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Corn Rootworm Insecticide Performance

Abstract

Commercially available corn rootworm insecticides are evaluated yearly for their ability to protect corn root systems from corn rootworm feeding injury. Three newly registered products, Cruiser® and Poncho® seed treatments (at the rootworm rate) and YieldGard® Rootworm seed (transgenic seed containing a *Bt* protein), are included in the tests. 2003 data from tests conducted at the Crawfordsville, Sutherland, and Nashua farms are presented in this report.

Keywords

Entomology

Disciplines

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Corn Rootworm Insecticide Performance

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Introduction

Commercially available corn rootworm insecticides are evaluated yearly for their ability to protect corn root systems from corn rootworm feeding injury. Three newly registered products, Cruiser[®] and Poncho[®] seed treatments (at the rootworm rate) and YieldGard[®] Rootworm seed (transgenic seed containing a *Bt* protein), are included in the tests. 2003 data from tests conducted at the Crawfordsville, Sutherland, and Nashua farms are presented in this report.

Materials and Methods

Crawfordsville plots were planted May 14, 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 1-row treatments 50-ft in length, replicated four times. (Nashua and Sutherland plots consisted of 2-row treatments and 100-ft row lengths.) 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 was the seed used for YieldGard[®] Rootworm treatments. Cruiser[®] and Poncho[®] seed treatments were commercially applied to DKC60-15, the isolate of the transgenic seed. The isolate seed was also used with the granular and liquid insecticide treatments. On July 30, 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 counts were taken on June 12. Lodging counts were taken just prior to harvest on September 30.

Results and Discussion

Table 1a. lists the results from the 2003 Crawfordsville test. There was heavy rootworm feeding pressure with 2.14 nodes of roots eaten in the untreated CHECK. There were no significant differences in stand counts. Due to limited rainfall during July and August (Table 2), yields were much lower than normal. Only two treatments, YieldGard Rootworm and Cruiser ST, had significantly higher yields than the CHECK.

The Nashua location had rootworm feeding pressures and growing conditions similar to Crawfordsville. YieldGard Rootworm and Force 3G placed out in a T-band had significantly higher yields than the CHECK. However, Cruiser ST yields and percent lodging were not significantly different from the CHECK at this location.

In stark contrast to the Crawfordsville and Nashua locations, Sutherland had adequate moisture through July (critical time for pollination). Even though there were significant differences between treatments in regard to node injury, there were no significant yield differences. As we have seen in previous tests, when there is only moderate root injury (1.24 nodes eaten in the CHECK), significant yield differences normally do not occur when there is adequate moisture and no (or very little) plant lodging.

Table 1a. 2003 evaluations for labeled corn rootworm treatments applied at planting time.¹

Treatment	Placement	Crawfordsville (SE, IA)		
		Node injury ^{2,3}	% lodging	Yield (bu/a)
Aztec 2.1G	Furrow	0.32 a	0 a	115 bc
Aztec 2.1G	T-band	0.58 a	0 a	109 bc
Aztec 4.67G	Furrow SB	0.28 a	0 a	103 c
Aztec 4.67G	T-band SB	0.37 a	0 a	114 bc
Capture 2EC	T-band	1.31 b	16 ab	90 c
Counter 20CR	Furrow	0.51 a	0 a	99 c
Counter 20CR	T-band	0.25 a	0 a	98 c
Cruiser 5FS	ST	1.15 b	0 a	134 ab
Force 3G	Furrow	0.50 a	0 a	118 a-c
Force 3G	T-band	0.38 a	0 a	120 a-c
Fortress 2.5G	Furrow	0.25 a	0 a	120 a-c
Fortress 5G	Furrow SB	0.36 a	0 a	110 bc
Lorsban 15G	T-band	0.49 a	0 a	104 bc
Poncho 1250	ST	1.45 b	0 a	105 bc
YieldGard RW	Transgenic	0.16 a	0 a	144 a
CHECK	----	2.14 c	32 b	100 c

Table 1b.

Treatment	Placement	Sutherland (NW, IA)			Nashua (NE, IA)		
		Node injury(0-3)	% lodging	Yield (bu/a)	Node injury(0-3)	% lodging	Yield (bu/a)
Aztec 2.1G	Furrow	0.14 ab	0 a	202 ab	0.23 ab	0 a	120 a-c
Aztec 2.1G	T-band	0.12 ab	0 a	191 ab	0.59 b-e	0 a	110 bc
Aztec 4.67G	Furrow SB	0.16 ab	0 a	199 ab	0.30 a-c	0 a	117 a-c
Aztec 4.67G	T-band SB	0.10 ab	0 a	196 ab	0.38 a-d	0 a	111 bc
Capture 2EC	T-band	0.45 bc	0 a	201 ab	1.16 f	0 a	119 a-c
Counter 20CR	Furrow	0.05 a	0 a	198 ab	0.78 c-f	0 a	111 bc
Counter 20CR	T-band	0.04 a	0 a	188 b	0.86 d-f	1 a	114 a-c
Cruiser 5FS	ST	1.07 d	0 a	199 ab	1.84 g	33 b	121 a-c
Force 3G	Furrow	0.11 ab	0 a	201 ab	0.31 a-c	0 a	121 a-c
Force 3G	T-band	0.08 a	0 a	196 ab	0.39 a-d	0 a	128 ab
Fortress 2.5G	Furrow	0.13 ab	0 a	196 ab	0.62 b-e	1 a	116 a-c
Fortress 5G	Furrow SB	0.11 ab	0 a	211 a	0.91 ef	0 a	114 a-c
Lorsban 15G	T-band	0.19 ab	0 a	193 ab	1.23 f	3 a	107 bc
Poncho 1250	ST	0.58 c	0 a	208 ab	1.07 ef	0 a	126 a-c
YieldGard RW	Transgenic	0.01 a	0 a	197 ab	0.03 a	0 a	133 a
CHECK	----	1.24 d	1 b	191 ab	2.46 h	34 b	106 c

¹ Sutherland planted May 2, Crawfordsville May 14, and Nashua April 26.

² Iowa State Node-Injury Scale (0-3). Number of full or partial nodes completely eaten. Means based on 40 roots.

³ Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).

Table 2. 2003 rainfall amounts.

	Crawfordsville		Nashua		Sutherland	
	Rainfall	DFN*	Rainfall	DFN	Rainfall	DFN
April	2.59	+0.55	3.84	+0.43	1.78	-1.04
May	6.48	+2.63	3.89	-0.45	3.80	+0.10
June	4.30	+0.03	6.09	+1.18	8.12	+3.69
July	1.77	-2.43	2.99	-1.68	5.51	+1.40
August	0.87	-2.89	0.49	-4.39	0.44	-4.19
TOTALS	16.01	-2.11	17.30	-4.91	19.65	-0.04

*Deviation from normal.