



## CORN

### SECTION 3

## Evaluation of soil-applied insecticides to control corn rootworm larvae (*Diabrotica* spp.) in Illinois, 2014

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### Locations

We established one trial at the Northern Illinois Agronomy Research Center near DeKalb (DeKalb County) and one trial at the Agricultural Engineering Farm near Urbana (Champaign County).

### Experimental Design and Methods

The experimental design was a randomized complete block with four replications. The plot size for each treatment was 10 ft (four rows) x 40 ft. Six randomly selected root systems were extracted from the first row of each plot on 17 and 28 July at Urbana and DeKalb, respectively. Root systems were washed and rated for corn rootworm larval injury using the 0 to 3 node-injury scale developed by Oleson et al. (2005) (Appendix I). The percentage of roots with a node-injury rating less than 0.25 (i.e., consistency percentage) was determined for each product at each location.

### Planting, Insecticide Application, and Yield

Trials were planted on 8 and 21 May at DeKalb and Urbana, respectively. Both trials were planted using a four-row, vacuum style planter constructed by Seed Research Equipment Solutions (SRES). Seeds were planted in 30-inch rows at an approximate depth of 1.75 inches. Granular insecticides were applied through modified Noble metering units mounted to each row. Plastic tubes directed the insecticide granules into the seed furrow. Liquid insecticides were applied at a spray volume of 5 gallons per acre using a CO<sub>2</sub> system. All insecticides were applied in front of the firming wheels on the planter. Active ingredients for all insecticides are listed in Appendix II.

Yields were estimated by harvesting the center two rows of each plot on 23 October at Urbana and on 2 November at DeKalb. Weights were converted to bushels per acre (bu/A) at 15.5% moisture. To ensure uniform plant densities across all plots, plant populations in the harvested rows were thinned at the V7 growth stage to 37,000 plants per acre.

### Agronomic Information

Agronomic information for all locations is listed in Table 3.1.

**TABLE 3.1** • Agronomic information for efficacy trials of soil-applied insecticides to control corn rootworm larvae, University of Illinois, 2014

	DeKalb	Urbana
<b>Planting date</b>	8 May	21 May
<b>Root evaluation date</b>	28 July	17 July
<b>Harvest date</b>	2 November	23 October
<b>Hybrid</b>	DEKALB DKC63-35RIB <sup>1</sup> Genuity VT Double Pro RIB Complete	DEKALB DKC63-35RIB <sup>1</sup> Genuity VT Double Pro RIB Complete
<b>Row spacing</b>	30 inches	30 inches
<b>Seeding rate</b>	38,500/acre	38,500/acre
<b>Previous crop</b>	Trap crop <sup>2</sup>	Trap crop <sup>2</sup>
<b>Tillage</b>	Fall—none Spring—discovator	Fall—chisel plow Spring—field cultivator

<sup>1</sup> Seed was treated with Cruiser, 0.5 milligrams (mg) of active ingredient (a.i.) per seed.

<sup>2</sup> Late-planted corn and pumpkins.



## CORN

### Climatic Conditions

Temperature and precipitation data for all locations are presented in Appendix III.

### Statistical Analysis

Data were analyzed using ARM 9 (Agricultural Research Manager), revision 9.2014.2 (Copyright© 1982–2014 Gylling Data Management, Inc., Brookings, SD).

### Results and Discussion

**DeKalb**—Mean node-injury ratings, consistency percentages, and yields are reported in Table 3.2. The mean node-injury rating for the untreated check (UTC) was 0.75, indicating that corn rootworm larval feeding was moderate. Mean node-injury

ratings for the soil-applied insecticides ranged from 0.05 to 0.08 and were significantly lower than the mean node-injury rating for the UTC. Mean consistency percentages for the soil-applied insecticides ranged from 92 to 100% and were significantly higher than the mean consistency percentage for the UTC (22%). Despite the significant improvement in root protection afforded by the various soil-applied insecticides, no significant differences in mean yields were observed among the treatments.

**Urbana**—Mean node-injury ratings, consistency percentages, and yields are reported in Table 3.3. The mean node-injury rating for the UTC was 0.83. Despite this moderate level of corn rootworm larval feeding, no significant differences in mean node-injury ratings, consistency percentages, or yields were observed among the treatments (including the UTC).

**TABLE 3.2** • Evaluation of soil-applied insecticides to control corn rootworm larvae, DeKalb, University of Illinois, 2014

Product	Rate <sup>1</sup>	Placement 8 May	Mean node- injury rating <sup>2-5</sup> 28 July	Mean % consistency < 0.25 <sup>4,6</sup>	Mean yield (bu/A) <sup>7,8</sup> 2 Nov
Aztec 2.1G	6.7	NU furrow <sup>9</sup>	0.06 b	96 a	187.7 a
Capture LFR	0.49	Furrow	0.05 b	100 a	181.4 a
Force 3G	4	NU furrow <sup>9</sup>	0.07 b	96 a	189.3 a
Force 3G	5	NU furrow <sup>9</sup>	0.08 b	92 a	189.3 a
Force CS	0.46	Furrow	0.05 b	100 a	186.5 a
Force CS	0.57	Furrow	0.06 b	92 a	184.2 a
Untreated check	—	—	0.75 a	22 b	175.5 a

<sup>1</sup> Rates of application for soil-applied insecticides are ounces (oz) of product per 1,000 ft of row.

<sup>2</sup> Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).

<sup>3</sup> Mean node-injury ratings were derived from six root systems per plot in each of four replications.

<sup>4</sup> Means followed by the same letter do not differ significantly ( $P = 0.05$ , Duncan's New Multiple Range Test).

<sup>5</sup> Data were analyzed using a square-root transformation; actual means are shown.

<sup>6</sup> Percentage of roots with a node-injury rating < 0.25.

<sup>7</sup> Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.

<sup>8</sup> Means followed by the same letter do not differ significantly ( $P = 0.1$ , Duncan's New Multiple Range Test).

<sup>9</sup> Applied with modified Noble metering units.



## CORN

**TABLE 3.3** • Evaluation of soil-applied insecticides to control corn rootworm larvae, Urbana, University of Illinois, 2014

Product	Rate <sup>1</sup>	Placement 21 May	Mean node- injury rating <sup>2-5</sup> 17 July	Mean % consistency < 0.25 <sup>4,6</sup>	Mean yield (bu/A) <sup>7,8</sup> 23 Oct
Aztec 2.1G	6.7	NU furrow <sup>9</sup>	0.04 a	100 a	166.3 a
Capture LFR	0.49	Furrow	0.07 a	92 a	162.1 a
Force 3G	4	NU furrow <sup>9</sup>	0.04 a	96 a	157.6 a
Force 3G	5	NU furrow <sup>9</sup>	0.13 a	83 a	166.0 a
Force CS	0.46	Furrow	0.39 a	83 a	147.0 a
Force CS	0.57	Furrow	0.22 a	71 a	158.6 a
Untreated check	—	—	0.83 a	46 a	160.6 a

<sup>1</sup> Rates of application for soil-applied insecticides are ounces (oz) of product per 1,000 ft of row.

<sup>2</sup> Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).

<sup>3</sup> Mean node-injury ratings were derived from six root systems per plot in each of four replications.

<sup>4</sup> Means followed by the same letter do not differ significantly ( $P = 0.05$ , Duncan's New Multiple Range Test).

<sup>5</sup> Data were analyzed using a square-root transformation; actual means are shown.

<sup>6</sup> Percentage of roots with a node-injury rating < 0.25.

<sup>7</sup> Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.

<sup>8</sup> Means followed by the same letter do not differ significantly ( $P = 0.1$ , Duncan's New Multiple Range Test).

<sup>9</sup> Applied with modified Noble metering units.