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Corn Rootworm Insecticide Performance

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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 Sutherland, Crawfordsville, and Nashua farms are presented in this report.

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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 Sutherland, Crawfordsville, and Nashua farms are presented in this report.

Materials and Methods

Sutherland plots were planted May 2, 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 2-row treatments 100-ft in length, 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 was the seed used for YieldGard® Rootworm treatments. Cruiser® and Poncho® seed treatments were commercially applied to DKC60-15, the isoline of the transgenic seed. The isoline seed was also used with the granular and liquid insecticide treatments. On July 22, 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 9, lodging counts on October 8, and the plot was machine harvested on October 20.

Results and Discussion

Table 1a. lists the results from the 2003 Sutherland test. There was moderate rootworm feeding pressure with 1.24 nodes of roots eaten in the untreated CHECK. There were no significant differences in stand counts. Even though there were significant differences between treatments in regard to node injury, there were no significant yield differences. As we have seen in similar tests, with adequate moisture (through pollination, Table 2), and no or very little plant lodging, significant yield differences normally do not occur.

In stark contrast to Sutherland, the Crawfordsville and Nashua plots did not get much rain during a hot July, and plants were moisture stressed (Table 2). There were no significant stand differences between treatments at either location. Compared with Sutherland, both locations had about twice as much root injury in the CHECK, (over two nodes eaten, Table 1b.), and about a third of the plants in the CHECK were lodged at both locations. Under these conditions, YieldGard Rootworm provided excellent root protection and was the only treatment that had significantly higher yields than the CHECK at both locations (+44 bushels/acre at Crawfordsville and +27 bushels/acre at Nashua). These results were quite surprising; but again, this is the first time we have been able to take "rootworm corn" to yield. Because of EPA regulations, we previously had to detassel all transgenic seed.

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

		Sutherland (NW, IA)		
Treatment	Placement	Node-injury[2,3]	% lodging	Yield (bu/a)
Aztec 2.1G	Furrow	0.14 ab	0 a	202 ab
Aztec 2.1G	T-band	0.12 ab	0 a	191 ab
Aztec 4.67G	Furrow SB	0.16 ab	0 a	199 ab
Aztec 4.67G	T-band SB	0.10 ab	0 a	196 ab
Capture 2EC	T-band	0.45 bc	0 a	201 ab
Counter 20CR	Furrow	0.05 a	0 a	198 ab
Counter 20CR	T-band	0.04 a	0 a	188 b
Cruiser 5FS	ST	1.07 d	0 a	199 ab
Force 3G	Furrow	0.11 ab	0 a	201 ab
Force 3G	T-band	0.08 a	0 a	196 ab
Fortress 2.5G	Furrow	0.13 ab	0 a	196 ab
Fortress 5G	Furrow SB	0.11 ab	0 a	211 a
Lorsban 15G	T-band	0.19 ab	0 a	193 ab
Poncho 1250	ST	0.58 c	0 a	208 ab
YieldGard RW	Transgenic	0.01 a	0 a	197 ab
CHECK	----	1.24 d	1 b	191 ab

Table 1b.

		Crawfordsville (SE, IA)			Nashua (NE, IA)		
Treatment	Placement	Node-injury(0-3)	% lodging	Yield (bu/a)	Node-injury(0-3)	% lodging	Yield (bu/a)
Aztec 2.1G	Furrow	0.32 a	0 a	115 bc	0.23 ab	0 a	120 a-c
Aztec 2.1G	T-band	0.58 a	0 a	109 bc	0.59 b-e	0 a	110 bc
Aztec 4.67G	Furrow SB	0.28 a	0 a	103 c	0.30 a-c	0 a	117 a-c
Aztec 4.67G	T-band SB	0.37 a	0 a	114 bc	0.38 a-d	0 a	111 bc
Capture 2EC	T-band	1.31 b	16 ab	90 c	1.16 f	0 a	119 a-c
Counter 20CR	Furrow	0.51 a	0 a	99 c	0.78 c-f	0 a	111 bc
Counter 20CR	T-band	0.25 a	0 a	98 c	0.86 d-f	1 a	114 a-c
Cruiser 5FS	ST	1.15 b	0 a	134 ab	1.84 g	33 b	121 a-c
Force 3G	Furrow	0.50 a	0 a	118 a-c	0.31 a-c	0 a	121 a-c
Force 3G	T-band	0.38 a	0 a	120 a-c	0.39 a-d	0 a	128 ab
Fortress 2.5G	Furrow	0.25 a	0 a	120 a-c	0.62 b-e	1 a	116 a-c
Fortress 5G	Furrow SB	0.36 a	0 a	110 bc	0.91 ef	0 a	114 a-c
Lorsban 15G	T-band	0.49 a	0 a	104 bc	1.23 f	3 a	107 bc
Poncho 1250	ST	1.45 b	0 a	105 bc	1.07 ef	0 a	126 a-c
YieldGard RW	Transgenic	0.16 a	0 a	144 a	0.03 a	0 a	133 a
CHECK	----	2.14 c	32 b	100 c	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.