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Reduced Rates of Corn Rootworm Insecticide

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Abstract
Full, three-fourths, and one-half rates of Force 3G insecticide were applied in-furrow at planting time on both continuous corn and rotated (corn/soybeans) cropping schemes. It was thought that northern corn rootworms, with extended diapause capabilities, may have caused damage to first-year corn in 2001.

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Introduction

Full, three-fourths, and one-half rates of Force 3G insecticide were applied in-furrow at planting time on both continuous corn and rotated (corn/soybeans) cropping schemes. It was thought that northern corn rootworms, with extended diapause capabilities, may have caused damage to first-year corn in 2001.

Materials and Methods

Golden-Harvest 8067 Bt seed corn was planted April 26 at the planting rate of 30,000 seeds/acre. The experimental design for each cropping scheme was a randomized complete block with five replications. Treatments measuring three rows (30-inch row spacing) by 100 ft were planted with a 6-row John Deere 7100 MaxEmerge planter. On July 12, 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 potentially occur. The plots were machine-harvested on October 15.

Results and Discussion

On the continuous corn ground, all three Force 3G treatments were significantly different from the untreated check in root injury, product consistency, and yield measurements (see Table 1). Based on the light rootworm feeding pressure (1.00 node eaten in the check), we normally would not see significant yield differences, even if there were significant root injury differences. However, plant moisture stress in late June and early July most likely accounted for the significant yield increases we saw with the lower root injuries. On the rotated ground, there was essentially no rootworm feeding. Only a few minor feeding scars were found on the sides of several roots (no root pruning). No significant differences were observed with any of the measurements (see Table 1).

Table 1. Average root-injury ratings, product consistency, and yields for planting-time insecticide treatments of Force 3G applied to continuous corn and rotated corn in Kanawha, 2002.

Continuous corn

Treatment[1]	Rate	Node-Injury (0-3)[2,3,4]	Product consistency[4,5]	Yield (bu/a)[4]
Force 3G	Full	0.14 a	100 a	174.3 a
Force 3G	Three-fourths	0.14 a	100 a	171.1 a
Force 3G	One-half	0.21 a	88 a	168.7 a
CHECK	----	1.00 b	4 b	157.0 b

Corn following soybeans

Treatment[1]	Rate	Node-Injury (0-3)[2,3,6]	Product consistency[5,6]	Yield (bu/a)[6]
Force 3G	Full	0.003	100	182.7
Force 3G	Three-fourths	0.003	100	183.1
Force 3G	One-half	0.009	100	181.3
CHECK	----	0.015	100	175.8

[1]Force 3G applied in-furrow at planting time.
[2]Means based on 25 observations (five roots five replications).
[3]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes eaten.
[4]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P < 0.05$).
[5]Product consistency = percentage of times Node-Injury rating was 0.25 (1/4 node eaten) or less.
[6]No significant differences between means (ANOVA, $P < 0.05$).