SECTION 1

Evaluation of products to control corn rootworm larvae (*Diabrotica spp.*) in Illinois, 2011

Nicholas A. Tinsley, Ronald E. Estes, and Michael E. Gray

Location

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 at DeKalb, Perry, and Urbana, and 10 ft (four rows) x 30 ft at Monmouth. Five randomly selected root systems were extracted from the first row of each plot on 12 July at Monmouth and Perry, and on 11 and 18 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 was determined for each product at each location.

Planting, Insecticide Application, and Yield

Trials were planted on 2, 3, 10, and 11 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. Force 2.1CS was applied at a spray volume of 5 gallons per acre (gal/A) using a CO_2 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 15 and 24 September at Perry and Monmouth, respectively, and on 7 and 22 October at Urbana and Dekalb, respectively. 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 had been thinned at the V6–V8 growth stage to 35,000 plants per acre at all locations.

Agronomic Information

Agronomic information for all four locations is listed in Table 1.1.

Climatic Conditions

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

Statistical Analysis

Data were analyzed using ARM 8 (Agricultural Research Manager), revision 8.3.4 (Copyright© 1982–2011 Gylling Data Management, Inc., Brookings, SD).

Results and Discussion

DeKalb—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 18 July are reported in Table 1.2. Mean node-injury ratings for the untreated checks (UTCs) ranged from 0.98–1.65, indicating that corn rootworm larval feeding was moderate. DKC61-22 had a statistically smaller mean node-injury rating than the other UTCs. One factor that may have contributed to this observation is that DKC61-22 was treated with clothianidin at the rate of 0.50 mg a.i. per seed while the other UTCs were treated with thiamethoxam at the rate of 0.25 mg a.i. per seed. Mean node-injury ratings for the seed and soil-applied insecticides ranged from 0.07–0.13; these ratings were significantly smaller than their UTC (DKC61-22). Mean node-injury ratings for the rootworm Bt hybrids ranged from 0.01–0.63 and, in all instances, were significantly smaller than their respective UTCs. The addition of soil-applied insecticides to rootworm Bt hybrids only resulted in significantly smaller mean node-injury ratings for Agrisure RW (Garst 84U58 3111). The percentages of roots with a node-injury rating < 0.25 were variable and ranged from 40–100% for the control products that were evaluated.

Mean yields for the UTCs were very low and ranged from 102–145 bu/A. Mean yields for the soil-applied insecticide Aztec 2.1G and the rootworm Bt hybrids were significantly greater than their respective UTCs—this trend was not

observed for Poncho 1250 when compared with its UTC (DKC61-22). The addition of soil-applied insecticides to rootworm Bt hybrids resulted in a significantly greater mean yield for Agrisure RW (Garst 84U58 3111) (only when SmartChoice 5G was used). However, adding soil-applied insecticide to the other rootworm Bt hybrids did not result in significantly greater mean yields. These results indicate that at these moderate levels of injury, the addition of a soil insecticide did not result in significantly greater yields for most rootworm Bt hybrids.

Monmouth—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 12 July are reported in Table 1.3. Mean node-injury ratings for the UTCs ranged from 0.11–0.42, indicating that corn rootworm larval feeding was minimal to moderate. Mean node-injury ratings for the seed- and soil-applied insecticides ranged from 0.02–0.11; however, mean node-injury ratings for these treatments were not significantly different from their UTC (DKC61-22). Mean node-injury ratings for the rootworm Bt hybrids ranged from 0.01–0.05. For most rootworm Bt hybrids, mean node-injury ratings were smaller than their respective UTCs; this trend excluded SmartStax (DKC61-21) and YieldGard VT3 (DKC62-97). The addition of soil-applied insecticides to rootworm Bt hybrids never resulted in significantly smaller mean node-injury ratings when compared with the rootworm Bt hybrids alone. The percentages of roots with a node-injury rating < 0.25 ranged from 84–100% for the control products that were evaluated. Percentage consistency for the rootworm Bt hybrids was not improved by adding a soil-applied insecticide.

Mean yields for the UTCs ranged from 179–218 bu/A. Mean yields for the seed- and soil-applied insecticides were not

Continued on page 8

TABLE 1.1 • Agronomic information for efficacy trials with products to control corn rootworm larvae, University of Illinois, 2011

	DeKalb	Monmouth	Perry	Urbana
Planting date	10 May	2 May	3 May	11 May
Root evaluation date	18 July	12 July	12 July	11 July
Harvest date	22 October	24 September	15 September	7 October
Hybrids	DKC61-21 SmartStax DKC61-22 RR2 DKC62-97 YieldGard VT3 Garst 84U58 3111 Agrisure RW Garst 84U58 GT GH H-8577 3000GT Agrisure RW GH H-8577 GT/CB/LL Mycogen 2T777 RR2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA	DKC61-21 SmartStax DKC61-22 RR2 DKC62-97 YieldGard VT3 Garst 84U58 3111 Agrisure RW Garst 84U58 GT GH H-8577 3000GT Agrisure RW GH H-8577 GT/CB/LL Mycogen 2T777 RR2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA	DKC61-21 SmartStax DKC61-22 RR2 DKC62-97 YieldGard VT3 Garst 84U58 3111 Agrisure RW Garst 84U58 GT GH H-8577 3000GT Agrisure RW GH H-8577 GT/CB/LL Mycogen 2T777 RR2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA	DKC61-21 SmartStax DKC61-22 RR2 DKC62-97 YieldGard VT3 Garst 84U58 3111 Agrisure RW Garst 84U58 GT GH H-8577 3000GT Agrisure RW GH H-8577 GT/CB/LL Mycogen 2T777 RR2 Mycogen 2T784 SmartStax Mycogen 2T789 Herculex XTRA
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[1]	Trap crop[1]	Trap crop[1]	Trap crop[1]
Tillage	Fall—moldboard plow Spring—mulch finisher	Fall—chisel plow Spring—field cultivator	Fall—chisel plow Spring—field cultivator	Fall—chisel plow Spring—field cultivator

[1] Late-planted corn and pumpkins.

TABLE 1.2 • Evaluation of products to control corn rootworm larvae, DeKalb, University of Illinois, 2011

Product	Rate[1,2]	Placement[1,2]	Mean node-injury rating[3,4,5,6] 18 July	% consistency < 0.25[7]	Mean yield (bu/A)[8,9] 22 Oct
Seed- and soil-applied insecticides					
Aztec 2.1G + DKC61-22[10]	6.7	NU furrow[12]	0.07 e	85	176 b–e
Poncho 1250 + DKC61-22[10]	1.25	Seed	0.13 de	79	160 efg
Rootworm Bt hybrids					
Agrisure RW (Garst 84U58 3111[11])	—	—	0.63 bc	40	175 b–f
Agrisure RW (GH H-8577 3000GT[11])	—	—	0.50 cd	60	169 def
Herculex XTRA (Mycogen 2T789[11])	—	—	0.17 de	85	159 efg
SmartStax (DKC61-21[10])	—	—	0.03 e	100	184 a–d
SmartStax (Mycogen 2T784[11])	—	—	0.01 e	100	157 fg
YieldGard VT3 (DKC62-97[10])	—	—	0.08 e	90	191 abc
Soil-applied insecticides + rootworm Bt hybrids					
Counter 20G + Agrisure RW (Garst 84U58 3111[11])	4.5	SB furrow[13]	0.01 e	100	184 a–d
Counter 20G + YieldGard VT3 (DKC62-97[10])	4.5	SB furrow[13]	0.02 e	100	194 ab
Force 2.1CS + Agrisure RW (Garst 84U58 3111[11])	0.46	Band	0.04 e	100	191 abc
Force 2.1CS + Herculex XTRA (Mycogen 2T789[11])	0.46	Band	0.01 e	100	172 c–f
Force 2.1CS + SmartStax (DKC61-21[10])	0.46	Band	0.00 e	100	188 a–d
Force 2.1CS + YieldGard VT3 (DKC62-97[10])	0.46	Band	0.02 e	100	187 a–d
SmartChoice 5G + Agrisure RW (Garst 84U58 3111[11])	3.5	SB furrow[13]	0.03 e	100	199 a
SmartChoice 5G + Herculex XTRA (Mycogen 2T789[11])	3.5	SB furrow[13]	0.02 e	100	178 b–e
Untreated checks (UTCs)					
DKC61-22[10]	—	—	0.98 b	20	145 g
Garst 84U58 GT[11]	—	—	1.45 a	0	122 h
GH H-8577 GT/CB/LL[11]	—	—	1.65 a	10	102 i
Mycogen 2T777[11]	—	—	1.55 a	16	107 hi

[1] Rates of application for band and furrow placements are ounces (oz) of product per 1,000 ft of row.
[2] Rates of application for seed-applied insecticides are milligrams (mg) active ingredient (a.i.) per seed.
[3] Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).
[4] Mean node-injury ratings were derived from five root systems per treatment in each of four replications.
[5] Means followed by the same letter do not differ significantly ($P = 0.05$, Duncan's New Multiple Range Test).
[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] Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.
[9] Means followed by the same letter do not differ significantly ($P = 0.10$, Duncan's New Multiple Range Test).
[10] Seed treated with Poncho (clothianidin), 0.50 milligrams (mg) of active ingredient (a.i.) per seed.
[11] Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.
[12] Applied with modified Noble metering units.
[13] Applied with modified SmartBox metering units.

TABLE 1.3 • Evaluation of products to control corn rootworm larvae, Monmouth, University of Illinois, 2011

Product	Rate[1,2]	Placement[1,2]	Mean node-injury rating[3,4,5,6] 12 July	% consistency < 0.25[7]	Mean yield (bu/A)[8,9] 24 Sep
Seed- and soil-applied insecticides					
Aztec 2.1G + DKC61-22[10]	6.7	NU furrow[12]	0.02 d	100	225 ab
Poncho 1250 + DKC61-22[10]	1.25	Seed	0.11 cd	84	222 abc
Rootworm Bt hybrids					
Agrisure RW (Garst 84U58 3111[11])	—	—	0.03 d	100	186 de
Agrisure RW (GH H-8577 3000GT[11])	—	—	0.05 d	100	212 a–d
Herculex XTRA (Mycogen 2T789[11])	—	—	0.02 d	100	194 b–e
SmartStax (DKC61-21[10])	—	—	0.01 d	100	199 b–e
SmartStax (Mycogen 2T784[11])	—	—	0.01 d	100	179 e
YieldGard VT3 (DKC62-97[10])	—	—	0.02 d	100	240 a
Soil-applied insecticides + rootworm Bt hybrids					
Counter 20G + Agrisure RW (Garst 84U58 3111[11])	4.5	SB furrow[13]	0.01 d	100	208 b–e
Force 2.1CS + Agrisure RW (Garst 84U58 3111[11])	0.46	Band	0.01 d	100	214 a–d
Force 2.1CS + Herculex XTRA (Mycogen 2T789[11])	0.46	Band	0.00 d	100	188 de
Force 2.1CS + SmartStax (DKC61-21[10])	0.46	Band	0.01 d	100	216 a–d
Force 2.1CS + YieldGard VT3 (DKC62-97[10])	0.46	Band	0.01 d	100	220 abc
SmartChoice 5G + Herculex XTRA (Mycogen 2T789[11])	3.5	SB furrow[13]	0.01 d	100	205 b–e
Untreated checks (UTCs)					
DKC61-22[10]	—	—	0.11 cd	85	218 a–d
Garst 84U58 GT[11]	—	—	0.27 b	60	216 a–d
GH H-8577 GT/CB/LL[11]	—	—	0.23 bc	60	193 cde
Mycogen 2T777[11]	—	—	0.42 a	50	179 e

[1] Rates of application for band and furrow placements are ounces (oz) of product per 1,000 ft of row.
[2] Rates of application for seed-applied insecticides are milligrams (mg) active ingredient (a.i.) per seed.
[3] Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).
[4] Mean node-injury ratings were derived from five root systems per treatment in each of four replications.
[5] Means followed by the same letter do not differ significantly ($P = 0.05$, Duncan's New Multiple Range Test).
[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] Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.
[9] Means followed by the same letter do not differ significantly ($P = 0.10$, Duncan's New Multiple Range Test).
[10] Seed treated with Poncho (clothianidin), 0.50 milligrams (mg) of active ingredient (a.i.) per seed.
[11] Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.
[12] Applied with modified Noble metering units.
[13] Applied with modified SmartBox metering units.

statistically different from their respective UTCs. Likewise, mean yields for all rootworm Bt hybrids were statistically similar to their UTCs. Adding soil-applied insecticides to the rootworm Bt hybrids never resulted in significantly greater mean yields.

Perry—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 12 July are reported in Table 1.4. Mean node-injury ratings for the UTCs ranged from 0.21–0.55, indicating that corn rootworm larval feeding was minimal to moderate. Mean node-injury ratings for the seed- and soil-applied insecticides ranged from 0.08–0.09. As was observed in Monmouth, mean node-injury ratings for these treatments were not significantly different from their UTC (DKC61-22). Mean node-injury ratings for the rootworm Bt hybrids ranged from 0.00–0.05. For all rootworm Bt hybrids, mean node-injury ratings were smaller than their respective UTCs. The addition of soil-applied insecticides to rootworm Bt hybrids never resulted in significantly smaller mean node-injury ratings. The percentages of roots with a node-injury rating < 0.25 ranged from 84–100% for the control products that were evaluated.

Overall, mean yields for this location were lower than for the other locations—no treatment yielded more than 152 bu/A. Mean yields for the seed- and soil-applied insecticides were not statistically different from their respective UTCs. Similarly, the mean yield for most of the rootworm Bt hybrids were statistically similar to their respective UTCs. However, the mean yields for Agrisure RW (GH H-8577 3000GT) and SmartStax (DKC61-21) were significantly higher and lower than their corresponding UTCs (GH H-8577 GT/CB/LL and DKC61-22), respectively. The addition of soil insecticides to rootworm Bt hybrids resulted in significantly greater yield for only one rootworm Bt hybrid (SmartStax, DKC61-21). It is likely that some other factor (e.g., moisture stress, see Appendix III) played a more important role in determining yield than the levels of root injury we observed.

Urbana—Mean node-injury ratings and consistency percentages for rootworm injury evaluations on 11 July are reported in Table 1.5. Mean node-injury ratings for the UTCs ranged from 0.87–1.70, indicating that corn rootworm larval feeding was moderate. Mean node-injury ratings for the seed and soil-applied insecticides ranged from 0.31–0.68. The mean node injury rating for Aztec 2.1G was significantly smaller than its UTC (DKC61-22); however, Poncho 1250 and its UTC (DKC61-22) had statistically similar mean node-injury ratings. Mean node-injury ratings for the rootworm Bt hybrids ranged from 0.02–0.41 and, in all instances, were significantly smaller than their respective UTCs. The addition of soil-applied insecticides to rootworm Bt hybrids only resulted in significantly smaller mean node-injury ratings for Agrisure RW (Garst 84U58 3111). The percentages of roots with a node-injury rating < 0.25 were variable and ranged from 20–100% for the control products that were evaluated.

Mean yields for the UTCs were very low and ranged from 68–149 bu/A. Mean yields for the soil-applied insecticide Aztec 2.1G and the rootworm Bt hybrids were significantly greater than their respective UTCs—this trend was not observed for Poncho 1250 when compared with its UTC (DKC61-22). The addition of soil-applied insecticides to rootworm Bt hybrids never resulted in significantly greater mean yields when compared with rootworm Bt hybrids alone.

TABLE 1.4 • Evaluation of products to control corn rootworm larvae, Perry, University of Illinois, 2011

Product	Rate[1,2]	Placement[1,2]	Mean node-injury rating[3,4,5,6] 12 July	% consistency < 0.25[7]	Mean yield (bu/A)[8,9] 15 Sep
Seed- and soil-applied insecticides					
Aztec 2.1G + DKC61-22[10]	6.7	NU furrow[12]	0.08 cd	84	131 b
Poncho 1250 + DKC61-22[10]	1.25	Seed	0.09 cd	85	137 b
Rootworm Bt hybrids					
Agrisure RW (Garst 84U58 3111[11])	—	—	0.05 d	100	144 ab
Agrisure RW (GH H-8577 3000GT[11])	—	—	0.02 d	100	152 a
Herculex XTRA (Mycogen 2T789[11])	—	—	0.05 d	90	131 b
SmartStax (DKC61-21[10])	—	—	0.03 d	100	117 c
SmartStax (Mycogen 2T784[11])	—	—	0.00 d	100	138 ab
YieldGard VT3 (DKC62-97[10])	—	—	0.01 d	100	144 ab
Soil-applied insecticides + rootworm Bt hybrids					
Counter 20G + Agrisure RW (Garst 84U58 3111[11])	4.5	SB furrow[13]	0.03 d	100	142 ab
Force 2.1CS + Agrisure RW (Garst 84U58 3111[11])	0.46	Band	0.01 d	100	144 ab
Force 2.1CS + Herculex XTRA (Mycogen 2T789[11])	0.46	Band	0.00 d	100	137 b
Force 2.1CS + SmartStax (DKC61-21[10])	0.46	Band	0.00 d	100	139 ab
Force 2.1CS + YieldGard VT3 (DKC62-97[10])	0.46	Band	0.00 d	100	152 a
SmartChoice 5G + Herculex XTRA (Mycogen 2T789[11])	3.5	SB furrow[13]	0.01 d	100	139 ab
Untreated checks (UTCs)					
DKC61-22[10]	—	—	0.21 bc	70	135 b
Garst 84U58 GT[11]	—	—	0.29 b	55	141 ab
GH H-8577 GT/CB/LL[11]	—	—	0.55 a	20	137 b
Mycogen 2T777[11]	—	—	0.44 a	35	133 b

[1] Rates of application for band and furrow placements are ounces (oz) of product per 1,000 ft of row.
[2] Rates of application for seed-applied insecticides are milligrams (mg) active ingredient (a.i.) per seed.
[3] Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).
[4] Mean node-injury ratings were derived from five root systems per treatment in each of four replications.
[5] Means followed by the same letter do not differ significantly ($P = 0.05$, Duncan's New Multiple Range Test).
[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] Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.
[9] Means followed by the same letter do not differ significantly ($P = 0.10$, Duncan's New Multiple Range Test).
[10] Seed treated with Poncho (clothianidin), 0.50 milligrams (mg) of active ingredient (a.i.) per seed.
[11] Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.
[12] Applied with modified Noble metering units.
[13] Applied with modified SmartBox metering units.

TABLE 1.5 • Evaluation of products to control corn rootworm larvae, Urbana, University of Illinois, 2011

Product	Rate[1,2]	Placement[1,2]	Mean node-injury rating[3,4,5,6] 11 July	% consistency < 0.25[7]	Mean yield (bu/A)[8,9] 7 Oct
Seed- and soil-applied insecticides					
Aztec 2.1G + DKC61-22[10]	6.7	NU furrow[12]	0.31 ef	70	192 bcd
Poncho 1250 + DKC61-22[10]	1.25	Seed	0.68 cd	20	155 ef
Rootworm Bt hybrids					
Agrisure RW (Garst 84U58 3111[11])	—	—	0.41 de	30	237 a
Agrisure RW (GH H-8577 3000GT[11])	—	—	0.40 de	55	185 de
Herculex XTRA (Mycogen 2T789[11])	—	—	0.05 f	100	211 a–d
SmartStax (DKC61-21[10])	—	—	0.02 f	100	213 a–d
SmartStax (Mycogen 2T784[11])	—	—	0.05 f	100	240 a
YieldGard VT3 (DKC62-97[10])	—	—	0.15 ef	85	216 a–d
Soil-applied insecticides + rootworm Bt hybrids					
Counter 20G + Agrisure RW (Garst 84U58 3111[11])	4.5	SB furrow[13]	0.06 f	100	226 abc
Counter 20G + YieldGard VT3 (DKC62-97[10])	4.5	SB furrow[13]	0.02 f	100	190 cd
Force 2.1CS + Agrisure RW (Garst 84U58 3111[11])	0.46	Band	0.05 f	100	248 a
Force 2.1CS + Herculex XTRA (Mycogen 2T789[11])	0.46	Band	0.02 f	100	235 a
Force 2.1CS + SmartStax (DKC61-21[10])	0.46	Band	0.01 f	100	222 a–d
Force 2.1CS + YieldGard VT3 (DKC62-97[10])	0.46	Band	0.02 f	100	229 ab
SmartChoice 5G + Agrisure RW (Garst 84U58 3111[11])	3.5	SB furrow[13]	0.06 f	100	220 a–d
SmartChoice 5G + Herculex XTRA (Mycogen 2T789[11])	3.5	SB furrow[13]	0.01 f	100	223 abc
Untreated checks (UTCs)					
DKC61-22[10]	—	—	0.87 bc	15	149 f
Garst 84U58 GT[11]	—	—	1.04 bc	15	95 g
GH H-8577 GT/CB/LL[11]	—	—	1.15 b	15	68 g
Mycogen 2T777[11]	—	—	1.70 a	0	82 g

[1] Rates of application for band and furrow placements are ounces (oz) of product per 1,000 ft of row.
[2] Rates of application for seed-applied insecticides are milligrams (mg) active ingredient (a.i.) per seed.
[3] Mean node-injury ratings are based on the 0 to 3 node-injury scale (Oleson et al. 2005, Appendix I).
[4] Mean node-injury ratings were derived from five root systems per treatment in each of four replications.
[5] Means followed by the same letter do not differ significantly ($P = 0.05$, Duncan's New Multiple Range Test).
[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] Corn was harvested from the center two rows of each plot and converted to bushels per acre (bu/A) at 15.5% moisture.
[9] Means followed by the same letter do not differ significantly ($P = 0.10$, Duncan's New Multiple Range Test).
[10] Seed treated with Poncho (clothianidin), 0.50 milligrams (mg) of active ingredient (a.i.) per seed.
[11] Seed treated with Cruiser (thiamethoxam), 0.25 milligrams (mg) of active ingredient (a.i.) per seed.
[12] Applied with modified Noble metering units.
[13] Applied with modified SmartBox metering units.