

Maximisation of Seed Production in Improved Strains and of Plants in Improved or Superior Varieties *

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In a printed note prepared by the Indian Council of Agricultural Research for the Eighth Meeting of the Crops and Soils wing of the Board of Agriculture and Animal Husbandry in India it was explained with the aid of available statistics that the average yields of the major food crops in India were practically the lowest in the world and that the yields were progressively declining from year to year. In another note from the same source circulated on the same occasion it was stated that pure seed was the first requisite for good cultivation, though it was seldom that the farmers sowed pure seeds. On the other hand, crop survey reports from U. S. A. speak of the achievements in crop breeding having more than offset the declining fertility in continually cropped soils such that the farmers have been enabled to maintain average yields despite the increased damage by pests and diseases.

None can deny that in this country too crop breeding has had its due laurels. A spread of about 95% by improved sugarcane varieties is a measure of advance that can stand comparison with the best in any land. It is at once a tribute to the magnificent achievements of the breeder, as to that of officials and non-official agencies who had taken upon themselves the task of popularisation of these varieties. Incidentally, it is an index of the readiness of the farmers to take to a new crop or variety, whose advantages are convincingly brought home to them.

In other agricultural crops too, the estimates of area covered by improved varieties or strains is fair to substantial ranging from 10 in oil seeds to 50 in cotton. The crop sampling surveys have indicated that during 1948-'49 about 39% of the area under rice in this State was under improved strains and this contributed about 30% increased yield over the cultivator's bulk **. Even if the increase is less than half of the above, we can safely infer that a complete coverage by pure seeds of improved strains of our food crops would wipe out the State's food deficit.

Under the present set up, we have, broadly speaking, three classes of farmers—the largest majority who either do not believe in pure seeds of improved strains or have not heard of them, the second group who are the most progressive and are ever keen to use these seeds, while the third forming an uninterested and indifferent class who use good seed

** Balasubramanyam, R. The part played by improved seeds in the maximisation of crop production. Madras Agricultural Journal Feb. '51.

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only when they get it. Our seed multiplication and distribution organisations and methods shall have to tackle all these three classes of persons, if the maximum improvement through the use of good seeds is to be obtained.

It is doubtful if all the seeds used by the name of pure seeds of improved strains, are entitled to be classed as such. So long as we have no Seed Act with Seed Testing Stations and a Seed Inspectorate, there can be no guarantee to the purity of seed and consequently to the performance of the crop raised therefrom. The Central Tobacco Research Station, Rajahmundry conducted an interesting test for three years with seeds of so-called superior tobacco strains of H. S. 9 that were being sold to the growers by different agencies and came to the surprising inference that there was no difference between them. In other words, all the so-called improved strains were found to be as effective and no better than the local Harrisons Special. It is yet to be found out as to how many of our so-called improved strains of other crops have deteriorated or have become ineffective with the lapse of time. Even if our nucleus seed is above reproach, the extent of impurity in the inner and outer farm seed is bound to vary, depending upon the care bestowed by the seed farm ryot. There may also be innumerable farmers who preserve their own seed, not depending upon the seed farm produce, and in whose case too, the purity may range very greatly. The tendency of many strains to run out as a consequence of the genetic and cytological make up or peculiarities, may further accentuate the problem, rendering the so-called pure seed of improved strains progressively ineffective. Until we are in a position to ensure the purity grade of an improved strain, we have to be prepared to meet with a decline in crop production in proportion to the seed impurity that only gets accentuated in geometrical proportions with every successive sowings. Many crops are also prone to cross-fertilisation to a more or less extent and thus give rise to mixtures of heterozygous individuals. Unless exploitation of natural cross-pollination for hybrid vigour is done in these crops, as in our Hybrid Cumbu Scheme, there is no chance of securing an appreciable increase in crop yields by the normal methods of seed multiplication and distribution to which we have been accustomed. But hybrid vigour is not a programme worth exploitation in all crops. Where it is not, we have to devise methods to see that the process of running out is effectively checked in time and the growers have a recurring source of good and pure seed. The practice of replenishing the seed every fourth year is an ideal practice, but has not been followed in all places and by all growers, owing to obvious difficulties in securing the replenishing stock of the right degree.

In perennial, seed propagated crops the position is even less certain and satisfactory. In coconuts and arecanuts for instance, our

existing methods of seednut selection is based purely on the observed characteristics of only the female parent. It is not known if the better size and appearance of the seedlings from the selected seednuts are due to parental selection or due to the roguing out of the undesirable or weak variants in the seed and nursery buds. The strongest plea in favour of the present method of selection is perhaps found in a recent article by Prof. Cramer of Dutch East Indies. Even he could only lay the claim that "Many Seedlings of high yielding original mother trees have shown themselves good yielders."** In other words, all seedlings do not inherit the parental characteristics, and one should therefore be prepared also to get at times many seedlings of low yielding capacity, quite unlike the selected parent. Our seed multiplication and distribution programmes in respect of these crops, cannot therefore be deemed as perfect.

With a sexually propagated crops too, the position is by no means satisfactory. In the absence of a plant certification agency, the virtue or excellence of the plant material rests now certainly on the word of the nurserymen, with no risk whatsoever of his being legally questioned, even after the plant is found later to be spurious or quite different from that indented and paid for.

A rational and scientific seed, and plant selection programme is therefore as much the prime need of the hour as a dynamic and comprehensive programme to popularise the pure seed and plant material of the improved and superior strains and varieties. It is for Science to test and evolve sound plant and seed selection methods and multiplication. In any such method there should be provision to determine the stage when a strain should be withdrawn, as a result of the periodic check on the process of its running out under natural conditions or when its pronounced susceptibility to any pest or disease is detected. There should be also a device to decide upon the stage when the distribution of seeds should stop in favour of a different procedure or of a repetition of the existing procedure with freshly replenished seed stock. In the case of virus free Great Scot potato seed, remarkable yield increases are believed possible in this State, when the foundation seed stock is replenished annually. Our present seed development programmes are largely built up on the assumption that the strain maintains its pristine efficiency undiminished under a wide set of conditions, provided adequate roguing, cleaning, drying and storage precautions are undertaken. This will not happen when virus infestation is common. The percentage efficiency of the strain in each tract is, therefore, of utmost importance and this has to be determined after a definite interval, so long as the seed distribution programme is proceeding in respect of that strain.

** On the authority of citation by the Director, Central Coconut Station, Kasaragode.

There are different methods of ensuring purity and quality of seeds which have been adopted in different countries of the world. In Sweden for instance the Research Station's responsibility mainly ceases after the evolution of the strains or varieties has been effected, whereupon the multiplication of seeds and distribution are entrusted to a Company known as General Swedish Seed Company which has the monopoly to the products produced by the Plant Breeding Institute. The Government reserves the right to appoint some members of the Board of the Seed Company. The multiplication of the improved varieties of strains is done on farms belonging to the Company but under the supervision of the State Technical Staff. Later, there is provision for periodic inspection of the farmer's field which is linked also to the State General Seed Testing Station maintained by the Government. Thus the responsibility for multiplication and distribution of seeds is primarily in the hands of non-official agency, though subject to supervision by the Officers of the Government*

The East Punjab Government have recently passed an Improved Seed and Seedlings Act which aims (1) to compel every cultivator to use only the improved seeds or seedlings listed by the Agricultural Department and (2) to control and regulate the movements of improved seeds or seedlings from one area to another. The seeds or seedlings are made available by the Department of Agriculture through its authorised agents, whose activities are subject to inspection by Officers of the Agricultural Department. Similar enforcements have also been resorted to in many other countries as well, though in different forms.

Under the existing circumstances, it appears to be very premature to adopt in this State either the Swedish method or the compulsory system as that contemplated in the East Punjab Act *in toto*. Our Seed multiplication and distribution methods are not by any means standardised or developed to an extent as to meet the full requirements of the cultivators in all parts of the State. Unless we are in a position to cover the entire state with our improved seeds and unless we are in a position again to enforce the use of the improved seeds by every ryot, any certification of seed or legislative enactment can only be partial in scope and largely infructuous.

To most of our cultivators, compulsion is naturally repugnant. It is on this principle that we largely depend upon persuasion and propaganda to achieve our objective of spreading our improvements.

Above all, certification or legislative action will involve an organisation to inspect the seed production and distribution, along with provision for testing the purity and quality at different stages. This implies a great

* Original publication not traceable.

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deal of expenditure to Government, which sum has to be added on to the cost of seed. Thus, in the ultimate analysis the cost of seed is bound to get increased, which fact may hamper the spread of improved seeds rather than help us in our objective of covering the maximum area under improved seeds.

On all these considerations, it seems reasonable to infer that the seed certification programme cannot be introduced at the present stage of our progress. The experience which the Madras State Government has in regard to the Agricultural Bill is a pointer that such measures are unlikely to appeal to our representatives in the Legislature.

It is not the Government alone who are engaged in or are concerned with the seed and plant production and distribution programmes. Thousands of farmers, landlords, seedsmen and nurserymen, some large companies in respect of tobacco seeds and sugarcane setts, are also interested or are actively engaged in this line. Each crop has its own peculiar aspects, which dictate differential remedies. In the case of fruits, a Bill to regulate private nurserymen is already under consideration. For potato, a seed certification programme on an All-India basis has been conceived. For sugarcane a varietal schedule and seed multiplication programme is being considered on a factory area basis. In the case of cumbu, the seed production programme is hinged around the methods for exploitation of heterosis. Some of the commodity committees are also having their distinctive seed multiplication programmes and methods in collaboration with State Governments, such as Indian Central Coconut Committee, Indian Central Tobacco Committee and Indian Central Arecanut Committee. The Indian Council of Agricultural Research too had evolved and worked upon a special scheme for vegetable seed production and supply during last Great War. All these show that a uniform plant for seed multiplication with a view to enhance the value or utility and to cover all the crops of a State or Union, is not possible.

Notwithstanding the foregoing limitations, it does seem both necessary and possible to formulate a seed development policy which would foster maximum coverage by seeds and plants of high purity and of tested merit. So far as the plants are concerned, the question has been examined in all its bearings, and the Bill now under consideration by Government represents a device which would secure maximisation of plant production on sound and accepted lines. In the case of seeds, however, there are certain features in the Swedish System that can be copied with benefit to our State. In the undivided Punjab, wheat and cotton seed production was at one time mainly entrusted to large individual holdings such as those of the British Cotton Growing Corporation, Sri Joginder Singh's Farm, Convillepur Farm Etc., There is no reason, why private companies or co-operative agencies or large individual

land owners, including the Temple lands cannot enter actively to the seed production and supply business on purely commercial lines. If the existing lands are producing seeds at a certain margin of profit, it should be possible with a fixed premium to provide just that incentive as would enable certain companies, societies or individuals to produce the same seeds on a much larger scale, but on approved lines and to be delivered at the prevailing market rates plus the premium or subsidy. With the concentrated attention of the department on such seed production farms, the owners of these commercial seed farms will also have a better opportunity for securing increased crop yields at less cost and with less damage by pests or diseases. It should be possible to demarcate the zones for each strain or batches of strains in a crop and allot one zone to one or a selected group of companies or societies, so that the production of seed may be in tune with the requirements of that zone. It should be possible for one firm, society or individual to have within the concerned area of operation, strains of more than one crop. Under such clearly defined zones and crop or strain allocations, the task of the Agricultural Department to supply nucleus seed to check the roguing and to certify the purity or viability etc., will be rendered easy in operation. All this will depend on either the passing of Seed Act, according to which every grower will be compelled to grow only the certified seed or approved strains, or on the efficiency of our extension service backed by that of the seed production and supplying firms. As explained already, the latter may have to hold the field for some years to come, so far as this State is concerned.

Along with the fostering of these commercial seed production and distribution agencies with well defined crop or strain zones, there is the need to take crop sampling check for testing the efficiency of the strains from time to time, in addition to the routine inspections for checking purity, viability etc., It is only when all these measures are implemented, will the whole seed multiplication programme be stabilised on a rational and dynamic basis. When that is accomplished, our research organisations will be free to perform their legitimate function of evolving increasingly more efficient strains to suit every condition or purpose, instead of the prevalent system where their research is mixed up with all kinds of non-research duties, including seed multiplication activities, to the benefit of none of these different branches of activities, but to the possible detriment of all work.

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