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2009

**NATIONAL PEANUT BOARD/VIRGINIA PEANUT GROWERS ASSOCIATION—
EXECUTIVE SUMMARY, 2009**

PROJECT TITLE: Evaluation of New Foliar-Applied and Seed Treatment Insecticides for Managing Thrips and Tomato Spotted Wilt in Peanut

TERM OF PROJECT: January 1-December 31, 2009

PROJECT INVESTIGATOR: D. Ames Herbert, Jr.

OBJECTIVES:

1. To evaluate alternatives to Orthene 97 as foliar applied insecticides for thrips control.
2. To evaluate insecticide seed treatment options for management of thrips and incidence of TSWV.

RESULTS:

In test 1, neither the foliar applications of Requiem (chenopodium extract) nor Karate Z (pyrethroid) performed as well in terms of thrips control as Orthene (organophosphate) at the rates tested. Tank mixes of Ecotec (rosemary and peppermint oils) and Orthene gave a numerical yield increase over Orthene alone. Tank mixes of Ecotec plus Radiant (spinetoram) had yields similar to that of Orthene. Results of this test indicate that there are effective, alternative chemical classes available as foliar applications for thrips management.

In test 2, the numbered seed treatment 'A17460' performed well and yielded statistically the same as the in-furrow Temik treatments. Advantages of effective seed treatments include lower rates of active ingredients per acre and their reduced toxicity to non-target species. Seed treatments also result in less exposure to the user and offer convenience over foliar applications.

In test 3, the at-planting in-furrow treatment 'DPX-HGW86' (at the three rates tested) performed well and had statistically the same yields as conventional Temik and Thimet treatments, with an average yield increase of 556 lb/acre over the untreated check.

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**VIRGINIA PEANUT GROWERS ASSOCIATION
FINAL REPORT—2009**

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TERM OF PROJECT: January 1-December 31, 2009

PROJECT INVESTIGATOR: D. Ames Herbert, Jr.

OBJECTIVES:

1. To evaluate alternatives to Orthene 97 as foliar applied insecticides for thrips control.
2. To evaluate insecticide seed treatment options for management of thrips and incidence of TSWV.

RESULTS:

Foliar-applied insecticides (Test 1)

The following insecticides applied as foliar broadcasts both at late ground cracking and again in 5 days (BC at late GC + 5d) were evaluated for control of thrips in Virginia peanut:

- Trt 1=Orthene 97 @ 4 oz
- Trt 2=Karate Z @ 1.28 oz
- Trt 3=Requiem 25EC @ 32 oz
- Trt 4=Ecotec @ 16 oz + Radiant SC @ 6 oz
- Trt 5=Ecotec @ 32 oz + Radiant SC @ 6 oz
- Trt 6=Ecotec @ 16 oz + Orthene 97 @ 4 oz
- Trt 7=Ecotec @ 32 oz + Orthene 97 @ 4 oz
- Trt 8=Ecotec @ 16 oz + Karate Z @ 1.28 oz
- Trt 9=Ecotec @ 32 oz + Karate Z @ 1.28 oz
- Trt 10=Untreated

'CHAMPS' peanut was planted 13 May at the Virginia Tech Tidewater Agric. Res. & Ext. Ctr., Suffolk, VA, using 36-inch row spacing. Treatments were applied with a CO₂ pressurized backpack sprayer as a broadcast at 14.3 gpa and 18 psi through 8002VS nozzles spaced 18 inches apart on the spray boom. Applications were made on 29 May at the late ground cracking stage and again on 3 Jun. A randomized complete block experimental design was used with 4 replicates; plots were 4 rows by 40 ft. Thrips injury to plants was determined by visually rating injury using a 0 to 10 scale, where 0 = no injury, 1 = 10% leaves injured, 2 = 20% leaves injured, 3 = 30% leaves injured, 4 = 40% leaves injured, 5 = ≥ 50% leaves injured and ≤ 5% terminal buds injured, 6 = ≥ 50% leaves injured and 25% terminal buds injured, 7 = ≥ 50% leaves injured and 50% terminal buds injured, 8 = ≥ 50% leaves injured and 75% terminal buds injured, 9 = ≥ 50% leaves injured and 90% terminal buds injured, and 10 = dead plants. Peanuts were dug on 1 Oct. Yields were determined by combining peanuts from 2 rows of each plot on 5 Oct and adjusting to 7% moisture. Data were analyzed using ANOVA and LSD statistical procedures.

There were significant differences in thrips injury on all four sample dates, with Requiem not differing from the non-treated check on any date (Table 1). Karate Z and a tank mix of Ecotec +

Karate Z were also not different from the check on the dates when thrips injury was the most severe. The treatments that provided the best control and had the least injury were tank mixes of Ecotec + Radiant SC and Ecotec + Orthene 97. Five of nine treatments had yields that were not different from the check including Requiem 25EC, Karate Z, Ecotec + Karate Z (2 rates), and the low rate of Ecotec + Radiant SC. The highest yields were obtained with tank mixes of Ecotec (high and low rates) + Orthene 97, Ecotec (high rate) + Radiant SC, and Orthene 97 alone.

Table 1. Thrips injury ratings and yield, Test 1. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate ¹	Thrips injury rating ²				Yield lb/acre ³
			Jun 2	Jun 9	Jun 16	Jun 23	
1	Orthene 97	4 oz	1.63 de ⁴	2.81 d	3.88 b	2.56 b	5837 a
2	Karate Z	1.28 oz	2.69 b	4.69 bc	6.75 a	5.75 a	4941 c
3	Requiem 25EC	32 oz	3.13 a	5.00 a	6.75 a	5.75 a	5123 c
4	Ecotec + Radiant SC	16 oz 6 oz	1.94 cd	2.50 e	2.94 d	2.19 d	5629 ab
5	Ecotec + Radiant SC	32 oz 6 oz	2.13 c	2.56 de	2.88 d	2.19 d	5874 a
6	Ecotec + Orthene 97	16 oz 4 oz	1.44 e	2.69 de	3.44 c	2.50 bc	5914 a
7	Ecotec + Orthene 97	32 oz 4 oz	1.69 de	2.69 de	3.44 c	2.25 cd	5902 a
8	Ecotec + Karate Z	16 oz 1.28 oz	2.94 ab	4.50 c	6.75 a	5.75 a	5192 bc
9	Ecotec + Karate Z	32 oz 1.28 oz	2.69 b	4.56 c	6.75 a	5.75 a	5335 bc
10	Untreated	---	3.19 a	4.88 ab	6.75 a	5.75 a	5261 bc
	LSD		0.32	0.31	0.17	0.28	481.4

¹All treatments were broadcast at late ground cracking and again in 10-14 days. Peanut was planted on May 13.

²Thrips injury rated on a 0-10 scale, 0 = no injury and 10 = dead plants.

³Yield based on weight of peanut with moisture content of 7%. Dig date = October 1 and harvest date = October 5.

⁴Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

Seed-applied insecticides (Test 2)

The following insecticides applied as seed treatments were evaluated for control of thrips in Virginia peanut:

- Trt 1=Untreated
- Trt 2=Cruiser 70WS @ 1 oz/cwt
- Trt 3=Dynasty PD 5.6DS @ 4 oz/cwt
- Trt 4=Dynasty PD 5.6DS @ 3 oz/cwt
- Trt 5=Dynasty PD 5.6DS @ 3 oz/cwt + Cruiser 70WS @ 1 oz/cwt
- Trt 6=A17460 @ 4 oz/cwt
- Trt 7=A17461 @ 4 oz/cwt
- Trt 8=A17462 @ 4 oz/cwt
- Trt 9=Dynasty PD 5.6DS @ 4 oz/cwt + Thimet 20G @ 5 lb/A (granular in-furrow)
- Trt 10=Dynasty PD 5.6DS @ 4 oz/cwt + Temik 15G @ 3.5 lb/A (granular in-furrow)
- Trt 11=Dynasty PD 5.6DS @ 4 oz/cwt + Temik 15G @ 7 lb/A (granular in-furrow)

'NC-V11' peanut was planted 12 May at the Virginia Tech Tidewater Agric. Res. & Ext. Ctr., Suffolk, VA, using 36-inch row spacing. Seed with the different insecticide and fungicide seed treatments was provided and treated by Syngenta Crop Protection, Inc. A randomized complete block experimental design was used with 4 replicates; plots were 2 rows by 40 ft. Stand counts, based on the total number of plants per 80 row ft, were recorded on 27 May and 8 Jun. Thrips injury to plants was determined as described above. Thrips counts were determined by collecting ten unopened terminal leaflets per plot in vials containing 30 ml soapy water, teasing the leaflets open, and counting thrips under a stereoscope. Incidence of *Tomato spotted wilt* was determined by examining two rows per plot for visual symptoms of the virus. Peanuts were dug on 1 Oct. Yields were determined by combining peanuts from 2 rows of each plot on 6 Oct and adjusting to 7% moisture. Data were analyzed using ANOVA and LSD statistical procedures.

There were significant differences in thrips injury on all four sample dates, with all treatments except those with Dynasty alone performing better than the non-treated check (Table 2a). It should be noted that Dynasty is a fungicide that was not expected to provide thrips control, but was included for comparison with other experimental fungicide/insecticide combination treatments. Plants in treatments with in-furrow applications of Thimet 20G or Temik 15G had the least injury, but seed treatments that included insecticides were very close, and often were not significantly different.

Results were similar with numbers of thrips. On most sample dates, seed treatments that included insecticides and the in-furrow insecticide treatments had the fewest thrips (Table 2b). This was especially apparent on 9 Jun when the immature population peaked at 120 per 10 leaflet sample in the non-treated check. On that date all insecticide treatments (seed and in-furrow) were equally effective at reducing immature populations. Late-season *Tomato spotted wilt* incidence (hits per 80 row ft) included a high of 12.8 in the numbered compound 'A17461', 10.8 in the non-treated check, and a low of 2.8 in the Thimet/Dynasty treatment (Table 2c).

Pod yield data followed these trends with the lowest yields in the non-treated check and the Dynasty alone (no insecticide) treatments, ranging from 5,040 to 5,293 lb/acre. Yields with the other treatments were much higher and ranged from 5,589 to 6,165 lb/acre. The highest yields

were achieved with the in-furrow treatments (Thimet 20G, Temik 15G) and the seed treatments with Cruiser 70WS and the numbered compound 'A17460'. These ranged from 5,831 to 6,165 lb/acre (Table 2c).

Table 2a. Stand counts and thrips injury ratings, Test 2. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	Plants per row ft ¹			Thrips injury rating ²			
			May 27	Jun 8	Jun 1	Jun 9	Jun 16	Jun 23	
1	Untreated	---	2.90 a ³	3.01	3.06 a	4.88 a	6.75 a	5.06 a	
2	Cruiser 70 WS	1 oz/cwt	2.56 b-d	2.78	0.69 c	1.25 b	3.31 bc	2.75 b	
3	Dynasty PD 5.6 DS	4 oz/cwt	2.61 a-c	2.86	2.69 ab	4.94 a	6.63 a	5.75 a	
4	Dynasty PD 5.6 DS	3 oz/cwt	2.53 b-d	2.71	2.50 b	5.00 a	6.75 a	5.75 a	
5	Dynasty PD 5.6 DS + Cruiser 70 WS	3 oz/cwt 1 oz/cwt	2.76 ab	2.86	0.69 c	0.75 cd	3.06 c	2.88 b	
6	A17460	4 oz/cwt	2.47 b-d	2.69	0.69 c	0.94 c	3.50 b	3.25 b	
7	A17461	4 oz/cwt	2.36 cd	2.70	0.63 c	0.88 c	3.19 c	3.06 b	
8	A17462	4 oz/cwt	2.39 cd	2.62	0.44 c	0.81 c	2.63 d	1.63 c	
9	Dynasty PD 5.6 DS Thimet 20G	4 oz/cwt 5 lb/A (IF)	2.63 a-c	2.99	0.50 c	0.75 cd	1.00 e	0.75 d	
10	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 3.5 lb/A (IF)	2.27 d	2.89	0.44 c	0.50 de	0.94 e	0.75 d	
11	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 7 lb/A (IF)	2.27 d	3.04	0.25 c	0.42 e	0.75 e	0.58 d	
	LSD		0.32	NS	0.50	0.26	0.28	0.80	

¹Based on the total number of plants in rows 1 and 2 of each plot (total of 80 row ft per plot). Peanut was planted on May 12.

²Thrips injury rated on a 0-10 scale, 0 = no injury and 10 = dead plants.

³Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

Table 2b. Thrips counts, Test 2. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	Thrips per 10 terminal leaflets ¹											
			May 27			Jun 2			Jun 9			Jun 16		
			Adult	Immat.	Adult	Immat.	Adult ²	Immat.	Adult	Immat.	Adult	Immat.		
1	Untreated	---	9.50 a ³	0.00	9.25 a-c	8.50 ab	1.25	120.50 a	0.50	21.25				
2	Cruiser 70 WS	1 oz/cwt	0.25 b	0.00	7.75 bc	0.25 c	2.50	34.00 b	0.00	28.50				
3	Dynasty PD 5.6 DS	4 oz/cwt	7.25 a	0.00	15.50 a	4.50 bc	2.00	119.50 a	1.25	19.50				
4	Dynasty PD 5.6 DS	3 oz/cwt	6.75 a	0.00	9.25 a-c	14.25 a	3.00	119.75 a	1.00	14.25				
5	Dynasty PD 5.6 DS + Cruiser 70 WS	3 oz/cwt 1 oz/cwt	0.25 b	0.00	6.50 bc	0.00 c	2.50	21.50 b	0.75	24.00				
6	A17460	4 oz/cwt	0.00 b	0.00	11.25 ab	0.50 c	3.00	28.00 b	0.25	39.25				
7	A17461	4 oz/cwt	1.00 b	0.00	5.75 bc	0.25 c	4.00	26.75 b	0.50	28.25				
8	A17462	4 oz/cwt	0.50 b	0.00	7.00 bc	0.00 c	2.75	14.25 b	0.75	32.25				
9	Dynasty PD 5.6 DS Thimet 20G	4 oz/cwt 5 lb/A (IF)	0.75 b	0.00	6.75 bc	1.00 c	2.25	20.00 b	1.00	12.25				
10	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 3.5 lb/A (IF)	0.50 b	0.00	3.75 c	0.25 c	5.67	8.00 b	0.33	17.33				
11	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 7 lb/A (IF)	1.25 b	0.00	4.75 c	2.50 bc	4.00	2.67 b	0.00	14.00				
	LSD		3.19	NS	6.39	7.43	NS	38.15	NS	NS				

¹Ten leaflets were sampled per plot on each date.

²There were no significant differences when adults were analyzed by species (92.6% tobacco, 4.1% western flower, 1.6% eastern flower, and 1.6% "other" thrips).

³Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

Table 2c. Tomato spotted wilt virus (TSWV) and yield, Test 2. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	TSWV hits/80 row ft ¹		Yield lb/acre ²
			Jul 15	Sep 28	
1	Untreated	---	1.75	10.75 ab ³	5293 c-e
2	Cruiser 70 WS	1 oz/cwt	2.00	4.25 ef	5831 ab
3	Dynasty PD 5.6 DS	4 oz/cwt	1.25	10.00 a-c	5073 de
4	Dynasty PD 5.6 DS	3 oz/cwt	2.00	9.25 a-d	5040 e
5	Dynasty PD 5.6 DS + Cruiser 70 WS	3 oz/cwt 1 oz/cwt	1.75	7.50 b-e	5601 b-d
6	A17460	4 oz/cwt	2.50	11.50 a	5991 ab
7	A17461	4 oz/cwt	1.50	12.75 a	5589 b-d
8	A17462	4 oz/cwt	1.50	5.75 d-f	5599 b-d
9	Dynasty PD 5.6 DS Thimet 20G	4 oz/cwt 5 lb/A (IF)	1.00	2.75 f	5685 a-c
10	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 3.5 lb/A (IF)	1.25	6.50 c-e	5904 ab
11	Dynasty PD 5.6 DS Temik 15G	4 oz/cwt 7 lb/A (IF)	2.25	6.67 c-e	6165 a
	LSD		NS	3.53	537.3

¹Based on the total number of plants exhibiting visual TSWV symptoms in rows 1 and 2 of each plot.

²Yield based on weight of peanut with moisture content of 7%. Dig date = October 1 and harvest date = October 6.

³Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

In-furrow-applied insecticides (Test 3)

The following insecticides applied into the seed furrow at planting were evaluated for control of thrips in Virginia peanut:

Trt 1=DPX-HGW86 20SC @ 0.088 lb ai/A (liquid in-furrow)

Trt 2=DPX-HGW86 20SC @ 0.134 lb ai/A (liquid in-furrow)

Trt 3=DPX-HGW86 20SC @ 0.176 lb ai/A (liquid in-furrow)

Trt 4=Thimet 20G @ 5 lb/A (granular in-furrow)

Trt 5=Temik 15G @ 7 lb/A (granular in-furrow)

Trt 6=Untreated

'CHAMPS' peanut was planted 12 May at the Virginia Tech Tidewater Agric. Res. & Ext. Ctr., Suffolk, VA, using 36-inch row spacing. Granular in-furrow (IF) Temik and Thimet treatments were applied into the seed furrow at the time of planting using tractor-mounted inverted jars with lid holes calibrated to deliver exact amounts via gravity. Liquid IF DPX-HGW86 treatments were applied into the seed furrow at 5 gpa using a micro-tube mounted between the disc openers, pressurized by CO₂ at 31 psi. A randomized complete block experimental design was used with 4 replicates; plots were 4 rows by 40 ft. Thrips injury to plants, thrips counts, and incidence of *Tomato spotted wilt* were determined as described above. Peanuts were dug on 1 Oct. Yields were determined by combining peanuts from 2 rows of each plot on 6 Oct and adjusting to 7% moisture. Data were analyzed using ANOVA and LSD statistical procedures.

All treatments had significantly less thrips injury relative to the non-treated check on all four sample dates. The DPX-HGW86 20SC treatments held well until the 9 Jun rating, then provided less control compared with the IF treatments with Thimet 20G and Temik 15G (Table 3a). There were differences between treatments for adult tobacco thrips populations on 27 May and 2 Jun but not on later sample dates (Table 3b). At the adult peak (2 Jun), only Temik 15G treated plots had significantly fewer than the non-treated check. All treatments had significantly fewer immature tobacco thrips than the non-treated check on 2 and 9 Jun, with no differences between treatments on these dates. Treatments significantly reduced *Tomato spotted wilt* incidence on 28 Sep relative to the untreated check, with differences between treatments (Table 3c). Yields were statistically the same among treatments and resulted in an average increase of 603 lb/acre compared with the non-treated check (Table 3c).

Table 3a. Stand counts and thrips injury ratings, Test 3. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	Plants per row ft ¹			Thrips injury rating ²			
			May 27	Jun 1	Jun 8	Jun 1	Jun 9	Jun 16	Jun 23
1	DPX-HGW86 20SC	0.088 lb ai/A (IF)	2.60	2.60	2.68	0.69 b ³	2.50 b	3.13 c	1.69 b
2	DPX-HGW86 20SC	0.134 lb ai/A (IF)	2.58	2.70	2.70	0.81 b	2.63 b	3.88 b	1.56 b
3	DPX-HGW86 20SC	0.176 lb ai/A (IF)	2.46	2.54	2.81	0.56 b	2.81 b	3.25 bc	1.63 b
4	Thimet 20G	5 lb/A (IF)	2.34	2.60	2.86	0.56 b	0.75 c	1.38 d	0.75 c
5	Temik 15G	7 lb/A (IF)	2.43	2.59	2.65	0.25 c	0.50 c	1.06 d	0.75 c
6	Untreated	---	2.67	2.65	2.69	3.13 a	4.81 a	6.75 a	5.63 a
	LSD		NS	NS	NS	0.29	0.34	0.71	0.46

¹Based on the total number of plants in rows 1 and 2 of each plot (total of 80 row ft per plot). Peanut was planted on May 12.

²Thrips injury rated on a 0-10 scale, 0 = no injury and 10 = dead plants.

³Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

Table 3b. Thrips counts, Test 3. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	Thrips per 10 terminal leaflets ¹											
			May 27			Jun 2			Jun 9			Jun 16		
			Adult	Immat.	Adult	Immat.	Adult	Immat.	Adult	Immat.	Adult	Immat.		
1	DPX-HGW86 20SC	0.088 lb ai/A (IF)	3.25 bc ²	0.00	11.25 a	1.00 b	5.50	7.75 b	0.50	5.75				
2	DPX-HGW86 20SC	0.134 lb ai/A (IF)	4.75 a-c	0.00	13.25 a	1.00 b	9.25	20.25 b	0.75	12.75				
3	DPX-HGW86 20SC	0.176 lb ai/A (IF)	6.00 ab	0.00	16.00 a	0.75 b	7.75	23.00 b	1.25	10.50				
4	Thimet 20G	5 lb/A (IF)	3.25 bc	0.00	8.50 ab	1.75 b	4.00	8.00 b	0.50	10.25				
5	Temik 15G	7 lb/A (IF)	2.00 c	0.00	1.75 b	0.00 b	5.25	6.75 b	1.25	11.25				
6	Untreated	---	7.00 a	0.00	13.00 a	7.50 a	2.75	81.00 a	0.50	14.25				
	LSD		3.20	NS	7.94	2.45	NS	26.56	NS	NS				

¹Ten leaflets were sampled per plot on each date.

²Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

Table 3c. Tomato spotted wilt virus (TSWV) and yield, Test 3. Tidewater AREC, Suffolk, VA, 2009.

#	Material	Rate	TSWV hits/80 row ft ¹		Yield lb/acre ²
			Jul 15	Sep 28	
1	DPX-HGW86 20SC	0.088 lb ai/A (IF)	1.25	11.00 b ³	5503 a
2	DPX-HGW86 20SC	0.134 lb ai/A (IF)	1.75	8.75 bc	5690 a
3	DPX-HGW86 20SC	0.176 lb ai/A (IF)	2.50	9.25 bc	5493 a
4	Thimet 20G	5 lb/A (IF)	1.75	7.75 bc	5589 a
5	Temik 15G	7 lb/A (IF)	1.75	7.00 c	5770 a
6	Untreated	---	2.00	15.50 a	5006 b
	LSD		NS	3.82	361.1

¹Based on the total number of plants exhibiting visual TSWV symptoms in rows 1 and 2 of each plot.

²Yield based on weight of peanut with moisture content of 7%. Dig date = October 1 and harvest date = October 6.

³Means within a column followed by the same letter(s) are not significantly different (Protected LSD, P=0.05).

DISCUSSION AND IMPACT:

In test 1, neither the foliar applications of Requiem (chenopodium extract) nor Karate Z (pyrethroid) performed as well in terms of thrips control as Orthene (organophosphate) at the rates tested. Tank mixes of Ecotec (rosemary and peppermint oils) and Orthene gave a numerical yield increase over Orthene alone. Tank mixes of Ecotec plus Radiant (spinetoram) had yields similar to that of Orthene. Results of this test indicate that there are effective, alternative chemical classes available as foliar applications for thrips management.

In test 2, the numbered seed treatment 'A17460' performed well and yielded statistically the same as the in-furrow Temik treatments. Advantages of effective seed treatments include lower rates of active ingredients per acre and their reduced toxicity to non-target species. Seed treatments also result in less exposure to the user and offer convenience over foliar applications.

In test 3, the at-planting in-furrow treatment 'DPX-HGW86' (at the three rates tested) performed well and had statistically the same yields as conventional Temik and Thimet treatments, with an average yield increase of 556 lb/acre over the untreated check.