IOWA STATE UNIVERSITY
Digital Repository

2006

Corn Breeding Research

Kendall Lamkey
Iowa State University

Paul R. White
Iowa State University, pwhite@iastate.edu

Follow this and additional works at: http://lib.dr.iastate.edu/farms_reports

Part of the Agricultural Science Commons, Agriculture Commons, and the Agronomy and Crop Sciences Commons

Corn Breeding Research

Abstract

The Northeast Research and Demonstration Farm is an invaluable facility for the cooperative federal-state corn breeding project at Iowa State University. We rely on the facility as one of our main testing locations in the northern part of Iowa. The corn breeding project at ISU has several goals. One of our most important is to educate graduate students for careers in plant breeding. We conduct basic research into the underlying genetics of important agronomic traits. We also develop and release improved germplasm to companies, other public breeding programs, and individuals. Research farms, like the one at Nashua, are vitally important to the achievement of all of these goals.

Corn Breeding Research

Kendall R. Lamkey, professor
Paul R. White, field lab technician
Department of Agronomy

Introduction

The Northeast Research and Demonstration Farm is an invaluable facility for the cooperative federal-state corn breeding project at Iowa State University. We rely on the facility as one of our main testing locations in the northern part of Iowa. The corn breeding project at ISU has several goals. One of our most important is to educate graduate students for careers in plant breeding. We conduct basic research into the underlying genetics of important agronomic traits. We also develop and release improved germplasm to companies, other public breeding programs, and individuals. Research farms, like the one at Nashua, are vitally important to the achievement of all of these goals.

Corn breeding research at ISU is funded by many sources. Several corn breeders at ISU are employees of the USDA-ARS and collaborators in the Department of Agronomy; therefore, the bulk of their funding comes from the USDA-ARS. The state plant breeders for all crops are funded primarily by the Raymond F. Baker Center for Plant Breeding (http://www.plantbreeding.iastate.edu/) and by federal completive grants.

Materials and Methods

In 2005 we grew 23 replicated experiments at the Northeast Research and Demonstration Farm. All of our research was conducted in small plots consisting of two rows by18 ft long. We can grow approximately 454 small plots/acre. The corn breeding project planted and harvested the plots using special small-plot equipment. All other field activities were conducted by the farm staff. In 2005 we grew 2,706 research plots or about seven acres of plots counting borders and fill. The experiments were primarily devoted to evaluating the performance of experimental inbred lines in hybrid combinations, graduate student research projects, the performance of synthetic varieties in hybrid combinations with inbred lines, and an experiment designed to determine the appropriateness of treating seed in small-plot research. The plots were planted on April 25 and harvested on October 8.

Results and Discussion

The data in Table 1 are from the Northern's Single Cross experiment. All data in this experiment are presented as deviations from the experiment's mean. We used this experiment to evaluate the performance of our elite coded inbred lines and our most advanced experimental inbred lines. The inbreds can be crossed either with other public inbred lines or with proprietary inbred lines. Inbreds in Table 1 that begin with the letter "B" were developed at Iowa State University. For example, the pedigree TR7245/B125 is a F_1 hybrid between the inbreds TR4006 and B125. Additional information on inbreds can be found at: http://www.ag.iastate.edu/centers/cad/index.html. Inbreds beginning with TR, FR, or LH are proprietary inbred lines. DKC52-45 is a commercial hybrid used as a check. The top hybrid in this experiment at Nashua was TR7245/B125, a cross between a proprietary foundation line and an ISU line. This hybrid stood well and was about two points wetter at harvest than the check. Overall, the hybrids made with public inbred lines performed quite well when compared with the checks. The major deficiency of hybrids involving ISU inbred lines was that they were slightly wetter at harvest. Complete data on the single-cross experiment is published yearly and is available on the web at: http://www.agron.iastate.edu/corn/Data/default.html.

These research trials are conducted at three or more locations each year. The data presented here are just from the Northeast Research Farm. This year's top-performing hybrids will be tested in the experiment next year in order to get a minimum of two years of data to verify their performance.

Table 1. Agronomic data for single crosses grown near Nashua, Iowa.

Pedigree	Grain yield	Yield rank	Grain moisture	Lodging	
				Root	Stalk
	bu/acre		%	%	%
TR7245/B125	17.9	1	-0.5	0.0	-4.2
TR4006/B116	13.1	2	-0.4	0.0	0.2
LH244/FR2108	12.1	3	0.9	0.0	6.3
DKC52-45	11.2	4	-2.4	0.0	0.0
TR4006/FR2108	10.1	5	-3.7	0.0	1.9
TR4006/2/B97/B99)-B-005-001-02-02-01-B	9.7	6	-0.7	0.0	-1.8
TR4006/2/B90/B99)-B-021-001-02-02-03-B	8.0	7	0.6	0.0	-4.9
B97/LH244	7.6	8	-0.5	0.0	-1.3
LH244/LH295	6.6	9	0.1	0.0	-1.2
FR3303/FR2108	5.5	10	-1.9	0.0	6.7
Experiment mean	155.5	.	17.6	0.4	12.0
Repeatability	0.6	.	0.8	0.0	0.6