



CORN

SECTION 1

Evaluation of products to control corn rootworm larvae (*Diabrotica* spp.) in Illinois, 2013

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Locations

We established four trials at University of Illinois research and education centers near DeKalb (DeKalb County), Monmouth (Warren County), Perry (Pike County), and 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. Five randomly selected root systems were extracted from the first row of each plot on 17, 18, 29, and 30 July at Monmouth, Urbana, Perry, 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 was determined for each product at each location.

Planting, Insecticide Application, and Yield

Trials were planted on 1, 1, 14, and 16 May at Monmouth, Perry, DeKalb, and Urbana, respectively. All 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 or through modified SmartBox 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 CO₂ system. All insecticides were 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.

Yields were estimated by harvesting the center two rows of each plot on 27 September at Monmouth; 8 and 14 October at Perry and Urbana, respectively; and 10 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 V6–V8 growth stage to 30,000 plants per acre at Perry and to 32,000 plants per acre at DeKalb, Monmouth, and Urbana.

Agronomic Information

Agronomic information for all locations is listed in Table 1.1.

Climatic Conditions

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

Statistical Analysis

Data were analyzed using ARM 8 (Agricultural Research Manager), revision 8.5.0 (Copyright© 1982–2012 Gylling Data Management, Inc., Brookings, SD).

Results and Discussion

DeKalb—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 30 July are presented in Table 1.2. Mean node-injury ratings for the untreated checks (UTCs) ranged from 0.18–0.47, indicating that corn rootworm larval feeding was low to moderate. Mycogen 2T777 (UTC) and NK N68B-GT (UTC) had significantly greater levels of root damage than all other treatments, including DEKALB DKC62-98 (UTC). Mean node-injury ratings for soil-applied insecticides, rootworm Bt hybrids, and rootworm Bt hybrids plus soil-applied insecticides were very low, ranging from 0.00–0.19. With the exception of Genuity VT Triple Pro, all rootworm control treatments provided statistically similar levels of protection from corn rootworm larval feeding. The mean node-injury rating for Genuity VT Triple Pro was statistically similar to its UTC (DEKALB DKC62-98). Mean percentage consistency (percentage of roots with a node-injury rating < 0.25) ranged from 40–100%. Genuity VT Triple Pro and all of the UTCs had mean consistency ratings of 75% or less. The application of Aztec 4.67G significantly improved the consistency rating for Genuity VT Triple Pro.

Mean yields ranged from 94.9–221.4 bu/A. Adding soil-applied insecticides to DKC62-98 (UTC) resulted in significantly greater yields. The application of Force CS to Genuity SmartStax RIB Complete significantly improved yields when compared with Genuity SmartStax RIB Complete alone. Because the mean-node injury ratings for Genuity



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TABLE 1.1 • Agronomic information for efficacy trials of products to control corn rootworm larvae, University of Illinois, 2013

	DeKalb	Monmouth	Perry	Urbana
Planting date	14 May	1 May	1 May	16 May
Root evaluation date	30 July	17 July	29 July	18 July
Harvest date	10 November	27 September	8 October	14 October
Hybrids	DEKALB DKC62-97 Genuity VT Triple Pro DEKALB DKC62-97RIB Genuity VT Triple Pro RIB Complete ¹ DEKALB DKC62-98 Genuity VT Double Pro DEKALB DKC63-33RIB Genuity SmartStax RIB Complete ² Mycogen 2T777 Roundup Ready 2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA NK N68B-GT Agrisure GT NK N68B-3122 Agrisure 3122 E-Z Refuge ²	DEKALB DKC62-97 Genuity VT Triple Pro DEKALB DKC62-97RIB Genuity VT Triple Pro RIB Complete ¹ DEKALB DKC62-98 Genuity VT Double Pro DEKALB DKC63-33RIB Genuity SmartStax RIB Complete ² Mycogen 2T777 Roundup Ready 2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA NK N68B-GT Agrisure GT NK N68B-3122 Agrisure 3122 E-Z Refuge ²	DEKALB DKC62-97 Genuity VT Triple Pro DEKALB DKC62-97RIB Genuity VT Triple Pro RIB Complete ¹ DEKALB DKC62-98 Genuity VT Double Pro DEKALB DKC63-33RIB Genuity SmartStax RIB Complete ² Mycogen 2T777 Roundup Ready 2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA NK N68B-GT Agrisure GT NK N68B-3122 Agrisure 3122 E-Z Refuge ²	DEKALB DKC62-97 Genuity VT Triple Pro DEKALB DKC62-97RIB Genuity VT Triple Pro RIB Complete ¹ DEKALB DKC62-98 Genuity VT Double Pro DEKALB DKC63-33RIB Genuity SmartStax RIB Complete ² Mycogen 2T777 Roundup Ready 2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA NK N68B-GT Agrisure GT NK N68B-3122 Agrisure 3122 E-Z Refuge ²
Row spacing	30 inches	30 inches	30 inches	30 inches
Seeding rate	36,000/acre	36,000/acre	36,000/acre	36,000/acre
Previous crop	Trap crop ³	Trap crop ³	Trap crop ³	Trap crop ³
Tillage	Fall—chisel plow Spring—discovator	Fall—disc plow Spring—soil finisher	Fall—disc-chisel plow Spring—field cultivator	Fall—chisel plow Spring—field cultivator

¹ Contains a 10% refuge-in-the-bag (non-rootworm Bt) seed-blend.

² Contains a 5% refuge-in-the-bag (non-rootworm Bt) seed-blend.

³ Late-planted corn and pumpkins.

SmartStax RIB Complete with and without Force CS differed only slightly (0.04), it is unlikely that the observed difference in mean yields (21.8 bu/A) can be attributed to increased root protection from the application of Force CS. Each of the UTCs had significantly lower yields than their corresponding rootworm Bt hybrids, in spite of the low to moderate root injury. With the exception of Force CS applied to Genuity SmartStax RIB Complete, the addition of a soil insecticide at planting did not significantly improve yields of the corresponding Bt treatment.

Monmouth—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 17 July are presented in Table 1.3. Mean node-injury ratings for the UTCs ranged from 0.42–0.69, indicating that corn rootworm larval feeding was low to moderate. The NK N68B-GT (UTC) had significantly greater levels of root damage than DEKALB DKC62-98 (UTC) and Mycogen 2T777 (UTC). Mean node-injury ratings for soil-applied insecticides, rootworm Bt hybrids, and rootworm Bt hybrids plus soil-applied insecticides were low, ranging from 0.01–0.27. Aztec 2.1G and Force CS

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TABLE 1.2 • Evaluation of products to control corn rootworm larvae, DeKalb, University of Illinois, 2013

Product	Rate ¹	Placement 14 May	Mean node- injury rating ²⁻⁵ 30 July	Mean % consistency < 0.25 ^{4,6}	Mean yield (bu/A) ^{7,8} 10 Nov
Soil-applied insecticides					
Aztec 2.1G + DEKALB DKC62-98 ⁹	6.7	NU furrow ¹³	0.03 bcd	100 a	187.0 cde
Capture LFR + DEKALB DKC62-98 ⁹	0.49	Band	0.09 bcd	90 ab	177.7 d-g
Force CS + DEKALB DKC62-98 ⁹	0.46	Band	0.08 bcd	93 ab	181.8 c-f
Rootworm Bt hybrids					
Agrisure 3122 E-Z Refuge ¹⁰ (NK N68B-3122 ¹¹)	—	—	0.03 bcd	95 ab	176.0 d-g
Genuity SmartStax RIB Complete ¹⁰ (DEKALB DKC63-33RIB ⁹)	—	—	0.04 bcd	95 ab	199.6 bc
Genuity VT Triple Pro (DEKALB DKC62-97 ⁹)	—	—	0.19 b	75 b	193.9 bcd
Herculex XTRA (Mycogen 2T789 ¹¹)	—	—	0.03 bcd	100 a	160.3 gh
SmartStax (Mycogen 2T784 ¹¹)	—	—	0.06 bcd	85 ab	162.0 fgh
Soil-applied insecticides + rootworm Bt hybrids					
Aztec 4.67G + Genuity VT Triple Pro RIB Complete ¹⁰ (DEKALB DKC62-97RIB ¹²)	3	SB furrow ¹⁴	0.02 bcd	100 a	192.0 b-e
Capture LFR + Agrisure 3122 E-Z Refuge ¹⁰ (NK N68B-3122 ¹¹)	0.49	Band	0.01 d	100 a	171.6 e-h
Capture LFR + Genuity SmartStax RIB Complete ¹⁰ (DEKALB DKC63-33RIB ⁹)	0.49	Band	0.01 d	100 a	209.4 ab
Counter 20G + Agrisure 3122 E-Z Refuge ¹⁰ (NK N68B-3122 ¹¹)	6	SB furrow ¹⁴	0.01 d	100 a	175.1 d-g
Force CS + Agrisure 3122 E-Z Refuge ¹⁰ (NK N68B-3122 ¹¹)	0.46	Band	0.00 d	100 a	179.1 c-g
Force CS + Genuity SmartStax RIB Complete ¹⁰ (DEKALB DKC63-33RIB ⁹)	0.46	Band	0.00 d	100 a	221.4 a
SmartChoice 5G + Herculex XTRA (Mycogen 2T789 ¹¹)	5	SB furrow ¹⁴	0.01 d	100 a	180.4 c-g
SmartChoice 5G + SmartStax (Mycogen 2T784 ¹¹)	5	SB furrow ¹⁴	0.01 d	100 a	162.9 fgh
Untreated checks (UTCs)					
DEKALB DKC62-98 ⁹	—	—	0.18 bc	75 b	152.7 hi
Mycogen 2T777 ¹¹	—	—	0.47 a	40 c	94.9 j
NK N68B-GT ¹¹	—	—	0.37 a	55 c	136.9 i

¹ Rates of application for band and furrow placements 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 Mean node-injury ratings were derived from five root systems per plot in each of four replications.

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

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

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

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

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

⁹ Seed was treated with Poncho, 0.50 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁰ Because root systems were evaluated at random, mean root ratings for these seed-blend products may

include refuge (non-Bt) root systems.

¹¹ Seed was treated with Cruiser, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹² Seed was treated with Poncho, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹³ Applied with modified Noble metering units.

¹⁴ Applied with modified SmartBox metering units.



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TABLE 1.3 • Evaluation of products to control corn rootworm larvae, Monmouth, University of Illinois, 2013

Product	Rate ¹	Placement 1 May	Mean node- injury rating ²⁻⁵ 17 July	Mean % consistency < 0.25 ^{4,6}	Mean yield (bu/A) ^{7,8} 27 Sep
Soil-applied insecticides					
Aztec 2.1G + DEKALB DKC62-98 ⁹	6.7	NU furrow ¹⁴	0.11 de	85 abc	188.3 de
Belay ¹⁰ + NK N68B-GT ¹¹	0.62	Furrow	0.27 cd	67 bcd	166.0 gh
Force CS + NK N68B-GT ¹¹	0.46	Band	0.14 de	80 abc	167.7 gh
Rootworm Bt hybrids					
Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	—	—	0.12 de	90 ab	208.1 ab
Genuity SmartStax RIB Complete ¹² (DEKALB DKC63-33RIB ⁹)	—	—	0.06 e	90 ab	212.6 a
Genuity VT Triple Pro (DEKALB DKC62-97 ⁹)	—	—	0.26 d	65 cd	201.9 abc
Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	—	—	0.07 e	90 ab	202.0 abc
Herculex XTRA (Mycogen 2T789 ¹¹)	—	—	0.07 e	95 a	194.2 cde
SmartStax (Mycogen 2T784 ¹¹)	—	—	0.02 e	100 a	175.1 fg
Soil-applied insecticides + rootworm Bt hybrids					
Aztec 4.67G + Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	3	SB furrow ¹⁵	0.03 e	100 a	198.5 bcd
Capture LFR + Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	0.49	Band	0.08 e	80 abc	210.3 ab
Counter 20G + Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	6	SB furrow ¹⁵	0.01 e	100 a	207.7 ab
Force CS + Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	0.46	Band	0.02 e	100 a	208.8 ab
SmartChoice 5G + Herculex XTRA (Mycogen 2T789 ¹¹)	5	SB furrow ¹⁵	0.02 e	100 a	213.0 a
Untreated checks (UTCs)					
DEKALB DKC62-98 ⁹	—	—	0.42 bc	45 de	182.7 ef
Mycogen 2T777 ¹¹	—	—	0.48 b	40 e	140.2 i
NK N68B-GT ¹¹	—	—	0.69 a	35 e	160.8 h

¹ Rates of application for band and furrow placements 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 Mean node-injury ratings were derived from five root systems per plot in each of four replications.

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

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

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

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

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

⁹ Seed was treated with Poncho, 0.50 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁰ Belay is not currently labeled for use in corn.

¹¹ Seed was treated with Cruiser, 0.25 milligrams (mg)

of active ingredient (a.i.) per seed.

¹² Because root systems were evaluated at random, mean root ratings for these seed-blend products may include refuge (non-Bt) root systems.

¹³ Seed was treated with Poncho, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁴ Applied with modified Noble metering units.

¹⁵ Applied with modified SmartBox metering units.



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provided statistically similar levels of root protection as the rootworm Bt hybrids and rootworm Bt hybrids plus a soil-applied insecticide. With the exception of Genuity VT Triple Pro, all rootworm Bt hybrids and rootworm Bt hybrids plus a soil-applied insecticide provided statistically similar levels of protection from corn rootworm larval feeding. The mean node-injury rating for Genuity VT Triple Pro was statistically similar to Agrisure 3122 E-Z Refuge, and all of the soil-applied insecticides. Mean percentage consistency ranged from 35–100%. Belay, Genuity VT Triple Pro, and all of the UTCs had mean consistency ratings of 70% or less. Adding a soil-applied insecticide to a rootworm Bt hybrid never resulted in significantly higher mean consistency ratings.

Mean yields ranged from 140.2–213.0 bu/A. The application of SmartChoice 5G resulted in significantly higher yields for Herculex XTRA. However, the addition of a soil-applied insecticide to rootworm Bt hybrids did not always result in higher yields. With the exception of Herculex XTRA, all rootworm Bt hybrids/soil-applied insecticide combinations had significantly higher yields than soil-applied insecticides applied to non-rootworm Bt hybrids (UTCs).

Perry—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 29 July are presented in Table 1.4. Mean node-injury ratings for the UTCs ranged from 0.39–0.89, indicating that corn rootworm larval feeding was low to moderate. Mycogen 2T777 (UTC) and NK N68B-GT (UTC) treatments had significantly greater levels of root damage than all other treatments, including DEKALB DKC62-98 (UTC). Mean node-injury ratings for soil-applied insecticides were very low and were statistically similar to the rootworm Bt hybrids and rootworm Bt hybrids plus soil-applied insecticides. The mean node-injury rating for Genuity VT Triple Pro was statistically similar to its UTC (DEKALB DKC62-98). Mean percentage consistency ranged from 30–100%. With the exception of Genuity VT Triple Pro, all soil-applied insecticides, rootworm Bt hybrids, and rootworm Bt hybrids plus soil-applied insecticides had statistically

similar percentage consistency ratings. The mean percentage consistency for Genuity VT Triple Pro was statistically similar to its UTC (DEKALB DKC62-98).

Mean yields ranged from 168.6–201.1 bu/A. Mean yields from all rootworm hybrids were not significantly different from their UTCs. Adding soil-applied insecticides to the rootworm Bt hybrids never resulted in a significant increase in mean yields. Mean yields for the soil applied insecticides were statistically similar to their respective UTCs.

Urbana—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 18 July are presented in Table 1.5. Mean node-injury ratings for the UTCs ranged from 0.91–1.80, indicating that corn rootworm larval feeding was moderate to severe. Mycogen 2T777 (UTC) and NK N68B-GT (UTC) had significantly greater levels of root damage than all other treatments, including DEKALB DKC62-98 (UTC). Mean node-injury ratings for soil-applied insecticides ranged from 0.10–0.65 and were statistically similar to each other. Root injury in the Capture LFR treatment was statistically similar to its UTC. Mean node-injury ratings for the rootworm Bt hybrids and rootworm Bt hybrids plus a soil-applied insecticide were statistically similar, ranging from 0.01–0.54. The addition of a soil-applied insecticide to a rootworm Bt hybrid never resulted in significantly greater levels of root protection. Mean percentage consistency ranged from 15–100%. Capture LFR, Genuity SmartStax RIB Complete, Genuity VT Triple Pro, and Genuity VT Triple Pro RIB Complete had statistically similar consistency percentages as their corresponding UTCs.

Mean yields ranged from 153.4–198.4 bu/A. Mycogen 2T777 (UTC) had significantly lower yields than all other treatments and the UTCs. Agrisure 3122 E-Z Refuge, Genuity SmartStax RIB Complete, Herculex XTRA, and SmartStax, had significantly higher yields than their corresponding UTCs. Adding soil-applied insecticides to the rootworm Bt hybrids never resulted in a significant increase in mean yields.



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TABLE 1.4 • Evaluation of products to control corn rootworm larvae, Perry, University of Illinois, 2013

Product	Rate ¹	Placement 1 May	Mean node- injury rating ²⁻⁵ 29 July	Mean % consistency < 0.25 ^{4,6}	Mean yield (bu/A) ^{7,8} 8 Oct
Soil-applied insecticides					
Aztec 2.1G + DEKALB DKC62-98 ⁹	6.7	NU furrow ¹³	0.10 cd	85 ab	187.8 a
Force CS + NK N68B-GT ¹⁰	0.46	Band	0.08 cd	90 ab	172.4 a
Rootworm Bt hybrids					
Agrisure 3122 E-Z Refuge ¹¹ (NK N68B-3122 ¹⁰)	—	—	0.16 cd	80 ab	184.8 a
Genuity SmartStax RIB Complete ¹¹ (DEKALB DKC63-33RIB ⁹)	—	—	0.06 cd	90 ab	199.0 a
Genuity VT Triple Pro (DEKALB DKC62-97 ⁹)	—	—	0.23 bc	65 bc	193.7 a
Genuity VT Triple Pro RIB Complete ¹¹ (DEKALB DKC62-97RIB ¹²)	—	—	0.15 cd	90 ab	192.2 a
Herculex XTRA (Mycogen 2T789 ¹⁰)	—	—	0.07 cd	100 a	188.8 a
SmartStax (Mycogen 2T784 ¹⁰)	—	—	0.14 cd	73 ab	201.1 a
Soil-applied insecticides + rootworm Bt hybrids					
Aztec 4.67G + Genuity VT Triple Pro RIB Complete ¹¹ (DEKALB DKC62-97RIB ¹²)	3	SB furrow ¹⁴	0.09 cd	85 ab	196.7 a
Capture LFR + Genuity VT Triple Pro RIB Complete ¹¹ (DEKALB DKC62-97RIB ¹²)	0.49	Band	0.08 cd	95 a	196.0 a
Counter 20G + Agrisure 3122 E-Z Refuge ¹¹ (NK N68B-3122 ¹⁰)	6	SB furrow ¹⁴	0.04 cd	95 a	183.9 a
Force CS + Agrisure 3122 E-Z Refuge ¹¹ (NK N68B-3122 ¹⁰)	0.46	Band	0.02 d	100 a	176.8 a
SmartChoice 5G + Herculex XTRA (Mycogen 2T789 ¹⁰)	5	SB furrow ¹⁴	0.03 cd	100 a	168.6 a
Untreated checks (UTCs)					
DEKALB DKC62-98 ⁹	—	—	0.39 b	45 cd	183.3 a
Mycogen 2T777 ¹⁰	—	—	0.89 a	45 cd	184.5 a
NK N68B-GT ¹⁰	—	—	0.69 a	30 d	190.2 a

¹ Rates of application for band and furrow placements 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 Mean node-injury ratings were derived from five root systems per plot in each of four replications.

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

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

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

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

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

⁹ Seed was treated with Poncho, 0.50 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁰ Seed was treated with Cruiser, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹¹ Because root systems were evaluated at random, mean root ratings for these seed-blend products may include refuge (non-Bt) root systems.

¹² Seed was treated with Poncho, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹³ Applied with modified Noble metering units.

¹⁴ Applied with modified SmartBox metering units.



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TABLE 1.5 • Evaluation of products to control corn rootworm larvae, Urbana, University of Illinois, 2013

Product	Rate ¹	Placement 16 May	Mean node- injury rating ²⁻⁵ 18 July	Mean % consistency < 0.25 ^{4,6}	Mean yield (bu/A) ^{7,8} 14 Oct
Soil-applied insecticides					
Aztec 2.1G + DEKALB DKC62-98 ⁹	6.7	NU furrow ¹⁴	0.10 cd	90 ab	174.7 fg
Belay ¹⁰ + NK N68B-GT ¹¹	0.62	Furrow	0.25 cd	70 a-d	177.7 efg
Capture LFR + DEKALB DKC62-98 ⁹	0.49	Band	0.65 bc	45 c-f	184.6 a-f
Force CS + DEKALB DKC62-98 ⁹	0.46	Band	0.15 cd	89 ab	183.5 a-g
Rootworm Bt hybrids					
Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	—	—	0.08 cd	90 ab	195.2 abc
Genuity SmartStax RIB Complete ¹² (DEKALB DKC63-33RIB ⁹)	—	—	0.27 cd	65 a-d	195.4 abc
Genuity VT Triple Pro (DEKALB DKC62-97 ⁹)	—	—	0.39 bcd	55 b-e	181.6 c-g
Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	—	—	0.54 bcd	45 c-f	182.7 b-g
Herculex XTRA (Mycogen 2T789 ¹¹)	—	—	0.09 cd	90 ab	187.3 a-f
SmartStax (Mycogen 2T784 ¹¹)	—	—	0.05 cd	95 ab	190.4 a-e
Soil-applied insecticides + rootworm Bt hybrids					
Aztec 4.67G + Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	3	SB furrow ¹⁵	0.05 cd	100 a	187.5 a-f
Capture LFR + Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	0.49	Band	0.03 d	100 a	195.5 abc
Capture LFR + Genuity SmartStax RIB Complete ¹² (DEKALB DKC63-33RIB ⁹)	0.49	Band	0.01 d	100 a	197.5 ab
Capture LFR + Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	0.49	Band	0.14 cd	84 abc	190.0 a-e
Counter 20G + Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	6	SB furrow ¹⁵	0.01 d	100 a	192.8 a-d
Force CS + Agrisure 3122 E-Z Refuge ¹² (NK N68B-3122 ¹¹)	0.46	Band	0.01 d	100 a	195.3 abc
Force CS + Genuity SmartStax RIB Complete ¹² (DEKALB DKC63-33RIB ⁹)	0.46	Band	0.01 d	100 a	198.4 a
Force CS + Genuity VT Triple Pro RIB Complete ¹² (DEKALB DKC62-97RIB ¹³)	0.46	Band	0.03 d	100 a	189.5 a-e
SmartChoice 5G + Herculex XTRA (Mycogen 2T789 ¹¹)	5	SB furrow ¹⁵	0.01 d	100 a	191.5 a-e
SmartChoice 5G + SmartStax (Mycogen 2T784 ¹¹)	5	SB furrow ¹⁵	0.00 d	100 a	193.2 a-d
Untreated checks (UTCs)					
DEKALB DKC62-98 ⁹	—	—	0.91 b	35 def	178.7 d-g
Mycogen 2T777 ¹¹	—	—	1.80 a	15 f	153.4 h
NK N68B-GT ¹¹	—	—	1.76 a	20 ef	170.0 g

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¹ Rates of application for band and furrow placements 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 Mean node-injury ratings were derived from five root systems per plot in each of four replications.

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

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

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

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

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

⁹ Seed was treated with Poncho, 0.50 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁰ Belay is not currently labeled for use in corn.

¹¹ Seed was treated with Cruiser, 0.25 milligrams (mg)

of active ingredient (a.i.) per seed.

¹² Because root systems were evaluated at random, mean root ratings for these seed-blend products may include refuge (non-Bt) root systems.

¹³ Seed was treated with Poncho, 0.25 milligrams (mg) of active ingredient (a.i.) per seed.

¹⁴ Applied with modified Noble metering units.

¹⁵ Applied with modified SmartBox metering units.