In running our eyes through the rules of the students club we come across the following as one of the duties of the Secretary.

College debates.

"He shall arrange for at least three meetings of the club, in a term at one of which a paper shall be read in another a debate and the third to be a social gathering." We have not often heard of papers read and debates held, but we are quite sure the Secretary has always exerted himself in getting up the Social gatherings. The literary side of the Club, we regret to note has never been very active and this year it has nearly become moribund. We, however, notice that of late it has been unusually active in holding weekly debates, instead of the usual reading of papers by one of the staff which neither gave the students occasion to think nor encouraged their debating power. We publish elsewhere a notice of the debates held, and in our opinion the second one "It is better to be lucky than rich" was by far the best.

Mr. M. R. Ramaswami Sivan.

With great satisfaction have we noticed the appointment of Mr. M. R. Ramaswami Sivan as the Senior Assistant in Chemistry to the Govt. Agricultural Chemist. Possessed as he is of zeal and earnestness of purpose, Mr. Sivan has earned a name as a good teacher. We congratulate him on his promotion and wish that he will soon climb up the ladder of gazetted appointments one of which he now holds.

Madras Agriculture: its Progress and its future.*

I wish to attempt to note in a very brief manner some of the outstanding features of the progress and development of Madras Agriculture, and to try, however imperfectly, to forecast its general trend as a guide to the direction in which future efforts for further advance

*A paper read by D. T. Chadwick Esq., M. A., I. C. S., at the Madras Exhibition in Jaunary 1916.

should take. Other lecturers will deal with particular problems of agricultural interest and I will confine myself to the consideration of the general trend of events. I have no wish to weary you with figures. But a few are necessary in order to illustrate the chief points. In the first place, the area within our Presidency which is annually cultivated is now 39 million acres, an extent equal to more than three times that of the arable area of Japan and almost three times the arable extent of the whole of the United Kingdom; and practically the whole of this large area is cultivated by an immense number of small farmers, whose holdings are frequently very scattered. Only in the planting districts do we find large compact areas under one management, such as form a great feature in the newly-opened countries of West America, Argentine and Australia. I am speaking here not in the interests of any particular trade or industry, but from the point of view of the farmer, the producer, the ryot, who wishes to maintain the fertility of the soil and at the same time is anxious to get the best price for his produce.

The last fifty to one hundred years has witnessed in nearly every country of the world a great change or the beginning of great changes in the general agricultural economy thereof. The great modifying cause of this change has been the enormous alteration in the general trade of the world due to a great improvement in the methods of transport. The result has been to bring all countries which could in any way pretend to possess stability and order into ever closer and closer commercial communion. One great result has been wider markets with steadier prices for agricultural produce of all such countries, and as far as pure agricultural practice is concerned the chief result of these improved methods of transit has been, in Europe, the great improvement in livestock of all kinds from cattle to poultry, in other temperate zones of the world a vast expansion of the area under wheat, and as far as tropical countries are concerned a most exceptional demand for their produce and especially for their industrial crops such as cotton, oil and rubber. These are crops which cannot as a rule be grown commercially outside tropical and sub-tropical areas, consequently in these products the countries so situated have a monopoly.

It is thus worth while to examine the prospective demand for our industrial produce and look to our present and future competitors in the world's market. Leaving out of consideration for the moment the planters' products, a little more than three quarters of our large cultivated area is under food grains, practically the whole of which are consumed within the country. For the support of our own local industries and for trade with other countries our three chief crops from the low lands are cotton, groundnut and coconut, which together represent less than one-seventh of our total cultivated area. A sure and steady market is almost more necessary for agricultural development than for any other trade, as the general agricultural economy of a large tract cannot be altered in the space of a few years. Therefore in the long run those countries are likely to be in a favourable position which supply fundamental world needs, and in this we are fortunate, for our main industrial crops, cotton and oil, certainly meet such needs. The first signs of any progressive civilization anywhere is that the people use more clothes. I do not only mean that they possibly wear more clothes at one and the same time, but they require greater supply, possibly owing to entrusting them more frequently to the destructive hands of the washerman. In either case it means a greater annual consumption, and for making most of the fabrics in general, personal or domestic use, cotton is essential. It is not easy to visualise what this demand for cotton means. But the following may serve as an illustration. Within the last twenty years the consumption of cotton clothes in India alone has increased by more than 50 per cent; and suppose that everybody in India was to use one more yard of cotton cloth per year than he does at present, whether in the form of clothes or as dusters in their houses, it would require a bulk of cotton equal to half the total annual outturn of our Presidency to satisfy that increased demand. The world will have cotton, and even the great upset of the present war has not caused anything like the fall in the demand therefor which was predicted. We therefore in Madras are in a favourable position in having cotton as one of our chief industrial crops. The one result of a worldwide market for any product is a general level or uniformity in price, and in cases of a world necessity

the price which that commodity will command is roughly regulated by the cost of production at the place where it is most expensive to produce. Thus the United States of America which for many years has been the biggest producer of cotton, and the world prices have depended very largely on the cost of cotton in America. It is said that twenty years ago the American farmer could afford to sell his cotton at 3 annas a pound and still get a profit, but with the present demand for cotton which with the increased cost of labour and the greater use of fertilizers cannot be cultivated at a profit unless 6 annas a pound is obtained for the produce. Our Madras cotton is certainly of shorter staple than American and so generally commands a lower price, but even so, the actual cost of production is as a rule less than 2 annas a pound, so that allowing for ginning percentage, brokerage, etc., a market quotation of 4 annas a pound leaves the crop a profitable one to the vast majority of our blacksoil ryots. During the last year, which has been a most difficult one for many a cotton-grower, the average price for Madras cotton has been about $4\frac{1}{8}$ annas a pound. Therefore, it not only appears that the total world demand for cotton will not decrease but in the long run will steadily tend to expand, but also with the cost of production in the United States as it is at present, it seems sure that the price will be one which will be steadily remunerative to the Madras ryots. This of course leaves out of consideration possible future competitors in the form of countries as yet undeveloped. We must be prepared in the far future for competition in cotton from large tracts in Africa, and during the last ten years much money has been spent by European countries in endeavouring to foster cotton cultivation in that continent. But so far all their outlay in all those countries has only resulted in a total crop equal to the present annual yield of our Presidency alone and over all such countries we possess an enormous initial advantage in that our Presidency is already fairly well developed. Order has been established for many years and trade connections have been formed. Our other great industrial crop is oil-seeds—notably groundnut and coconut. I will not deal with this in such detail because in the main its features are very similar. One of the great results of the application of scientific knowledge to industrial

arts has been a vast increase in the uses to which vegetable oils can be put, and although we are likely to meet competition in the oil market from Africa more quickly than cotton, yet in regard to that also we are at present in a favourable position.

The Madras ryot has already responded very largely to this steady increasing world demand for cotton and oil. In the last forty five years the area under groundnut alone in this Presidency has increased by $1\frac{1}{8}$ million acres. It is only for ryotwari villages that we have anything like complete statistics for long series of years. These represent roughly three-quarters of our total cultivated area. In the last twenty years in these ryotwari villages the area under cotton and groundnut alone has increased by about a million acres, or 24 per cent. This expansion has not been entirely at the expense of our food-grains, for the area under cereals and pulses has also increased by half a million acres, certainly very much slower rate of increase but yet one which is probably sufficient for the increased local demand, because there has been a large rise in the imports of foodstuffs. Thus the Madras ryot has undoubtedly responded to the increased demand for his industrial produce and the prospect for the future in regard to these crops is also promising.

But the prospect is not sufficient. It is essential for the general welfare of the country that the Agricultural section thereof derive as full benefit as possible from this world demand for its products. W can look to no wide extension of cultivation such as is possible in large undeveloped countries of Africa. An increase in the total out-put of the country must mainly result from steady improvements in the methods of farming. But even that is not sufficient to ensure that the Madras ryot shall realise to the full the advantages which the demand would appear to hold to him. World-wide markets bring with them great benefits but at the same time possess grave responsibilities and dangers. With improvements in communications and organisations it always follows that a would-be purchaser who is dissatisfied with the quality of the article is often able to get what he wants elsewhere. Thus with crops which are widely grown for industrial purposes the result is that certain standards in markets

become set; and those who do not maintain those standards, sooner or later, but nevertheless surely, find that lower and lower prices can only be obtained for their produce. The last stage is of course the total practical loss to the trade. This has already practically happened once in our Presidency in regard to Tinnevelly senna. Constant adulteration directly tends to damage our trade in favour of our competitors. So it is of importance to the cultivator to maintain the general qualtity of any produce which he puts on the world's market and probably the greatest economical improvement in our rural population will appear when any ryots who grow produce of a superior quality and handle it properly are sure of obtaining a better price for it commensurate with its quality. Very small lots of better produce are of little use to large traders, but if we can steadily improve the methods by which our better products are placed in larger quantities directly on the market, we need not, I think, fear any competition which will develop in time from other tropical countries. This point can be illustrated very clearly at present from both of our main crops. In cotton the spinner requires a fibre as uniform in staple and colour as he can obtain. If he has to mix cotton from different localities for certain purposes he obviously wants to be able to know what he is mixing. But at the same time he needs it in bulk and small isolated lots of better quality are of little or no use to him.

In regard therefore to industrial products efforts have to be directed not only towards increasing the yield by better farming and also to ensure that a better price be obtained by the ryot for the better article by better marketing. In this latter work all who will can help. It demands study, patience and commonsense and not agricultural skill. Thus on our district farms various strains of indigenous types of cotton have been grown and tested against each other several years and also different farming practices all within the resources of the ryots are tried. By this means it has been possible both in Tinnevelly, Bellary and Nandyal to separate out plants which breed true and yet at the same time give not only a higher percentage of lint to seed but lint very uniform both in staple and colour. These can be seen in the

Exhibition. These strains are then grown for us under contract by ryots on a large scale. The whole of the crops so grown are purchased by the Department, carefully ginned and thus a large quantity of pure seed is obtained. This is then sold to ryots in the villages for their ordinary cultivation. The exhibits in the Agricultural section are arranged to show what a pure strain means both in the uniformity of the staple that results and also in the matter of increased yield. They are briefly abstracted in the diagram now shown. In the first place this strain gives 4 per cent more lint over the ordinary type of Tinnevellies. As it is the lint which brings in the money, there is straight away an increase of 4 per cent to the ryot, and at first this is all that he obtained by growing this good seed. He sold the lint to the local middleman who mixed it with produce from other villages and when it reached the larger dealer the latter only gave for it the ruling market price. In fact the ryot had realised nothing for growing a cotton of better quality. Two years ago arrangements were made by which the ryots in two villages which had grown this cotton on a large scale took in their produce at one and the same time direct to the big dealer. By this means there was a fair bulk of it brought at one time, and as a result it was possible for the villagers to obtain about 5 per cent increase in price over the ordinary market rate for ordinary cotton. Thus they not only obtained the increase due to 4 per cent increase in quantity which they had obtained in the previous years, but they also got 5 per cent increase in price on their whole consignment on account of the better quality and also got back all their seed pure and unmixed for next year's sowings. In an ordinary normal year this means at least from Rs. 4 to Rs. 6 an acre increase in the return they get from their crop. And remember it is all profit. It means in fact an increase in profits of anything from about 18 to 25 per cent. This is very considerable. But it chiefly depends on maintaining the quality of the article and selling it in bulk direct. Two years ago two villages did this. Last year thirty villages did it; and between these and the seed which were sold direct through departmental agencies there were 34,000 acres to our own knowledge under pure types of cotton. Whilst about 10 years ago it was reported that

in Kurnool it was exceedingly difficult to find a field which did not grow cotton of two or three different varieties mixed together. I am not putting these figures before you as a record of any achievement but only as an illustration to emphasise the importance to the cultivator of growing his crops pure and marketing them direct and well. It is he whom we all want to see profited by raising crops of better quality. The other point I would like to deduce from these figures is that whilst 34,000 acres may seem a nice round figure, yet it is a very small proportion of the two million acres on which cotton is grown in our Presidency.

Cotton in this Presidency in recent years also provides a warning. In the recent review on Agriculture in India published by the Government of India the introduction of Cambodia cotton into Madras was described as the most successful effort in introducing exotic cottons into India. Six years ago this cotton commanded a premium of 12¾ per cent. to 15 per cent. in price over the best strain of Madras cotton. Still later a large Lancashire spinner told the Secretary of State that the mills he was interested in were ready to buy the whole Madras crop of Cambodia cotton and more at higher rates if they could only get it pure. But yet Cambodia cotton now sells at ordinary Madras rates or mostly so ; the one great reason is that it is difficult to get it pure in bulk. Only joint action in marketing can assure to small holders the profits due to them for the quality of the produce they grow.

The next illustration I would take is from groundnut. The gross annual value of this crop to our Presidency is now somewhere about seventy million rupees a year. The bulk of it is exported to France and regularly for some years on the Marseilles market Madras groundnut has uniformly got the bottom price. This means that if the production in other parts of the world were to increase rapidly, it is the Madras farmer who would first of all feel the effects of that competition. On analysis after production our groundnut is not so inferior in oil content as to warrant the difference in price which is often obtained for it in Marseilles when compared with the produce of West Africa, and the disability under which our trade in groundnut rests can largely

be removed by our own efforts. In order to prevent the breaking of the kernels when the shells are removed in the old traditional methods by beating with a stick the heap of groundnut is wetted. Unless they are most carefully dried afterwards some dampness still hangs around the kernels with the result that after they have been left in bags for some time they begin to turn rancid. There is a bag of such groundnut in the exhibition and I have brought some of them here. I ask you to look at this sample of black dirty, evil-smelling groundnuts which I now hand round. This is not specially prepared for the exhibition but a bag which was simply taken from a godown in Georgetown last week. It is obvious that any sample such as these is useless for extracting the best quality of oil, and the evil does not remain there because if some of these wetted kernels which still retain their dampness are shipped along with others which at time of shipment were perfectly dry, rancidity will spread from the damp ones to the good ones, and to a certain extent spoil their quality also. This damping could be entirely prevented by the use of machinery for shelling, of which there are several cheap types on the market. The Pondicherry Chamber of Commerce gave the difference in price between the machine shelled and hand-shelled kernels at from Rs. 5 to Rs. 6 a candy of 529 pounds, that even taking an outturn a little below normal means that if a ryot could get his nuts always shelled by machinery they would be worth from Rs. 9 to Rs. 10 an acre more to him. Of course only very large private owners can erect this machinery for their own use although it is not very expensive. But there is an opening here whereby, by combination among the ryots, they ought to be able to increase their profits. I hope soon to have regular running tests made with some of the machines on the market to find the minimum quantity which must be handled to make their use distinctly profitable. But here again we are losing through bad marketing. Time does not permit me to do more than refer very briefly to actuals of improvements in farming practices which have been adopted by the ryots. Speaking here in Madras I thought it was preferable to emphasise the facts that in cotton and oil-seeds we had the prospect of a safe steady and developing market, that our trade in these commodities has been

steadily increasing but, that in both of them we have still to make vast improvements in our methods of handling and marketing in order to ensure to our cultivators a fair share in the profits resulting from this increased demand and in order to establish our position in these markets against our competitors of the future. It is the same right through. In speaking about indigo only the other day Mr. C. B. Simpson emphasised the fact that it would be an immense advantage to Madras trade if both ryots and merchants ever came definitely to sell the products between themselves on a basis of actual analysis of the dye, instead of on a system of more or less arbitrary deductions from ruling prices. It will doubtless be a long task to establish intelligent co-operative marketing, and the path may be strewn with disappointments. But the task is not hopeless.

The ryot is by no means for ever bound by tradition. Many there are, of course, who will not deviate from the custom of their fathers. But we now know that trained men in the villages speaking from knowledge and speaking with knowledge can prevail on some of the more wisely venturesome to test new methods. But the man who ventures to argue with the ryots must be thoroughly trained and sure in his own knowledge of facts. Given these, our experience has been that slowly ryots will try new methods even to the extent of climbing areca palms and spraying the nuts with copper sulphate to forestall the possible ravages of disease. Amongst other samples of better farming practice which have been adopted may be cited very considerable sales of green manure seeds for growth of leguminous crops on paddy lands ultimately to be ploughed in. The use in Tinnevelly in a 11,000 acres by the ryots themselves of the seed drill, the treating of cholam seed with copper sulphate before sowing as a preventive against smut and so forth. All these and others are now on the tens of thousands of acres. But the ryot will not derive the full benefit that he should from the adoption of improved practice and the use of purer seed unless his method of marketing is also improved and his trade be better organized. This is likely to be a much more difficult matter than the mere teaching of better methods; it is a problem with many local ramifications in every tract, and one which needs most careful

local study, but it is one which will have to be faced and which is becoming more and more insistent every year. In this the chief port and chief trading centre of our Presidency it seems appropriate to emphasise the question of marketing.

Chrysanthemum cultivation around Coimbatore.

Plants are cultivated not only for seed, bark or leaf but also for flowers. Flowers of some plants are beautiful to look at and extremely fragrant and from the petals of such flowers are extracted some of the most delicious perfumes. Beautiful bouquets and guady garlands are also made of them. The importance of flowers in worshipping gods among the Hindus and on marriage occasions is too well known to need comment here. The cultivation of such flower-yielding plants gives very high remunerative returns when carried out in places where there are facilities for marketing. In Coimbatore there is a large sale for flowers of chrysanthemums which are cultivated in the neighbouring villages of Kurichi, Kuniamuthur and Pallepalayam. The plant is a shrub of many roots and stems and is propagated by division : that is, by dividing it into as many slips as it can give. After the final picking of the flowers the plants are pruned, and irrigated which make them grow and shoot up quickly. They are lifted, divided and planted out avoiding the parent stem.

The season for its cultivation corresponds to that of hot weather cholam of Coimbatore. The planting is done in March—April and the plants begin to flush in July.

Chrysanthemums grow well on clayey soils under well irrigation. The field intended for the cultivation is well ploughed and fallowed for a period of 3 or 4 months. Sheep-folding is the common manure the crop receives; but it is not uncommon to manure the land with cattle dung. If the tilth happens to be