2007

Transgenic Seedcorn Evaluated for Corn Rootworm Management

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Abstract
Transgenic seedcorn hybrids, that contain a gene from the naturally occurring soil bacterium *Bacillus thuringiensis* (Bt), were evaluated for their ability to protect corn-root systems from corn rootworm feeding injury. Force 3G was used as an insecticide treatment in several of the tests.

Keywords
Entomology

Disciplines
Agricultural Science | Agriculture | Entomology

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Introduction

Transgenic seedcorn hybrids, that contain a gene from the naturally occurring soil bacterium *Bacillus thuringiensis* (Bt), were evaluated for their ability to protect corn-root systems from corn rootworm feeding injury. Force 3G was used as an insecticide treatment in several of the tests.

Materials and Methods

Three test plots were planted May 8 in an area that had been a corn rootworm beetle "catch crop" (high populations of late-planted corn) the previous year. The experimental design for each test (planted side by side) was a randomized complete block with single-row treatments, 50-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. Specially designed seed hoppers (with standard "finger pickup mechanisms") were used to handle the small amounts of pre-bagged seed. On July 27, following the majority of corn rootworm feeding, corn-root systems were dug, washed, and rated for injury on the Iowa State node-injury scale: 0.00 equals no feeding; 1.00=one node (circle of roots), or the equivalent of an entire node, eaten back to within approximately 1.5 in. of the stalk (or soil line if roots originate from above ground nodes); 2.00=two nodes eaten; and 3.00=three nodes eaten. Damage in-between complete nodes eaten is noted as the percentage of the node missing (e.g. 1.25=1¼ nodes eaten). A product consistency (%) was also calculated for each treatment. Product consistency equals the percentage of times a treatment limited feeding injury to 0.25 (¼ node eaten) or less. Plant stands were taken on June 6. Lodging counts were taken on September 22. A plant was considered lodged if it was leaning at least 30° from vertical. Yields were hand harvested on October 10.

Results and Discussion

There was moderate corn rootworm feeding in the tests with approximately one node of roots eaten in the untreated checks (Tables 1a–1c). The roots from the transgenic and Force treatments had very little feeding. With the good growing conditions at Kanawha and only moderate root feeding, treatment yields were not different from the CHECK in all tests.

Acknowledgments

Thanks to David Rueber and his staff for their assistance with these tests.

Tables 1a, 1b, and 1c. Average root-injury, product consistency, percent lodging, stand counts, and yields for corn rootworm transgenic hybrids, Kanawha, IA, 2006.

Table 1a.

Treatment[a]	Placement[b]	Node-injury[c,d]	Product consistency[d,e]	Percent lodging[f]	Stand count[f] 20 row-ft	Yield[d] (bu/a)
YieldGard Plus	Bt seed	0.01 a	100 a	0	33.25	234 a
Force 3G	T-band	0.03 a	100 a	0	31.50	206 b
CHECK	----	0.89 b	15 b	5	33.50	219 ab

Table 1b.

Treatment[g]	Placement[b]	Node-injury[c,d]	Product consistency[d,e]	Percent lodging[d]	Stand count[f] 20 row-ft	Yield[f] (bu/a)
Herculex XTRA	Bt seed	0.04 a	100 a	3 a	32.25	204
Force 3G	T-band	0.12 a	95 a	0 a	31.25	210
CHECK	----	1.39 b	5 b	43 b	32.75	197

Table 1c.

Treatment[h]	Placement	Node-injury[c,d]	Product consistency[d,e]	Percent lodging[f]	Stand count[f] 20 row-ft	Yield[f] (bu/a)
Herculex RW	Bt seed	0.02 a	100 a	0	32.13	192
Herculex XTRA	Bt seed	0.03 a	100 a	0	32.13	190
CHECK	---	1.09 b	5 b	3	32.88	185

[a]YieldGard Plus (DKC60-18) treated with Poncho 250; near-isoline seed for Force and CHECK (DKC60-19).
[b]T-band=insecticide applied at planting time.
[c]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes completely eaten.
[d]Means sharing a common letter do not differ significantly according to Ryan's *Q* Test ($P \leq 0.05$).
[e]Product consistency=percentage of times nodal injury was 0.25 (¼ node eaten) or less.
[f]No significant differences between means (ANOVA, $P \leq 0.05$).
[g] Herculex XTRA (Pioneer 34A18) treated with Poncho 250; seed for Force and CHECK (Pioneer 34A16, a Herculex I conversion of 34A15).
[h]Herculex RW (Mycogen 2D545) and Herculex XTRA (Mycogen 2E526) were treated with Cruiser at the rate of 0.25 mg/seed; near-isoline CHECK seed was Mycogen 2E522.