

## The part played by improved seeds in the maximisation of crop production

By

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Many a sudden crisis in the agricultural industry and economy of a country have been successfully solved by the crop breeders. The achievements in the field of plant introduction and development of new tracts have considerably helped the maximisation of production in most countries. Some of the notable contributions are (a) the discovery of new beet varieties having a sugar content of eight percent over the older types when enemy blockade threatened to cut off sugar supplies to France during the Napoleonic wars, (b) the selection of blight-immune varieties of potato when the Irish peasants were faced with total loss of their staple crop, (c) the development of early-fruited varieties of cotton which staved off the ravages of boll weevil in America, (d) the evolution of wilt resistant strains of cotton which made the cultivations of wilt sick S. E. American possible, (e) the breeding of new races of cotton and wheat suited to the extensive areas in U.S.S.R. characterised by low mean temperature and short cropping seasons, (f) the conversion of Egypt, a minor cotton-growing country during the early part of the nineteenth century, into the main supply base for the world's requirements of long staple cotton, (g) the large expansion of cotton cultivation in South Africa, through release of jassid-resistant cotton varieties, (h) the successful exploitation of hybrid vigour in maize by America and (i) extension of sugarcane cultivation in India to regions originally considered unsuitable.

2. The march of genetics and the resultant refinements effected in breeding technique during the present century have been phenomenal. They have opened up immense opportunities for the creation of better and newer races of crops suited to the exacting conditions of climate, soil and man. The progressive countries who had the early advantage of such basic knowledge instituted an intensive research on crops as part of State concern by providing liberal funds for equipment and material on a permanent basis. Recent crop surveys in America have indicated that advances achieved in the field of breeding have more than offset the declining fertility in continuously soils and have enabled the farmers to maintain average yields inspite of increasing damage by pests and diseases and to extend the cultivation of crops to areas of high risk and recurrent hazards of weather.

3. Plant breeding work in India is scarcely forty-five years old while that in Madras is much younger, most crop sections except rice having come into existence only after the year 1920. During

these thirty years, the crop breeders have to their credit several new varieties in all the major crops like rice, cotton, millets and oilseeds. Many of these improved varieties released for cultivation were the outcome of straight selection made in cultivators' bulk or in crosses effected between closely related varieties. They have solved to a very limited extent the problems of diseases, pests, duration, drought, lodging, quality and yield of finished produce. Most of the varieties judged from their respective area spread, must be deemed to possess only a limited adaptability. The full advantages of improved strains are very often not realised on account of the limitations in the quantities of pure seed produced for distribution by the Department leaving the bulk of the adaptive area to natural spread having a purity range of 60 to 95 percent. Such a state of affairs is beset with two drawbacks viz., (1) The increases in production will be more or less roughly proportional to the purity grade of the variety grown and (2) The fall in production will be in geometrical proportion to the impurity in the seed material used for successive plantings. An all-out effort made in covering the entire adaptive zones with pure seeds will therefore help in increasing the production per unit area proportionate to the impurity found in seeds used for sowing by cultivators.

4. The official estimates of area spread of improved varieties place rice at 48%, cotton at 50%, sugarcane at 95% and millets and oilseeds at 10% of the respective annual areas. Notwithstanding the large spread of rice and sugarcane, the normal outturns per acre figuring in the Season and Crop reports have remained more or less stationary. It should however be interpreted as an indirect tribute to the new varieties which have helped to maintain the normal yields in spite of extension of cultivation to new areas, the seasonal losses resulting from unkind weather and damage by pests and diseases. The normal yields of cotton which were 250 lb. for irrigated and 35 to 54 lb. for unirrigated areas in the districts of Coimbatore, Salem and Tiruchirapalli in the year 1921-1922, have been revised to the higher figures of 300 lb. for irrigated and 85 to 125 lb. for unirrigated cotton. In this connection, it will be worthwhile to review the trends seen in the crop-cutting experiments on rice in Madras conducted during 1948-1949. The estimates as per sampling method were (a) 39% of rice was under improved strains, which in turn gave 30% increased yield over the cultivators' bulk (b) the total production of the State was higher than the official figures adopted in the Season and Crop reports by 5% and (c) the productive capacity of the Departmental strains registered further increases upto 33% when associated with manures. There was one definite indication in these crop-cutting trials. Improved strains of rice were noticed to respond invariably well under conditions of high fertility. It would therefore appear that a great portion of our present deficit could be reduced by undertaking an intensive manurial campaign in areas where our strains have largely spread.

5. One of the greatest difficulties in the case of food crops, has been the need to breed and multiply a large number of varieties suited to varying environments of the State. Other countries especially America, have solved similar problems by developing newer varieties having wider range of adaptability and by creating one variety community blocks on a zonal basis. Emphasis on this objective must be laid in all our future programmes of work. Reduction in the number of improved strains will help the State in the maintenance of purity and the production of large quantities of pure seeds at low cost. This has been achieved in the case of sugarcane and Cambodia cotton. Uganda-1 is a new versatile cotton which does well over the whole of the Cambodia - irrigated and unirrigated, summer and winter-planted area.

6. The objective of all official policy is to stimulate production. Even in America, the benefits of science widely advertised among the farming communities through state leaflets and farm magazines and followed up by persistent and intensive propaganda, were regarded in the early part of this century as impractical and 'book farming' by a large section of the farmers. Times have changed since then. They are now voluntarily seeking advice to an ever-increasing degree and are over-enthusiastic in putting into immediate practice the latest discoveries. Our propaganda machinery being on a low organisation level may fail to provoke our farmers into active collaboration and may slow down progress unless other methods are adopted. State legislation has helped Egypt in increasing and maintaining the national yield and quality of cotton. Similar isolated acts are found in Bombay and Hyderabad in so far as they relate to cotton. The most recent example of such legislative enactment is 'The East Punjab, improved seeds and seedlings Act of 1949', whereby only specified varieties of crops can be grown in notified areas. It is time that the advisability of enacting similar acts in other States of India, is seriously considered as additional measures for stepping up production.

7. As a result of the second world war, intensive campaigns were and are still being made for increasing the production of food crops by granting water concessions and by bringing new areas under the plough. The area figures given in the Season and Crop reports for the three years namely 1938—'39, 1944—'45 and 1947—'48 indicate that (1) irrigated crops of rice and sugarcane maintained a steady rise in area while cotton and millets changed little till 1944—'45 but definitely declined later, (2) among the major unirrigated crops groundnuts replaced others to the extent of about six lakh acres by 1944—'45 and (3) the gross cropped area which rose up by nearly a million acres during 1944—'45, fell down to the 1938—'39 level in the year 1947—'48. Even admitting that a good portion of this decline may be due to inadequate monsoons, the failure to utilise the rest of the area

remains to be satisfactorily explained. Most of the area newly brought under the plough will be poor in fertility and generally unsuited for the cultivation of improved varieties. They probably proved unremunerative to the farmer who preferred to abandon such areas in subsequent years. The development of such new lands can therefore be best done by insisting that the cultivator must grow one or more crops recommended as suitable by the State. There is again a large extent of lands in the rice deltas which remain fallow during summer and which can be cropped intensively. The solution of waste areas and fallow lands require a bolder breeding approach. Varieties suited to deficient soil moisture, short cropping season and poor fertility have to be evolved. They require the application of the latest breeding methods like distant hybridisation involving rare genes found in wild ancestors, exploitation of polyploidy and utilisation of hybrid vigour. The progress in all such programmes will be slow and will need the whole time of specialised workers. A beginning has been made in using hybrid vigour for the improvement of cumbu. The first fruits of such distant hybridisation with wild cottons have been obtained at Coimbatore. These new types possess extreme resistance to drought and a total crop life of 135 days. They are expected to be useful in extending cotton cultivation to regions of deficient soil moisture and in the development of extensive rice fallows of Tanjore where duration is the limiting factor. We are just beginning where others have considerably advanced and with proper planning, the internal production of major commodities can be pitched upto the self-sufficiency level, making the State investment on the breeding programmes and genetic research pay many times over.

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## The Importance of Pest Control in the Maximisation of Crop Production

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It may not be easily understood how, of all agricultural improvements, the control of crop pests can contribute for the maximisation of production. Pests occurring on crops damage them and reduce the yields and when they are controlled we prevent the loss that would otherwise have occurred. Varietal, cultural and manurial improvements are directly associated with the maximisation of production, but operations carried out for control of pests cannot add to the yielding capacity of plants, but can only check the damage to crops. How then can we secure maximisation of crop production through control of pests? If it is conceded that there is a