Products Evaluated for Corn Rootworm Management

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Introduction

Commercially available corn rootworm products were evaluated for their ability to protect corn-root systems from corn rootworm feeding injury (corn following corn tests). Products were also tested in the absence of corn rootworms (corn following soybean tests) to address the question, "Do corn rootworm transgenics have the same yield potential as their respective isolines?"

Materials and Methods

Corn following corn tests. Plots were planted April 27 in an area that had been a corn rootworm beetle "catch crop" (high populations of late-planted corn) the previous year. The experimental design was a randomized complete block with two-row treatments, 100-ft in length, replicated four times. A four-row John Deere 7100 planter with 30-in. row spacing was used to plant the plots at 29,900 seeds/acre. DKC60-18 was the corn hybrid used for the YieldGard Plus treatments (transgenic seed containing a Bt gene). DKC60-19, the non-Bt equivalent (near isoline) of the transgenic seed, was used with the granular and liquid insecticide treatments. Seed treatments were commercially applied to the near-isoline seed.

A test evaluating another corn rootworm transgenic seed corn, Herculex XTRA, was planted adjacent to the previous test. The planting date and experimental design were identical to the previous test. Seed for Herculex XTRA was Pioneer 34A18. Pioneer 34A16 (a Herculex I conversion of 34A15) was used for the near-isoline seed.

Corn following soybean tests. Separate YieldGard Plus and Herculex XTRA tests were planted adjacent to each other on soybean ground on April 27. The experimental design for each test was a randomized complete block with two-row treatments, 100-ft in length, replicated four times. On July 10 corn-root systems were dug from all tests, washed, and rated for injury. All plots were machine harvested.

Results and Discussion

YieldGard Plus tests (Tables 1a and 1b). There was heavy corn rootworm feeding in the corn-on-corn test (CHECK=2.03 nodes eaten). All treatments had less root feeding than the CHECK. Treatments with node-injury scores greater than one node (Regent and Cruiser) had more lodging than other treatments. Lower yields were also seen with these treatments. Node-injury scores for YieldGard Plus and Force (T-band) were not different. However, YieldGard Plus (transgenic seed) had higher yield than Force (applied to near-isoline seed). In the corn-on-soybean test, there were only a few roots that had feeding scores (no root pruning was observed). Although YieldGard Plus had a +11-bushel advantage over Force, yields between the two were not statistically different. In an identical test conducted at Nashua, YieldGard Plus and Force had yields of 225 and 209 bushels/acre, respectively. This 16-bushel difference was statistically significant.

Herculex XTRA tests (Tables 2a and 2b). In both the corn-on-corn, and corn-on-soybean tests, Herculex XTRA and Force were not different from one another in node-injury scores or yields. In identical tests at Nashua, the corn-on-corn node-injury scores and yields were not different. However, in the corn-on-soybean test, where no corn rootworm feeding occurred, Herculex XTRA had a lower yield than Force, 199 and 214 bushels/acre, respectively.

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Table 1a. 2006 corn rootworm products evaluated at Crawfordsville, IA–corn following corn test.

Treatment[a]	Placement[c]	Node-injury[d,e]	Product consistency[e,f]	Percent lodging[e]	Stand ct 17.5 ft	Yield[e] (bu/a)
YieldGard Plus	Bt seed	0.02 a	100 a	0 a	29.75	210 a
Fortress 2.1G	Furrow	0.11 a	100 a	1 a	29.25	190 b
Aztec 2.1G	T-band	0.13 a	100 a	0 a	28.88	180 bc
DEFCON 2.1G	T-band	0.14 a	96 a	0 a	29.13	191 b
Fortress 5G	Furrow SB	0.14 a	96 a	0 a	28.88	179 bc
Force 3G	T-band	0.15 a	100 a	0 a	29.50	181 bc
Aztec 2.1G	Furrow	0.20 a	96 a	0 a	28.75	179 bc
Aztec 4.67G	T-band SB	0.21 a	83 a	0 a	28.63	182 bc
DEFCON 2.1 G	Furrow	0.21 a	92 a	1 a	28.50	185 bc
Lorsban 15G	T-band	0.22 a	96 a	0 a	28.50	181 bc
Force 3G	Furrow	0.27 a	79 a	1 a	28.88	179 bc
Capture LFR	T-band	0.39 a	75 a	8 a	29.13	178 bc
Poncho ST	ST	0.76 b	25 b	10 a	28.75	190 b
Regent 4SC	Furrow M	1.06 bc	13 b	50 b	30.13	167 c
Cruiser ST	ST	1.13 c	4 b	63 b	28.18	172 bc
CHECK	---	2.03 d	0 b	88 c	28.63	156 d

Table 1b. YieldGard Plus–corn following soybeans test.

YieldGard Plus	Bt seed	0.000 a	100	0	28.00	226 a
Force 3G	T-band	0.003 ab	100	0	27.88	215 ab
CHECK	----	0.005 b	100	0	28.50	202 b

Table 2a. 2006 Herculex XTRA test–corn following corn test.

Treatment[b]	Placement[c]	Node-injury[d,e]	Product consistency[e,f]	Percent lodging[e]	Stand ct. 17.5 ft	Yield[e] (bu/a)
Herculex XTRA	*Bt* seed	0.02 a	100 a	0 a	29.63	193 a
Force 3G	T-band	0.15 a	96 a	0 a	28.88	200 a
CHECK	----	1.67 b	0 b	76 b	28.88	174 b

Table 2b. Herculex XTRA–corn following soybeans test.

Herculex XTRA	Bt seed	0.002	100	0	29.63	193
Force 3G	T-band	0.009	100	0	28.88	206
CHECK	----	0.010	100	0	28.88	208

[a]YieldGard Plus (DKC60-18); isoline seed for all other treatments (DKC60-19).
[b]Herculex XTRA (Pioneer 34A18); Force and CHECK (Pioneer 34A16 a Herculex I conversion of 34A15).
[c]T-band & Furrow=applied at planting; SB=SmartBox; ST=seed treatment; M=microtube.
[d]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes completely eaten.
[e]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).
[f]Product consistency=percentage of times nodal injury was 0.25 (¼ node eaten) or less.