only a partial remedy, there appeared a man with a complete and constructive policy and with the energy and courage to put it into effect. Sir Horace Plunkett, whose name will go down to posterity as one of the greatest statesmen that Ireland has ever produced, summarised his policy as seeking "Better farming, Better business and Better living." The first object involving costly and protracted research and elaborate administrative machinery was largely the sphere

of the State. The second which would enable the farmer to hold his own with other groups of the public, was essentially the sphere of voluntary effort. The third was the desired effect of both. Sir Horace realised that the weak national character of a subject nation would be still further enervated by any large state Scheme for better farming. Therefore, he wisely concentrated his first efforts upon establishing organised voluntary effort for securing better agricultural business.

"The key-note of our proposal", wrote Sir Horace Plunkett, "is the proposition that the Irish farmers must work out their own salvation and further that this can only be done by combination among themselves." For this purpose he promptly adopted the co-operative methods of Rochdale and Denmark, and hence co-operation has become the basis of the new economic social structure of the country. He had, however, to address over fifty meetings before he could arouse any response.

In 1888, when after a long absence in America, Sir Horace Plunkett returned to Ireland, he found the economic situation full of difficulties. The adoption of free trade in 1846 had put an end to artificial barriers against foreign competition. Beef from America and butter from Denmark were rapidly displacing Irish products. Sir Horace realised first, that only through the large scale production of produce of high quality could Ireland expect to meet this competition and second, that only through co-operative methods could Irish farmers control a large-scale business. Chief among the Irish rural industries, which were in danger of ruin on account of the competition of their more advanced and better organised neighbours was that of butter-making. Sir Horace therefore decided, as a first step, to attempt the construction of creameries. The first co-operative creamery was started in 1889 at Drumcollogher, and was immediately successful, paying the highest price for milk in its neighbourhood.

From this small beginning no greater silent revolution had been effected in Ireland than that which has transformed the butter-making industry from an unorganised slovenly, and unprofitable process, into one which is well organised and profitable, and which bids fair to give Irish butter a leading position on the British Market. This change has been brought about by the Co-operative Movement.

In the early part of the 19th century when butter was made without the aid of machinery, the Irish farmer enjoyed a great advantage from his close proximity to the great markets of England and Scotland. This happy state of things was brought to an end by the Danes, who, owing to German tariffs and the cheapness of cereals imported from America, concentrated upon the production of the breakfast requirements of the British Market. Denmark became covered with a net work of creameries equipped with the most modern appliances for the manufacture of butter of high quality.

This fact was soon reflected in Irish prices, and by about 1885 Irish butter was the cheapest on the market and universally condemned. Sir Horace Plunkett and his followers quickly realised the situation and saw that this danger could only be averted by a complete change in the directions; first technique; and secondly marketing.

Thus with courage and perseverance the Irish pioneers in 1889 began the task of promoting creameries, which were the first and most successful of Irish Co-operative Societies. They were organised more according to German than to Danish methods, having share capital allotted to members in proportion to the number of their cows.

Many of the creameries enforce a binding rule, by which the members contract to bring to the Society all the milk which is not required for their own domestic consumption. Some such rule is, of course, of the greatest importance in ensuring continued prosperity for the creamery.

The price of milk is fixed from time to time by the Committee according to the percentage of butter-fat in the milk. A creamery is not generally started until the supply of milk from 100 to 1,000 cows is guaranteed within the radius of not more than five or six miles. In places, however, where dairying is carried out by a small population scattered over a large area, the difficulty has been got over by the establishing of auxiliary creameries, these are merely separating stations, which forward the cream to a central creamery for churning into butter.

The problem of capital has always been a difficult one, and it is held by many that the present methods are inadequate. Shares are of the value of £1 and are usually held in proportion

of one share one cow. The remainder of the capital is raised by means of an overdraft from a bank, on the joint and several guarantee of the members of the committee, who have as their protection the uncalled balance of the members' shares.

In number, membership and value of business the creameries are the most important group of Irish Co-operative Societies, the following being their statistics for the year ending 31st March 1922

Number of creameries	...	339
Membership.	...	49,959
Paid up share capital.	...	£2,05,848
Loan capital.	...	£4,30,331
Turnover.	...	£5,661,518

Many of the creameries carry out various subsidiary enterprises for the benefit of their members. Of these the most common is the collective purchase of agricultural requirements of all kinds, in districts where no special society has been found for that purpose. Other creameries do a large trade in eggs and poultry which they collect from their members.

The success of the co-operative movement is shown by the gradual disappearance of its competitors. The output of factories and proprietary creameries is on the decline, although unfortunately no figures on the subject are available.

In spite of this progress in the local production of butter, the creameries have made little advance in federation. They have not yet realised the necessity of not competing with one another. In other words the problem of marketing the produce on a national basis has hardly been approached. A body known as the Irish Co-operative Agency Society Limited with headquarters in Limerick, has been in existence since 1892, when it was formed for the purpose of marketing the supplies of the co-operative creameries. Although it still does enough business to justify its existence, it cannot be said to have taken that place in the movement for which it was originally intended. There is a tendency among the creamery managers to make their own bargains as long as the market is good, and only to resort to the agency when there is considerable difficulty in selling.

The Irish Agricultural wholesale Society (I.A.W.S.) which will be discussed later, has recently developed a considerable

trade in the marketing of butter and other agricultural produce on a commission basis, and this may have a great effect in improving the position of the Irish Creameries. It does, however, disclose a weakness, that the creameries should be using two wholesale bodies for trade which could more economically be handled at one centre.

To meet these difficulties, great efforts are being made by the Irish Agricultural Organisation Society (I. A. O. S.) to popularise what is known as the "Butter Control Scheme" on the lines adopted so successfully in both Denmark and Holland. The essence of the scheme is that all the creameries affiliated to the central, make butter of a guaranteed standard, and are allowed to sell it under a brand, which will become well known on the British Market.

The work of the creameries, however, can never be thoroughly satisfactory, until a system of farming is adopted throughout the country which will ensure a more even production of milk during winter and summer. In order to encourage winter milk production the I. A. O. S. has been advocating the adoption of a system of continuous cropping suggested by Mr. Wibberly.

The average yield of the cow is a point of the greatest possible importance in a dairy country, and in this respect Ireland has still much to learn. A cow testing association or milk record Society is an inseparable adjunct of a creamery in Denmark and other progressive countries. Such a Society, if organised, will cause a rapid improvement of both the quantity and the fat content of milk.

After the creameries the most important trading societies in Ireland are those known as "Agricultural Societies." The main work of these societies, of which in 1921 there were 399 with a membership of 66,831 and a turnover of £20,41,290 is to purchase in bulk the seeds, fertilisers, food stuffs and other agricultural requirements of their members. By doing this, they effect considerable saving through wholesale rates on favourable terms and they also ensure the good quality of materials.

Quite a number of societies carry on a general store business for the supply of domestic requirements, groceries etc. Owing to the strong movement in favour of extended tillage during the war, most of the agricultural societies, developed their trade in implements for their members' use. The economic results achieved by Agricultural Societies in Ireland are very easily distinguished.

There has been a continuous improvement in the conditions of sale of the principal articles in which these societies deal. Prices have been lowered, rings have been broken, and what is more of importance guarantees of quality have been secured.

The Agricultural Co-operative Movement, besides the work of organising the business side of farming in Ireland, set itself to develop other rural industries which previously had been neglected. These were bacon-curing, poultry-keeping and egg-production, Bee-keeping, and fruit-growing etc.

As regards poultry and eggs, the position of Ireland, in close proximity to the English markets, has offered a particular advantage and incentive to the industry. Nevertheless, it had never assumed its proper position in the life of the country. The reputation of Irish eggs was no more savoury than that of Irish butter. The yearly loss to Irish farmers, distributed among all classes of the population, and most serious for the poorest, amounted to thousands of pounds.

Complete ignorance of the technical details of the industry, and a lack of proper arrangements for marketing largely accounted for this situation. Winter egg production was as unusual as winter dairying. No attempt was made to sell the eggs either clean or graded, or to ensure that the produce was delivered fresh.

The situation was one in which the application of the co-operative principles seemed likely to prove particularly advantageous. Consequently the addition of eggs and poultry to the business of the existing creamery societies was recommended, and in 1897, the formation of independent societies for this purpose was proposed. Later a poultry expert was added to the staff of the I. A. O. S. and a Dane, M. Viggo Schwaz, was brought over to introduce the methods of grading and packing which had established the Danish egg as the head of the English market.

In the year 1920 Ireland exported to Great Britain eggs to the value of £ 14,307,726 and poultry to the value of £2,017,640. There were also exported feathers to the value of £ 72,599. The total value of these exports was therefore £ 16,397,965.

Talking in millions conveys little to the mind of the average person. But in order to make the value of this undeveloped trade apparent to all, it may be mentioned that it represented over

£ 8'10'0 in income to every man, woman and child in Ireland while it also contributed the main source of livelihood to a very considerable percentage of Irish population.

There were in 1921 in Ireland 10 poultry-keepers societies with a membership of 3,188 and a turnover of £ 177,282, which collect, grade, pack, and market the eggs for their members, and in many cases have engaged in the dressing of the poultry. They perform these services so far as possible along the most modern and scientific lines. The eggs which are collected regularly by vans of the society, are graded according to size or weight, and in some cases are paid for on that basis.

Bee-keeping in Ireland offers an opportunity for considerable profit with very little trouble. At present much honey goes to waste, or rather is not produced at all. And yet the demand is great and capable of extension. Bee-keepers' Co-operative Societies are easily formed, since they require practically no capital. In 1902, the Irish Bee-keepers' Federation Limited (I.B.K.F.) was created, with the depot in Dublin. Unfortunately, however, interest in this industry was allowed to lapse, and the few societies which were formed have now disappeared. The I.B.K.F. has been superseded by a depot of the Irish Agricultural Wholesale Society, and a special Society for the encouragement of bee-keeping and the proper grading of honey has been formed. The history of co-operation in this industry indicates that separate societies for comparatively subsidiary industries do not succeed. Such undertakings are best provided as parts of the more general types of societies.

The next section of Irish co-operation is in respect of bacon-curing and meat. There are two large and successful societies engaged in the work, one at Roscrea, and the other and the larger at Wexford. Beside these, there are many smaller societies, some of them working in conjunction with creameries of agricultural societies. These societies take their members' pigs, sheep and cattle, slaughter them, produce bacon and sell dressed meat. The Wexford society is flourishing, and does a large and increasing trade.

The Irish Agricultural Wholesale Society Limited (I.A.W.S.) to which reference has already been made, was formed to act as a trade federation for the whole movement: apart from creameries,

for which the Agency at Limerick was intended. The I.A.W.S. has been of the utmost service to the organised farmers, in breaking through various rings and combinations of manufacturers, although its task has been almost over-whelming. It was opposed by the manufacturers and it was under-capitalised. Notwithstanding these difficulties, the Irish Agricultural Wholesale Society has succeeded in building up a trade of impressive dimensions, and has conferred great benefits upon the societies. Its turnover increased from £ 54,000 in 1905 to £ 1,118,718 in 1921.

As a result of the working of the Irish Agricultural Wholesale Society, Irish farmers have obtained a great reduction in the prices of the artificial fertilisers. In regard to seeds, the I. A. W. S. gives a guarantee of purity and germination. In dealing with dairy and egg machinery it fought a long fight with the manufacturers. The Irish manufacturers boycotted it, and it had recourse accordingly to American firms. By amalgamation with the Irish Producers Limited, the I. A. W. S. was enabled to deal in poultry, honey and eggs. It also established a grocery department for the sale of household requisites to the distributive societies. It thus aims at being a joint wholesale society for the consumers' and producers' movement.

Credit societies have played a useful part in the poorer districts of rural Ireland. Not only did they enable hundreds of peasants to escape from the gombeen-man or money-lending shop keeper, but they raised in time nearly all their capital by means of local deposits. The high prices of farm produce during the war checked the demand for loans and it became necessary for the I. A. O. S. to warn societies against receiving an excess of deposits. It is unfortunate that the lack of credit federation made it necessary to check this co-operative thrift. The more difficult agricultural situation of the present time may again stimulate the development of credit and thrift societies. If so, every advantage should be taken of the change. Credit and thrift organisation is the soundest foundation for any agricultural co-operative movement, as the experience of Germany has proved and as the developments in India indicate.

Meanwhile as society after society sprang up, it became essential to form a central body to direct and supervise the work of the movement. Consequently in 1894, the Irish Agricultural

Organisation Society, (I. A. O. S.) was formed. With its foundation the birth pangs of the movement were at an end. The I.A.O.S. became a central committee for the local co-operative societies, providing them with advice and auditing services, convening conferences among them and organising new societies wherever there was demand for them. The Committee and officers are subject to annual election by delegates of affiliated societies, and by those individuals who subscribe to the movement. The control of the movement is therefore thoroughly democratic.

The work of the I. A. O. S. is supplemented and strengthened by the weekly paper, the "Irish Homestead", whose editor Mr. George Russel, better known as A. E., a poet, painter, economist and writer of the first order, combines this rare assortment of gifts in the articles which stir every week a wide range of readers to renewed action in the interests of country life.

A later addition has been the co-operative Reference Library which is established at Plunkett House, along with the I. A. O. S. It is widely used by agriculturists of all nations.

The foregoing briefly describes the development of the Irish rural movement towards "Better business." In 1895, when this movement was 5 years old and included a complete framework of co-operative organisation, Sir Horace Plunkett felt that the time was ripe to call in State aid in order to bring up-to-date the antiquated condition of agricultural technique and to launch a secondary movement towards better farming. Scarcely less marvellous than the success of the self-help movement, was Sir Horace's achievement through the Recess Committee. This body included representatives of every political party in Ireland. Not only did it produce a unanimous report upon the form in which State aid could best be applied to Ireland, but it elaborated in twelve months a detailed scheme, based upon first hand observations in other countries, from which subsequently was planned the Irish Department of Agriculture and Technical Instruction. This body proved to be one of the most efficient of its kind. Its control is democratic, and it enables a central state Department to co-operate actively with country Agricultural Committees.

The new "Department", as it is called, began work in 1900, and it has exercised a deep and lasting impression upon Irish farming methods.

As the Irish farmers learnt from the Department and the country Agricultural Staffs how to use profitably modern fertilisers and feeding stuffs, so they increased the business of their co-operative societies in such commodities. Conversely, as the creameries taught farmers to value their cows according to both the quality and quantity of their milk, so the farmers turned to the Department for guidance and help in the improvement of their livestock.

Thus the two parallel movements towards better farming and better business have continued, in spite of minor causes of friction, to react favourably upon each other. And if we look back over the period of about 40 years since the new rural policy was first announced, its undoubted success in the face of immense difficulties is apparent. It has been due in the main to two factors. First, to the correctness and appeal of the co-operative principle as Sir Horace Plunkett adapted it for Ireland, and second, to his own personality, which has attracted to his support the best elements of every class in the Irish life. The Irish Co-operative Movement, however, has benefited not merely Ireland itself. It is an example to rural reformers everywhere, and indeed is an inspiration to all who look upon better living as the ultimate goal of human desire and human effort.

Botany of some useful plants—III.

By

S. N. CHANDRASEKHAR, M. A., AND T. S. RAMAKRISHNAN, M. A.

Vigna catieng.

The cowpea (Tam. Karamani or Payaru) is an indigenous plant and has been under cultivation from remote times in most parts of India. It is grown either alone as a subordinate crop—as a second crop in rice fields—or more often as a mixed crop along with millets. Bunds round paddy fields are sometimes sown with cowpea. Many varieties are present differing in their habits, in the colour of flowers or in the size and colour of pods and seeds. The seeds are generally sown with the rains in July and the pods are gathered from October to December.

It is a low sub-erect herbaceous annual resembling in general appearance Phaseoli but differing from the latter in being glabrous. The leaves are pinnately trifoliate with a distinctly grooved petiole and prominent stipules produced below the point of attachment. Stipels are present; the leaflets are ovate to cuneate-lanceolate in shape—the lateral ones being oblique—and entire.

The flowers which vary in colour from white to yellow or pink are borne in axillary racemes, clustered at the end of an elongated nodiform peduncle. Bracts and bracteoles are present. The calyx is bell shaped with the upper two teeth being more or less connate. The standard, wings and keel petals are of equal lengths; the standard is orbicular; the keel petals are as broad as the wings, free below but fused above. The stamens number 10 and are diadelphous, with uniform anthers. The ovary is sessile with many ovules and a filiform style profusely bearded on the inner surface, the stigma is glabrous. The pod is glabrous, elongated almost cylindrical with a slightly beaded appearance and many seeded.

The young pods are cooked and eaten as a vegetable. The ripe seeds are used as they are or made into flour just like dhal. The whole plant as well as the pods form a rich cattle food especially for mich cows. It is also used as a green manure.

Dolichos.

This genus is found in the tropics of both the hemispheres and includes 20 species of which six are indigenous to India. The horsegram and lablab beans come under this. The representa-

tives of this genus are twiners or prostrate or sub-erect herbs. The leaves are pinnately trifoliate with small stipules and the leaflets are stipellate. The flowers are borne in axillary racemes, fascicled on a nodiform rachis. Striated bracts and bracteoles are present. The calyx is persistent campanulate and five toothed, the two upper being usually connate. The corolla is exserted, the petals being almost equal in length. The standard is orbicular and provided with two hard auricles at the base. Stamens are 10 in number and diadelphous with uniform anthers. The ovary is subsessile, many ovuled, with a thickened or filiform style bearded on the surface and round the terminal globose stigma. The pod is flat or inflated linear or broad, incurved with the remains of the persistent style. The seeds are thick and oblong.

Dolichos lablab var typicus.

The common lablab bean (Tam. Avarai) is largely cultivated throughout India mostly in gardens and round about dwellings. It is made to grow over pandals or roofings of houses. Innumerable varieties and forms are present exhibiting much variation in the colour of the flowers, fruits, seeds and sometimes in the whole vines. The size and shapes of the pods also vary in the different forms. The flowers show all gradations of colour from white to pink. The pods too exhibit variations in colour from whitish to green and violet; in some cases a mixture of all these colours are found. The pods may be short or long, flattened or inflated and broad or narrow. The seeds are sown in July-August and the plants continue to bear from November onwards for five to six months. Generally this plant is grown as an annual being removed during the hot months, but it is capable of continuing as a biennial or perennial. When grown like this, fruiting ceases during the hot weather, but resumes with the rains.

It is a herbaceous twiner the stem being covered with rough short hairs. The plant branches profusely and spreads far and wide producing a dense growth. The lateral leaflets are oblique while the terminal one is symmetrical, subacuminate, with three prominent veins from the base, herbaceous and pubescent. The keel petals are narrow, bent sharp, free at the base but united for the rest of the length. The stamens are ten in number of two lengths five of each sort. The ovary is flattened with a style thickened upwards and bearded. The pod contains usually 4 to 6

seeds and the ventral edges often present a corrugated appearance. Generally the seeds are arranged with their long axes parallel to the suture.

The pods are held in great esteem as a vegetable and used fresh in the preparation of a number of curries. Young pods are salted, steamed and dried in the sun to be used later on in the preparation of soups or to be fried in oil.

Dolichos lablab var lignosus.

This is a more robust variety known as Mochai in Tamil and is cultivated in fields as a subordinate crop. It is also grown alone as a fodder or smother crop or mixed with millets especially cholam. It is sown from June to August and fruits are gathered from October to March. It is a twining bushy perennial but an annual under cultivation. This plant does not spread so much as the variety typicus. There is a characteristic odour associated with the plant. The flowers are generally white. The pods are flat with 4 to 6 seeds. The seeds have their long axes at right angles to the suture. In other respects this resembles the former variety.

The seeds alone are used, the pericarp being very fibrous. They are boiled, spiced and eaten as such or mixed with curries. The mature seeds are soaked overnight in water and when they begin to germinate they are sundried and stored for future use. The pods are used as cattlefood also.

Dolichos biflorus.

The horsegram (Tamil Kollu) is grown throughout the year especially in the Madras Presidency and hence it is sometimes called as the Madras gram. It is found throughout the tropics of the Old World. It thrives on very poor soil and requires only a small amount of rainfall. It is often grown as the first crop in newly reclaimed lands. It is generally cultivated in fields by itself and can be sown at any time and in any soil but the usual practice is to sow it in November and harvest in March.

It is a low densely branched herbaceous annual with long trailing branches. The stem is round and hoary; the leaves are tri-foliate and the stipules are lanceolate 6 to 9 mm. long. The leaflets are ovate (the lateral leaflets being slightly oblique) and densely covered with long hairs. The flowers are yellow and formed in axillary fascicles. The keel petals are as long as the wings but broader and slightly free at the base. The stamens

are of two lengths, 5 of each kind with oblong anthers. The ovary is sessile and covered with hairs; the style is slightly bent with a slightly swollen dark green stigma. The pods are flattened, falcate, softly hairy, 2 inches long and 1/3 of an inch broad with 5 to 6 seeds. The seeds are kidney shaped, reddish brown to black and often with a mottled appearance.

It is cultivated both for its seed and as a fodder crop for horses and cattle. It is also raised as a green manure or smother crop. The seeds and the flour made from them are used in the preparation of many articles of food. The seeds are often boiled with water used for drinking purposes especially in the cold season. The pulse is boiled and given to horses. Soups and porridges are also made with this. Medicinally also the seeds are valued.

Cajanus Indicus.

It is known as cadjan or pigeon pea (Tamil: Thovarai, Hindi: Dal) and is supposed to be a native of Africa where it grows wild but has been in cultivation in India from as early as 1686. The common varieties are (1) *Cajanus indicus var. flavus*, where the standard is wholly yellow, with 2 or 3 seeds in pods which are never spotted and (2) *Cajanus indicus var. bicolor* in which the standard has red veins, the pods are streaked and contain 3 to 5 seeds. The former is a 3 months crop and is comparatively less robust. The latter is really perennial but is kept in the field only for 9 months and is profusely branching and robust. There is yet a third variety which assumes the size of a bush and is commonly met with in gardens in Bangalore and Mysore as a hedge plant. *Cajanus indicus* is grown throughout India more extensively in Bombay, United Provinces and Central Provinces. In Madras it is commonly cultivated in Salem, North Arcot, South Arcot, Madura, Tinnevely, Bellary, Ganjam and Coimbatore. It is grown either as a pure or mixed crop. The var. bicolor is sown in June and harvested in February. It is a hardy plant and thrives even in seasons of drought. It grows best in red clayey loam.

It is a branching annual undershrub, growing to a height of 3 to 5 feet. There is a deep tap root reaching to a length of 1½ to 2 feet with a number of lateral branches. The stem is round at the base with 5 to 6 raised whitish ridges running down the lengths of the branches from the leaf bases. The branches and the stem are finely pubescent woody and fibrous. The leaves are

pinnately trifoliate, stipulate the stipules being small and lanceolate, petiolate, the petioles being ridged and pulvinate. Leaflets are stipellate, elliptic, entire, acute, 5 to 7 cms. by 2 to 3 cms., densely clothed with soft hairs, velvety to touch and with a number of yellow glands distributed on both the surfaces but more on the lower.

The flowers are in axillary and terminal racemose fascicles, bracteate and ebracteolate with orange coloured corolla. The calyx is gamosepalous, persistent, green with 5 lobes, the posterior two being connate. The standard is suborbicular and short clawed; the wings are as long as the standard and spurred; keels are of a light greenish yellow colour, free at the base and apex and united in the middle and as large as the wings. The stamens are diadelphous, 9 plus 1, of two heights, 5 short and 5 long and curved with yellow anthers. The ovary is flattened with a bent style and capitate stigma. The pod is 3 to 4 seeded constricted between the seeds. In one variety irregular coloured markings, giving a mottled appearance, are present on the surface of the pod. The seeds are round and flattened with yellow or orange coloured kernels.

Next to rice or wheat it forms the most important constituent of the Hindu diet. The seed is cooked as it is or made into a flour and consumed. The tender green pods are sometimes used as a vegetable; the split peas are employed in the preparation of sweets and pungent delicacies. The leaves and the prunings of young shoots are given to cattle. The husk of the seed with the attached bits of kernel forms favourite food of milch cows. They are used for making charcoal for gunpowder. The seeds are soaked and mixed with wet red earth and kept in this condition for a length of time. Later they are dried and then split. This treatment improves the keeping and cooking qualities of this pulse.

The importance of Silage for Cattle in South Kanara.*

BY S. KRISHNA NAYAK, L. Ag.

(Summary.)

On the West Coast cattle are small, stunted and unfit for road-work. A cow on an average gives less than 2 lb. milk per day and thousands of cattle are purchased from the neighbouring provinces every year.

Of the many causes that lead to the deterioration of cattle, the chief is the want of good fodder for a major portion of the year. Practically from January to July cattle starve. From August to November green grass is available but the irregular rainfall affects its supply. Thus cattle become weak and thin; some of them die at the on-coming of the south-west monsoon and those that survive begin to decline after November.

The only remedies that can be suggested are (1) the growth of fodder crops and (2) preservation and utilization of hill grass which is available in large quantities.

The following paragraphs record the results of three trials made in the latter direction in Moodbidri in South Kanara :

During the second week of November hill grass which was fully mature was cut and put into pits 13' x 13' x 6'. It was spread uniformly in thin layers taking care to press it thoroughly by making two big animals trample on it. For every layer of 9" thickness, powdered common salt was sprinkled uniformly at one handful of salt per bundle of grass (100 lb.) The process of filling in was continued until after the stuff was two feet above ground when it was covered with a layer of dry grass and earth. The top and sides were also plastered over. The pits were opened in January and the contents removed in small quantities and fed to cattle daily. The stuff was very good. It had a brown color and a delightful smell and was quite agreeable to cattle.

* Paper read at the M. A. S. U. Conference in July 1928.

Cost of preparation :—

MR. DHARMASAMARAJAYA'S PLOT.

	R.	A.	P.
Digging pit 13'×13'×6' 16 men	8	0	0
Cutting grass 24 bundles or 24,000 lbs.	10	2	0
Transporting and carting	5	0	0
Filling in . . . 7 men	3	8	0
Hire of animals for trampling	2	0	0
Salt	1	0	0
Covering and plastering	0	6	0
	Rs. 30	0	0

Cost per 100 lb. two annas or per cft. Rs. 0—0—6.

In the Mission Coconut plot the cost per 100 lb. was Rs. 0—3—1 and in Mr. Bijoor's plot Rs. 0—3—4. The average of the three plots came to Rs. 0—2—4 per 100 lb.

Thus out of a pit with 24000 lb. of grass put in, 8 animals could be maintained at 20 lb. per day per animal for over 4 months at a total cost of Rs. 80.

This is a lesson which every South Kanara ryot should lay to heart and by which he could save himself and his cattle from ruin as all over the district immense facilities exist for preparing ensilage.

Principal Tadulingam's Welcome Speech.

Your Excellencies, Ladies and Gentlemen,

Once more it is my proud privilege to welcome you all to this—the 17th session of the Agricultural Conference. Sir C. P. Ramaswami Ayyar who presided last year referring to his visit to His Excellency Viscount Goschen's farm said "Having had an opportunity of seeing the house and farm I was struck with obvious proofs manifested by the present state of the farm and the keen interest in agricultural operations evinced by His Excellency." We have the unique honour of having His Excellency himself to preside over this, the last conference during his Governorship. To us it is a very real token of His Excellency's deep and continued interest in Agriculture and a great stimulus in our work. We have had proofs of this interest in the titles of Rao Bahadur conferred on two of our members Messrs. T. S. Venkataraman and D. Ananda Rao and I take this opportunity to congratulate them on this distinction. Two years ago the Freeman Building was opened by Your Excellency and the year just past saw the installation of the Teaching Section in the new building. The eagerly expected report of the Royal Commission on Agriculture has just been published and in a year or two the members of our Union will be called upon to play an ever increasing part in the developments that are certainly ahead. The opening of Animal Nutrition Section, the sittings of the Townsend Committee on Co-operation and the requisition of one of our members Rao Bahadur M. R. Ramaswami Sivan to help in the scheme of opening an Agricultural College in the Benares University are events of the greatest significance. The outlook of the educated section of the public has, it is gratifying to note, undergone a distinct change and the huge number of applications for admission into the College this year is ample testimony to this tendency. It is therefore with a spirit full of satisfaction at past achievements and keen optimism in the future that I welcome you to begin your deliberations and will stand no more between you and the Secretary who will present his report.

Once again Your Excellencies, ladies and gentlemen, I extend to you my most sincere welcome.

PRESIDENTIAL SPEECH.

BY

HIS EXCELLENCY VISCOUNT GOSCHEN.

It is a great pleasure to me to be able to be present here today to take part in your celebrations and to meet so many students at present attending the College and old boys. It is now some time since I paid you a visit and under the guidance of Mr. Anstead I have today seen much that has interested me. I have listened with interest and pleasure to the report of the Working Committee of the Madras Agricultural Students' Union which has just been read. I am confident that a gathering such as this must have valuable results and should be encouraged in every way. It demonstrates to the public the interest which present and past students are taking in agriculture. It affords an opportunity for past officers and students to keep in touch with the work of the College and to maintain friendships which have been made during their residence, and most important of all by discussions such as will ensue today to exchange views on current matters important to the agricultural world.

Mr. Anstead has asked me to inaugurate the discussion which takes place here this afternoon on agricultural subjects. But I am not sure in what capacity he expects me to address you,—as Governor of the Province or as an agriculturist myself. Perhaps he hopes that you may find a judicious blend of both. As Governor of a Province, of which the majority of the population are dependent on agriculture, it is but natural that I must be deeply concerned with the progress of this industry and with all measures that may conduce to the betterment of the rural population. As an agriculturist I have deep sympathy with landowners and ryots in those anxieties and worries which fall to the lot of all farmers the world over. Your Principal in his address referred to a visit paid to my estate by Sir C. P. Ramaswami Ayyar and the kind remarks he made in connection with it, but he omitted to state a fact of which he was perhaps unaware, that my farm consists of some of the worst and most heart-breaking land in England. I mention this not as a farmer's grumble but merely that you can understand how sincere is my sympathy with the agricultural class.

The Secretary of the Union kindly expressed on behalf of the students the pleasure it gave them to see Lady Goschen here to-day. I am sure she appreciates that reference, and as the wife of an agriculturist she knows enough of the subject to take a practical interest in it, while as my helpmate in this Presidency she has always been anxious to assist all the efforts made to improve the conditions of life of the women and children in the towns and villages. Indian ladies also are taking a considerable and helpful interest in social problems, especially those connected with education and health. May I suggest to them that there are opportunities for work in connection with agriculture and village life in which their help will be greatly appreciated.

The Principal and the Secretary of the Union have both of them in their addresses referred to the recent publication of the Report of the Agricultural Commission. If it has been eagerly awaited, I think I may say that it has not disappointed the high expectations that were raised. It is a statesmanlike document, lofty in its ideals, broad in its view, embracing in its purview not only agriculture in its narrower sense but the conditions of life of those who are engaged in it and measures which may be taken for their uplift. It is a report of absorbing interest and should be read by all who have at heart the welfare of the Presidency. Now I have had sufficient administrative experience to know that Reports often find a haven of rest in pigeon holes where they remain in an inglorious oblivion. By their sheer bulk this Report and the evidence upon which it is based might seem to defy such a method of disposal, but that bulk is not disproportionate to the immensity of the issues with which it deals and I can assure you that it is with reference to its intrinsic value that the Government are determined that this Report shall not suffer such a fate. I can assure you that the Government do not intend that such should be the existence of this Report. They intend at once to take it into consideration and to proceed immediately with certain recommendations of administrative reform. We are calling together the heads of the various Departments concerned that we may bring about that co-ordination between them recommended by the Report and which is so urgently needed. If we are to achieve progress, that progress must be made all along the line and our energies and financial assistance must not be devoted to one selected Department. Our tactics must not

consist of isolated rushes by separate units but of a united advance in which all units must co-operate and have a knowledge of a concerted scheme. This can only be achieved by the co-operation of all Departments concerned,—Agricultural, Co-operative, Educational, Forest, Veterinary, Health and Research. Now I have placed 'Research' last in the list because I want to devote a few sentences to this subject if you can bear with me a little longer. I do not know exactly why it is, but I am confident that sufficient importance is not attached to Research, probably because in India it is as regards agriculture in its infancy. Demands for its financial support are not popular, for which one of the reasons may be that results—the outcome of painstaking and laborious work—take time to achieve. The public like 'quick returns.' Another reason may be the erroneous impression often entertained that it is the hobby of scientists and not practical politics. All these arguments are based on false premises. In the words of the Report: "The basis of all agricultural progress is experiment." And in this Presidency we can in certain directions see the fruit of research in connection with sugar cane, cotton, paddy, in which experiments have already been made as to the best cane or seed to be grown with results beneficial to the grower. But there is an enormous field for Research. To mention only one matter of vital importance to the ryot, "manures"—on which research is proceeding, or again the subject of nutrition on which the health of the village population depends, a subject in which both the Board of Agriculture and the Department of health are concerned. If it is once realized how greatly the physique of the people can be improved by research and thereby also their happiness and their capacity for output, surely money for this object will be willingly granted. But more is needed besides financial support and that is the acceptance of the fact by the agriculturists that progress in these directions is needed. The period of resignation to present conditions must pass and must give way to a determination on the one side to proceed with measures for the improvement on a scientific basis of the methods of agriculture and on the other to co-operate with the Government in such measures and to take an active and willing share in their promotion. What the Commission describes as the "advance of the rural community towards a fuller life" can only be attained by the co-operation not only of Government Departments but by the sympathetic co-operation of the Government and the community themselves.

To create a public opinion favourable to advancement education is necessary and here I hope we have found one means of supplying it. I was much struck by the report of the good work which was done in other parts of the Empire and in North India by advertising trains on the railways, exhibiting agricultural products, seeds, machinery, implements, etc. It seemed to me, however, that in this Presidency motor vans might serve a more useful purpose as they would be able to penetrate to villages far from the railway and attend shundies. In co-operation with Mr. Anstead who is enthusiastic over the scheme we have devised the vans which are here today and which we intend despatching on a preliminary tour. One van will house the lecturers and demonstrators and a magic lantern will be attached to the car. If the scheme proves a success, I hope to add another van from the Public Health Department to advertise their work and explain to villagers the protective measures which they should adopt and generally advise them on matters of hygiene. In time to come I hope possibly private enterprise may help us in this direction by providing vans in districts. Education and demonstration is necessary before we can expect cultivators to adopt the most up to date methods of growing crops, of realising the most suitable crops to cultivate, of breeding and rearing stock; but once this is given to them I am very hopeful that we shall receive their cordial co-operation. We hope also by adopting various suggestions made to us by a Committee which sat to examine the work of the Co-operative Societies to extend their usefulness, as it is through their assistance that we can approach the ryots and increase their power of self-help. I am confident that we can rely on the cordial support of landowners to assist us in our efforts to improve the system of agriculture for the benefit of the Presidency and all classes engaged in this industry.

I should like to mention today one example of the enthusiasm and generosity of this class which has already occurred. The Raja of Parlakimadi has placed at my disposal the sum which he received for allowance during the period of his services on the Commission. He and I and Mr. Anstead have been in consultation as to how this gift can be most usefully applied and we have decided to set up with it a scholarship at Pusa for men who have already served in the Department for a period of at least for 5 years and shown that they are likely to benefit for intensive training at Pusa to enable them to take post graduate course in plant genetics and fit themselves for the higher ranks of the service.

Now, Gentlemen, I fear I have detained you too long and yet I have had to leave unsaid many matters connected with the Report which I should have liked to discuss with you today, but I would, if I may, conclude with an appeal to you all.

We have reached an important milestone on our "agricultural way," and you, the professors and students, past and present, can greatly assist us in determining the progress we can make in the future in approaching our ideals by the zeal and thoroughness you bring to bear on your work, by the maintenance of your enthusiasm after you have passed through the doors of this College and by your realization of the fact that to make a success of your careers to theory and scientific knowledge you must add and keep up to date practical knowledge as well. Great responsibilities rest upon you which I am confident it is your earnest desire to fulfil that thereby you may serve the great industry to which you have devoted yourselves and increase the prosperity, happiness and welfare of those who are dependent for their livelihood upon it.

Mr. R. D. Anstead's Speech

In proposing a vote of thanks to His Excellency the Director spoke as follows:—

Your Excellency and Viscountess Goschen,

This is the one occasion in the year when I can lay aside my rod of office and cease for a few hours to be Director of Agriculture, for, I attend this Conference as an Honorary Member of the Madras Agricultural Students' Union and in their name it is my very pleasant privilege this afternoon to propose a vote of thanks to you for taking the trouble to come here and preside at this Conference. We trust that you have formed a good impression of this Union and of the value of this Conference. The Union was started in the early days of the College by a wise and beloved Principal, Mr. Wood whose memory is still green in these halls and its spirit is one which I know will appeal to your Excellency. The Union aims at the promotion of good sportsmanship and a bond of affection between past and present students of the College and all those Professors and others who take and have taken an intensive part in the College life. Perhaps I can bring home to you, Sir, the spirit of the Union if I tell you that when I came to reside at the College some years ago, I was entitled to wear certain cricket colours not altogether unknown, but despite this I had to win my College colours. I am proud to say that I did so and I am pleased to be able to say that the whole time I was here I played as an ordinary member of the College team under a captain who was a student. That will perhaps give you an idea of the spirit at which we aim.

As regards this Conference which has been held annually for a long time we trust that your Excellency approves of it, and I may perhaps be permitted to remind you that it will be continued during the next two days. It affords an opportunity for junior members of the Agricultural Department to try their wings, to give the present students an idea of what the Agricultural Department is trying to do and the general public a chance of taking part in discussions and criticisms of our work in a friendly spirit. We note with alarm a slight tendency on the part of the authorities to curtail the scope of the Conference and

to restrict the attendance thereat. We hope that if Your Excellency has formed a favourable impression of the Conference and its value, you will speak very seriously to the Director of Agriculture and persuade him to oppose any tendency to restrict the function.

Your Excellencies, I know that during the course of the year you listen to a very large number of votes of thanks, most of them couched in much the same terms. I want, if possible, to make you feel that our thanks are not just stereotyped. We truly thank you from the bottom of our hearts, not only for your presence here to day, and for the stirring address you have delivered to us but also for the kind interest you have always shown in the College and the work of the Department since first you arrived in the Presidency. Please believe me when I say that we really appreciate your kindness and are grateful to you. So long as we know that we have your sympathy and good wishes in what we are trying to do, we are quite content and have our reward.

In the name of the Students' Union I thank you both. We are particularly grateful to Viscountess Goschen for honouring us with her gracious presence and we take it as a very great complement.

A short note on different adhesives to Bordeaux mixture.

BY R. NARASIMHAN.

Sub-Assistant in Mycologist.

Bordeaux mixture is a mixture of coppersulphate and of lime in equal quantities of water. This mixture is sprayed on to plants for checking fungus diseases. Adhesives are substances added to make the constituents of the mixture adhere to the plants without being washed down.

A small trial was made in the Botanical gardens and round about Coimbatore to find out the comparative adhesive properties of different substances namely, Resin with soda, Casein with soda, Casein in lime water and Fish oil soap.

Spraying was done against Rust on figs, Sooty mould on guavas and sapotas, Fruit-rot on papayas, Die back on orange and against Mildew on grape vine.

A short description of the method of preparation of different adhesives is given below:—

Resin with soda For every 50 gallons of Bordeaux mixture 2 lbs. of resin and one lb. of soda are added. Soda available in the bazaar is boiled in a gallon of water and in the process resin is added in small quantities at a time and well stirred. This solution is boiled gently over a slow fire until the colour is like that of coffee decoction. Now it will stick on to your fingers if you dip them. This is just the stage when the vessel should be removed and the contents added to the Bordeaux mixture. Insufficient boiling, however, results in a non-sticky gritty mixture which will clog the nozzle of the sprayer. It takes about 40 minutes for the above process.

Casein with soda. The strength of the solution made was 10 oz. of Casein and 5 oz. of soda to 50 gallons of the mixture. This process is the same as above except that casein replaces resin. In 20 minutes the solution assumes the whitish colour of rice kanji. When the solution is added on to the mixture Casein readily disappears in the mixture and does not alter the sky blue colour of the mixture while resin does to a slight extent.

Casein in lime water. To make a 50 gallon mixture 1 lb. of casein and 1 lb. of lime are required. Lime is dissolved in a gallon of water to which casein is added and stirred well for about

15 minutes and the solution added to Bordeaux mixture. The Mysore Agricultural Department, however use casein with lime water. The resultant mixture is always efficacious.

Fish oil soap. In this mixture fish oil soap forms only 6 per cent. To make a mixture say of 50 gallons, dissolve 3 lbs of Fish oil soap in about 16 gallons of water. This should be well manipulated until the soap is fully dissolved and added to the mixture. Don't use water containing salt as the mixture gets curdled and chokes up the nozzle of the sprayer.

Results of trials are below :—

Adhesive.	Kind of tree.	For what fungus.	No. of trees sprayed.	Effect of spraying.	Remarks.
1. Resin and soda.	Figs.	Rust.	24	Three sprayings (after the leaf fall season) once in a fortnight, keeps down the disease.	Good adhesive. It stands rain, cheap and available in any bazaar.
2. Casein and soda.	Figs and Grape vine	Rust and Mildew	5 6	„ „ Three sprayings after pruning checks the disease.	Very good adhesive. Costly not easily procurable anywhere. Easily damaged by insects when the bottle containing it is exposed.
3. Casein and Lime water.	Orange and Roses	Die back and Mildew	10 7	Pruning the dead twigs and spraying checks the disease.	Do. Do. Do. Do.
4. Fish oil soap.	Guavas and Sapotas	Sooty and mould	25 9	3 sprayings minimise the degree of attack.	An adhesive of doubtful character Easily washed down by rain. A good remedy for a combined attack of insect and fungus.

It is added that of the above adhesives spraying with the last one alone requires supervision, the other three show themselves out by their very nature on the leaves and plants even long after spraying while the last is easily washed down by rain.

So far the trials with the adhesives at Coimbatore show that resin and soda is the one that can be safely recommended to ryots.

EXTRACTS.

Newspaper Entomology.

The cutting herewith speaks for itself. If this be an average sample of newspaper information what about other matter we read day by day?

"The 'plague' of caterpillars in the Farnullen district of Lisbellaw (Fermanagh) has been the happy hunting ground of entomologists and Government officials during the past week. Since the announcement of the 'plague' these caterpillars have been discovered also in force in other parts of the country.

"Our correspondent who visited the scene of the outbreak, writes that the fields in which the caterpillars are in force are masses of crawling, black creatures, about an inch in length. Even the roadways and lanes are covered with them, particularly in the sunshine. Some farmers to prevent their ingress to their homesteads have laid around the houses a line of tar.

"Major Henderson, of Lisbellaw, who is home from British Columbia, where he has a large fruit farm, and who has experience of caterpillar plagues, being an authority on entomology, is of opinion that the 'plague' will have passed in a month or so.

"Already some fields have been partially burnt by the farmers, where the long tufts of grass were found thick with the caterpillars.

"Sir Chales Langham, Bart., Tempo Manor, has identified the caterpillars as harmless *melitoea aurinia*, known as the 'greasy frittillary.' He says the caterpillars feed on weed in wet pasture land and, therefore, do good."—Northern Whig., May 4th.

(Page 94, Entomologist's Record, and Journal of Variation
Vol. XI, No. 6, June 1928.)

Y. R. R.

Science and the Wheel-barrow.

An interesting Report.

In recent years a revival has occurred of endeavours made in the eighteenth century to place the use of muscular energy on a physiological foundation. The most recent of these is described in a report published by the Industrial Fatigue Research Board on the transport of bricks in wheel-barrow.

The observations described in the report were conducted at the works of Messrs. Itter Limited at King's Dyke, near Peterborough, which are engaged in the production of Fletton bricks. In the course of a day a single barrow worker moves some 10,000 burnt bricks or 8,000 green, and the day's work of each man amounts to moving something like 20 tons of bricks from 25 to 75 yards. The observations made were confined to the journey from the kiln to the siding. The methods by which this labour was measured was to determine the normal consumption of oxygen of the man while at rest and immediately afterwards the consumption while performing the work under investigation, using a respiratory apparatus, which included a Douglas bag for collecting the expired air. The barrows were of the one wheel type, and the legs were 14 in. to 16 in. high. The path from the kiln to the siding was often iron plated, but did not always run direct, and the change of direction sometimes abrupt, says "Engineering."

Some results of practical importance were obtained. For a journey of about 50 yards, for example done by a normal man at a brisk walking pace the percentages of the aggregate working done in raising and lowering the handles, stopping and starting and maintaining speed were respectively 7.75, 21.55 and 70.7, so that any intermediate stop added about 30 per cent to the work, involved in the journey.

As the result of these observations, a practical trial was given in the works to certain alterations in the length of the barrow legs and it was found that better results were got by increasing it to 18 in. The arrangement of the load so as to give a balance of the height suitable to the stature and length of arm of the worker was also found to give improvement in the work of men who had not used it previously. In fact however experienced men were found already to have adopted for their own use the arrangement which was recommended afterwards from the physio-

logical point of view. On the strength of observations as to the relative proportion of energy absorbed in starting and stopping, it was recommended that the track should be so arranged as to avoid intermediate stops during a journey. The 18 in. barrow leg has been adopted in the works, and fitted with an iron shoe so as to keep the height fairly constant. Arrangements have been made for fresh workers to have their load so built up as to balance the barrow at a height suitable to their height and length of arm.

NOTES.

Cricket at the Agricultural College Visitors vs Students.

The annual cricket fixture in which visitors to the College Day and Conference play with the residents of the Agricultural colony was played on the 12th instant before a big gathering. The visitors' team included Messrs. Anstead and Ramaswamy of Presidency fame besides Messrs. Chockalingam, Bhandary and Vasudevan well known players from Ootacamund. Mr. Anstead who captained the visitors won the toss and sent in Ramasawmy and Bhandary to face the attack of Venkataraman and Natesan. Runs came in merrily at the beginning Ramaswamy scoring freely off Venkataraman's slow deliveries. Thomas—the Home-skipper relieved Venkataraman at the College end and the batsmen were content with singles against good bowling from both ends. The partnership did not however last long, for Bhandary in trying to drive Natesan lifted the ball into the bowler's hands. Chockalingam came to partner Ramaswamy and a good partnership was anticipated, but Ramaswamy in his anxiety to force the pace sent a meek return for Natesan to bring off another but a more difficult catch off his own bowling. Vasudevan took Ramasawmy's place at the crease and the Ooty pair played careful yet attractive cricket so that the score mounted to 70. At this stage Shetty relieved Thomas at the College end and Chockalingam who was playing a plucky game fell a victim to one of Shetty's good length deliveries. With the dissociation of the partnership the scoring slackened though now and then Vasudevan relieved the monotony by a crisp drive to cover. But his career was short-lived. For Thomas taking over from Natesan from the pavilion end dismissed Vasudevan who conceded a catch at mist off. Thereafter the bowlers had the upper hand of the batsmen till when

Mr. Anstead came to the crease and demonstrated a bit of his old game. His partners however failed him, one by one, so that when the winnings came to a close for 136 he was left unbeaten with a well-played 15 to his credit. For the visitors, the chief rungetters were Ramasawmy, Chockalingam, Vasudevan, Anstead and Rai who scored 39,27,22,15 (not out) and 13 respectively. The bowling honours were shared by Natesan, Thomas and Shetty who captured 4, 3 and 3 wickets conceding 28,14 and 23 runs respectively.

During the interval Mr. Tadulingam the President and other members of the Agricultural Officers' Cricket Club were "At Home" to the visitors. After partaking of an enjoyable Tea, the party sat for a group-photograph.

On resumption, the Homeskipper sent in Shiva Rao and Subramanyam to face the trundling of Ramaswamy and Vasudevan. Ramaswamy sent down two successive maidens, but Subramanyam clearly turned Vasudevan to the leg boundry twice in his first over. With 19 runs on the board the homesters encountered their first disaster, Shiva Rao falling a victim to Vasudevan, thanks to a marvellous catch made by Ramaswamy in the slips. Venkataraman stepped into the breech and opened confidently collecting two braces and a single off Vasudevan by crisp cutting. But Vasudevan had his revenge before long by rattling Venkataraman's stumps with a ball that turned in considerably. Vasudevan very nearly repeated his success immediately but Chockalingam dropped Subramanyam in the slips. Subramanyam celebrated his life with a good display of cricket hitting the bowling all round the wicket and in spite of several changes in the bowling raised the score in partnership with Shetty to 86 when Shetty who was playing a sound game and had collected 24 runs was unfortunately run out. Saldanha joined Subramanyam and when stumps were drawn the pair had raised the score to 114 of which Subramanyam's contribution was 56. Thus the contest ended in a draw for the third time in succession, though this year it was greatly in favour of the home-team.

Students' Activities.

Activities of the students were in full swing soon after the admittance of first year candidates. The welcome to them by the second and third year students came off on the 17th close at the heels of the successful college week celebrations. After tea, Mr. Annamalai read an address of welcome to the fresh arrivals and

introduced them to their new associations, the college hostel and Estate. The Literary and Game secretaries welcomed them to the activities of the club and the athletic field in short and spirited speeches. The latter traced back the athletic activities of the Students' Club from 1912 exhorting them to keep up the past traditions and made them understand that the role they were called upon to play as students of this college, was in no way less dignified and less amazing than that of men in other walks of industry. Several other students spoke thereafter, one of them referring to the grand welcome extended by Nature's dumb voice. Dr. T. V. Ramakrishna Ayyar next gave a graphic idea of his experience of welcome parties given in America to fresh men who 'jolly up' with their partners and how they were introduced by old students to their tutors with the help of written cards passed round. He humorously closed with a reference to the welcome afforded by the roaring monsoon winds. None of the speakers attempted to enlighten the audience on the reason why the sickles kept back their hands from welcoming our friends on the first practical day which welcome would have been as hot as the tea they drank, as one of the responders put it. After the response from their first year, the Principal, the President of the function, wound up the proceedings advising the students to develop and foster a spirit of brotherhood. The function was immediately succeeded by an entertainment of comic and tragic scenes from Shakespeare and Mollier by the great mono-actor-Mr. V. Venkoba Rao.

A friendly cricket match was held on the 22nd between the Government college and our college which ended in a draw. The elections of the various team captains and the discussion on the budget came off on the 18th. A new member was elected this year to be in entire charge of the Tennis section. The elections of students, representative on the editorial board of the M.A.S.U. which formed a new feature this year were over.

The Cecil Wood Memorial Fund.

At a meeting of the students of Mr. R. C. Wood, M. A., Principal of the Coimbatore Agricultural College (1909-1922), held in the Freeman Building on the 12th July 1928, under the chairmanship of Mr. K. Gopalakrishna Raju, L. Ag., Assistant Director of Agriculture, it was decided to keep green the memory of their beloved Principal who since his retirement from the Indian Agricultural service in 1922 has been actively connected with agriculture in Africa and recently in the West Indies, as the Professor of Agriculture in the Imperial College of Tropical Agriculture Trinidad. The following resolutions were passed :—

1. That a suitable memorial be instituted to keep green the memory of Mr. R. C. Wood.
2. That a full size oil painting be presented to the College for being added on to similar pictures in the gallery.
3. That a medal be awarded to the best student of the College (under conditions to be decided at a later meeting.)
4. That an endowment be made for a scholarship to be granted (under conditions to be decided later) to a deserving student of this College.
5. And that a prize be awarded annually for the best paper on "Agricultural Economic Survey of any tract of this presidency" (open to all).

With this end in view a provincial committee consisting of the following members was elected :—

1. Mr. K. Gopalakrishna Raju, President.
2. „ S. Narayaniah, Vice President.
3. „ V. T. Subbiah Mudaliar, Secretary and Treasurer.
4. „ R. Chockalingam Pillai, Member.
5. „ R. Narasimhan, Member.

All members of the Department are requested to contribute liberally and send in remittances to the Secretary and Treasurer. The Cecil Wood Memorial Fund, Lawley Road, P.O., Coimbatore. They will be acknowledged in the Madras Agricultural Students Union Journal.

The Sampson Memorial Fund.

A good number of friends and admirers of Mr. H. C. Sampson met on the 13th July. M. R. Ry. A. V. Thirumuruganatham Pillai, Avl., was voted to the chair on the proposition of M. R. Ry. K. Gopalakrishna Raju Garu, which was duly seconded by M. R. Ry. N. S. Kulandaswami Pillai Avl. The chairman of the meeting explained the object of the meeting and re-called the services rendered to the country in the cause of Agriculture by Mr. H. C. Sampson and concluded by appealing that it is only in the fitness of things that Mr. Sampson's connection with the department should be commemorated in some suitable form.

The following resolutions were then passed unanimously.—

- (1) That a portrait of Mr. Sampson's be unveiled and presented to the College gallery.
- (2) That an annual scholarship or a prize associated with his name be instituted, the details of the nature of the prize and the award to be decided after funds are collected.
- (3) That a committee consisting of Messrs. M. Govindakidavu A. V. Thirumuruganatham Pillai, N. S. Kulandaswami Pillai, C. Narayana Ayyar, K. T. Alwa, S. Narayaniah, C. V. Seshachari and V. S. Narayanaswami Ayyar with M. R. Ry. K. Gopalakrishna Raju Garu as the Secretary and Treasurer, be formed to give effect to the above resolutions.

- (4) That M. R. Ry. K. Gopalakrishna Raju Garu be authorised to take steps to collect and receive subscriptions to the above fund.

Members of the Department who are desirous of joining are requested to remit their donations to the Secretary and Treasurer the Sampson Memorial Fund, Lawley Road P. O., Coimbatore or to the Secretary The District Urban Bank, Coimbatore who have consented to be Bankers for the above fund. They will be acknowledged in the Union Journal.

Woodhouse Memorial Prize.

In memory of Mr. E. J. Woodhouse, late Economic Botanist and Principal of Sabour Agricultural College, who was killed in action in France, in 1917, a prize in the form of silver medal and books of a combined value of Rs. 85 will be awarded to the writer of the best essay on a subject of Botanical interest to be selected from the list noted below. The length of the essay should not exceed 4000 words.

The competition is open to graduates of Indian Universities and to Diploma holders and Licentiates of recognised Agricultural Colleges in India who are not more than 30 years of age on the date of submission of their essays.

Papers should be forwarded to the Director of Agriculture, Bihar and Orissa, Sabour, Bhagalpur, East Indian Railway Loop before November 1st 1928.

Failing papers of sufficient merit no award will be made.

B. C. BURT,

Director of Agriculture, Bihar and Orissa.

List of subjects for 1928 prize. 1. Modern methods of crop improvement by botanical methods. 2. The application of cytology to plant breeding. 3. The place of physiological research in botanical science as applied to crop improvements. 4. The importance of lower organisms to the growth of plants. 5. The technique of field trials with special reference to Indian crops. 6. The problem of sterility in Indian crops and fruit trees.

N. B.—The prize essay if of sufficient merit will be published in the Agricultural Journal of India. It must not be published otherwise without the sanction of the Director of Agriculture, Bihar and Orissa.

The examiners will be:—1. The Imperial Economic Botanist, Pusa. 2. The Economic Botanist, Sabour. 3. A Botanist attached to a Provincial Agricultural Department, who will be selected by the Trustees each year. 4. A leading Botanist of an Indian University.

Departmental Notifications, July 1928.

Gazette Notifications:—Mr. M. Mangesha Rao, Demonstrator, to officiate as Assistant Director, I circle.

Non-gazetted Appointments, transfers etc:—Mr. T. Narayana Rao to be Assistant, Millets Section (on probation) V grade, vice Mr. T. R. Krishnamurthi resigned. Mr. P. R. Subramanya Ayya, assistant demonstrator on return from leave to Ettiyapuram sub-circle.

The following persons are appointed as Upper Subordinates V grade, on probation with effect from 16th July 1928:—Messrs. B. N. Padmanabha Ayyar, S. Ramachandra Rao and Krishnaswami Ayyar, V, to the Paddy Specialist's Section; Messrs. Kunhikrishnan Nambiyar, Ramabadrana, G. and T. Krishna Reddi to the Millets Specialists Section; Messrs. K. S. Ranganatha Ayyar, G. Sundaresan, and B. V. Venkatacharaya to Second Circle, Guntur; Messrs. K. Ambikacharan, R. Gopala Ayyar, M. Vaidyanatha Ayyar and S. Muthuswami Ayyar to Third Circle, Bellary; Messrs. K. Krishnan and M. K. Venkatasubramanyam to Fifth Circle; Mr. P. K. Natesa Ayyar Mr. M. K. Padmanabhan to Sixth Circle, Madura and Mr. P. Oothaman to Eighth Circle, Coimbatore.

The following Upper Subordinates-Vth grade-on probation are confirmed in their appointments:—Mr. R. Sankara Ayyar, Assistant to Cotton Specialist; Mr. N. Annaswami Ayyar, and Mr. T. V. Krishnaswami Rao, Upper Subordinates in the agricultural section.

The following promotions of lower subordinates are ordered with effect from 1st July:—Mr. S. Ramaswami Raju to 1st grade; Messrs. A. Kondayya Sarma, R. Sitaramayya and T. D. Iswara Ayyar to III grade, Messrs. T. A. Rangaswami Ayyangar, T. Lakshmiopathi Rao, P. Kannappa Pillai, K. Hanumantha Rao, V. V. S. Varadarajan, E. N. Rangaswami Ayyangar, K. Achyuthan Nambiyar, C. K. Subramanya Ayyar and M. Krishnaswami Ayyangar to IV grade.

LEAVE ETC:—

First Circle:—Mr. P. Lakshminarayana, assistant demonstrator, First Circle extension of leave on average pay for 23 days.

Second Circle :—Mr. S. Sithapathi Rao, assistant demonstrator, Nayadupeta leave on average pay for 20 days from 2nd July. Mr. K. Gurumurthi, Demonstrator, leave on medical certificate for two months and nineteen days from 5th May.

Third Circle :—Mr. K. Rama Rao demonstrator, Cuddapah, leave on average pay for 25th days from 23rd May. Mr. P. V. Subba Rao, assistant manager extension of leave on average pay for 20 days. Mr. A. Krishnaswami Ayyar, demonstrator, leave on average pay for 2 months and 6 days from 25th June. Mr. S. M. Kalyanaraman Assistant on cotton work, extension of leave on average pay from 23rd June.

Fourth Circle :—Mr. E. N. Rangaswami Ayyangar, assistant demonstrator, leave on average pay for 4 months from date of relief.

Fifth Circle :—Mr. K. Sitarama Ayyar, demonstrator, Musiri, leave on average pay for 12 days from 6th June. Mr. V. Subramanyam, Manager, extension of leave on average pay for one month and fifteen days.

Sixth Circle :—Mr. P. R. Subramanya Ayya, assistant demonstrator, extension of leave on average pay on medical certificate for two months from 16th May.

Seventh Circle :—Mr. A. Kunhikoran Nambiyar, demonstrator, leave on average pay for 7 days from 5th June. Mr. E. K. Nambiyar, Manager, Coconut Station, leave on average pay for 3 months from 15th July. Mr. M. U. Vellodi, Manager, leave on average pay for 2 months from 1st July.

Eighth Circles :—Mr. D. S. Subramanya Ayyar, assistant demonstrator leave on average pay for 2 months from 29th June. Mr. V. S. Ramaswami Ayyar, Demonstrator, leave on average pay for two weeks from 25th July.

Live Stock :—Mr. S. P. Fernando, assistant manager, extension of leave on average pay for 15 days. Mr. M. V. Narasimha Sastry assistant demonstrator, Madras, leave on average pay for one month on relief by Mr. M. Alaghiriswami Naidu. Mr. A. Venkobachari, assistant manager, Chintaldevi extension of leave on average pay for one week Mr. S. P. Fernando, assistant manager extension of leave on average pay for two months.

C. S's Section :—Mr. P. Sudarsana Naidu, Assistant, leave on average pay for 25 days from 31st May. Mr. R. Chockalingam Pillai, Assistant, extension of leave on average pay for one month.

G. A. C's Section :—Mr. T. S. Ramasubramanya Ayyar, assistant leave on average pay for two months from 2nd July.

P. S's Section :—Mr. N. Parthasarathy Ayyangar, assistant leave on average pay for one month from 19th June.

G. L. B's Section :—Mr. M. Ratnavelu, Sub-assistant leave on average pay for 13 days from 25th June.

M. S's Section :—Mr. V. Gomathinayakam Pillai, assistant, leave on average pay for 3 weeks from 8th June 1928.

G. E's Section :—Mr. M. S. Kylasam Ayyar, assistant, leave on average pay for 15 days from 30th June. Mr. A. G. Ramasawmy Ayya, Sub-assistant, leave on average pay for 14 days from 13th July. Mr. C. K. Subramaniam, Sub-assistant leave on average pay for 21 days from 26th June.

G. M's Section :—Mr. K. M. Thomas, assistant leave on average pay for 12 days from 5th June. Mr. S. Rajaratnam, Subassistant, extension of leave on average pay for 15 days.

Principal's Section :—Mr. K. M. Jacob, Manager, leave on average pay for one month from 9th July.

BALANCE SHEET OF THE MADRAS AGRICULTURAL STUDENTS' UNION.
FOR THE PERIOD ENDING 31st MAY 1928.

RECEIPTS.	R. A. P.	EXPENDITURE.	R. A. P.
Opening Balance on 1st July 1927 ...	2,541 5 9	Furniture	... 69 2 0
In Fixed Deposit (Ramasastrulu's) ...	693 7 4	Postage Charges	... 105 14 0
Collections—Journal account ...	1,127 12 7	Stationary	... 6 4 0
Donation for College Day ...	183 4 0	Journal account	... 1,070 6 8 ³²
Entertainment—Drama	248 0 0	College Day	... 591 7 6
Donation for Building Fund	38 0 0	In current account	... 1,350 0 0
Miscellaneous Receipts	2 0 0	In cash	... 447 4 2
		In Fixed Deposit	... 1,193 7 4
Total Rs.	4,833 13 8	Total Rs.	4,833 13 8

(Sd.) S. N. Chandrasekhar, . . .
Auditor.

COLLEGE DAY (1927-28.)

RECEIPTS.	R. A. P.	EXPENDITURE.	R. A. P.
Donations for College Day ...	183 4 0	RECEPTION.	
Entertainment (Drama Collections).	248 0 0	Printing Charges.	... 88 15 0
		Presents	... 10 0 0
		Crockery replaced	... 1 10 0
		Refreshment European.	82 9 6
		" Indian	... 106 4 3
		Sports, Prizes, etc.	239 6 9
		Entertainment (Drama).	123 14 0
			193 0 9
		MISCELLANEOUS.	
		Photo	... 15 0 0
		Repairs to furniture	... 2 2 0
		Remuneration	... 18 0 0
			35 2 0
Total Rs.	431 4 0	Total Rs.	591 7 6

(Sd.) S. N. Chandrasekhar,
Auditor.

Journal Account.

RECEIPTS.	R.	A.	P.	EXPENDITURE.	R.	A.	P.
By Subscriptions.	1,103	12	7	Printing Charges.	765	6	0
By Advertisement Charges.	24	0	0	Preparation of Photo and Blocks.	70	6	0
				Establishment Charges.	234	10	8
Total Rs.	1,127	12	7	Total Rs.	1,070	6	8

(Sd.) S. N. CHANDRASEKHAR,
Auditor.

Budget for 1928-29.

RECEIPTS.	R.	A.	P.	EXPENDITURE.	R.	A.	P.
Closing Balance on 1-6-28.				Lighting	15	0	0
*In current account	1350	0	0	Postage.	120	0	0
Fixed Deposit (Ramasastrulu Mungala endowment.)	693	7	4	Repairs to furniture and building.	50	0	0
do.	500	0	0	Stationery.	20	0	0
In cash.	447	4	0	College Day celebration.	500	0	0
College Day.	500	0	0	Journal.	1040	0	0
Journal.	1500	0	0	Establishment.	288	0	0
				Ground-rent.	0	8	0
				Furniture, crockery, table cloth etc.,	175	0	0
				Total Rs.	2208	8	0
				Closing Balance.	2782	3	4
	4990	11	4		4900	11	4

* Since transferred to Reserve Fund Rs. 1000 in 2 year deposit.

(Sd.) M. C. CHERIAN,
Secretary.

APPENDIX.

REPORT OF THE WORKING COMMITTEE

OF THE

Madras Agricultural Students' Union, Coimbatore.

For the year ending 30th June 1928.

YOUR EXCELLENCY, LADIES AND GENTLEMEN,

THE Committee beg to submit an account of the work of the Union during the year 1927-28.

2. This Union, though christened the Students' Union, is composed both of past and present Students of the College and of Officers of the Department. It claims as Patrons a fairly large number of gentlemen interested in Agriculture. Since its inception 18 years ago this institution has had the rare privilege of welcoming successive Governors of this Province on several occasions and the Union has this year the unique honour of having Your Excellency to preside over and guide the deliberations commencing to-day. It was only this day two years ago that Your Excellency was most graciously pleased to open the Freeman Building and the Exhibition located therein on the occasion of the celebration of the Golden Jubilee of the introduction of Agricultural Education in Madras. Your Excellency's interest in agriculture is further evidenced by the several schemes proposed and partly given effect to for the amelioration of the ryots during Your Excellency's term of office. The inauguration by Your Excellency of the Demonstration Car this afternoon is the latest instance of Your Excellency's sympathy for the welfare of the toiler in the field. We are indeed grateful to Your Excellency for accepting our invitation. We would also thank Her Excellency Viscountess Goschen for Her Excellency's presence in our midst to-day.

3. This day last year we held the 16th College Day and Conference and it was presided over by the then Hon'ble Law Member Sir C. P. Ramaswami Ayyar. Twelve papers were read in all on different subjects and discussions held.

College day and Conference.

The Sports were held on the first day. There were several events for which a large number of competitors entered. The Champion of the Day was Mr. S. Ramaswami, Student of Class II. Mrs. Anstead kindly gave away the prizes. There was a friendly Cricket match between the visitors and residents which ended in a draw. The Conference sessions were interspersed by entertainments during nights in English, Tamil and Telugu. During the sessions opportunity was also taken to have the photo of Rao Sahib, now Rao Bahadur, M. R. Ramaswami Sivan who had just then retired as Principal, unveiled by the Director Mr. Anstead.

4. Along with the public, we, the members of the Union, were anxiously awaiting the report of the Royal Commission on Agriculture. The Lidlithgow Commission. Now that it has been published, we hope their recommendations will greatly influence the future agricultural policy in this Province.

5. The Committee feel gratified that during the past two years to meet the increase in demand for agricultural education, Government have been pleased to extend facilities both in the shape of Laboratories and increase in the number of admissions largely through the strenuous efforts of our popular Director Mr. Anstead. We feel that the demand is becoming more and more insistent as is evidenced by the large number of applications this year. It is hoped that with further facilities for agricultural education improvements are possible in this direction.

While on this point, the Committee urge consideration of two matters by Government, viz., (1) the institution of Post Graduate studies about which members of the Union approached the then Hon'ble Minister for Development last year and (2) the starting of Agricultural Colonies for trained students by the grant of lands and advances of money as in the Punjab and in Travancore.

6. The Journal has continued to run its course notwithstanding the difficulties incidental to agricultural journalism in this country. Proposals for its further improvement will be placed before the Business Meeting of the Union.

Journal.

7. The financial position of the Union is satisfactory. The statement of accounts for the year ending May 31, will also be submitted at the Business Meeting.

Accounts.

8. The Ramasastrulu-Munagala Prize for the best account of original research work or enquiry carried out on any agricultural subject goes this year to Mr. K. L. Ramakrishna Rao. This prize was instituted by students and officers of the Department to perpetuate the memory of the late Mr. K. Ramasastrulu Naidu, Assistant Director of Agriculture and of his friend and patron, the present Rajah of Munagala.

9. The Union would take this opportunity of congratulating their members Mr. D. Ananda Rao and Rao Sahibs T. S. Venkataraman and M. R. Ramasami Sivan on the Rao Bahadurships conferred on them.

Congratulations.

In conclusion, the Union beg to tender their thanks to Sir C. P. Ramaswami Ayyar, the President of last year, Mr. and Mrs. Anstead, our President Mr. Tadulingam, to Mrs. P. V. Ramiah and other conveners and members of Committees, to Mr. H. Shiva Rao, Captain of the volunteers and other ladies and gentlemen who helped us to make the College Day and Conference a success.



(v)

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(vi)

Amendments to the Rules of the Union

Members under old rules whose arrears to the Union exceed a sum equivalent to their two years' rate of subscription for the journal will not be eligible either to vote or to serve on any of the Committees.—M. Rajagopalan.

In rule 3 after the word "journal" insert the word 'quarterly.'—C. S. Krishnasami.

The title of the journal instead of as at present shall be "the Madras Agricultural Journal"—Organ of the Madras Agricultural Students' Union.—V. Muthusami Aiyer.

There shall be an editorial board of not less than five members ordinarily to represent one section each of whom two namely the Editor and one member shall be members of the working committee; the Vice-President shall be the ex-officio member of the board.—V. Muthusami Aiyer.

Donation for a patron shall be Rs. 250 instead of Rs. 100 as at present.—V. Muthusami Aiyer.

(vii)

SEVENTEENTH COLLEGE DAY AND CONFERENCE. PROGRAMME.

SATURDAY.

JULY 7TH 3 P. M.—Sports. Union "At Home."
Mrs. Anstead gives away the Prizes.

SUNDAY.

JULY 8TH 5 P. M.—Hockey Match.

MONDAY.

JULY 9TH 11 A. M.—His Excellency Viscount Goschen, G. C. I. E.,
G. B. E., V. D., inspects Exhibition.

NOON to 2 P. M.—His Excellency opens Conference.

Reading of the Annual Report by the Secretary.

Address of Welcome by Principal Tadulingam

Presentation of College Medals and Prizes by His Excellency.

Reading of papers and discussion.

Vote of thanks to His Excellency by the Director Mr. R. D.
Anstead.

Group Photo.

TUESDAY.

JULY 10TH FORENOON.—Visits to Laboratories & Breeding Stations.

„ 1 TO 4 P. M.—Conference II Session.

„ 9 P. M.—Entertainment (Admission by tickets.)

WEDNESDAY.

JULY 11TH FORENOON.—Visits to Breeding Stations and Exhibition.

„ 9 A. M.—Joint Conference of Deputy Directors and Research
Officers with officers of Nitrams Limited.

„ 1 to 4 P. M.—Conference III Session.

THURSDAY.

JULY 12TH FORENOON.—Visits to Laboratories and Exhibition.

„ 9 A. M.—Deputy Directors Conference.

„ 1 P. M.—Cricket Match.

„ 9 P. M.—Entertainment (Admission by tickets.)

FRIDAY.

JULY 13TH 8 A. M.—Business Meeting of the Union.

„ AFTERNOON.—Deputy Directors, Conference.

SATURDAY.

JULY 14TH.—Committee Meetings etc.

Visitors leave.

(viii)

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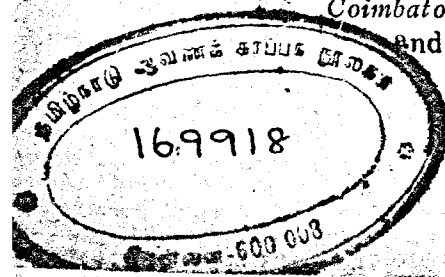
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Mofussil:—C. Ramaswami Nayadu, Bellary.

" K. T. Alwa, Coimbatore.

" G. Rajagopala Nayadu, Periapalayam.

" K. Unnikrishna Menon, Tellicherry.

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Resident: (10) M. C. Cherian, Secretary.

" D. Srinivasa Rao, Treasurer.

" V. Muthusami Ayyar, Editor.

" R. Narasimha Ayyar, Manager.

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" T. R. Naganatha Ayyar "

" M. Rajagopala Ayyar "

" M. V. Raghava Rao "

" H. Shiva Rao "

" U. Vittal Rao "

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" R. Swami Rao, (Nandyal)

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" V. S. Narayanaswami Ayyar (Salem).

" V. G. Dhanakoti Raju, (Hosur.)

" K. G. S. Bhandari (Ootacamund).

" T. Paramanandam, (Anakapalle.)

Working Committee (14 Members).

he resident Vice-President and the ten resident members with lowing student members form the Working Committee.

Student-Members (3)

C. Annamalai of class III

Kerala Varma " II

K. Venugopal " I

EDITORS:—S. N. Venkataraman and

C. V. Sankaranarayanan.

Editorial Board (as per resolution passed in July).

T. V. Rajagopalachari.

M. C. Cherian.

V. Muthuswami Ayyar,

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Printed at the Electric Printing Works, Tower Building, Coimbatore.