

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 Nashua farm plus a 3-year, multi-location summary are presented in this report.

Materials and Methods

NK N65-Y3 was planted May 14, 2002, 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 100-ft rows and replicated six 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 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.). The Node-Injury scale allows 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. Beyond this point, economic damage can occur. Stand counts were taken on June 16, lodging counts on September 5, and the plot was machine-harvested on October 27.

Results and Discussion

Table 1 lists the results from the 2002 Nashua test. There was heavy rootworm pressure with 1.96 nodes of roots eaten in the untreated CHECK. All treatments from Poncho ST through Regent 4SC were not significantly different from the CHECK. There were no significant differences in regard to stand counts. With only light lodging and adequate rainfall throughout the growing season, there were no significant yield differences between any of the treatments.

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, 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 through Regent 4SC had yields that were similar. A word of caution is in order, though, when interpreting 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 yield differences between 0.25 and 1.00 node. An example of this was seen this year at Crawfordsville (southeast Iowa). The corn plants suffered severe moisture stress during pollination, and severe lodging also occurred. When rootworms ate at least 1.00 node of roots, there was no less than 63% lodging. Yields decreased 58% when root injury increased from 0.25 to 1.00 node.

Table 1. Average root-injury, product consistency, percent lodging, and yield for planting-time insecticide treatments, yield test, Nashua.

Insecticide	Placement ¹	Node-Injury ^{2,4}		Product consistency ^{3,4}	Percent lodging ⁵	Yield (bu/acre) ⁵
		Full	Partial (%)			
Aztec 2.1G	T-band	0 .	12 a	100 a	0	177
Force 3G	Furrow	0 .	16 a	96 a	0	188
Counter 20CR	T-band	0 .	21 ab	84 ab	0	179
Force 3G	T-band	0 .	21 ab	84 ab	0	185
Aztec 4.67G	T-band SB	0 .	22 ab	96 a	0	200
Counter 20CR	Furrow	0 .	30 a-c	80 a-c	0	188
Aztec 2.1G	Furrow	0 .	33 a-c	68 a-e	0	200
Aztec 4.67G	Furrow SB	0 .	33 a-c	76 a-d	0	194
Capture 2EC	T-band	0 .	44 a-d	40 b-f	6	185
Capture 2EC	Furrow	0 .	63 a-e	48 a-f	0	186
Fortress 5G	T-band SB	0 .	77 a-f	28 c-f	6	189
Lorsban 15G	T-band	0 .	79 a-f	24 d-f	6	182
Fortress 5G	Furrow SB	0 .	91 a-f	8 f	6	186
Prescribe ST	ST	1 .	05 b-f	28 c-f	14	185
Poncho ST	ST	1 .	14 c-g	32 b-f	8	212
Lorsban 15G	Furrow	1 .	15 c-g	32 b-f	24	191
Fortress 2.5G	Furrow	1 .	23 d-g	20 ef	2	186
ProShield ST	ST	1 .	40 e-g	16 ef	18	174
Regent 4SC	Furrow-M	1 .	57 fg	8 f	10	204
CHECK	---	1 .	96 g	0 f	28	174

¹T-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.

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

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

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

⁵No significant differences between means (ANOVA, $P \leq 0.05$).

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.

Insecticide	Placement ²	Node-Injury ^{3,5}		Product consistency (%) ^{4,5}	Percent lodging ⁵	Yield ⁵ (bu/acre)
		Full	Partial (%)			
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 a-c	2 a	160 ab
Fortress 5G	T-band SB	0 . 41	ab	65 a-c	6 ab	158 ab
Fortress 5G	Furrow SB	0 . 45	ab	61 a-d	6 ab	160 ab
Lorsban 15G	T-band	0 . 47	ab	54 b-e	3 a	157 ab
Capture 2EC	T-band	0 . 51	ab	51 c-e	6 ab	162 ab
Lorsban 15G	Furrow	0 . 71	b	43 d-f	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

¹Side-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).

²T-band & Furrow = insecticide applied at planting time; SB = SmartBox application of 3 oz mat./1000 row-ft in 2000 & 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.

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

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

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