

206  
VA-17  
454  
2007

**NATIONAL PEANUT BOARD  
FINAL REPORT—2007**

**PROJECT TITLE:** Investigating Chlorpyrifos Failures in VA/NC Peanut Fields, Year 2

**PROJECT INVESTIGATOR:** D. Ames Herbert, Jr.

**LOCATION:** Virginia Tech Tidewater Agricultural Research and Extension Center (TAREC), Suffolk, VA

**OBJECTIVES:**

1. To determine the effectiveness of the soil insecticide chlorpyrifos (Lorsban) against the soil insect complex.
2. To collaborate with North Carolina faculty and field faculty (county agents) to monitor the soil insect populations in peanut fields in Surry, Isle of Wight and Suffolk Counties in Virginia and Chowan, Gates, and Perquimans Counties in North Carolina to develop an understanding of why chlorpyrifos (Lorsban) has failed to protect the crop and develop appropriate management strategies for those sites.

**METHODS:**

In Virginia, research was conducted at the Tidewater AREC in Suffolk and on growers' fields in Isle of Wight and Surry Counties. Tests were established in locations that suffered poor performance from Lorsban in recent years. A cooperative companion study (independently funded from North Carolina sources) took place in Gates, Perquimans and Chowan Counties.

Treatments included Lorsban 15G @ 13 lb/acre with single (early pegging) and/or double applications (early pegging and again at late pegging). Lorsban 15G was applied in a 12- to 14-in band over the row at the Tidewater AREC location with a field cycle-mounted Noble applicator, and at other locations with commercial ground applicators. Multiple cultivars were evaluated in Virginia. All treatments were replicated four times at each location. After digging, 100 pods were collected per plot prior to harvest and the number of scarred and penetrated pods was recorded. Pod yield data were collected from the Tidewater AREC (Suffolk) location. Monitoring for lesser cornstalk borer was also performed at the Isle of Wight County location.

**RESULTS AND DISCUSSION:**

The control of soil insect pests, primarily southern corn rootworm, has been accomplished through the use of primarily one product. Lorsban (chlorpyrifos) has been used for decades and has proven very effective in protecting developing pods from damage due to wireworm, cutworm, lesser cornstalk borer, but primarily southern corn rootworm damage. In the past three years, we have observed instances of apparent product failure despite proper application. More recently (2005) we have collected data that indicates even the use of Lorsban at an elevated rate did not prevent pod damage. This was first observed in a field in Virginia, but has subsequently occurred in North Carolina. In 2006, we established research plots at four locations in Virginia (in Suffolk and Isle of Wight Counties) and at one location in Gates County, North Carolina to take a critical look at what was occurring in the field. These trials used various timings of

Lorsban applications as well as standard and 2X label rates. We also conducted extensive plant sampling and soil sieving throughout the season to evaluate pod damage, and conducted final pod damage, yield and grade assessments.

Findings from 2006 indicate a partial failure in one of the Virginia locations and complete failure in the North Carolina location of Lorsban to provide protection of developing and mature pods from insect damage. Soil sampling indicates the predominant insects are rootworms, which is surprising since these have typically been relatively easy to control. Even more surprising was the finding that in the Gates County location, the higher the rate of Lorsban used, the greater the insect damage and the lower the yield.

In 2007 in the Virginia field trials, the one at Tidewater AREC showed that a single Lorsban application was effective in minimizing pod damage in both varieties tested, Wilson and Champs (Table 1). At the Gwaltney location in Isle of Wight County, the single application was equal to the double application in minimizing pod damage (Tables 2a and 2b). At the Pittman location in Surry County, the single application was effective but the double application was no better than the untreated control (Tables 3a and 3b). In the North Carolina field trials (Tables 4-6), only one of three had enough insect pressure to evaluate Lorsban treatments. In that case, single application was not as effective as the double application (Table 6). These findings document a real need to further explore what is occurring not only in Virginia peanut fields, but those in northeast North Carolina as well.

In the Isle of Wight County location, neither single nor double Lorsban 15G applications reduced lesser cornstalk borer pod injury relative to the untreated control. It is worth noting that Phillips peanut had approximately six times less pod injury due to lesser cornstalk borer than Wilson (Tables 2a and 2b).

#### **DELIVERY OF RESULTS:**

Results were presented at the Statewide Peanut Production Conference (February 12, 2008, Paul D. Camp Workforce Development Center, Franklin, Virginia). Findings were published by the respective investigators in quarterly and annual reports, discussed in production meetings, and used to update crop production information provided by the Virginia and North Carolina Peanut Production Guides. This research will ensure that producers have the best tools possible to make informed decisions which can lead to improved profitability of virginia-type peanuts grown in the V-C area.

**Table 1. Mean percent pod injury and yield results, PT07SCR1. Tidewater AREC, Suffolk, Virginia, 2007.**

#	Variety	Material and rate	Mean percent pod injury <sup>1</sup>		Yield lb/acre <sup>2</sup>
			Scarified	Penetrated	
1	Wilson	Lorsban 15G @ 13 lb/A	2.00 b	0.00 a	5602.8 a
2	Wilson	Untreated	5.00 ab	0.00 a	5071.3 a
3	CHAMPS	Lorsban 15G @ 13 lb/A	3.25 ab	0.00 a	5682.1 a
4	CHAMPS	Untreated	7.75 a	0.00 a	5254.4 a
	LSD		4.94 P=0.12	0.00 P=1.00	639.7 P=0.21

<sup>1</sup> A pre-harvest sample of 100 full-sized pods were randomly selected per plot after digging. Samples were taken on October 11.

<sup>2</sup> Yield based on weight of peanut with moisture content of 7%. Dig date = October 5 and harvest date = October 15.

<sup>3</sup> Means within a column followed by the same letter(s) are not significantly different.

**Table 2a. Mean percent pod injury by southern corn rootworm and lesser cornstalk borer, PT07SCR2 (Billy Gwaltney farm, Isle of Wight Co., VA). Tidewater AREC, Suffolk, Virginia, 2007.**

#	Variety	Material	Rate	Mean percent pod injury <sup>1</sup>		
				Scarified	Penetrated	Lesser cornstalk borer
1	Phillips	Lorsban 15G	13 lb/A, 1 <sup>st</sup> week in July	3.00 b <sup>2</sup>	0.00 a	3.00 a
2	Phillips	Lorsban 15G (x2)	13 lb/A, 1 <sup>st</sup> week in July 13 lb/A, 3 <sup>rd</sup> week in July	3.75 ab	0.00 a	4.50 a
3	Phillips	Untreated	---	8.00 a	0.25 a	4.00 a
	LSD			4.64 P=0.08	0.50 P=0.42	4.58 P=0.73

<sup>1</sup> A pre-harvest sample of 100 full-sized pods were randomly selected per plot after digging. Samples were taken on October 4.

<sup>2</sup> Means within a column followed by the same letter(s) are not significantly different.

**Table 2b. Mean percent pod injury by southern corn rootworm and lesser cornstalk borer, PT07SCR2 (Billy Gwaltney farm, Isle of Wight Co., VA). Tidewater AREC, Suffolk, Virginia, 2007.**

#	Variety	Material	Rate	Mean percent pod injury <sup>1</sup>		
				Scarified	Penetrated	Lesser cornstalk borer
1	Wilson	Lorsban 15G	13 lb/A, 1 <sup>st</sup> week in July	5.00 a <sup>2</sup>	0.00 a	25.75 a
2	Wilson	Lorsban 15G (x2)	13 lb/A, 1 <sup>st</sup> week in July 13 lb/A, 3 <sup>rd</sup> week in July	5.25 a	0.25 a	22.50 a
3	Wilson	Untreated	---	9.25 a	0.00 a	21.50 a
	LSD			7.27 P=0.34	0.50 P=0.42	12.87 P=0.71

<sup>1</sup> A pre-harvest sample of 100 full-sized pods were randomly selected per plot after digging. Samples were taken on October 4.

<sup>2</sup> Means within a column followed by the same letter(s) are not significantly different.

**Treatment mean (mean of southern corn rootworm scarred)**

1. Lorsban 1x .....	4.000 b
2. Lorsban 2x .....	4.500 b
3. Untreated.....	8.625 a
LSD .....	3.9196

**Variety mean (mean of southern corn rootworm scarred)**

1. Phillips .....	4.917
2. Wilson.....	6.500
LSD .....	--

**Split plot analysis (mean of southern corn rootworm scarred)**

Treatment .....	0.0523
Variety.....	0.2628
Treatment x variety .....	0.9728

**Treatment mean (mean of southern corn rootworm penetrated)**

1. Lorsban 1x .....	0.0000
2. Lorsban 2x .....	0.1250
3. Untreated.....	0.1250
LSD .....	--

**Variety mean (mean of southern corn rootworm penetrated)**

1. Phillips .....	0.0833
2. Wilson.....	0.0833
LSD .....	--

**Split plot analysis (mean of southern corn rootworm penetrated)**

Treatment .....	0.4219
Variety.....	1.0000
Treatment x variety .....	0.2740

**Treatment mean (mean of lesser cornstalk borer damage)**

1. Lorsban 1x .....	14.375
2. Lorsban 2x .....	13.500
3. Untreated.....	12.750
LSD .....	--

**Variety mean (mean of lesser cornstalk borer damage)**

1. Phillips .....	3.833 b
2. Wilson.....	23.250 a
LSD .....	3.5416

**Split plot analysis (mean of lesser cornstalk borer damage)**

Treatment .....	0.6744
Variety.....	0.0001
Treatment x variety .....	0.7357

**Table 3a. Mean percent pod injury, PT07SCR3, Steven & Michael Pittman Farm, Surry Co., VA. Tidewater AREC, Suffolk, Virginia, 2007.**

#	Variety	Material	Rate	Mean percent pod injury <sup>1</sup>	
				Scarified	Penetrated
1	Wilson	Lorsban 15G	13 lb/A, 1 <sup>st</sup> week in July	8.50 a <sup>2</sup>	0.00 a
2	Wilson	Lorsban 15G (x2)	13 lb/A, 1 <sup>st</sup> week in July 13 lb/A, 3 <sup>rd</sup> week in July	10.75 a	0.00 a
3	Wilson	Untreated	---	17.00 a	0.00 a
	LSD			16.71 P=0.48	0.00 P=1.00

<sup>1</sup> A pre-harvest sample of 100 full-sized pods were randomly selected per plot after digging. Samples were taken on October 8.

<sup>2</sup> Means within a column followed by the same letter(s) are not significantly different.

**Table 3b. Mean percent pod injury, PT07SCR3, Steven & Michael Pittman Farm, Surry Co., VA. Tidewater AREC, Suffolk, Virginia, 2007.**

#	Variety	Material	Rate	Mean percent pod injury <sup>1</sup>	
				Scarified	Penetrated
1	Gregory	Lorsban 15G	13 lb/A, 1 <sup>st</sup> week in July	13.75 a <sup>2</sup>	0.25 a
2	Gregory	Lorsban 15G (x2)	13 lb/A, 1 <sup>st</sup> week in July 13 lb/A, 3 <sup>rd</sup> week in July	26.00 a	0.75 a
3	Gregory	Untreated	---	25.00 a	1.00 a
	LSD			13.30 P=0.12	1.04 P=0.27

<sup>1</sup> A pre-harvest sample of 100 full-sized pods were randomly selected per plot after digging. Samples were taken on October 8.

<sup>2</sup> Means within a column followed by the same letter(s) are not significantly different.

**Treatment mean (mean of southern corn rootworm scarified pods)**

1. Lorsban 1x .....	11.125
2. Lorsban 2x .....	18.375
3. Untreated.....	21.000
LSD .....	--

**Variety mean (mean of southern corn rootworm scarified pods)**

1. Wilson.....	12.083 b
2. Gregory .....	21.583 a
LSD .....	6.866

**Split plot analysis (mean of southern corn rootworm scarified pods)**

Treatment .....	0.0658
Variety.....	0.0282
Treatment x variety.....	0.5345

**Treatment mean (mean of southern corn rootworm penetrated pods)**

1. Lorsban 1x .....	0.125
2. Lorsban 2x .....	0.375
3. Untreated.....	0.500
LSD .....	--

**Variety mean (mean of southern corn rootworm penetrated pods)**

1. Wilson.....	0.000 b
2. Gregory .....	0.667 a
LSD .....	0.425

**Split plot analysis (mean of southern corn rootworm penetrated pods)**

Treatment .....	0.2746
Variety.....	0.0161
Treatment x variety.....	0.4208

**Table 4. Chowan County- Sampling of 25 September 2007.**

Treatment and formulation	Rate lb ai/A	Timing of Application	Number of Damaged Pods /Replication <sup>1</sup>				Average
			I	II	III	IV	
Lorsban 15G	2.0	Flowering (19 June)	0.00	12.00	7.00	0.00	4.75 a <sup>2</sup>
Lorsban 15 G + Lorsban 15G	2.0 2.0	Flowering (19 June) + Pegging (24 July)	3.00	0.00	1.00	0.00	1.00 a
Lorsban 15G	2.0	Pegging (24 July)	0.00	1.00	2.00	3.00	1.50 a
Untreated Check			1.00	13.00	5.00	4.00	5.75 a

<sup>1</sup> 100 pods were collected from each replication.<sup>2</sup> Means followed by the same letter are not significantly different (LSD, P=0.05).**Table 5. Gates County- Sampling of 25 September 2007.**

Treatment and formulation	Rate lb ai/A	Timing of Application	Number of Damaged Pods /Replication <sup>1</sup>				Average
			I	II	III	IV	
Lorsban 15G	2.0	Flowering (19 June)	2.00	4.00	2.00	3.00	2.75 a <sup>2</sup>
Lorsban 15 G + Lorsban 15G	2.0 2.0	Flowering (19 June) + Pegging (24 July)	2.00	2.00	4.00	1.00	2.25 a
Lorsban 15G	2.0	Pegging (24 July)	2.00	1.00	2.00	10.00	3.75 a
Untreated Check			5.00	1.00	8.00	11.00	6.25 a

<sup>1</sup> 100 pods were collected from each replication.<sup>2</sup> Means followed by the same letter are not significantly different (LSD, P=0.05).**Table 6. Perquimans County- Sampling of 25 September 2007.**

Treatment and formulation	Rate lb ai/A	Timing of Application	Number of Damaged Pods /Replication <sup>1</sup>				Average
			I	II	III	IV	
Lorsban 15G	2.0	Flowering (19 June)	19.00	37.00	19.00	36.00	27.75 b <sup>2</sup>
Lorsban 15 G + Lorsban 15G	2.0 2.0	Flowering (19 June) + Pegging (24 July)	9.00	13.00	8.00	12.00	10.50 a
Lorsban 15G	2.0	Pegging (24 July)	16.00	33.00	30.00	14.00	23.25 b
Untreated Check			9.00	41.00	10.00	31.00	22.75 ab

<sup>1</sup> 100 pods were collected from each replication.<sup>2</sup> Means followed by the same letter are not significantly different (LSD, P=0.05).