Corn Rootworm Insecticide Performance

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Introduction

Commercially available corn rootworm granular and liquid insecticides, as well as seed treatments, are evaluated yearly for their ability to protect corn root systems from corn rootworm feeding injury. The 2002 data from the Crawfordsville farm, plus a 3-year, multi-location summary are presented in this report.

Materials and Methods

The 2002 Crawfordsville test was planted May 4 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 treatments applied to single 50-ft rows and replicated four times. Granular and liquid planting-time insecticide formulations were applied with modified application equipment mounted on a four-row John Deere 7100 planter (30-inch row spacing). On July 23, 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.). The Node-Injury scale allowed us to additionally calculate a precise product performance consistency. Product consistency equals the percentage of times a treatment limited feeding damage to 0.25 (1/4 of a node eaten) or less. This is the point where potential economic damage can occur. Stand and lodging counts were taken on October 7.

Results and Discussion

Table 1 lists the results from the 2002 Crawfordsville test. There was moderately heavy rootworm pressure with 1.76 nodes of roots eaten in the untreated CHECK. The three seed treatments plus Regent 4SC failed to significantly reduce rootworm feeding. Plant lodging was very severe in this test. Treatments that kept rootworm injury less than one node, had significantly less lodging (0–33%) than those treatments that had over one node eaten (70–98% lodging). There were no significant treatment differences in regard to stand counts.

In the 3-year summary (Table 2), only those treatments that were tested all three years in side-by-side trials are listed. Results are from seven locations (no 2002 Crawfordsville yields) representing a variety of soil types, tillages, fertilities, corn rootworm pressures, and environmental conditions. The seed treatments ProShield and Prescribe were significantly different from the CHECK in regard to Node-Injury, consistency, and lodging. However, they were not significantly different from the CHECK in regard to yield. From a statistical standpoint, all products from Aztec 2.1G to Regent 4SC had yields that were similar. A word of caution is in order, though, when trying to interpret the yield results. These data represent yields from locations that had generally *normal* rainfall amounts during the growing seasons. When there are drought conditions, we routinely see significantly lower yields when injury increases from 0.25 to 1.00 nodes eaten. A case in point was this year at Crawfordsville where the corn plants suffered severe moisture stress during pollination; severe lodging also occurred. Yields decreased 58% when injury increased from 0.25 to 1.00 node.

Table 1. 2002 root-injury ratings, product consistency, and percent lodging for planting-time insecticide treatments, Crawfordsville.

Insecticide	Placement[1]	Node-Injury[2,4] Full	Node-Injury[2,4] Partial (%)	Product consistency (%)[3,4]	Percent lodging[4]
Counter 20CR	T-band	0	20 a	90 a	0 a
Aztec 2.1G	T-band	0	32 a	75 ab	3 a
Fortress 2.5G	Furrow	0	35 a	65 abc	0 a
Fortress 5G	T-band SB	0	39 a	60 abcd	13 a
Counter 20CR	Furrow	0	42 a	50 abcdef	5 a
Lorsban 15G	T-band	0	43 ab	55 abcde	0 a
Force 3G	T-band	0	45 ab	65 abc	20 a
Fortress 5G	Furrow SB	0	52 ab	40 bcdefg	8 a
Aztec 2.1G	Furrow	0	68 abc	25 cdefg	10 a
Force 3G	Furrow	0	68 abc	15 efg	33 a
Lorsban 15G	Furrow	0	70 abcd	15 efg	25 a
Aztec 4.67G	Furrow SB	0	71 abcd	10 fg	28 a
Aztec 4.67G	T-band SB	0	77 abcd	20 defg	20 a
Capture 2EC	T-band	1	04 bcde	5 g	73 b
Capture 2EC	Furrow	1	14 cde	0 g	73 b
Poncho	ST	1	25 cdef	5 g	70 b
Prescribe	ST	1	29 def	5 g	85 b
Regent 4SC	Furrow-M	1	53 ef	0 g	95 b
ProShield	ST	1	58 ef	0 g	98 b
CHECK	----	1	76 f	0 g	98 b

[1]T-band & Furrow = insecticide applied at planting time; SB = SmartBox application of 3.7 oz mat./1000 row-ft; Furrow-M = microtube application, in-furrow (water carrier rate of 4 gallons/a); ST=seed treatment.

[2]Iowa State Node-Injury Scale (0–3); full = number of nodes completely eaten; partial = percentage of a node (or an additional node) eaten.

[3]Product consistency = percentage of times Node-Injury rating was 0.25 (1/4 node eaten) or less.

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

Table 2. Three-year (2000–2002) summary of root-injury, product consistency, percent lodging, and yield for planting-time insecticide treatments, Iowa State University corn rootworm efficacy tests (7 locations).[1]

		Node-Injury[3,5]		Product	Percent	Yield[5]
Insecticide	Placement[2]	Full	Partial (%)	consistency (%)[4,5]	lodging[5]	(bu/acre)
Aztec 2.1G	T-band	0	.22 a	81 a	1 a	159 ab
Force 3G	Furrow	0	.27 a	78 a	3 a	161 ab
Force 3G	T-band	0	.29 a	74 ab	6 ab	163 ab
Aztec 2.1G	Furrow	0	.30 a	74 ab	2 a	168 a
Counter 20CR	T-band	0	.30 a	74 ab	2 a	154 ab
Counter 20CR	Furrow	0	.34 a	71 abc	2 a	160 ab
Fortress 5G	T-band SB	0	.41 ab	65 abc	6 ab	158 ab
Fortress 5G	Furrow SB	0	.45 ab	61 abcd	6 ab	160 ab
Lorsban 15G	T-band	0	.47 ab	54 bcde	3 a	157 ab
Capture 2EC	T-band	0	.51 ab	51 cde	6 ab	162 ab
Lorsban 15G	Furrow	0	.71 b	43 def	8 ab	155 ab
Regent 4SC	Furrow-M	1	.03 c	35 ef	16 bc	164 ab
ProShield	ST	1	.19 c	26 fg	23 c	149 bc
Prescribe	ST	1	.29 c	12 gh	22 c	150 bc
CHECK	----	1	.93 d	4 h	43 d	137 c

[1]Side-by-side comparisons in 35 replications; replications that did not have sufficient larval feeding to challenge a product's performance (CHECK rep mean <0.75 of a node injured) were deleted from these analyses (35 of 44 replications analyzed).

[2]T-band & Furrow = insecticide applied at planting time; SB = SmartBox application of 3 oz mat./1000 row-ft in 2000 and 2001; 3.7 oz mat./1000 row-ft in 2002; Furrow-M = microtube application, in-furrow (water carrier rate of 4 gallons/a); ST=seed treatment.

[3]Iowa State Node-Injury Scale (0–3); full = number of nodes completely eaten; partial = percentage of a node (or an additional node) eaten.

[4]Product consistency = percentage of times Node-Injury rating was 0.25 (1/4 node eaten) or less.

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