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Corn Breeding Investigations: 2001 Testcross and Single-Cross Trials

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Abstract

Germplasm resources are the breeding materials used in corn breeding. Recurrent selection methods are used for the genetic improvement of genetically broad-based populations, and similar methods are used to develop recycled inbred lines from elite line by elite crosses. The Iowa program emphasizes genetic enhancement via recurrent selection methods of genetically broad-based synthetic varieties. To determine if the recurrent selection methods are effective in the synthetic populations, lines intermated to form the next cycle population for continued selection also are evaluated in testcrosses and single crosses. The lines that have productive, consistent performance across locations and years are released for possible use by public and private corn breeders.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences

Corn Breeding Investigations: 2001 Testcross and Single-Cross Trials

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Introduction

Germplasm resources are the breeding materials used in corn breeding. Recurrent selection methods are used for the genetic improvement of genetically broad-based populations, and similar methods are used to develop recycled inbred lines from elite line by elite crosses. The Iowa program emphasizes genetic enhancement via recurrent selection methods of genetically broad-based synthetic varieties. To determine if the recurrent selection methods are effective in the synthetic populations, lines intermated to form the next cycle population for continued selection also are evaluated in testcrosses and single crosses. The lines that have productive, consistent performance across locations and years are released for possible use by public and private corn breeders.

Materials and Methods

Eight experiments that included single-cross hybrids and testcrosses were evaluated in 2001. Experimental plots of 90 square feet (two-row plots, 18 feet long, five feet wide with 30 inches between rows) were used for all experiments. All plots were planted and harvested with equipment modified for small experimental plots. Plots were planted May 14 and harvested October 25. The eight experiments included the following hybrids and testcrosses:

- Early maturity single crosses: 80 entries with 68 open-pedigree crosses and two check hybrids evaluated in two replications.
- B100 testcrosses: 60 experimental lines evaluated in two replications. B100 is an

Oh45 recovery and represents Lancaster Sure Crop heterotic group.

- LH227 testcrosses: 60 experimental lines evaluated in two replications. LH227 is a B73 recovery and represents Iowa Stiff Stalk Synthetic heterotic group.
- Two experiments (one 40 entries and second 30 entries) conducted for Committee for Agriculture Development (CAD) to evaluate experimental single crosses in three replications.
- Regional trial of 15 testcrosses having AES 400-600 group maturity. Single crosses were evaluated in two replications.
- Commercial hybrid trials: 30 farmer selected commercial hybrids were evaluated in two replications.
- Open-pollinated varieties were evaluated in four-row plots to compare relative performance of open-pollinated varieties with present-day hybrids.
- Data were collected on each of the 740 plots for grain yield, final stand, grain moisture at harvest, root and stalk lodging, and dropped ears.

Results and Discussion

Data for the early maturity single crosses also were obtained at Calumet, Kanawha, Estherville in Iowa and Kenyon, Minnesota. Data for each location and combined across locations are available electronically at <http://www.agron.iastate.edu/corn/data/>. At Nashua, Iowa, average yield of 70 single crosses was 114 bushels/acre. Some of the better single crosses included B105 × B114 (145 bushels/acre), LH176 × LH198 (142 bushels/acre), B97 × LH227 (133 bushels/acre), B97 × N196 (133 bushels/acre), B103 × B111 (133 bushels/acre), and LH172 × LH202 (133 bushels/acre); LH176 × LH198 and LH172 × LH202 are check hybrids. The five best-yielding

hybrids for the 30 selected commercial hybrids included Midwest Seed 7706 (185 bushels/acre), Novartis N58-09 (176 bushels/acre), Mark 98Bt111 (176 bushels/acre), Novartis N58-D1 (175 bushels/acre), and Pioneer 34M95 (173 bushels/acre). Moisture levels for the five hybrids were similar, but Mark 98Bt111 (19.2%) and Pioneer 34M95 (15.0%) had greater incidence of root lodging than all except one of the 30 hybrids. Data for the three testcross trials and two CAD trials will be used to select lines for further testing in single-cross hybrids.