

A Note on the Methods of Maximising Production of Pedigree Rice Seed and its Distribution to the Cultivators*

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It is well recognised that successful plant breeding work by itself can improve the production of rice in this country by at least 10 per cent if the existing unselected varieties that are now being used by ryots are systematically replaced by improved strains by well planned seed multiplication and distribution schemes. Increases in production may be obtained by crop management as a short term programme, but in the management of a crop, the question of costs comes in and a certain treatment ceases to be useful if it is uneconomical. Growing an improved variety costs the cultivator no additional expenditure. No difficulty has been experienced anywhere about the cultivator being unwilling to take up an improved strain when once he is convinced of its superiority.

It has been found that differences up to 20 per cent exist between crops grown from 'elite' seed of a strain and seed of the strain that has deteriorated. Deterioration occurs when seed requirements of a particular region are too large to permit of a research station to exercise the necessary supervision at all the stages of seed production and multiplication. The primary functions of 'seed distribution schemes' are: (1) increased production, (2) increased value of the produce and (3) introduction of the better yielding strain into new areas. The full benefits of an improved strain are realised in proportion to the progress made in the above which are connected with the rapidity of its extension in the country and the maintenance of its purity.

Taking first the quick method of extension in the country an understanding of the methods followed in some countries and some of the other States of the Indian Union may be helpful to give an idea of practical aspects so that we might adopt such of those methods that are suited to our conditions.

Taking the case of cereals, in the U. S. A., the research stations produce enough seed to sow at least 1000 acres of the strain. This is given to a limited number of growers say 25 to 30, who are 'certified' growers so that the crop may be kept in a state of high purity. The produce from this area furnishes the foundation for further rapid spread. From this stage the seed gets into commercial production and it is at this stage that there is the danger of admixture, which occurs in the several phases of the crop, threshing and storage operations. But it has been recognised that the responsibility of the Government does not cease with the mere development of superior strains, but also extends to the

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multiplication and maintenance of an assured supply of the strain to all those who want the same. There are private seedmen in every one of the several States, but the Government employs about 80 to 100 Extension Agronomists and a very large number of agents, who check the purity of the seed. Supervision is done in the 'field' and the inspection in the 'sack' by the Department which ensure a thorough check on the seed purity. These activities are financed through a small certification fee and sales tax on the sale price of the seed.

In Canada, one of the biggest Seed Unions in the world called "The Canadian Seed Growers' Association", a private organisation employs provincial officers for field inspection who certify the seed both after the 'field' and 'sack' inspection. This association grows nearly a million acres of wheat every year forming about 5 per cent of the total area and from the produce of this area the whole tract under wheat in Canada is covered.

The Seed Union at Svalof, which has also its own Research Station works on similar lines in the case of most of the cereals. In Australia, the Government departments deal directly with the farmers. A list of growers of pure seed is published in the Agricultural Gazette. The list is compiled after inspection of the standing crop and also the seed in the bin or sack. In Japan, before the war, seed distribution was so thoroughly organised that any but the use of certified seed was considered illegal. Pedigree seeds were made available in very many godowns in requisite quantities at reasonable rates through the Government agencies and in some places through private organisations such as Better Farming Societies, Village Seed Associations, etc.

In Burma, before the war, besides the departmental farms, a large number of seed farms were doing this work. The 'major' seed farms are owned by Government and situated at the head-quarters of the district and equipped with adequate buildings etc., for storing the produce. There were 24 such farms in 1939 - '40 with a total area of 2800 acres. Scattered round about each of these major seed farms are the minor ones. These were usually Government porambores reclaimed and leased out to tenants on certain conditions and usually they got special concessions by way of subsidies of seed, manures, etc. These minor farms, 153 of which occupied 9500 acres in 1939 - '40 are inspected thoroughly by the State and the whole produce is bought by Government and sold to people. There are also a number of private organisations to which seeds are first distributed from the minor seed farms who maintain registers showing the names of those to whom the seed is distributed. The total seed thus distributed is reckoned to be sufficient for nearly one million acres every year.

A similar procedure as above is said to be in vogue in the Punjab with regard to wheat. In Bengal, when one improved strain was first

intended to be quickly multiplied, 10 lb. packets of improved seed were distributed the first year free to 12,000 people. It immediately struck root and further purity, etc., was maintained through seed farm at central places in each district which also had two or three registered Seed Growers. These are under the direct supervision of staff of Government.

The District Village Improvement Committees of Bombay, who run seed farms and the registered Seed Unions of the Central Provinces supervised by the Government, where each member deposits a part of his produce at the time of harvest, may be of some interest to us in Madras. There were 23,000 such private seed farms in the Central Province in 1938 - '39 and twelve million pounds of paddy seed sufficient for three lakhs of acres were sold by them, excluding wheat, sugarcane, etc. In Sind, there are permanent registered departmental rice-seed growers in each thana or district.

In regard to the actual method of distribution and sale, there are variations from country to country and province to province. In the U. S. A. the cost of certified "pedigree" seed is usually much higher than the produce for consumption. The growers do not mind this extra cost and there is actually a rush for the seed, because they are convinced of its definite superiority over the local seed. This is achieved through a very strict control in the several stages of crop growth and the produce, followed by certification. In Bombay and also in Sind as in the Dhan Prabhundakaran Sabhas, seed from the seed farms was being distributed on exchange basis in most of the cases, the small differences in price being written off. In Bengal and United Provinces the 'Sawai' system the grower obtaining the seed from the Government godowns and returning the quantity at harvest time with 25 per cent more, was in vogue and the ryots contract to sell, if required to the Government, upto three times the quantity they have taken. In the Punjab, the sale of departmental seed is in the hands of non-official commission agents, who get usually a commission of two annas to three annas per maund of seed and the distribution is checked up by the departmental officers. When the seed farms are run by the Co-operative Societies, sales to non-members are usually charged 10 per cent extra.

In the case of paddy crop, where the rate of multiplication may be quick enough, a forty-fold multiplication is possible each year. Thus supposing an area of 10,000 acres is to be covered, the scheme of work will be:—

1st year from nucleus seed from the station = 6 acres (of primary seed)

2nd year from the above primary seed,
secondary seed farms which may be
certified, if necessary } = 240 acres

3rd year - seed purchased by the Depart- }
 ment and distributed to ryots } = 9,600 or 10,000 acres

This unit can be taken as the basis for operating the seed distribution scheme. Work on this scale requires an efficient supervising staff, provision of facilities for drying and storage and possibly some working contingent expenditure for paying roguing charges, premium to the cultivators for production of good seed etc. It may not be difficult to persuade the ryots to pay even 25 per cent more for seed which would satisfy the standard of that produced in a research station and though it may be necessary to finance this scheme in beginning of the season, this is recoverable after sale of the seed. There may be some difference between receipts and expenditure but considering the easy and sure way of increasing the total production, this money should be found by the State Treasuries.

Seed production even in the most advanced countries as can be seen from the above, is still in the hands of the Governmental agency or departments with adequate supervision at each and every stage. If private seed agents are encouraged, a form of certification may be necessary. Financial regulation may have to be slightly relaxed to permit maximum turn-over. Co-operative organisations wherever feasible, may be encouraged to take up the distribution of seed. The price of seed should be at a higher rate (but not very high) so that there may not be misuse, but the quality of the seed produced must reach a high standard to attract the farmer. For the poorer sections of cultivators, the seed may be given in exchange if necessary, with a small percentage of extra seed to be collected at harvest time. Police thanas and village chavadis may be utilised for seed distribution to small ryots. A system of seed distribution at a fixed price like the selling of quinine at Post Offices, during the sowing season may be useful for smaller ryots when a new strain has to be quickly substituted. Takkavi loans should be given freely to taluk associations and the like, stipulating their seed requirements will be purchased from approved seed growers, while seed lent to small agriculturists on loan may be made recoverable in kind at harvest plus a reasonable rate of interest in kind. Better Farming Societies may be encouraged to be established and improved types grown for seed purposes and inspection is to be freely given by the Agricultural Departmental Officers. Blocks of cultivable wastes may be given free of assessment with some sort of subsidy to persons who undertake to grow approved Departmental strains. The establishment of large pedigree seed farms managed by private individuals but controlled and supervised by the Department must be encouraged. Hand bills, pamphlets, posters and local dailies may be made use of to publish availability of improved types at particular centres well in advance of the sowing season.

It is sometimes pointed out by the cultivator that the original standard of an improved strain with regard to yield or other attributes deteriorates with lapse of time.

Though experimental proof is not available, it is possible that in quantitative characters, such as yield, controlled by a large number of genes there may be small mutations and such mutations when they are retrograde might cause deterioration. The existence of physiological forms in disease-causing organisms is responsible for some disease resistant strains to lose their resistance to a particular disease after a lapse of time. Where the strains are of hybrid origin it cannot be said that the strains are really homozygous for all the quantitative characters and it is possible that the residuum of impurity present would get increased in subsequent years. Non genetic causes such as the inadvertant mechanical mixture with other low yielding varieties at different stages of the crop growth, non-adaptability to climate and soil conditions and exhaustion of the soil in the absence of suitable manuring may all cause deterioration.

A nucleus has to be always maintained on the breeding stations to form the primary source for seed multiplication. The best way of doing this is to make secondary selections, even from the improved strain at periodical intervals, say once in five or six years, if possible, under replication. Those progenies which are representative and are high yielding and do not show variability can be bulked up, and this made to form the nucleus for further multiplication.

To get the maximum efficiency out of the use of improved strains and to prevent slipping back of the yields, the cultivator would also be changing his seed every five or six years. To keep up a continuous flow of supply of 'elite' pure seed, it is therefore essential that there must be an organisation to produce the seed in sufficient quantities as before said. Thus in the improvement of a crop, the joint efforts of the scientists and the producers are essential. Without the active co-operation of the producer, not much progress can be achieved. Good seed must not only be viable seed, but it must be fixed in type and should be adapted to the locality combined with high yield.

A few practical hints to farmer friends can be summed up as follows: (1) Select in the field, take good plants, discard light grain, save this seed; (2) grow this seed in the seed plot, the most fertile of your fields, as good seed cannot be produced on bad land and (3) Select every year and step up production for all-round plenty and prosperity.