EFFECT OF THE METHOD OF COMBINING THE FOUR INBRED LINES OF A DOUBLE CROSS OF MAIZE UPON THE YIELD AND VARIABILITY OF THE RESULTING HYBRID

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LARGE scale production of inbred lines from several varieties of corn was begun at the Iowa Agricultural Experiment Station in 1922. Hundreds of lines were started, the majority of which have been discarded, but a number of good ones have been produced from each of the varieties. The task remains of combining the best of them to produce the most desirable hybrid combinations. Even with relatively few lines, making and testing of all possible hybrid combinations is a staggering task. Thus with only 40 inbreds, 780 single crosses and 274,170 double crosses are possible.

This paper reports the effect upon the yield and variability of two methods of making double crosses among lines from different varieties.

REVIEW OF LITERATURE

Jenkins (3) was the first to use the performance records of single and inbred-variety crosses in predicting the performance of double crosses. He used four different methods as follows (a) the mean values of all possible single crosses among the four lines, (b) the mean value of the four single crosses not used as parents, (c) the mean of all single-cross tests involving each one of the four parent lines, and (d) the mean of the inbred-variety crosses of the four lines. The methods involving single-cross combinations were found to be most reliable. The most important advantage of the inbred-variety cross method was that it permitted the inclusion of all the inbred lines in the tests each year.

Doxtator and Johnson (2) used Jenkins' method (b) in which the four single crosses not used as parents in the double cross were averaged to predict the character desired. They were able to predict the relative yields of double crosses very closely.

Anderson (1) also concluded that double cross yields could be predicted closely by averaging the yield of the four single crosses not used as parents of the double cross.

Wu (6) compared single cross yields in which the inbred parents were derived (a) from the same single cross, (b) from single crosses having one line in common, and (c) from unrelated single crosses. Crosses of closely related material (a) were significantly lower in yield than those from (b) and (c). Crosses of the inbreds from (b) were not significantly different in yield than crosses among inbreds from (c), the unrelated inbreds.

1Contribution from the Farm Crops Subsection, Iowa Agricultural Experiment Station, Ames, Iowa, and the Division of Cereal Crops and Diseases, Bureau of Plant Industry, U. S. Dept. of Agriculture, cooperating. Journal paper J667. Project 163. Received for publication February 21, 1940.

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3Figures in parenthesis refer to “Literature Cited”, p. 353.