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Transgenic Seed Corn Evaluated for Corn Rootworm Control

Abstract

The newly labeled YieldGard® Rootworm seed corn (transgenic seed containing a Bt protein) along with two traditional granular insecticides (Force and Aztec) were evaluated for their ability to protect corn root systems from corn rootworm feeding injury. 2003 data from tests conducted at the Kanawha, Nashua, and Crawfordsville farms are presented in this report.

Keywords

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Disciplines

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Transgenic Seed Corn Evaluated for Corn Rootworm Control

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August 6. The center two rows of each treatment were machine harvested on October 9.

Introduction

The newly labeled YieldGard[®] Rootworm seed corn (transgenic seed containing a *Bt* protein) along with two traditional granular insecticides (Force and Aztec) were evaluated for their ability to protect corn root systems from corn rootworm feeding injury. 2003 data from tests conducted at the Kanawha, Nashua, and Crawfordsville farms are presented in this report.

Materials and Methods

The Kanawha plot was planted on April 28, 2003, 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 4-row treatments, 200-ft in length, and replicated four times. A four-row John Deere 7100 planter with 30-inch row spacing was used to plant the plots at 29,900 seeds/acre. Specially designed seed hoppers (with standard “finger pickup mechanisms”) were used to handle the small amounts of pre-bagged seeds. DKC60-12 (with Gaucho seed treatment) was the seed used for the YieldGard Rootworm treatments. The isoline seed DKC60-15 was used for the granular insecticide and untreated CHECK treatments (no seed treatment applied to the isoline seed). On August 6, corn root systems were dug, washed, and rated for damage on the following Iowa State Node-Injury Scale: 0.00 equals no feeding; 1.00 equals one node (circle or roots), or the equivalent of an entire node, eaten back to within approximately two inches of the stalk; 2.00 equals two nodes eaten; and 3.00 equals three nodes eaten. Damage in-between complete nodes eaten is noted as the percentage of the node missing (i.e., 0.25 = 1/4 of one node eaten, 0.50 = 1/2 node eaten, 1.25 = 1 1/4 nodes eaten, etc.). Stand and lodging counts were taken on

Results and Discussion

There was very *light* rootworm feeding pressure in the Kanawha test with 0.37 node of roots eaten in the CHECK (Table 1a). No plant lodging was observed. In regard to yield, neither the granular insecticides nor the transgenic seed corn were significantly different from the CHECK. However, both insecticide treatments had significantly higher yields than the transgenic seed. No explanation can be given for this difference. The Nashua field (Table 1b) also had *light* rootworm injury and consequently no significant yield differences.

Another Nashua field (Table 1c), one-half mile from the previous field, had extremely *heavy* rootworm feeding with 2.46 nodes of roots eaten in the CHECK. YieldGard Rootworm and Force had significantly higher yields than the CHECK, 27 and 22 bushels more per acre, respectively. Similar *heavy* rootworm injury was recorded at the Crawfordsville location (Table 1d). Heat stress and little rainfall during the July pollination period contributed to much lower yields than normal at Crawfordsville (and Nashua as well). The transgenic seed yielded 40 bushels more per acre than the best insecticide treatment. The root systems of the transgenic treatment were evidently able to find moisture and nutrients not accessible to the root systems of the other treatments.

The product consistency of YieldGard Rootworm was 100% at all four locations. Product consistency equals the percentage of times nodal injury was 0.25 or less (based on all roots evaluated).

Large-scale YieldGard Rootworm yield tests, Iowa State University, 2003.**1a. Kanawha – light rootworm pressure field, April 28.**

Treatment	Placement	Yield (bu/a) ¹	Node-injury (0-3) ²	Product consistency ³	Stand ct. (17.5 ft)	% Lodging
Force 3G	T-band	195 a	0.03 a	100 a	30.00 a	0
Aztec 2.1G	T-band	194 a	0.07 a	95 a	28.00 b	0
CHECK	----	190 ab	0.37 b	55 b	29.13 ab	0
YieldGard RW	Transgenic	184 b	0.01 a	100 a	30.13 a	0

1b. Nashua – light rootworm pressure field, planted April 26.

Treatment	Placement	Yield (bu/a)	Node-injury (0-3)	Product consistency	Stand ct. (17.5 ft)	% Lodging
CHECK	----	121	0.809 b	34 b	25.94 b	6 b
Force 3G	T-band	120	0.154 a	97 a	27.50 a	0 a
Aztec 2.1G	T-band	117	0.134 a	95 a	27.63 a	0 a
YieldGard RW	Transgenic	112	0.003 a	100 a	27.56 a	0 a

1c. Nashua – heavy rootworm pressure field, planted April 26.

Treatment	Placement	Yield (bu/a)	Node-injury (0-3)	Product consistency	Stand ct. (17.5 ft)	% Lodging
YieldGard RW	Transgenic	133 a	0.03 a	100 a	26.63	0 a
Force 3G	T-band	128 a	0.39 b	70 b	25.50	0 a
Aztec 2.1G	T-band	110 b	0.59 b	29 c	27.63	0 a
CHECK	----	106 b	2.46 c	0 d	27.00	34 b

1d. Crawfordsville – heavy rootworm pressure field, planted May 14.

Treatment	Placement	Yield (bu/a)	Node-injury (0-3)	Product consistency	Stand ct. (17.5 ft)	% Lodging
YieldGard RW	Transgenic	149 a	0.04 a	100 a	28.13	0 a
Force 3G	T-band	109 b	0.39 a	58 b	28.50	0 a
Aztec 2.1G	T-band	92 c	0.39 a	63 b	27.63	0 a
CHECK	----	93 c	2.36 b	0 c	27.88	47 b

¹ Iowa State Node-Injury Scale (0-3). Number of full or partial nodes completely eaten.² Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).³ Product consistency = percentage of times nodal injury was 0.25 (1/4 node eaten) or less.