Cycle Evaluation of Reciprocal Recurrent Selection for Popping Volume, Grain Yield, and Resistance to Root Lodging in Popcorn

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Although a great deal of progress is evident when the current popcorn hybrids are compared with the original varieties, the performance of most of these hybrids is relatively inferior for yield and lodging resistance when compared to dent hybrids. A part of this may be that the maximum effort in improvement has been directed towards quality. Generally speaking, the most important measurement of quality is popping volume or the ratio of the popped corn to the raw corn.

Accordingly, this study was started to determine whether progress could be attained in a reciprocal recurrent selection program when selecting simultaneously for several attributes and to compare progress made by selection between and within selfed families.

Several systems of recurrent selection have been proposed (1, 2, 3). Sprague (9) has summarized four types of recurrent selection and briefly outlined the assumptions and differences in procedure with respect to each type.

Numerous investigators (5, 6, 7, 10) have used the technique for some phase of study in corn improvement research. The technique has also been used in other crops (4, 8). Thomas has completed work on popping volume measurements of individual ears.

Materials and Methods

In 1949, selves were made in population A0 and the selfed plants were also outcrossed to population B0. Selfs were made in population B0 and outcrossed to population A0. Population A0 was an advanced generation of corn originally harvested from a single-cross yield trial grown at Plainview, Texas, and taken from a variety known as Hycross and produced in Kansas.

In 1950, two tests of 81 entries were grown in a lattice design with 3 replications. These tests were made up of 79 test crosses from each of the 2 populations plus 2 checks which were P32 and P38, two commercial popcorn hybrids.

Based on the 1950 yield test results, the 10 most desirable lines from each population were crossed in all possible combinations in 1951. These 2 groups of 45 single-crosses each represented the beginning of the first cycle of recurrent selection or populations A1 and B1. In addition, and on the basis of the yield test results, a number of Sx lines from populations A0 and B0 were again selfed.

Unpublished data.