THE COMBINING ABILITY OF INBRED LINES OF GOLDEN BANTAM SWEET CORN

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WHEN only a few inbred lines of corn are available the usual method of determining how they can be used most advantageously is to make all possible combinations between them and select for commercial production the single, three-way, or double crosses that prove the most satisfactory. When many inbred lines are available it has proved desirable to test their combining ability and discard those that give low-yielding crosses on the average. The first method of determining combining ability consisted of a series of crosses of each inbred with 10 or 12 inbred lines used as testers. In 1932, Jenkins and Brunson presented data to show that an open-pollinated variety could be used as a tester to determine the relative combining ability of inbred lines. Significant and fairly high correlations were obtained between the mean yields of inbred lines in several single crosses and the average combining ability of these same lines in top crosses. This has led to the use of top crosses as a means of selecting inbred lines with satisfactory combining ability.

The present study was made to determine the reliability of top crosses as a means of determining the combining ability of inbred lines of sweet corn. A study was made also of the relation between characters of inbred lines and their F1 top crosses.

MATERIALS AND METHODS

In 1934, a group of 39 inbred lines, of which 31 were obtained from an eight-rowed canning type of Golden Bantam and 8 from a cross of two inbred lines, were selected for this study. The lines had been inbred for 6 to 12 years and were the most desirable lines remaining from the standpoint of vigor and other desirable plant characters. Since the majority of these lines, like those obtained from the earlier inbreeding studies with Golden Bantam lines at Minnesota, were sufficiently vigorous to be used in commercial single crosses, these lines if crossed in all possible combinations to find the most desirable hybrids, would have necessitated making and testing 741 single crosses \( \frac{1}{2}n (n-1) \). With a few exceptions, each of these lines was top crossed to the parental Golden Bantam variety, to Del Maiz, a medium-maturing, 10- to 16-rowed yellow sweet corn developed by the Minnesota Valley Canning Company, Le Sueur, Minnesota, and to a Del Maiz inbred line. The Golden Bantam and Del Maiz top crosses were separated into two groups and grown in single-row plots with three randomized replications at University Farm, St. Paul, Minn. The field distribution of the two groups was also randomized. The Golden Bantam and Del Maiz top crosses and the single

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