

## RECENT AGRICULTURAL DEVELOPMENT IN MADRAS \*

BY

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I have been requested by your President to tell you about some of the recent advances made by the Madras Agricultural Department. Before attempting to do so, I want those of you who are strangers to this part of India to realize that in this Presidency we have a very wide range of conditions and we are able to grow in consequence more or less every crop which is grown in India with the single exception perhaps of Bengal jute.

On the East Coast we have three large deltas with big irrigation systems and a net-work of canals which carry paddy; on the West Coast we have an intricate maze of rivers and backwaters; in the central regions we have land which is cultivated under wells and tanks, or merely rainfed, and in the north the rainfall is so precarious that we are seldom free from famine conditions of greater or less intensity. Down the western side of the Presidency runs a range of hills which rise to 9,000 feet in places and provide dense jungles and open rolling grass downs. Here are situated our Hill stations where fruit and flowers can be grown which will rival those grown in England. Large areas have been brought under tea, coffee, and rubber.

Our soils range from heavy black cotton soils, through clay loams, laterites and gravels to almost pure sands, the latter carrying coconuts and casuarina.

We depend upon both monsoons and our rainfall varies from 300 inches to 20 or less. Our main crops are paddy and cotton, and we have large areas under groundnuts, millets, and coconuts. Sugarcane is a minor crop and is grown in small patches all over the Presidency and we look in a five acre block of cane as rather a big thing.

It will be understood therefore that our agricultural problems spread over a very wide range.

As in other provinces we have paid a great deal of attention to crop improvement by selection and breeding, especially with our two main crops—paddy and cotton. Development in recent years has been in the opening of new breeding stations to serve particular areas and in the study of other crops. Thus we now have four paddy breeding stations, one at Coimbatore, the headquarter station, one at Aduturai to serve the Tanjore delta, one at Maruteru to serve Godavari delta, and one at Pattambi to serve the West Coast. So also with cotton we have several subsidiary stations as well as the headquarter station at Coimbatore. In 1923, a millet-breeding station was started at Coimbatore and we are now taking steps to open a subsidiary

station for millets and cotton work, these two crops being grown in rotation in the Bellary district at Adōni. Considerable progress has been made with the improvement of cholam and ragi by the usual methods of selection and it is hoped to issue the first of the improved strains to the ryots in the coming year. A beginning has also been made in a small way with the improvement of groundnuts in the same way and we contemplate the appointment of an Oil-seeds Specialist before long to take up the intensive study of this crop as well as coconuts. The latter is a big and important crop with us, along our sea coasts. Under our conditions the coconut is never self-fertilized naturally so that selection of nuts for sowing purposes is of limited value. We have evolved a method which has proved quite successful of selfing selected trees and a number of plants have been raised as a result of both self-fertilization and cross-fertilization of trees chosen for special characters. It will naturally take a long time to produce any results of a tangible nature but a start has been made.

In recent years another advance has been made with this crop. It has always been thought that coconuts can only be grown in places where they can be watered, at least in the young stages, during the hot weather. We have been able to demonstrate on a very wide scale that coconuts can be grown quite successfully from the nursery stage without any water except the natural rainfall if dry farming methods are employed and the plants are set out 30 to 35 feet apart and the soil between them thoroughly intercultivated during the hot weather. This has enabled large areas of land hitherto carrying no crop at all to be placed under coconuts. Grown under these conditions, the palms come into full bearing at 8 to 10 years old which is a gain of several years over the local method of cultivation.

A considerable number of improved strains of both paddy and cotton have been evolved on the breeding stations and issued to the ryots. These have become popular and are in great demand but it is difficult, often impossible, to supply seed. To overcome this difficulty we have organized a system of seed farms conducted under a simple agreement with selected ryots. There is nothing novel about this system but we are now endeavouring to persuade the seed farm ryots to form co-operative societies for the multiplication and supply of seed and in the case of cotton to combine this work with co-operative ginning and the sale of pure unmixed lint of standard types.

Full advantage of the improved strains of cotton has not been obtained by the ryots owing to the unpopularity of legislation introduced in the first place to control the ravages of insect pests and in the second to control the mixing of lint types. The Pest Act and the Cotton Transport Act have raised a storm of controversy and unfortunately brought agriculture into the realm of politics with the result that both Acts have been so modified that they are largely abortive and certainly do not now produce the result for which they were originally designed.

Cultural improvements such as the economic planting of paddy from thinly sown nurseries, the drill sowing and subsequent intercultivation of cotton and millets with bullock drawn implements have been adopted over wide areas as a result of demonstration and propaganda work.

Now that a strain of Cambodia cotton has been isolated which is vigorous and produces lint of fair quality, and we are in a fair way to do the same for rainfed cottons we have begun to turn our attention to the cultivation and manuring of this crop. The question of the best time at which to sow is now under investigation. The local practice is to wait for the monsoon rains, but the results of our experiments have shown that the interval between the date of sowing and the date of picking has a profound effect upon the final yield and early sown cotton has in our hands given nearly four times the yield of late sown cotton. If future experiments confirm this result the introduction by the ryots of early sowing should have far-reaching effects.

The use of light iron ploughs is also spreading but more slowly, probably on account of their price and also because of the smallness of the cattle in some places. About 2,000 ploughs a year are purchased and there must be some 10,000 now at work in the Presidency. The increased use of implements like ploughs and three-roller cane crushing mills is linked up with the problem of cattle breeding and fodder production in a very intimate way and these problems have to be dealt with as a whole and they will take time and patience to solve. We have recently started an organized campaign with the demonstration of pit silage making, but it is not always easy to find the material to silage when the cultivator does not grow enough fodder to feed his animals even in the rainy season and when he is tempted to place land under a money crop rather than under a fodder crop. There are opportunities however on the West Coast of converting the hill grasses into valuable silage and this idea is being exploited.

By economic planting, by green manuring, and by using selected strains the department has demonstrated to the ryots that it is possible to increase the yield of paddy very considerably and these methods have been applied to other crops and widely adopted. But there is a limit to this, the limiting factor being the quantity of available manurial constituents, especially phosphorus and nitrogen in the soil. To maintain these increased yields and to obtain still better yields, more intensive manuring is necessary and unless this is attended to there is a danger that the introduction of improved strains which are inherently heavy yielders may do more harm than good by exhausting an already impoverished soil. This is a point of view which has been brought to the notice of this Congress in former years.

There is not enough cattle manure to go round and the use of artificials is indicated. Ten years ago Dr. Harrison had shown that the nitrogen in green manure is largely dissipated in the form of gas and experiments conducted on our station at Manganallur based on his work had shown that, paddy responds well to a concentrated nitrogenous manure such as sulphate of ammonia in addition to green manure and that this is particularly the case when phosphate is also added.

The difficulty at that time which stood in the way of demonstrating this to the ryots was the very high price of all imported artificials like sulphate of ammonia and superphosphate while the price of bonemeal was also tending to rise owing to the export demand and the supply of fish manure from the West Coast was variable depending upon the seasons.

Of late years the whole situation has changed and now not only sulphate of ammonia and superphosphate are easily obtainable at reasonable prices but



firms are vying with one another to sell all kinds of artificials and one of the outstanding features of recent years is the way in which the ryots have waked up to the value of manures and are quite ready to buy them. Over 3,000 tons of sulphate of ammonia alone was purchased last year. This is due to the fact that the department had demonstrated the value of green manure and cattle and fish manure and planted the idea in their minds.

But they are now being besieged by propagandists and firms to buy sulphate of ammonia, nitrate of soda, calcium cyanamide, ammophos, leunaphos, nitro-chalk and a number of other new fertilizers about which no one knows anything at all. They naturally turn to the Agricultural department for advice, but unfortunately we also know little or nothing about these new fertilizers and as yet have had no time to experiment with them. Realizing, however, that it is our duty to test them out, we are just starting an experiment station on a new plan. This station will be subsidized by manure firms. The cost of each trial has been worked out and firms will pay a subsidy as a proportionate share, of the total cost based on the number of trials which they wish to have made. The Agricultural department will carry out the work and the trials will be conducted on scientific lines based on the latest methods adopted at Rothamsted over a period of five years when the results will be published.

In this way it is hoped to give a thorough trial to all new fertilizers placed on the market. In the first instance the trials will be confined to paddy, but if the scheme proves popular and successful it will be extended to trials with other crops and on dry as well as on wet lands.

There is a danger at present that these cheap artificial manures will be used to replace organic manures and not merely to supplement them and this leads me to speak of another problem on which we have done a good deal of work recently. It was found by a study of our permanent manure plots that seed produced in different plots behaved in different ways, depending upon how the crop from which it was obtained had been manured. When sown on soil of average fertility seed produced on plots which had been manured with cattle manure gave a much better crop than seed which had been produced on plots manured with artificials only. This somewhat surprising result was followed up and in collaboration with Lt.-Col. McCarrison it has been found that the food value and vitamin content of the grain is probably dependent upon, and can be controlled by, the system of manuring, and that in order to produce grain of high food value the crop must be manured with organic manure. What the minimum quantity of organic manure necessary to ensure a full vitamin content in the resulting grain may be we do not yet know, but if it is all replaced by minerals the food value and vitamin content of the grain falls beneath that of an unmanured crop.

This has opened up a new field of study and we are now beginning to pay attention to the study of the food value of paddy and other crops from all points of view. It emphasizes the necessity for increasing the supply of organic manure and the system of producing artificial farm-yard manure advocated by Rothamsted has been carefully studied and we have now been able to prepare good material from waste products like prickly-pear, cane, trash, weeds, stubbles, cotton stalks and even groundnut husk by a method which is demonstratable to the ryots. We are also about to instal an experi-

mental activated sludge plant at Coimbatore to convert our estate sewage into fertilizer for the farm.

We have also taken up the study of animal nutrition and have our own buildings and staff at Coimbatore so that we can work out local problems. We carry on this work in collaboration with and under the friendly guidance of Mr. Warth, the Imperial Physiological Chemist at Bangalore.

Turning now to other sections, we have recently attempted the biological control of a caterpillar pest of coconuts on the West Coast. This pest was introduced a few years ago to the West from the East Coast on coconut leaves carried on the railway, and it was introduced without the parasites which control it naturally on the East Coast. The consequence was that it spread with alarming rapidity and did a great deal of damage. We have now introduced a number of its natural parasites and have established laboratories where these are bred and released in large numbers. This method has met with considerable success and the pest is being kept under reasonable control. Quite recently the *Icerya* scale has made its appearance in the Nilgris where it is attacking wattle and a number of local weeds. We propose to deal with this biologically also and are only awaiting a consignment of the necessary lady bird beetle from South Africa and Australia.

Satisfactory progress has been made in recent years with the control of fungoid diseases of crops. A fungus which attacks the fruit bunches of the areca palm during the monsoon has proved controllable by spraying just before the rains with Bordeaux mixture and this method is now adopted on a large scale and involves millions of trees. The bud-rot disease of palmyra palms on the East Coast is also being controlled successfully by systematic destruction of dead trees and removal of attacked leaves at the outset of infection. The Pest Act has been introduced to deal with this disease and it has worked quite smoothly and the work is carried out systematically by the Revenue Department under our guidance, a special staff being employed for the purpose.

The most recent development in mycological research of recent years has been the search for strains resistant to certain diseases, a more logical way of attacking the disease problem in general than a frontal attack on the disease itself which can never give a permanent amelioration. This work now involves several crops and fungi, among which may be mentioned the mosaic of sugarcane, *Piricularia* of paddy, and the wilt of groundnuts.

On the propaganda and district work side we have found that the most satisfactory way of getting information to the ryots and persuading them to adopt new methods is to demonstrate the improvement whatever it may be on their own land so that they may be convinced that it is an improvement in the first place and that it can be carried out under the conditions of life and farming in the second place. We now have hundreds of such demonstrations and confine ourselves to small plots rather than to trying to conduct big demonstration areas or model farms. The latter we have persuaded co-operative societies to undertake and we now have a few better farming co-operative societies which conduct small model farms on which the improved methods of cultivation and manuring advocated by the department are adopted and demonstrated, one or two plots being farmed in accordance with local methods

to act as a control and contrast. Departmental officers supply advice and draw up cropping schemes but the society runs the farm and keeps a profit and loss account so that it is able to demonstrate to the members the monetary gain to be obtained by the adoption of these improved methods. I may say that in the case of paddy it amounts on the average to an increased profit of about Rs. 25 per acre. Improved strains of seed are grown on these farms and the seed is sold to the members of the society. Some of these societies are now beginning to conduct the sale of implements and manures.

We take advantage of all local fairs and festivals to hold small agricultural exhibitions and to deliver lantern lectures, and we endeavour to make these as practical as possible, that is to say, we give actual demonstrations of iron ploughs at work for example and allow and encourage the visitors to handle them themselves; during the cane crushing season we erect a Sindewahé furnace and actually make jaggery over it in a thin pan, and so on.

We have just built and equipped a travelling motor van to carry an exhibition from village to village thinking that in this part of the world where we have not many railways and where they do not always pass through the most densely populated rural areas such vans would serve our purpose better than exhibition trains. One of these van units is in show in the grounds here for you to see. We hope before long to add a cinema outfit to it, at present it carries a magic lantern outfit.

I have now touched quite briefly on some of the more important and outstanding recent developments of the Madras Agricultural Department but the time is too short to really do them justice and to cover the whole ground. I have not for example touched on the thorny problem of agricultural education partly for lack of time and also because the subject will come up elsewhere during this Congress. I have also had no time to speak of the cattle-breeding work which is being done on a large scale on three cattle farms the largest of which is at Hosur, near Bangalore.

The headquarters of our research work is situated at Coimbatore which is 12 hours by train from Madras and if any of you can spare the time to pay us a visit we shall be more than delighted to show you what we are doing and attempting to do.

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