2008

Evaluation of Corn Rootworm Hybrids

James Oleson
Iowa State University

Jonathan Tollefson
Iowa State University

Marlin E. Rice
Iowa State University, merice@iastate.edu

Evaluation of Corn Rootworm Hybrids

Abstract
This past summer, corn root worm technologies were evaluated in side-by-side experiments at four locations in Iowa. The objective of this study was to measure and compare the degree of root protection, standability, and yield provided by the three corn rootworm Cry protein technologies and a standard soil insecticide—Aztec 2.1G.

Keywords
Entomology

Disciplines
Agricultural Science | Agriculture | Entomology

Evaluation of Corn Rootworm Hybrids

Jim Oleson, ag specialist
Jon Tollefson, professor
Marlin Rice, professor
Department of Entomology

Introduction

This past summer, corn rootworm technologies were evaluated in side-by-side experiments at four locations in Iowa. The objective of this study was to measure and compare the degree of root protection, standability, and yield provided by the three corn rootworm Cry protein technologies and a standard soil insecticide—Aztec 2.1G.

Materials and Methods

Plots were planted in areas that had been corn rootworm beetle "catch crops" (high populations of late-planted corn) the previous year. The experimental design was a randomized complete block with four-row treatments at Ames, Crawfordsville, and Sutherland. Nashua had six-row treatments. Plot lengths were 70 to 100 ft, replicated four times. Planting dates were: Ames, May 14; Crawfordsville, May 2; Nashua, May 1; and Sutherland, April 30. Stand counts were taken approximately four weeks after planting. In late July, following the majority of corn rootworm feeding, three roots were dug from the two center rows of each treatment (two roots from rows 2–4 at Nashua). The root systems were transported back to Ames where they were power washed and rated for injury using the Iowa State Node-Injury Scale. This scale rates roots from 0–3 based on the number of nodes eaten.

Product consistency represents the percentage of times that the roots had ¼ node or less eaten back to within 1½ inches of the stalk. Consistency is a percentage and works on the same principle as a batting average in baseball—the larger the number, the better the performance. Prior to harvest, the percentage of lodged plants (the stalk or base of plant leaning at least 30 degrees from vertical) was calculated.

Results and Discussion

The amount of injury from corn rootworm larvae was variable across locations and the spectrum of products evaluated. At three locations (Ames, Crawfordsville and Sutherland), there were no differences among any of the rootworm products with respect to the amount of root injury. However, at the fourth location (Nashua), Agrisure CB/LL/RW and Aztec 2.1G had significantly more rootworm injury than occurred in YieldGard Plus and Herculex XTRA. The reasons for this difference in the level of rootworm injury are unknown.

At three locations, the product consistencies of Agrisure CB/LL/RW, Aztec 2.1G, Herculex XTRA, and YieldGard Plus were statistically the same, thereby providing similar levels of root protection against corn rootworm larvae. However, at the fourth location in Nashua, Agrisure and Aztec had statistically less protection consistency than either YieldGard Plus or Herculex XTRA. Again, the reasons for this inconsistency are unknown since the same Agrisure hybrid and Aztec treated hybrid were planted at the other three locations.

Lodging ratings were inconsistent and did not appear to be strongly related to corn rootworm injury this year. For example, at Nashua where the YieldGard Plus and Herculex XTRA were 100 percent in consistent root protection, the Herculex hybrid suffered 28 percent lodging. Aztec 2.1G also had poorer consistency ratings at this location, but suffered less lodging than Herculex XTRA.

There were no differences in yields at Ames, but there were at the other three locations (data presented in Table 1).

Table 1. Average node-injury, product consistency, percent lodging, stand count, and yield for corn rootworm treatments, 2007.

Johnson Farm, Ames, IA

Treatment[1]	Placement[2]	Node-injury[3,4]	Product consistency[4,5,6]	Percent lodging[4,5]	Stand count 17.5 row-ft[4]	Yield[4] (bu/a)
YieldGard Plus	----	0.002 a	100 a	0	29.17	171
Herculex XTRA	----	0.007 a	100 a	0	27.17	169
Aztec 2.1G	T-band	0.011 a	100 a	0	29.33	191
Agrisure CB/LL/RW	----	0.111 a	89 a	0	29.17	177
CHECK	----	1.209 b	17 b	0	29.17	168
Southeast Research Farm, Crawfordsville, IA[6]						
YieldGard Plus	----	0.01 a	100 a	54 a	30.00 ab	181 a
Herculex XTRA	----	0.02 a	100 a	49 a	29.50 ab	159 bc
Agrisure CB/LL/RW	----	0.04 a	100 a	44 a	27.75 b	173 ab
Aztec 2.1G	T-band	0.07 a	100 a	34 a	29.75 ab	182 a
CHECK	----	2.53 b	0 b	80 b	30.75 a	152 c
Northeast Research Farm, Nashua, IA						
Herculex XTRA	----	0.02 a	100 a	28 b	34.33	195 b
YieldGard Plus	----	0.04 a	100 a	0 a	34.33	228 a
Agrisure CB/LL/RW	----	0.82 b	17 b	27 b	34.42	189 b
Aztec 2.1G	T-band	0.87 b	21 b	3 a	34.08	196 b
CHECK	----	2.21 c	0 b	100 c	34.50	157 c
Northwest Research Farm, Sutherland, IA						
YieldGard Plus	----	0.02 a	100 a	0 a	32.00	194 a
Herculex XTRA	----	0.02 a	100 a	14 b	32.00	164 b
Aztec 2.1G	Furrow	0.10 a	100 a	0 a	32.75	162 b
Agrisure CB/LL/RW	----	0.12 a	92 a	4 ab	34.13	184 a
CHECK	----	1.99 b	8 b	74 c	32.88	101 c

[1]YieldGard Plus (DKC60-18) and Herculex XTRA (Pioneer 34A20) were treated with Poncho 250; Agrisure CB/LL/RW (N67-W2) was treated with Cruiser Extreme 250; the seed for Aztec 2.1G and CHECK was Pioneer 34A16 and it had no seed treatment.

[2]T-band or Furrow = placement of insecticide applied at planting time.

[3]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes eaten back to within 1½ in. of the stalk.

[4]Means sharing a common letter do not differ according to Ryan's Q Test ($P \leq 0.05$).

[5]Product consistency = percentage of times nodal injury was 0.25 (¼ node eaten) or less.

[6]3.06 in. rainfall on June 22 and 1.64 in. rainfall on June 23 accompanied with very strong winds caused lodging in all treatments (lodging occurred in the absence of root injury).