



CORN

SECTION 2

Evaluation of Force 3G and a seed-blend to control corn rootworm larvae (*Diabrotica spp.*) in Illinois, 2011

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Location

We established one trial at the University of Illinois 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 20 ft (eight rows) x 20 ft. For the seed-blend, three root clusters were extracted from the center four rows of each plot on 13 July—each cluster contained a non-rootworm Bt refuge root system and two adjacent rootworm Bt root systems (Figure 2.1). For non-seed-blend treatments, six randomly selected root systems were extracted from the center four rows of each plot. 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 was determined for each product. For the seed-blend treatment, a weighted formula was used to calculate the mean node-injury rating and percentage consistency.

Planting and Insecticide Application

The trial was planted on 12 May using a four-row, ALMACO constructed planter with John Deere 7300 row units. Precision cone units were used to plant the seeds. Seeds were planted in 30-inch rows at an approximate depth of 1.75 inches. Force 3G was applied through modified Noble metering units mounted to each row. Plastic tubes directed the insecticide granules into the seed furrow. The insecticide was applied in front of the firming wheels on the planter. Twisted drag chains were attached behind each of the row units to improve insecticide incorporation. Active ingredients for all insecticides are listed in Appendix II.

Agronomic Information

Agronomic information is listed in Table 2.1.

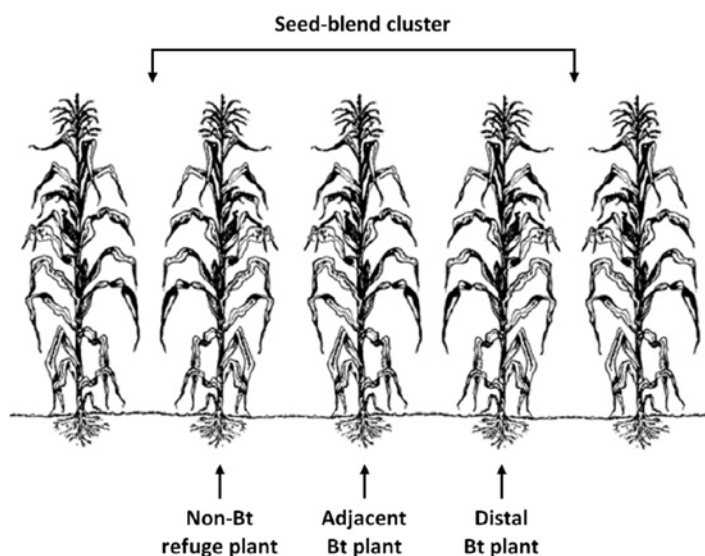


FIGURE 2.1 + Diagram of root cluster selection for the seed-blend treatment, Urbana, University of Illinois, 2011

Climatic Conditions

Temperature and precipitation data are presented in Appendix III.

Statistical Analysis

Data were analyzed using SAS 9.2 (Copyright© 2002–2008 SAS Institute, Inc., Cary, NC).

TABLE 2.1 + Agronomic information for efficacy trial of Force 3G and a seed-blend to control corn rootworm larvae, Urbana, University of Illinois, 2011

Planting date	12 May
Root evaluation date	13 July
Hybrids	Mycogen 2T777 RR2 Mycogen 2T784 SmartStax
Row spacing	30 inches
Seeding rate	36,000/acre
Previous crop	Trap crop ¹
Tillage	Fall—chisel plow Spring—field cultivator

¹ Late-planted corn and pumpkins.



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Results and Discussion

Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 13 July are reported in Table 2.2.

The mean node-injury rating for the untreated check (UTC) was 1.12, indicating that corn rootworm larval feeding was moderate. Mean node-injury ratings for SmartStax and the seed-blend (95% Mycogen 2T784 + 5% Mycogen 2T777) were very low and ranged from 0.04–0.05. Although the mean node-injury rating for Force 3G was numerically greater (0.31), it was not statistically different from SmartStax or the seed-blend. The percentage of roots with a node-injury rating < 0.25 was very high for SmartStax and the seed-blend (95–100%), moderately high for Force 3G (58%), and very low for the UTC (17%).

Mean node-injury ratings for the root systems included in the root clusters for the seed-blend treatment are reported in Table 2.3. The mean node-injury rating for refuge root systems was

0.68; mean node-injury ratings for the two rootworm-Bt root systems were each 0.03. These values were statistically similar to each other and were significantly smaller than the mean node-injury rating for the refuge root systems.

TABLE 2.3 • Spatial analysis of root-injury for seed-blend root clusters, Urbana, University of Illinois, 2011

Location ¹	Mean node-injury rating ^{2,3,4,5} 13 July
Refuge (Mycogen 2T777 ⁶)	0.68 a
Adjacent (Mycogen 2T784 ⁶)	0.03 b
Distal (Mycogen 2T784 ⁶)	0.03 b

¹ Indicates location of root system within the root cluster (see Figure 2.1).

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

³ Mean node-injury ratings were derived from three root systems per plot in each of four replications.

⁴ Means followed by the same letter do not differ significantly ($P = 0.05$, PROC MIXED).

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

⁶ Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

TABLE 2.2 • Evaluation of Force 3G and a seed-blend to control corn rootworm larvae, Urbana, University of Illinois, 2011

Product	Rate ¹	Placement	Mean node-injury rating ^{2,3,4,5,6} 13 July	% consistency < 0.25 ^{7,8}
Force 3G + Mycogen 2T777 ⁹	4	NU furrow ¹¹	0.31 a	58
SmartStax (Mycogen 2T784 ⁹)	—	—	0.04 a	100
95% SmartStax (Mycogen 2T784 ⁹) + 5% Mycogen 2T777 ⁹	—	—	0.05 a	95
UTC ¹⁰ (Mycogen 2T777 ⁹)	—	—	1.12 b	17

¹ Rates of application for Force 3G are ounces (oz) of product per 1,000 ft of row.

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

³ For non-seed-blend treatments, mean node-injury ratings were derived from six root systems in each of four replications.

⁴ For the seed-blend treatment, a weighted formula was used to calculate the mean node-injury rating.

⁵ Means followed by the same letter do not differ significantly ($P = 0.05$, PROC MIXED).

⁶ Data were analyzed using a square-root transformation; actual means are shown.

⁷ Percentage of roots with a node-injury rating < 0.25.

⁸ For the seed blend treatment, a weighted formula was used to calculate percentage consistency.

⁹ Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁰ UTC = untreated check.

¹¹ Applied with modified Noble metering units.