Performance of Two-Ear Type of Corn Belt Maize


CORN Belt plants of *Zea mays* L. have been selected for many years to produce only one harvestable ear. Before harvesting was mechanized, factors responsible for the selection pressure of one-ear types were: (a) farmers found it more convenient to harvest one large ear from a plant than several smaller ears; (b) seed for planting usually came from large ears selected from one-ear plants, and this tended to perpetuate one-ear types; and (c) corn shows were very popular in the era before hybrid corn and mechanized corn production and large ears usually won honors at these shows. Changes in ideas of ear size and type and wide scale use of mechanical harvesters have eliminated some of the reasons for growing one-ear-type hybrids.

Southern prolific-type corns have been shown (2, 5, 6, 7, 11) to be less subject to genotype × environment interactions than adapted single-ear types. During the past 10 years, corn breeders have been examining the possibilities that prolific-type corn may have in the Corn Belt. Farmers are ultimately interested in total yield per se; however, they are highly interested in hybrids that are able to adjust favorably to changing environmental conditions. Most farmers are willing to sacrifice some yield potential to obtain a well-adapted hybrid that is likely to produce an above-average yield under a wide range of uncontrollable environmental conditions. High yielding, two-ear types may be useful in the Corn Belt if they could be shown to interact less with changing environmental conditions than one-ear types.

The genetic capacity of certain corn hybrids to produce two ears was investigated as a factor in genotype × environment interactions. Specifically, the objectives were (a) to compare the consistency of yield of 3 types of single crosses: 1-ear × 1-ear, 1-ear × 2-ear, and 2-ear × 2-ear at 4 planting rates, and (b) to relate the performance of the single crosses to degree of second-ear development.

**REVIEW OF LITERATURE**

The literature is void of information on performance of two-eared corn hybrids adapted to the Corn Belt. This is not surprising because Corn Belt plant breeders have selected against prolific hybrids for many years. Currently, the potential of two-eared hybrids is unknown; however, there is some literature on Southern types of corn that are usually prolific.

Zuber et al. (11) found prolific-type corn hybrids capable of producing more than one ear per stalk at high planting rate. Josephson (6) in Tennessee found that hybrids capable of producing more than one ear per stalk at high planting rate could better adjust to fertility and available moisture, which permits higher yields from thinner stands with single-ear hybrids. The capacity of prolific hybrids to produce one good ear on each stalk at high planting appeared to Josephson (7) to be the greatest advantage of prolific hybrids. Freeman (5) pointed out the prolific tendency in hybrids in the South gave them ability to wide fluctuations in soil fertility and moisture. Prolific hybrids were found by Bauman (2) to be flexible in adapting to changing environmental conditions.

**MATERIALS AND METHODS**

Three types of single crosses, classified on the basis of the number of harvestable ears produced by the parents, were investigated at Ames and Ankeny, Iowa. Twelve single crosses of each of the following types were investigated at Ames and Ankeny, Iowa:

- 1-ear, 1-ear × 2-ear, and 2-ear × 2-ear, referred to as 1×1, 1×2, and 2×2, respectively, were compared at 8,000, 12,000, and 16,000, and 20,000 plants per acre. Six inbreds with 2 tester lines to make the 12 single crosses. The single-ear testers were C103 and Hy, and the 2-ear testers were R71 and B60. The single-ear parents included 8 inbred lines, all of which are being used in commercial double-cross hybrids and thus would be considered as lines above average. The 2 two-ear lines have had some previous testing, except R71, has been considered for release to the commercial scale. They are probably more nearly a random group of lines as far as performance in hybrid combinations.

A split-plot field design was used with plots as whole plots and hybrids as subplots. A subplot was 400 inches long, with 40 inches between the 4 rows. Planned comparisons were made at each location each year between the 4 population levels being studied;