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Evaluation of Transgenic Rootworm Corn, with and without Seed Treatments or Insecticide

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Abstract
The purpose of this study was to evaluate potential benefits of combining transgenic rootworm protection with a soil insecticide. We tested the transgenic rootworm protected hybrid YieldGard VT Triple (DKC 61-69) and its near isoline (DKC 61-72) in a full factorial design with two soil insecticides, Poncho 1250 seed treatment and Aztec.

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Introduction

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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 was a mixed maturity blend with a greater proportion of late-maturing varieties. This trap crop constitutes a favorable environment for adult rootworm females late in the season when other fields are maturing and results in a high abundance of rootworm larvae the following year. The experimental design for this study was a split block design with four replications (i.e., blocks). Treatments were eight rows wide, to minimize border effects, and 75 ft long. The study was planted on May 9 by Ryan Rusk from the Northwest Research and Demonstration Farm at a population of 32,000 seeds/acre. The Poncho 1250 seed treatment was applied commercially on both hybrids tested. The insecticide, Aztec, was applied in furrow at an application rate of 6.7 ounces/1000 row-ft. Stand counts (Table 1) were taken by counting the number of plants in 17.5 row ft. The stand counts were taken both early and late in the growing season and averaged. After the majority of corn rootworms had finished feeding, five roots were dug per treatment from rows two and five. Prior to leaving the field, excess soil was removed. Roots were then soaked in water overnight, and subsequently washed with a pressurized water sprayer to remove the remaining soil. Roots were laid out by replication and evaluated for rootworm feeding injury (Table 2) following the Iowa State Node-Injury Scale (0–3). The percent product consistency was calculated for each treatment as the percentage of times a treatment limited feeding injury to 0.25 node or less. Lodging counts (Table 1) were taken at harvest time along with final stand count. A plant was considered lodged if it was leaning at least 30 degrees from vertical. Yields (Table 2) were taken by machine harvesting rows three and four from the plots. Weights were converted to bushels/acre of No. 2 shelled corn at 15.5% moisture.

Results and Discussion

Tables 1 and 2 summarize the means for nodal injury, stand counts, percent lodging, and yield. The percent lodging was statistically higher for DKC 61-72 (check) and DKC 61-72 treated with Poncho 1250 than for the other treatments. Yield was statistically higher for DKC 61-69 than DKC 61-72 regardless of soil insecticide treatment. No statistical differences were noted among stand counts.

Acknowledgements

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Additional Information

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

Table 1. Average stand counts, percent lodging, and yield.

Treatment	Hybrid[2]	Form	Rate[3]	Placement[4]	Stand counts[5,6]	% Lodging[6,7]	Bushels/ acre[8,9,10]
Poncho 1250	DKC 61-69	600FS	1.25	ST	29.40	0a	213a
Aztec	DKC 61-69	2.1G	6.7	Furrow	29.60	0a	212a
CHECK	DKC 61-69	------	------	------	29.50	0a	208a
Aztec	DKC 61-72	2.1G	6.70	Furrow	30.75	1a	202 b
Poncho 1250	DKC 61-72	600FS	1.25	ST	30.75	12 b	202 b
CHECK	DKC 61-72	------	------	------	29.60	35 c	195 b

[1]Planted May 9, 2008; evaluation dates: stand counts October 2; lodging October 2; yield October 30, 2008.
[2]Hybrids were YieldGard VTTriple (DKC 61-69) and the associated non-Bt near isoline (DKC 61-72).
[3]Insecticide listed as ounces per 1,000 row-ft; seed treatment (ST) listed as mg a.i/seed.
[4]T-band and Furrow = Insecticide applied at planting time; ST = seed treatment.
[5]No significant differences between means (ANOVA, $P \leq 0.05$).
[6]Means based on 8 observations (2-row trt × 17.5 row-ft/treatment × 4 reps).
[7]Means sharing a common letter do not differ according to Ryan's Q Test ($P \leq 0.05$).
[8]Means sharing a common letter do not differ based on ANOVA ($P \leq 0.05$).
[9]Means based on four observations (2-row trt × 70 row-ft/treatment × 4 reps).
[10]Yields converted to 15.5% moisture.

Table 2. Average root injury and product consistency.

Treatment	Hybrid[2]	Form	Rate[3]	Placement[4]	Node- Injury[5,6,7]	Product Consistency[7,8]
Poncho1250	DKC 61-69	600FS	1.25	ST	0.01a	100a
Aztec	DKC 61-69	2.1G	6.7	Furrow	0.02a	100a
CHECK	DKC 61-69	------	------	------	0.03a	100a
Aztec	DKC 61-72	2.1G	6.7	Furrow	0.63ab	50 b
Poncho1250	DKC 61-72	600FS	1.25	ST	1.05 b	0 c
CHECK	DKC 61-72	------	------	------	1.56 c	0 c

[1]Planted May 9, 2008; evaluated August 15, 2008.
[2]Hybrids were YieldGard VTTriple (DKC 61-69) and the associated non-Bt near isoline (DKC 61-72).
[3]Insecticide listed as ounces per 1,000 row-ft; seed treatment (ST) listed as mg a.i/seed.
[4]T-band and Furrow = insecticide applied at planting time; ST = seed treatment.
[5]Chemical and check means based on 20 observations (5 roots/2 row treatment × 4 replications).
[6]Iowa State Node-Injury Scale (0–3). Number of full or partial nodes completely eaten.
[7]Means sharing a common letter do not differ according to Ryan's Q Test ($P \leq 0.05$).
[8]Product consistency = percentage of times nodal injury was 0.25 (¼ node eaten) or less.