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Management of Corn Rootworms in Refuge Corn

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Abstract
We evaluated current management options for corn rootworm in refuge corn. Refuge corn is defined as corn that does not produce insecticidal toxins from the bacterium Bacillus thuringiensis (Bt) for control of corn rootworm. We studied a soil-applied insecticide and a seed treatment by measuring their effectiveness at protecting corn roots from injury due to feeding by corn rootworms.

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Introduction

We evaluated current management options for corn rootworm in refuge corn. Refuge corn is defined as corn that does not produce insecticidal toxins from the bacterium *Bacillus thuringiensis* (Bt) for control of corn rootworm. We studied a soil-applied insecticide and a seed treatment by measuring their effectiveness at protecting corn roots from injury due to feeding by corn rootworms.

Materials and Methods

The corn was planted in an area that had been planted the previous year with "trap crop." The seed planted for the trap crop is a mixed maturity blend with a greater proportion of late-maturing varieties. This trap crop constitutes a favorable environment for adult females late in the season when other fields are maturing, and helps to ensure a high abundance of rootworm eggs the following season. The experimental design for this study was a randomized complete block with four replications (i.e., blocks). Treatments in this strip study were paired rows 75 ft long. Seeds were pre-bagged and planted with a four-row John Deere Max Emerge™ 7100 integral planter that had 30 in.-row spacing. Corn was planted at a population of 35,600 seeds/acre on May 9, 2008. The hybrid tested in this study was DKC 61-72. The seed treatment (Poncho 1250) was commercially applied. The granular insecticide (Aztec 2.1G) tested, was applied with modified Noble® metering units mounted on the planter. The Noble units were calibrated in the laboratory to accurately deliver material at a tractor speed of 4 mph. Plastic tubes directed the granular treatments to a 7-in. band into the seed furrow, placing all the insecticide in-furrow. Eleven-inch poly-bristle skirts were attached to the frame of the planter and positioned so the bristle tips touched the ground.

Rootworm feeding damage was evaluated following the Iowa State Node-Injury Scale (0–3). The product consistency (%) was calculated for each treatment as the percentage of times a treatment limited feeding injury to 0.25 node or less (Table 1). Lodging counts and final stand counts (Table 1) were taken at harvest time. A plant was considered lodged if it was leaning at least 30 degrees from vertical. The study was taken to yield and machine harvested. Weights were converted to bushels/acre of No. 2 shelled corn at 15.5% moisture. Yield data (Table 2) were analyzed with ANOVA and pairwise comparisons conducted using Ryan's Q test.

Results and Discussion

In this study, the Aztec 2.1G furrow treatment and the Poncho 1250 seed treatment had statistically less node injury than the CHECK (Table 1). With percent lodging, the Aztec 2.1G furrow treatment was statistically better than either the Poncho 1250 treatment or CHECK. No difference was noted for stand count or yield (Table 2).

Acknowledgements

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Additional Information

The 2008 Insecticide and Plant-Incorporated Protectants final report is available online at www.ent.iastate.edu under latest news.

Table 1. Average root injury, percent lodging, and percent product consistency.

Treatment[2]	Form	Rate[3]	Placement[4]	Node- % injury[5,6.8]	Percent lodging[7,8]	Product consistency[8,9]
Aztec	2.1G	6.7	Furrow	0.24a	1a	75a
Poncho 1250	600FS	1.25	ST	0.36a	37 b	50a
CHECK	-----	-----	-----	0.85 b	63 b	5 b

[1]Planted: May 9, 2008; evaluation dates: root injury July 21; lodging September 24, 2008.
[2]The insecticide application and seed treatment was applied over DKC61-72 (true isoline).
[3]Insecticide listed as ounces per 1,000 row-ft; seed treatment (ST) listed as mg a.i/seed.
[4]Furrow = insecticide applied at planting time; ST = seed treatment.
[5]Chemical, seed treatment, and check means based on 20 observations (5 roots/2 row trt × 4 replications).
[6]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes completely eaten.
[7]Means based on eight observations (2 row trt × 70 row-ft/treatment × 4 replications).
[8]Means in the same column sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).
[9]Product consistency = percentage of times nodal injury was 0.25 (¼ node eaten) or less.

Table 2. Average stand counts and yield.

Treatment	Form.	Rate[2]	Placement[3]	Stand count[4,5]	Bushels acre[5,6,7]
CHECK	-----	-----	-----	30.00	185
Aztec	2.1G	6.7	Furrow	31.60	184
Poncho 1250	600FS	1.25	ST	29.90	183

[1]Planted May 9 – evaluation dates: stand counts June 17; yield October 31, 2008.
[2]Insecticide listed as ounces per 1,000 row-ft; seed treatment (ST) listed as mg a.i/seed.
[3]Furrow = insecticide applied at planting time; ST = seed treatment.
[4]Means based on eight observations (2 row trt x 17.5 row-ft/treatment × 4 replications).
[5]No significant differences between means (ANOVA $P \leq 0.05$).
[6]Means based on four observations (2 row trt × 68.75 row-ft/treatment × 4 replications)
[7]Yields converted to 15.5% moisture.