THE RELATIONSHIP BETWEEN PREDICTED PERFORMANCE OF DOUBLE CROSSES OF CORN IN ONE YEAR WITH PREDICTED AND ACTUAL PERFORMANCE OF DOUBLE CROSSES IN LATER YEARS

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TWENTY inbred lines of corn that appeared to have some promise for use in the southern and south central corn zones in Minnesota were selected in 1939 and crossed in all possible combinations. The data from yield trials made in 1940 were used to determine the relative desirability of the various inbreds for use in Minnesota based on the yield, maturity, ability to withstand lodging, and other characters of their single crosses. The single crosses between the more desirable combining inbred lines were again grown in yield trials in 1941 and the data from the 2 years' trials were used to predict the yielding ability and other characters of double crosses. The performance of each double cross was predicted from the average of four of the six possible single crosses that can be made between four inbred lines, not using the two parental single crosses in the average.

Forty-nine double crosses were selected for further study as actual double crosses. These included the more promising double crosses based on prediction data. Other double crosses in different maturity groups that appeared less desirable in yielding ability were included also. The actual and predicted performance of these 49 double crosses has been used in a further study of the reliability of the prediction method.

The variability of ear and plant characters of predicted double crosses was determined from data on single crosses grown in 1940-41, inclusive, and estimated from the differences between the means for each group of four single crosses used to predict each double cross. This variability has been compared with the actual estimated variability for the same characters of the double crosses grown in 1943-44, inclusive. Characters studied included date silked, plant height, ear height, ear length, kernel row number, moisture content at husking, and yield in bushels per acre.

REVIEW OF LITERATURE

Jenkins (8) suggested several methods of predicting the yield of double crosses and compared the reliability of four methods with 42 actual and predicted double crosses. The four methods studied did not differ widely in their apparent value. Further studies (1, 3, 6) have indicated that the method of predicting the yield of a double cross by averaging the yield of the four single crosses not used as parents of the double cross was highly reliable.

Eckhardt and Bryan (4, 5) studied the variability of double crosses in relation to the origin and manner of combining their inbred parents. They found some

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3 Figures in parenthesis refer to "Literature Cited", p. 67.