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# Evaluation of Transgenic Corn and Non-bt Corn with and without Soil Insecticides for Control of Corn Rootworm

**Abstract**
The purpose of this study was to evaluate the effectiveness of transgenic corn and soil insecticides, either alone or in combination, for the control of corn rootworm.

**Keywords**
RFR A1079, Entomology

**Disciplines**
Agricultural Science | Agriculture | Entomology

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# Evaluation of Transgenic Corn and Non-bt Corn with and without Soil Insecticides for Control of Corn Rootworm

**RFR-A1079**

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## Introduction

The purpose of this study was to evaluate the effectiveness of transgenic corn and soil insecticides, either alone or in combination, for the control of corn rootworm.

## 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 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 randomized complete block design with four replications. Treatments were two rows wide, and 75 ft in length. This study was planted on April 22 at a population of 35,600 seeds/acre. Seeds were pre-bagged and planted with a four-row John Deere Max Emerge™ 7100 integral planter that had 30-in. row spacing. Granular insecticide formulations were applied with modified SmartBox metering units mounted on the planter. The SmartChoice-SB 5G, Counter-SB 20G, and Aztec 4.67G insecticide treatments were applied with modified SmartBox™ metering units. These products were applied as ounces per 1,000 row ft. The commercial SmartBox™ were removed from their large-base containers and sandwiched between a flat metal plate on the bottom and a custom-made, threaded plastic cap on the top. An inverted 1,000 ml bottle, screwed into the top cap provided a secure and sealed container for insecticide. A short plastic tube attached to the dispenser opening of the metering unit could be connected to either the planter's T-band or furrow tubes.

## Results and Discussion

Node injury was significantly higher and percent product consistency significantly lower, for the three isoline treatments (checks) than all other treatments (Table 1). Some differences in stand counts were noted among treatments (Table 2). There was lodging observed within this study (Table 3), although root injury on the untreated checks exceeded 1.25 nodes (Table 1). Yields tended to be greater among treatments with rootworm protection compared with the untreated checks (Table 4). However, no differences in yield were noted among the treatments with rootworm protection (Table 4).

## Acknowledgements

We would like to thank Dow AgroSciences, and AMVAC for providing the funding for this study. Seed was provided by Monsanto and Dow AgroSciences. We would also like to thank Kevin Van Dee and his staff for their work in this study.

## Additional Information

The 2010 Insecticide and Plant-Incorporated Protectants field evaluation report will be available on-line at www.ent.iastate.edu under latest news soon.

**Table 1. Average root-injury and percent product consistency for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Crawfordsville, IA 2010[1].**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Node-injury[5,6,7] | Product consistency[8,9] |
|---|---|---|---|---|---|
| My-HXT2 + SmartChoice-SB | 5G | 0.18 | Furrow | 0.01a | 100a |
| My-GENSS | ------ | ------ | ------ | 0.02a | 100a |
| My-HXT2 + Aztec-SB | 4.67G | 0.14 | Furrow | 0.02a | 100a |
| My-HXT2 + Counter-SB | 20G | 0.90 | Furrow | 0.02a | 95a |
| YGVT3 | ------ | ------ | ------ | 0.03a | 100a |
| YGVT3 + Aztec | 2.1G | 0.14 | Furrow | 0.03a | 100a |
| YGVT3 + Aztec | 2.1G | 0.14 | T-Band | 0.05a | 100a |
| My-HXT1 | ------ | ------ | ------ | 0.05a | 100a |
| My-HXT2 | ------ | ------ | ------ | 0.06a | 95a |
| DeKalb-Iso | ------ | ------ | ------ | 0.90 b | 15 b |
| My-Iso | ------ | ------ | ------ | 1.34 c | 0 c |
| My-Conv | ------ | ------ | ------ | 1.36 c | 0 c |

[1]Planted April 22, 2010; evaluated July 30, 2010.
[2]My-GENSS = Mycogen Smartstax (Mycogen 2T784); My-HXT1 = Mycogen brand Herculex XTRA (Mycogen 2T289); My-Conv = Mycogen brand Conventional (Mycogen 2T777); YGVT3 = YieldGard VT Triple (DKC61-69); DeKalb-Iso = DeKalb brand RR Isoline (DKC 61-72); My-HXT2 = Mycogen brand Herculex XTRA (Mycogen 2T789); My-Iso = Mycogen brand RR Isoline (Mycogen 2T783).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow and T-band = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Chemical and check means based on 20 observations (5 roots/2 rows × 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 significantly 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.
[9]No significant differences between means (ANOVA, $P \leq 0.05$).

**Table 2. Average stand counts for evaluation of insecticide treatments and plant incorporated protectants. Yield study: Crawfordsville, IA 2010[1].**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Stand count[5,6] |
|---|---|---|---|---|
| My-HXT2 + Aztec-SB | 4.67G | 0.14 | Furrow | 31.25a |
| My-Iso | ------ | ------ | ------ | 31.25a |
| YGVT3 + Aztec | 2.1G | 0.14 | Furrow | 29.50ab |
| DeKalb-Iso | ------ | ------ | ------ | 28.50abc |
| My-HXT1 | ------ | ------ | ------ | 27.50abc |
| My-HXT2 | ------ | ------ | ------ | 27.00 bc |
| My-HXT2 + SmartChoice-SB | 5G | 0.18 | Furrow | 27.00 bc |
| YGVT3 | ------ | ------ | ------ | 26.75 bc |
| My-HXT2 + Counter-SB | 20G | 0.90 | Furrow | 26.50 bc |
| YGVT3 + Aztec | 2.1G | 0.14 | T-Band | 26.25 bc |
| My-GENSS | ------ | ------ | ------ | 25.00 bc |
| My-Conv | ------ | ------ | ------ | 25.00 c |

[1]Planted April 22, 2010; evaluated June 7 and September 30, 2010.
[2]My-GENSS = Mycogen Smartstax (Mycogen 2T784); My-HXT1 = Mycogen brand Herculex XTRA (Mycogen 2T289); My-Conv = Mycogen brand Conventional (Mycogen 2T777); YGVT3 = YieldGard VT Triple (DKC61-69); DeKalb-Iso = DeKalb brand RR Isoline (DKC 61-72); My-HXT2 = Mycogen brand Herculex XTRA (Mycogen 2T789); My-Iso = Mycogen brand RR Isoline (Mycogen 2T783).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow and T-band = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on eight observations (2-row trt × 17.5 row-ft/treatment × 4 replications × 2 evaluations).
[6]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).

**Table 3. Average lodging for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Crawfordsville, IA 2010[1].**

| Treatment[2] | Form. | Rate[3] | Placement[4] | % Lodging[5,6] |
|---|---|---|---|---|
| My-GENSS | ------ | ------ | ------ | 0 |
| My-HXT1 | ------ | ------ | ------ | 0 |
| My-Conv | ------ | ------ | ------ | 0 |
| My-Iso | ------ | ------ | ------ | 0 |
| My-HXT2 | ------ | ------ | ------ | 0 |
| My-HXT2 + Aztec-SB | 4.67G | 0.14 | Furrow | 0 |
| My-HXT2 + Counter-SB | 20G | 0.90 | Furrow | 0 |
| My-HXT2 + SmartChoice-SB | 5G | 0.18 | Furrow | 0 |
| DeKalb-Iso | ------ | ------ | ------ | 0 |
| YGVT3 | ------ | ------ | ------ | 0 |
| YGVT3 + Aztec | 2.1G | 0.14 | Furrow | 0 |
| YGVT3 + Aztec | 2.1G | 0.14 | T-Band | 0 |

[1]Planted April 22, 2010; evaluated September 30, 2010.
[2]My-GENSS = Mycogen Smartstax (Mycogen 2T784); My-HXT1 = Mycogen brand Herculex XTRA (Mycogen 2T289); My-Conv = Mycogen brand Conventional (Mycogen 2T777); YGVT3 = YieldGard VT Triple (DKC61-69); DeKalb-Iso = DeKalb brand RR Isoline (DKC 61-72); My-HXT2 = Mycogen brand Herculex XTRA (Mycogen 2T789); My-Iso = Mycogen brand RR Isoline (Mycogen 2T783).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow and T-band = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on eight observations (2-row trt × 17.5 row-ft/treatment × 4 replications).
[6]No significant differences between means (ANOVA, $P \leq 0.05$).

**Table 4. Average yield for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Crawfordsville, IA 2010[1].**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Bushels/acre[5,6,7] |
|---|---|---|---|---|
| My-HXT2 + Aztec-SB | 4.67G | 0.14 | Furrow | 140a |
| My-HXT2 + SmartChoice-SB | 5G | 0.18 | Furrow | 131ab |
| My-GENSS | ------ | ------ | ------ | 122ab |
| My-HXT2 | ------ | ------ | ------ | 120ab |
| YGVT3 | ------ | ------ | ------ | 119abc |
| YGVT3 + Aztec[8] | 2.1G | 0.14 | Furrow | 114abc |
| My-HXT1 | ------ | ------ | ------ | 113abc |
| My-HXT2 + Counter-SB | 20G | 0.90 | Furrow | 113abc |
| YGVT3 + Aztec | 2.1G | 0.14 | T-Band | 112abc |
| My-Iso | ------ | ------ | ------ | 112abc |
| My-Conv | ------ | ------ | ------ | 105 bc |
| DeKalb-Iso | ------ | ------ | ------ | 91 c |

[1]Planted April 22, 2010; machine harvested October 8, 2010.
[2]My-GENSS = Mycogen Smartstax (Mycogen 2T784); My-HXT1 = Mycogen brand Herculex XTRA (Mycogen 2T289); My-Conv = Mycogen brand Conventional (Mycogen 2T777); YGVT3 = YieldGard VT Triple (DKC61-69); DeKalb-Iso = DeKalb brand RR Isoline (DKC 61-72); My-HXT2 = Mycogen brand Herculex XTRA (Mycogen 2T789); My-Iso = Mycogen brand RR Isoline (Mycogen 2T783).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow and T-band = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on four observations (2-row trt × 69 row-ft/treatment × 4 replications)
[6]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).
[7]Yields converted to 15.5 percent moisture.
[8]Means based on three observations (2-row trt × 69 row-ft/treatment × 3 replications).