Note

POSSIBLE PRACTICAL METHOD FOR PRODUCING HYBRID SEED OF SELF-POLLINATED CROPS THROUGH THE USE OF MALE-Sterility

The following plan is suggested as a means for producing hybrid seed on a commercial scale in barley, wheat, and other normally self-pollinated farm crops.

The effect of environment on the phenotypic expression of genetic characters is well known. Thus, it would seem possible that the expression of some factors for male-sterility would be suppressed in certain soils or climates. The observations of the writer and others on the variation in certain male-sterile stocks from greenhouse to field cultures, from one location to another, and from season to season lend support to this expectation. As a result it would be possible to produce fertile lines of varieties that were homozygous for genes for male-sterility. Seeds from these lines when grown in other localities would produce only male-sterile plants that could be sown in rows adjacent to another, pollen-producing variety. Under these conditions—even in self-pollinated species such as barley and common wheat—there is a considerable percentage of seed set on male-sterile plants (25% set or better in many cases), which would be hybrid seed and could be used in the production of the commercial crop by farmers.

Using barley as an example, the program would be to obtain male-sterile stocks in, say, Wisconsin. The use of irradiation would probably be desirable to increase the frequency of male-sterile mutants. These would be tested for male-sterility in several places. If a number of mutants were found and so tested, it would be a reasonable expectation that among them would be one that was male-sterile in one location and fertile in another. This would be the desired stock and the gene could probably be transferred by backcrossing into any variety for combining with any other variety in the production of hybrid seed adapted to a given area.

It is obvious that such a plan, if successful, could result in the production of hybrid seed on an economically profitable basis. The chief doubt in the writer’s mind regarding the feasibility of the plan is not whether male-steriles with the desired behavior can be found, but whether the low percentage of natural crossing (particularly with a crop such as barley that has an especially low frequency of natural crossing) and the increased cost of production would make the hybrid seed too expensive to be profitable. However, hybrid seed could provide special advantages and be worth a considerable premium by developing a better root system that would reduce heaving and increase drought resistance, and by producing a more vigorous growth that would be better able to compete with weeds.

Hybrids between related lines of wheat or barley that are segregating male-sterile plants could be obtained on a considerable scale for testing the results of Jones and Singleton with maize. These investigators have found that hybrids between certain closely related inbred strains of maize show marked heterosis. If their results were verified...