FIELD DAY 2006

Southwest Research–Extension Center

Report of Progress 961

Kansas State University
Agricultural Experiment Station
and Cooperative Extension Service

Southwest Research-Extension Center

EFFICACY OF IN-SEASON APPLICATIONS OF SYSTEMIC INSECTICIDE TO CONTROL DECTES STEM BORERS IN SOYBEAN

by
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SUMMARY

We tested six systemic insecticides applied to the soil and nine systemic insecticides applied to the foliage for their effectiveness in reducing Dectes stem borers (*Dectes texanus*) in soybean. The insecticides were applied during the beetle flight to target the first two instars of the insect developing inside the plants. Of the soil insecticides tested, only fipronil significantly reduced Dectes stem borer infestations with both applications. The late application of imidacloprid and acetamiprid also seemed to reduce Dectes stem borer infestations. Of the soil insecticides tested, only fipronil significantly reduced Dectes stem borer infestations with both applications. The late application of thiacloprid also seemed to reduce Dectes stem borer infestations. Dectes stem borer infestation was 20 to 25% of plants infested.

PROCEDURES

This trial was conducted in soybeans, Pioneer 93B85 (maturity group 3.8), planted May 20, 2005, on the Ramsey Brothers Farm 3 miles north of Garden City, Kansas. Three sets of plots were set up, one for soil-applied insecticides and two for foliar-applied insecticides. In two experiments, 20 treatments were assigned in a randomized complete-block design with five replications. In the third experiment, four treatments were assigned in a randomized complete-block design with five replications. Plots were four rows (10 ft) wide and 20 ft long, with a 5-ft alley across the ends of the plots. We tested six systemic insecticides applied to the soil and nine systemic insecticides applied to the foliage. The insecticides were applied during the beetle flight to target the first two instars of the insect developing inside the plants. The soil-applied treatments were applied July 20 and August 8, when the soybeans were 12 and 24 inches high, respectively. The liquid soil treatments were applied with a back-pack, hand-held sprayer with a single nozzle (fan LF3 80°) that was held close to the ground to apply a 6-inch band 6 inches from the base of the plants. The insecticides were incorporated by hand raking the soil and by irrigation several days later. The foliar treatments were applied July 22 and August 19 with the back–pack sprayer, with a hand-held boom with two nozzles (Conejet TXVS 6) directed at a single row. The nozzles were held 12 inches from the row and to each side. In both methods, the sprayer was calibrated to deliver 20 gal/acre (7.5 sec per 20 ft row at 30 psi). A chronometer was used to measure the time spent on each row to help maintain appropriate speed.

Dectes stem borers infestations were recorded at the end of the season (September 15 to October 20) by dissecting 30 plants in each plot, taken from six locations in the two center rows. The plants were dissected to record any tunneling, tunneling that reached the base of the plant, and presence of live Dectes larvae. Grain yield data was not collected because infestations were very low, and the plants had been heavily damaged by hail.

RESULTS AND DISCUSSION

Dectes stem borer populations were much higher in 2005 than in 2004, but on July 4 there was a serious hail storm that seriously defoliated the soybeans. It also broke or bruised the stems. Although the plants recovered from buds, the resulting plants were smaller, later maturing, and more branched than normal. They were almost a month later than usual in reaching the stage at which Dectes beetles could oviposit in them. This meant that most of the plants escaped the main flight of Dectes beetles. A few of the plants were

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tunneling in the stem, inasmuch as the number of larvae was much fewer than the number of tunnels in the stems. The second application was applied later than intended, due to an interruption from irrigation and rainy weather.

In 2004, we were able to show a significant difference in yield (4.6 to 6.6 bu/acre) between the fipronil and the untreated check treatments. This implies a 7 to 11% physiological yield loss due to Dectes stem borer infestations. We did not take yield data in 2005.

Fig 1. Dectes Stem Beetles in 100 sweeps in soybeans 2005

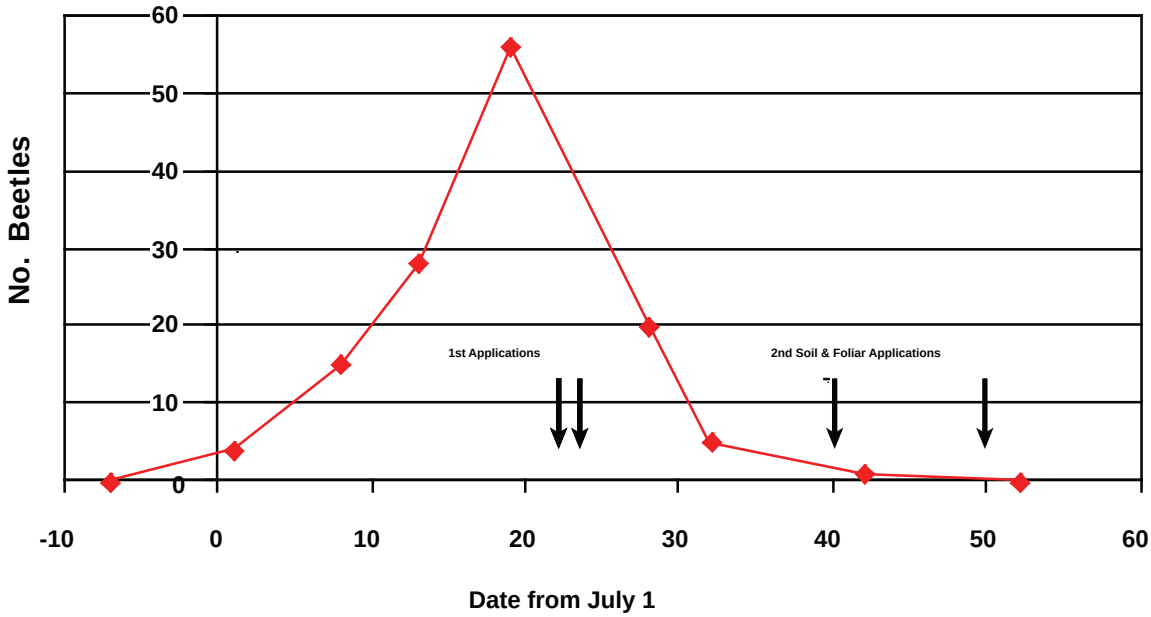

Figure 1. Dectes stem beetles in 100 sweeps in soybeans, 2005.

Table 1. Efficacy of soil-applied systemic insecticides against Dectes stem borers in soybean. Southwest Research-Extension Center, Garden City, Kansas, 2005.

Treat. No.	Chemical name	Product name[1]	Rates-product */1000ft	Treatment time			Tunneling present /30 plant	Tunneling to base /30 plants	Larva present /30 plants
				July 20	Both	Aug 8			
1.	Check		___				6.3 ab	4.9 a	3.4 abc
2.	Fipronil	Regent 4SC	0.24oz	6.2 ml			1.2 d	0.4 d	0.3 d
3.	Imidacloprid	Provado 1.6 F	1.72 oz	44.3 ml			5.5 abc	3.1 abc	3.7 ab
4.	Imidacloprid	Provado 1.6 F	1.72 oz		44.3 ml		5.2 abc	3.0 abc	3.6 abc
5.	Imidacloprid	Provado 1.6 F	3.44 oz	88.6 ml			4.2 abc	2.4 abcd	2.5 abc
6.	Thiamethoxam	Platinum	0.46 oz	11.8 ml			6.8 a	3.5 abc	5.2 a
7.	Thiamethoxam	Platinum	0.46 oz		11.8 ml		4.4 abc	2.4 abcd	3.6 abc
8.	Acetamiprid	Intruder WSP	0.132 oz	3.26 gm			6.9 a	5.1 a	4.6 a
9.	Acetamiprid	Intruder WSP	0.132 oz		3.26 gm		6.9 a	3.3 abc	4.0 ab
10.	Dinotefuran	V-10112	16.4 gm	14.28			6.1 ab	3.5 abc	4.0 ab
11.	Dinotefuran	V-10112	16.4 gm		14.28 gm		6.3 ab	4.1 ab	4.1 ab
12.	Acephate	Orthene 90 S	1.01 oz	24.9 gm			5.9 abc	3.8 abc	4.4 a
13.	Acephate	Orthene 90 S	1.01 oz		24.9 gm		7.2 a	4.1 ab	5.1 a
14.	Fipronil	Regent 4SC	0.24 oz			6.2 ml	3.3 bcd	**1.4 cd**	**1.3 cd**
15.	Imidacloprid	Provado 1.6 F	1.72 oz			44.3 ml	**2.7 cd**	**1.9 bcd**	**1.7 bcd**
16.	Imidacloprid	Provado 1.6 F	3.44 oz			88.6 ml	5.6 abc	3.9 abc	3.8 ab
17.	Thiamethoxam	Platinum	0.46 oz			11.8 ml	5.7 abc	3.7 abc	4.6 a
18.	Acetamiprid	Intruder WSP	0.132 oz			3.26 gm	5.2 abc	**1.6 bcd**	3.9 ab
19	Dinotefuran	V-10112	16.4 gm			14.28 gm	4.4 abc	2.1 abcd	2.8 abc
20.	Acephate	Orthene 90 S	1.01 oz			24.9 gm	6.1 ab	2.8 abc	4.3 a
	F-test Prob.						0.0393	0.0914	0.0009
	CV						23 %	28 %	37 %

[1]Reference to specific products is provided solely for informational purposes. Experiments with pesticides on non-labeled crops or pests are part of the insecticide registration process; it does not imply endorsement or recommendation of non-labeled uses of pesticides by Kansas State University. All pesticide use must be consistent with current labels.

Table 2. Efficacy against the Dectes stem borers in soybean of systemic insecticides applied to foliage. Southwest Research-Extension Center, Garden City, Kansas, 2005.

Treat. No.	Chemical name	Product name[1]	Rates-product */acre	Treatment time: July 22	Treatment time: Both	Treatment time: Aug 19.	Tunneling present /30 plant	Tunneling to base /30 plants	Larva present /30 plants
1.	Check		—				6.5 abcde	6.0 abc	5.0 ab
2.	Fipronil	Regent 4SC 0.13 lb ai/A	4.2 oz	6.2 ml			**1.1 g**	**1.0 efg**	**1.0 ef**
3.	Thiacloprid	Calypso 4F 0.125 lb ai/A	4 oz	5.9 ml			4.0 cdef	**3.2 bcdef**	**2.1 def**
4.	Thiacloprid	Calypso 4F 0.125 lb ai/A	4 oz		2X		**3.4 defg**	**2.6 efg**	2.5 bcdef
5.	Clothianidin	TM-44401 50WP 1.6 oz ai/A/COC	0.24 oz&1%	4.4 gm			7.1 abc	6.3 ab	4.6 abc
6.	Clothianidin	TM-44401 50WP 1.6 oz ai/A/COC	0.24 oz&1%		2X		4.1 cdef	3.9 abcde	2.8 bcde
7.	Thiamethoxam	Centric 40 WG 0.05 lb ai/A	2 oz	2.84 gm			8.6 a	7.2 a	6.0 a
8.	Thiamethoxam	Centric 40 WG 0.05 lb ai/A	2 oz		2X		3.6 bef	2.0 defg	2.4 cdef
9.	Acetamiprid	Intruder WSP 70%	2.3 oz	3.26 gm			4.8 bcdef	3.4 bcdef	2.9 bcde
10.	Acetamiprid	Intruder WSP 70%	2.3 oz		2X		3.8 def	3.0 cdefg	2.4 cdef
11.	Dinotefuran	V-10112 70SG 0.176 lb ai/A	4.0 oz	5.7 gm			7.8 ab	5.4 abcde	3.4 abcd
12.	Dinotefuran	V-10112 70SG 0.176 lb ai/A	4.0 oz		2X		6.3 abcde	5.0 abcde	3.5 abcd
13.	Acephate	Orthene 90S 1 lb ai/A	1.1 lb	25 gm			7.4 abc	5.5 abcde	4.5 abcd
14	Fipronil	Regent 4SC 0,13 lb ai/A	4.2 oz			6.2 ml	**2.3 fg**	**0.7 g**	**0.7 f**
15.	Thiacloprid	Calypso 4F 0.125 lb ai/A	4 oz			5.9 ml	5.6 abcde	5.1 abcde	4.7 abc
16.	Clothianidin	TM-44401 50WP 1.6 oz ai/A/COC	0.24 oz&1%			4.4 gm	4.8 bcdef	3.6 bcde	2.4 cdef
17.	Thiamethoxam	Centric 40 WG 0.05 lb ai/A	2.0 oz			2.84 gm	6.8 abcd	6.0 abc	4.5 abcd
18.	Acetamiprid	Intruder WSP 70%	2.3 oz			3.26 gm	7.2 abc	5.8 abcd	4.6 abc
19	Dinotefuran	V-10112 70SG 0.176 lb ai/A	4.0 oz			5.7 gm	3.4 efg	3.2 bcdef	2.7 bcde
20.	Acephate	Orthene 90S 1 lb ai/A	1.1 lb			25 gm	5.3 abcde	5.4 abcde	3.7 abcd
	F-test Prob.						0.0003	0.0005	0.0009
	CV						22 %	24 %	23 %

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Table 3. Efficacy against the Dectes stem borers in soybean of systemic insecticides applied to foliage August 19, Southwest Research-Extension, Center, Garden City, Kansas, 2005

Treat. No.	Chemical name	Product name[1]	Rates-product */acre	Tunneling present /30 plant	Tunneling to base /30 plants	Larva present /30 plants
1.	Check		—	6.2	5.2	4.2
2.	Thiamethoxam &	Centric 40 WG	2 oz			
	Lambda cyhalothrin	Warrior 1CS	3.8 oz	8.0	7.2	5.4
3.	Lambda cyhalothrin	Warrior 1CS	3.8 oz	8.2	7.2	5.0
4.	Emamectin Benzoate	Proclaim 5SG	4.8 oz	5.6	5.6	3.8
	F-test Prob.			0.4662	0.6945	0.6957
	CV			18 %	20 %	20%

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Dectes entry hole.

Dectes tunnel with 3 entry holes.

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SRP 961 **August 2006**

