

# IMPACT OF TARNISHED PLANT BUGS ON COTTON: INSECTICIDE EFFICACY AND VARIETAL RESPONSE

J. T. Robbins, F. A. Harris and R. E. Furr  
Delta Research and Extension Center  
Mississippi State University  
MAFES  
Stoneville, MS

## Abstract

Tarnished plant bug adults and nymphs, *Lygus lineolaris* (Palisot de Beauvois), were effectively controlled with several foliar applied insecticides. Effective consistent control of both adults and nymphs was provided by application of Orthene® 90S (0.5 lb ai/A), Regent® 2.5EC(0.05 lb ai/A), and Monitor® 4L (0.33 lb ai/A). Bidrin® 41 WP (0.33 lb ai/a) and Vydate® 3.77 L (0.25 lb ai/A) provided effective control compared to the untreated checks. Calypso® 70 WG (0.047 lb ai/A) significantly reduced plant bug infestations and is one of the newer promising products tested. Certain adjuvants were tested and in some cases this use provided higher levels of control.

## Introduction and Methods

Two field trials (Test I and Test II) were conducted in 1999 to evaluate foliar spray insecticides for tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), control. A third field trial (Test III) was conducted to evaluate tarnished plant bug response to five varieties of cotton which included conventional, Bollguard®, Roundup Ready®, and stacked gene varieties. Eight rows of reservoir strip crops were planted between each 8-row set of cotton to facilitate the plant bug population. The pattern was 3 rows of corn, *Zea mays* L., followed by 1 row of mustard, *Brassica* sp., and 1 row of pigweed, *Amaranthus retroflexus* L., then 3 more rows of corn. This pattern (8 rows cotton, 8 rows of reservoir crops) was repeated across the field. During the last two years the use of reservoir crops has appeared to enhance and keep more plant bugs available to insure tests could be run all year (Robbins, 1998).

### Test I and Test II

Deltapine 5409 was planted on May 4, 1999 on 40 in. rows, 26.6 ft. wide (8 rows), and 50ft. long with planting and all other production practices conducted by farm services of the Delta Research and Extension Center at Stoneville, Mississippi. Treatments were applied to the 8 row plots arranged in a randomized complete block replicated 4 times. All applications were made with a Melroe® Spra-Coupe model 230 operated at 48 psi which delivered 6 gpa spray

volume through Conejet® TX-8 tips at 5.5 mph. An overspray with Vydate 3.77L (0.25 lb ai/A) was applied on 11 June 1999 for insect control maintenance. Test treatment applications were made on 1 July 1999, 12 July 1999, and 23 July 1999, when threshold levels of tarnished plant bugs were observed in one or more plots.

Tarnished plant bug counts were made in each plot for adults with a sweep net, while nymphs were sampled using drop cloth (Snodgrass, 1993). Four 3-ft. samples were observed for each plot and 25 sweeps made with standard sweep net. Counts were made prior to the treatment on 23 July to determine pretreatment infestations, and on two post treatment dates, 26 July and 28 July.

### Test III

All treatments were applied to 8 row plots (26.6 ft. wide by 50 ft. long) arranged in split plot, randomized complete block design replicated 4 times. Deltapine 5409, 33b, 425 RR, 450 RR/B, and Stoneville 474 were planted on 4 May 1999, in 40-in. rows with planting and all other agronomic practices conducted by Farm Services at Stoneville, Mississippi. Application of insecticides were made with a Melroe Spra-Coupe model 230 operated at 48 psi which delivered 6 gpa spray volume through TX-8 Cone-jet tips at 5.5 mph. One overspray with Monitor 4L (0.2 lb ai/A) was applied to all plots on May 17, 1999 for insect control maintenance. Applications were made on 1 July and 19 July when above treatment threshold levels of tarnished plant bugs were observed in one or more plots.

Tarnished plant bug counts were made in each plot for adults and nymphs utilizing a 3 ft. drop cloth and standard sweep net. Four 3 ft. drop cloth samples were observed in each plot in addition to standard sweep net samples of 25 sweeps per plot. Pretreatment counts were conducted to determine infestation levels. Analysis of variance was conducted on the data and least significant differences applied to determine differences in treatments.

## Results and Discussion

### Test I

Drop cloth data are presented as mean number of adults plus nymphs in the three observation periods. Yield data are presented as mean lint cotton per acre using 35 % gin turnout. Mean numbers of tarnished plant bug adults plus nymphs from drop cloth samples are shown for 21, 26, and 28 July in Table 1. Provado® 1.6F (0.047 lb ai/A), Regent 2.5EC (0.038 lb ai/A), Monitor 4L (0.33 lb ai/A, and Calypso 70 WG (0.047 lb ai/A) significantly reduced plant bug adults and nymphs on 21 July. Average drop cloth counts showed that only Orthene 90S (0.5 lb ai/A), both rates of Regent 2.5EC, and Monitor 4L (0.33lb ai/A) significantly reduced counts below the untreated check on 26 and 28 July. Yield results

show plots treated with Monitor 4L (0.33 lb ai/A) and Calypso 70W (0.047 lb ai/A) had significantly higher yields than the untreated plots.

### Test II

Mean numbers of adults plus nymphs in the Bidrin 8 (0.33 lb ai/A) (without Dynamic® adjuvant), and Bidrin 41 WP (0.033 lb ai/A) with and without Dynamic adjuvant), and Steward® 1.25 SC (0.09 lb ai/A) + Vydate 3.77L (0.25 lb ai/a) treatments were significantly reduced on 21 July as compared to the untreated check (Table 2). All treatments except Bidrin 8 (0.33 lb ai/A) + Dynamic) significantly reduced tarnished plant bug counts as compared to the check on 6 July. All Bidrin treatments and Vydate 3.77L significantly reduced tarnished plant bug counts below the untreated check on 28 July. The lint yield data showed no statistically significant mean differences.

### Test III

Treatments applied for tarnished plant bug control were Baythroid + Regent (0.05 +0.05 lbs ai/A) made on 1 July and Regent (0.05 lb ai/A) made on 19 July. These treatments were made when samples from one or more plots provided counts above threshold levels. Thresholds used for the first two weeks of squaring were 1 nymph or adult per 6 row ft using the drop cloth or 8 bugs per 100 sweeps. After the first two weeks of squaring thresholds were 2 adults or nymphs using the drop cloth or 15 using the sweep net (Layton, 1999).

Results of tarnished plant bug response to different cotton varieties are summarized in Tables 3, 4, 5, and 6. Mean counts in Stoneville 474 were significantly higher than in one or more other varieties in two of the data sets (Tables 3 and 4). This possibly suggests a greater preference by tarnished plant bugs for Stoneville 474 than for other varieties tested. However, analysis of yield data suggests greater tolerance for tarnished plant bugs in the conventional varieties, Stoneville 474 and Deltapine 5409. These conventional varieties produced higher average yields, but not statistically higher, in untreated plots than the transgenic cottons. All varieties produced higher average yields when treated for tarnished plant bugs than when not treated. The increase in the treated conventional varieties was not statistically significant. The three transgenic varieties produced significantly higher yields when treated for tarnished plant bugs than when not treated. These test results suggest possible greater sensitivity to tarnished plant bug injury in the transgenic varieties tested than in the two conventional varieties.

### References

Layton, Blake. 1999. Cotton insect control guide. Mississippi State University Extension Service Publication 343.

Robbins, J. T., F. A. Harris, and R. E. Furr. 1998. Tarnished plant bug control in the Mississippi Delta. Proceedings Beltwide Cotton Conference. Vol. 2, pp. 1197-98.

Snodgrass, G. L. 1993. Estimating absolute density of nymphs of *Lygus lineolaris* in cotton using drop cloth and sweep net sampling methods. J. Econ. Entomol. 86 (4):116-1123.

Table 1. Mean Tarnished Plant Bug adults and nymphs per 12 row feet on three observation dates and mean lint cotton per acre using 35% gin turnout. (Test I).

Treatment	Observation Dates			Yield
	7/21	7/26	7/28	
Untreated Check	15.3 a <sup>1</sup>	5.3 a	8.3 a	646 c
Provado 1.6F (0.047)	6.1 b	4.8 a-c	4.5 ab	640 c
Provado 75WG(0.047)	10.0 ab	5.8 ab	6.1 a	687 bc
Regent 2.5EC (0.038)	8.0 b	2.0 bc	4.3 b	715 bc
Regent 2.5EC (0.5)	8.3 a	2.3 bc	2.5 b	767 bc
Orthene 90S (0.5)	8.8 a	1.1 c	2.6 b	736 bc
Monitor 4L (0.33)	6.3 b	2.5 bc	2.5 b	882 ab
Calypso 4SC (0.047)	8.3 a	5.0 a	5.8 ab	712 bc
Calypso 70WG (0.047)	7.3 b	6.6 a	6.1 ab	904 a
LSD p=(0.05)	7.1	4.0	3.9	233

Treatments applied 30 Jun, 12 Jul, and 23 Jul.

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).

Table 2. Mean Tarnished Plant Bug adults and nymphs per 12 row feet on three observation dates and lint cotton per acre yield using 35% gin turnout. (Test II).

Treatment	Observation Dates			Yield
	7/21	7/26	7/28	
Untreated Check	10.8 a <sup>1</sup>	7.5 a	6.3 a	795 a
Bidrin 8 (0.33)	4.8 b	2.5 b	1.8 b	939 a
Bidrin 8 (0.33)*	8.3 ab	4.0 ab	1.8 b	859 a
Bidrin 41WP (0.33)	4.0 b	2.3 b	1.8 b	759 a
Bidrin 41WP (0.33)*	4.3 b	1.5 b	1.3 b	768 a
Steward 1.25SC (0.09)*	6.5 b	2.8 b	3.1 a	826 a
Steward 1.25SC (0.065)	5.3 b	3.3 b	2.3 a	760 a
+Vydate 3.77L (0.25)*				
Vydate 3.77L (0.33)	6.0 a	1.8 b	1.6 b	762 a
LSD p=(0.05)	4.9	3.7	4.5	262

Treatments applied 1 Jul, 12 Jul, and 23 Jul.

\*- Dynamic added to these treatments at 0.125% v/v.

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).

Table 3. Mean Tarnished Plant Bug adults plus nymphs by two sampling methods on July 6, 1999.

Variety	25 Sweeps		Drop Cloth (12 Row Ft.)	
	Treated	Untreated	Treated	Untreated
33B	2.8 a <sup>1</sup>	2.8 a	2.5 b	4.3 ab
425 RR	2.3 a	2.3 a	5.0 ab	3.3 b
450 RR/B	2.0 a	2.8 a	4.5 ab	6.3 a
474	3.3 a	6.5 b	5.8 a	4.8 ab
5409	1.3 a	3.3 a	6.3 a	5.8 ab
LSD p=(0.05)	3.8	3.8	2.6	2.6

\*Baythroid + Regent (0.05 + 0.05 lb ai/A) were applied on 1 July.

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).

Table 4. Mean Tarnished Plant Bug adults plus nymphs by two sampling methods on July 27, 1999.

Variety	25 Sweeps		Drop Cloth (12 Row Ft.)	
	Treated	Untreated	Treated	Untreated
33 B	3.3 a <sup>1</sup>	4.3 b	3.5 a	7.3 ab
425 RR	3.0 a	4.3 b	2.8 a	7.0 ab
450 RR/B	3.5 a	8.0 ab	3.5 a	4.0 b
474	5.5 a	10.0 a	3.0 a	10.3 a
5409	1.8 a	5.5 b	4.3 a	6.0 a
LSD p=(0.05)	4.4	4.4	5.5	5.5

\*Regent (0.05 lb ai/A) was applied on 19 July.

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).

Table 5. Mean Tarnished Plant Bug adults plus nymphs by two sampling methods on August 2, 1999.

Variety	25 Sweeps		Drop Cloth (12 Row Ft.)	
	Treated	Untreated	Treated	Untreated
33 B	2.5 a <sup>1</sup>	4.3 a	4.0 a	4.0 a
425 RR	4.3 a	3.3 a	3.8 a	4.0 a
450 RR/B	1.0 a	3.8 a	3.8 a	5.3 a
474	4.0 a	6.0 a	2.0 a	5.0 a
5409	4.5 a	4.0 a	3.0 a	6.5 a
LSD p=(0.05)	3.7	3.7	4.0	4.0

\*Regent (0.05 lb ai/A) was applied on 19 July.

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).

Table 6. Mean lint cotton per acre using 35% gin turnout. Stoneville, MS, 1999.

Variety	Lint Yield	
	Treated	Untreated
33 B	851 a <sup>1</sup>	568 a
425 RR	792 a	601 a
450 RR/B	835 a	499 a
474	756 a	665 a
5409	777 a	670 a
LSD p=(0.05)	169	169

<sup>1</sup>Means with columns followed by the same letter are not significantly different (LSD, P=0.05).