

HOW THE PLANT BREEDER CAN HELP THE RYOT.

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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 in 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 kullu* 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 2000lb. of cleaned grain in 95 days from sowing to harvest. Another selection from the same variety matures a crop of 2300lb. 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 the plant arose as the result of a natural cross. Since then, the seed 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 the 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.