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**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 A9117, Entomology

**Disciplines**
Agricultural Science | Agriculture | Entomology

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# Effects of Soil Insecticides in Combination with Transgenic Rootworm Corn

**RFR-A9117**

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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 rootworm 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 feet in length. This study was planted on May 11 at a population of 41,000 seeds/acre. Seeds were planted with a four-row John Deere Max Emerge™ 7100 integral planter that had 30-in. row spacings. The SmartChoice-SB 5G and Counter-SB 20G insecticide treatments were applied with modified SmartBox™ metering units. These products were applied as ounces per 1000 row ft. All treatments were applied at 4 mph using the "fixed speed mode" on the SmartBox™ controllers. The liquid products, Warrior II 2.09 CS, and Lorsban 4E were applied at planting with a compressed-air system built directly into the planter by Almaco manufacturing (Nevada, IA). These products were applied as ounces per 1000 row ft. These two liquid treatments were applied in furrow using Teejet XR80015 spray nozzles at 21 psi to deliver 5 GPA of finished spray.

## Results and Discussion

There were no differences among treatments in stand counts (Table 1). For root injury, both of the transgenic hybrids (YieldGard VT Triple and Herculex XTRA) with or without an insecticide application overtop did not differ (0.00 to 0.09) (Table 2). The isoline hybrids (YieldGard Corn borer and Mycogen RR hybrid) with an insecticide application overtop had intermediate node injury while the untreated checks (YieldGard corn borer and Mycogen RR only) had more injury (Table 2). For lodging, all treatments performed better than the untreated checks and did not differ from each other (Table 3). With yield, there were no differences between the transgenic hybrids (YieldGard VT Triple and Herculex XTRA) with or without an insecticide application overtop, although yield was lower in the untreated checks (Table 4).

## Acknowledgements

We thank Dow AgroSciences, and AMVAC for providing the funding for this study. Seed was provided by Dekalb and Dow AgroSciences.

## Additional Information

The 2009 Insecticide and Plant-Incorporated Protectants final report will be available on-line at www.ent.iastate.edu under latest news soon.

**Table 1. Average stand counts for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Nashua, IA, 2009.[1]**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Stand count[5,6] |
|---|---|---|---|---|
| My-HXT + SmartChoice-SB | 5G | 0.18 | Furrow | 38.20 |
| YGVT3 + SmartChoice-SB | 5G | 0.18 | Furrow | 36.95 |
| My-HXT + Counter-SB | 20G | 0.90 | Furrow | 36.90 |
| My-HXT | ------ | ------ | ------ | 36.70 |
| YGVT3 + Counter-SB | 20G | 0.90 | Furrow | 36.25 |
| YGVT3 | ------ | ------ | ------ | 35.95 |
| YGCB | ------ | ------ | ------ | 35.50 |
| YGCB + Counter-SB | 20G | 1.20 | Furrow | 35.10 |
| My-Iso | ------ | ------ | ------ | 34.60 |
| My-Iso+Lorsban+Warrior II | 4E+2.09 | 1.94+0.189 | Furrow | 34.25 |

[1]Planted April 23, 2009; evaluated June 1 and September 15, 2009.
[2]My-HXT = Mycogen brand Herculex XTRA (Mycogen 2W587); My-Iso = Mycogen brand RR (Mycogen 2W583); YGCB = YieldGard CornBorer (DKC61-73); YGVT3 = YieldGard VT Triple (DKC61-69).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on 16 observations (2-row trt of 17.5 row-ft/treatment × 4 replications × 2 evaluations). The values shown are the mean number of plants per 1/1000 acre.
[6]No significant differences between means (ANOVA, $P \leq 0.05$).

**Table 2. Average root-injury and product consistency for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Nashua, IA, 2009.[1]**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Node injury[5,6,7] | Product consistency[8,9] |
|---|---|---|---|---|---|
| My-HXT + SmartChoice-SB | 5G | 0.18 | Furrow | 0.00a | 100a |
| YGVT3 + SmartChoice-SB | 5G | 0.18 | Furrow | 0.00a | 100a |
| YGVT3 + Counter-SB | 20G | 0.90 | Furrow | 0.01a | 100a |
| My-HXT + Counter-SB | 20G | 0.90 | Furrow | 0.02a | 100a |
| YGVT3 | ------ | ------ | ------ | 0.04a | 95a |
| My-HXT | ------ | ------ | ------ | 0.09a | 90a |
| YGCB + Counter-SB | 20G | 1.20 | Furrow | 0.72 b | 35 b |
| My-Iso+Lorsban+Warrior II | 4E+2.09 | 1.94+0.189 | Furrow | 1.02 b | 30 bc |
| YGCB | ------ | ------ | ------ | 1.45 c | 10 bc |
| My-Iso | ------ | ------ | ------ | 1.69 c | 0 bc |

[1]Planted April 23, 2009; evaluated July 23, 2009.
[2]My-HXT = Mycogen brand Herculex XTRA (Mycogen 2W587); My-Iso = Mycogen brand RR (Mycogen 2W583); YGCB = YieldGard CornBorer (DKC61-73); YGVT3 = YieldGard VT Triple (DKC61-69).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow = 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]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).

**Table 3. Average percent lodging for evaluation of insecticide treatments and plant-incorporated protectants. Yield study: Nashua, IA, 2009.[1]**

| Treatment[2] | Form. | Rate[3] | Placement[4] | Lodging[5,6] (%) |
|---|---|---|---|---|
| My-HXT + Counter-SB | 20G | 0.90 | Furrow | 0a |
| YGVT3 + Counter-SB | 20G | 0.90 | Furrow | 0a |
| My-HXT + SmartChoice-SB | 5G | 0.18 | Furrow | 0a |
| My-HXT | ------ | ------ | ------ | 1a |
| YGVT3 | ------ | ------ | ------ | 1a |
| YGCB + Counter-SB | 20G | 1.20 | Furrow | 9ab |
| YGVT3 + SmartChoice-SB | 5G | 0.18 | Furrow | 12ab |
| My-Iso+Lorsban+Warrior II | 4E+2.09 | 1.94+0.189 | Furrow | 37ab |
| YGCB | ------ | ------ | ------ | 54 b |
| My-Iso | ------ | ------ | ------ | 63 b |

[1]Planted April 23, 2009; evaluated September 15, 2009.
[2]My-HXT = Mycogen brand Herculex XTRA (Mycogen 2W587); My-Iso = Mycogen brand RR (Mycogen 2W583); YGCB = YieldGard CornBorer (DKC61-73); YGVT3 = YieldGard VT Triple (DKC61-69).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on 8 observations (2-row trt of 17.5 row-ft/treatment × 4 replications).
[6]Means sharing a common letter do not differ significantly according to Ryan's Q Test ($P \leq 0.05$).

**Table 4. Average yield for evaluation of insecticides treatment and plant-incorporated protectants. Yield study: Nashua, IA, 2009.[1]**

| Treatment[2] | Form | Rate[3] | Placement[4] | Bu/acre[5,6,7] |
|---|---|---|---|---|
| YGVT3 | ------ | ------ | ------ | 185a |
| YGVT3 + SmartChoice-SB | 5G | 0.18 | Furrow | 174ab |
| YGVT3 + Counter-SB | 20G | 0.90 | Furrow | 168ab |
| My-HXT + Counter-SB | 20G | 0.90 | Furrow | 158ab |
| My-HXT + SmartChoice-SB | 5G | 0.18 | Furrow | 158ab |
| My-HXT | ------ | ------ | ------ | 156ab |
| YGCB + Counter-SB | 20G | 1.20 | Furrow | 149 bc |
| My-Iso+Lorsban+Warrior II | 4E+2.09 | 1.94+0.189 | Furrow | 125 cd |
| YGCB | ------ | ------ | ------ | 118 d |
| My-Iso | ------ | ------ | ------ | 107 d |

[1]Planted April 23, 2009; machine harvested November 10, 2009.
[2]My-HXT = Mycogen brand Herculex XTRA (Mycogen 2W587); My-Iso = Mycogen brand RR (Mycogen 2W583); YGCB = YieldGard CornBorer (DKC61-73); YGVT3 = YieldGard VT Triple (DKC61-69).
[3]Insecticide listed as ounces a.i. per 1,000 row-ft.
[4]Furrow = insecticide applied at planting time; SB = SmartBox application at planting time.
[5]Means based on 4 observations (2-row trt of 68.75 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% moisture.