

# TARNISHED PLANT BUG AND BOLL WEEVIL CONTROL TRIALS IN THE MISSISSIPPI DELTA

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## Abstract

Foliar applied insecticide trials were conducted at the Delta Branch Experiment Station, Stoneville, Mississippi, for efficacy on tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), and boll weevil, *Anthonomus grandis* (Boheman). Effective control was accomplished using several insecticides in cotton. Regent 2.5EC, a new fipronil product, and Actara 25WG provided excellent tarnished plant bug control. Steward 1.25SC gave suppression of plant bugs. Currently labeled and recommended boll weevil insecticides that proved effective were Baythroid 2E and Vydate 2.77L. Bidrin 8L also provided control that was significant against the boll weevil. Monitor 4E suppressed boll weevils but was less effective than other insecticides.

## Introduction and Methods

Deltapine 5409 cotton variety was planted on May 6, 1998. All treatments for plant bugs and boll weevils were applied to 8 row plots (26.6 ft. wide by 50 ft. long) arranged in randomized complete blocks replicated 4 times. All planting and other agronomic practices were conducted by DREC Farm Services. Insecticide applications were made utilizing 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.

Two tarnished plant bug insecticide field tests were conducted on Delta Branch Experiment Station, Stoneville, MS, in 1998. Treatment applications for both tests were made June 24, July 7, and August 10, when above threshold levels were observed in some plots. Eight rows of reservoir strip crops (corn, mustard, and pigweed) were planted between each 8-row set of cotton to augment tarnished plant bug infestation (Furr et al. 1999). Tarnished plant bug counts were made in each plot of both tests for adults and nymphs utilizing a 3-ft drop cloth (Snodgrass 1993). Two 3-ft samples were observed per plot. Visual observations were also taken in each plot of both tests from 25 terminals and squares on the upper 5 nodes of the cotton plant. Counts were made pretreatment on June 24 and posttreatment on June 30, July 6, and July 9 utilizing the drop-cloth method. Terminal counts were also made in both tests on June 30, July 6 or 7, July 9, July 14, August 3, August 7, and August 14. Drop-cloth sample data are presented as mean number

per 6-row ft. and visual observations are presented as mean number per 100 terminals.

One boll weevil insecticide field test was conducted on Delta Branch Experiment Station in 1998. Applications for boll weevils were made July 6, July 10, July 17, July 24, and July 28 when above threshold levels were observed in some plots. Boll weevil counts were made in each plot for damaged squares (oviposition and feeding punctures) from 25 squares and converted to percent damaged squares. Counts were made on July 1 prior to the application on July 6 to determine pretreatment infestations. Observations for percent damaged squares were made on July 7, July 15, July 20, July 27, August 3, and August 10.

## Results and Discussion

### Tarnished Plant Bug Test I

Counts of adults from drop-cloth samples show no treatment effects on the two post-treatment observation dates (Table 1). Average drop-cloth counts of nymphs show that Orthene® 90S (0.5 lb ai/A) and Provado® 1.6F (0.047 lb ai/A) significantly reduced average nymph numbers below the untreated check on July 6 (Table 2). Other mean differences were not significant when comparing counts from the drop cloth.

Average plant bug adults per 100 terminals show several treatments with significant mean differences compared to the untreated check (Table 3). Baythroid® 2EC (0.033 lb ai/A), Legend® 2.7F (0.079 lb ai/A), Provado® 1.6F plus Dimethoate 4E (0.025 + 0.25 lb ai/A), and Regent® 2.5EC (0.038 lb ai/A) produced significantly reduced average counts on July 9. Orthene® 90S produced lowered average counts on July 14. Orthene® 90S, Baythroid® 2EC, and Provado® 1.6F plus Baythroid® 2EC produced significantly lower average counts on August 14. Other treatments applied resulted in a reduction in plant bug numbers on some observation dates, but were not significantly different from the untreated check.

Tarnished plant bug nymphs per 100 terminals show the following significant mean differences compared to the untreated check (Table 4). Orthene® 90S, Provado® 1.6F, Baythroid® 2EC, Legend® 2.7F, Provado® 1.6F plus Baythroid® 2EC, and Regent® 2.5EC produced significantly lower average counts on July 14.

Lint yield data were also taken from these test plots, however, no significant differences occurred. Even though there were no significant differences, an average increase of over 100 lb of lint was observed from plots treated with Provado 1.6F and Regent 2.5EC when compared to the untreated check.

### Tarnished Plant Bug Test II

Counts of adults from drop cloth samples show that Vydate® 3.77L (0.33 lb ai/A), Actara® 25WG (0.067 lb

ai/A), Actara® 225WG (0.09 lb ai/A), and Steward® 1.25SC + Vydate® 3.77L (0.11 + 0.25 lb ai/A) significantly reduced counts below the untreated check on July 9 (Table 5). Average drop-cloth counts of nymphs show that on June 30 Actara® 25WG (0.067 lb ai/A), Steward® 1.25SC (0.09 lb ai/A), and Steward® 1.25Sc + Vydate® 3.77L (0.11 + 0.25 lb ai/A) significantly reduced counts below the untreated check on July 9 (Table 6). Treatments that significantly reduced nymph counts below the untreated check on July 9 were Vydate® 3.77L (0.33 lb ai/A), Actara® 25WG (0.067 lb ai/A), and Actara® 25WG (0.09 lb ai/A).

Average plant bug adults per 100 terminals show only Actara® 25WG (0.067 lb ai/A) significantly reduced counts below the untreated check on August 14 (Table 7). Other treatments substantially reduced average adult counts, but mean differences were not statistically significant when insecticide treatments were compared to the untreated check.

Average nymphs per 100 terminals show the following significant mean differences compared to the untreated check (Table 8). Vydate® 3.77L (0.33 lb ai/A), Furadan® 4F (0.25 lb ai/A), Actara® 25WG (0.067 and 0.09 lb ai/A), and Steward® 1.25 SC (0.09 lb ai/A) produced significantly lower nymph counts on July 7. All insecticide treatments reduced nymph counts significantly lower than the untreated check on July 9. Actara 25WG (0.09 lb ai/A) and Steward 1.25SC + Vydate 3.77L (0.11 + 0.25 lb ai/A) significantly reduced nymph counts on July 14.

### **Boll Weevil Test**

Treatments for boll weevil control were initially applied on July 6. These treatments were initiated when infestations were observed to be increasing and approaching 10 percent square damage. A total of five applications of the different treatments were made at 4- to 7-day intervals depending on weather and equipment variables. Some treatments showed lower average percent damaged squares than the untreated check on July 20 (Table 5). Regent 2.5EC (0.038 and 0.05 lb ai/A) and Bidrin 8L (0.5 lb ai/A) significantly reduced percent square damage below the untreated check on July 20. All treatments produced significantly lowered percent damaged squares on July 27 and August 3, except Monitor 4E (0.5 lb ai/A) on July 27. However, average boll weevil damaged squares in plots treated with Monitor was substantially lower than the untreated check on this date. Boll weevil numbers reflected in damaged squares surged to the highest levels observed on August 10, 13 days after the last treatment application, and no treatment mean differences were significant on this date.

All boll weevil insecticide treatments produced average yield significantly higher than the untreated check.

## **Conclusions**

Currently labeled and recommended tarnished plant bug control products that provided consistent effective control in the 1998 tests were Orthene® 90S (0.5 lb ai/A) and Vydate® 3.77L (0.33 lb ai/A). Baythroid 2EC (0.033 lb ai/A), and Provado 1.6F plus Baythroid 2EC (0.025 lb + 0.03 lb ai/A) provided effective adult control. However, there was a considerable amount of variability in performance of pyrethroid products, which may be the result of resistance to pyrethroids and other classes of insecticides (Snodgrass and Elzen, 1995).

The new fipronil product, Regent® 2.5EC (0.038 lb ai/A) and the experimental product Actara® 25WG (0.67 and .09 lb ai/A) show promise as tarnished plant bug insecticides. The experimental product, Steward® 1.25 SC (.09 and .11 lb ai/A) provided some suppression of tarnished plant bugs.

Currently labeled and recommended boll weevil control products that provided effective control were Baythroid® 2E (.033 lb ai/A) and Vydate 3.77L (.33 lb ai/A). Bidrin® 8 (0.5 lb ai/A) provided significant boll weevil suppression. Monitor® 4E (.5 lb ai/A) showed boll weevil suppression but was less effective than other products tested. The new fipronil product, Regent® 2.5E (.038 and .5 lb ai/A) provided significant boll weevil control and is a promising new boll weevil insecticide.

## **References**

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Table 1. Mean tarnished plant bug adults per 6 row feet (drop cloth counts) on one pretreatment and two posttreatment observation dates (Test I). Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates		
	6/24	6/30	7/6
Untreated Check	0.8	2.0	1.3
Orthene 90S (0.5)	0.5	2.5	1.5
Provado 1.6F (0.047)	1.3	2.0	1.3
Baythroid 2E (0.033)	0.3	1.0	2.3
Legend 2.7F (0.079)	0.5	2.0	3.3
Provado 1.6F (0.025) + Baythroid 2E (0.03)	0.5	2.5	3.0
Provado 1.6F (0.025) + Dimethoate 4E (0.025)	0.3	2.5	2.8
Monitor 4L (0.3)	0.5	1.0	1.5
Regent 2.5EC (0.038)	0.8	2.8	2.0
LSD (p= 0.05)	1.3	2.3	2.5

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 2. Mean tarnished plant bug nymphs per 6 row feet (drop cloth counts) on one pretreatment and three posttreatment observation dates. (Test I) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates			
	6/24	6/30	7/6	7/9
Untreated Check	2.3	3.0	6.5	6.0
Orthene 90S (0.5)	0.8	2.5	1.8	1.5
Provado 1.6F (0.047)	0.8	5.5	2.5	7.0
Baythroid 2EC (0.033)	1.8	6.8	4.3	7.5
Legend 2.7F (0.079)	3.0	8.0	6.3	7.5
Baythroid 2EC (0.033) + Provado 1.6F (0.025)	1.3	6.5	5.5	10.8
Provado 1.6F (0.025) + Dimethoate 4E(0.025)	3.0	8.3	4.0	7.0
Monitor 4EC (0.31)	1.8	6.0	6.0	8.3
Regent 2.5EC (0.038)	0.3	5.0	4.0	3.5
LSD (p= 0.05)	2.0	5.5	3.8	6.5

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 3. Mean tarnished plant bug adults per 100 terminals in terminal observation counts on seven posttreatment observation dates. (Test I) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates						
	6/30	7/6	7/9	7/14	8/3	8/7	8/14
Untreated Check	1.0	2.0	10.0	27.0	10.0	54.0	24.0
Orthene 90S (0.5)	0.0	5.0	3.0	13.0	4.0	59.0	11.0
Provado 1.6F (0.047)	0.0	0.0	4.0	21.0	8.0	69.0	13.0
Baythroid 2EC (0.033)	1.0	4.0	2.0	38.0	9.0	89.0	7.0
Legend 2.7F (0.079)	0.0	2.0	1.0	18.0	4.0	62.0	15.0
Provado 1.6F (0.025) + Baythroid 2E (0.03)	0.0	3.0	3.0	23.0	4.0	78.0	8.0
Provado 1.6F (0.025) + Dimethoate 4E (0.025)	1.0	9.0	1.0	32.0	14.0	63.0	21.0
Monitor 4L (0.3)	0.0	0.0	7.0	36.0	12.0	73.0	29.0
Regent 2.5EC (0.038)	2.0	5.0	0.0	18.0	6.0	67.0	14.0
LSD (p= 0.05)	2.1	10.7	7.4	12.2	8.5	21.7	11.9

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 4. Mean tarnished plant bug nymphs per 100 terminals in terminal observation counts on seven posttreatment observation dates. (Test I) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates						
	6/30	7/6	7/9	7/14	8/3	8/7	8/14
Untreated Check	1.0	1.0	3.0	30.0	10.0	44.0	24.0
Orthene 90S (0.5)	2.0	0.0	0.0	11.0	14.0	42.0	18.0
Provado 1.6F (0.047)	3.0	5.0	2.0	15.0	19.0	33.0	21.0
Baythroid 2EC (0.033)	4.0	0.0	9.0	17.0	19.0	65.0	26.0
Legend 2.7F (0.079)	12.0	2.0	7.0	17.0	23.0	46.0	36.0
Provado 1.6F (0.025) + Baythroid 2E (0.03)	4.0	2.0	0.0	13.0	20.0	48.0	23.0
Provado 1.6F (0.025) + Dimethoate 4E (0.025)	6.0	3.0	3.0	21.0	14.0	45.0	27.0
Monitor 4L (0.3)	2.0	0.0	1.0	36.0	17.0	46.0	31.0
Regent 2.5EC (0.038)	7.0	0.0	1.0	17.0	28.0	39.0	18.0
LSD (p= 0.05)	6.1	5.9	7.1	11.8	16.3	28.3	19.9

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 5. Mean tarnished plant bug adults per 6 row feet (drop cloth counts) on one pretreatment and three posttreatment observation dates. (Test II) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates			
	6/24	6/30	7/7	7/9
Untreated Check	0.8	2.5	2.3	5.3
Vydate 3.77L (0.33)	1.3	1.8	2.3	0.8
Bidrin 8 (0.33)	0.8	4.3	1.5	2.0
Fury 1.5E (0.0375)	0.3	0.5	4.0	5.8
Furadan 4F (0.25)	1.3	2.0	0.8	3.0
Actara 25WG (0.067)	1.3	2.0	2.5	1.3
Actara 25WG (0.09)	0.0	1.3	0.8	1.0
Steward 1.25SC (0.09)	0.3	0.5	2.0	4.5
Steward 1.25SC (0.11)	1.3	1.3	4.0	3.0
Steward 1.25SC (0.11) + Vydate 3.77L (0.25)	0.0	1.5	3.5	1.5
LSD (p= 0.05)	1.3	2.1	2.5	3.4

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 6. Mean tarnished plant bug nymphs per 6 row feet (drop cloth counts) on one pretreatment and three posttreatment observation dates. (Test II) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates			
	6/24	6/30	7/7	7/9
Untreated Check	1.8	8.5	8.3	11.8
Vydate 3.77L (0.33)	2.3	4.0	2.5	0.8
Bidrin 8 (0.33)	1.8	6.3	9.0	11.3
Fury 1.5E (0.0375)	2.8	9.8	7.0	7.0
Furadan 4F (0.25)	1.0	4.5	9.0	10.0
Actara 25WG (0.067)	2.5	2.0	5.5	2.8
Actara 25WG (0.09)	1.8	5.5	2.0	2.0
Steward 1.25SC (0.09)	2.0	2.5	9.3	8.5
Steward 1.25SC (0.11)	3.5	8.3	10.3	10.3
Steward 1.25SC (0.11) + Vydate 3.77L (0.25)	1.5	2.5	5.8	5.0
LSD (p= 0.05)	2.5	5.9	6.4	8.3

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 7. Mean tarnished plant bug adults per 100 terminals in terminal observations on seven posttreatment observation dates. (Test II) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates						
	6/30	7/7	7/9	7/14	8/3	8/7	8/14
Untreated Check	0.0	2.0	9.0	26.0	6.0	29.0	31.0
Vydate 3.77L (0.33)	0.0	0.0	1.0	14.0	11.0	44.0	16.0
Bidrin 8 (0.33)	0.0	1.0	13.0	23.0	6.0	32.0	14.0
Fury 1.5E (0.0375)	0.0	3.0	3.0	21.0	6.0	46.0	13.0
Furadan 4F (0.25)	1.0	2.0	7.0	32.0	8.0	43.0	17.0
Actara 25WG (0.067)	0.0	3.0	3.0	19.0	5.0	38.0	10.0
Actara 25WG (0.09)	0.0	2.0	2.0	10.0	17.0	49.0	21.0
Steward 1.25SC (0.09)	0.0	2.0	9.0	15.0	4.0	47.0	28.0
Steward 1.25SC (0.11)	1.0	2.0	9.0	13.0	11.0	46.0	25.0
Steward 1.25SC (0.11) + Vydate 3.77L (0.25)	0.0	0.0	1.0	21.0	4.0	39.0	19.0
LSD (p=0.05)	1.3	3.6	11.2	17.8	14.1	17.9	18.3

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 8. Mean tarnished plant bug nymphs per 100 terminals in terminal observations on seven posttreatment observation dates. (Test II) Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates						
	6/30	7/7	7/9	7/14	8/3	8/7	8/14
Untreated Check	9.0	9.0	11.0	24.0	13.0	19.0	30.0
Vydate 3.77L (0.33)	6.0	2.0	0.0	13.0	13.0	23.0	28.0
Bidrin 8 (0.33)	3.0	4.0	3.0	18.0	6.0	22.0	18.0
Fury 1.5E (0.0375)	4.0	5.0	1.0	12.0	10.0	32.0	17.0
Furadan 4F (0.25)	3.0	1.0	3.0	14.0	6.0	28.0	21.0
Actara 25WG (0.067)	6.0	0.0	4.0	13.0	16.0	28.0	32.0
Actara 25WG (0.09)	6.0	1.0	2.0	8.0	5.0	32.0	28.0
Steward 1.25SC (0.09)	6.0	2.0	2.0	12.0	4.0	34.0	28.0
Steward 1.25SC (0.11)	8.0	3.0	2.0	14.0	11.0	35.0	22.0
Steward 1.25SC (0.11) + Vydate 3.77L (0.25)	4.0	4.0	1.0	7.0	14.0	29.0	25.0
LSD (p=0.05)	6.4	6.5	5.1	12.9	11.3	15.5	13.9

<sup>1</sup>Rate = lb ai/A

Application dates: 6/24, 7/7, and 8/10

Table 9. Mean percent boll weevil punctured squares. Stoneville, MS, 1998.

Treatment (rate <sup>1</sup> )	Observation Dates						
	7/1	7/7	7/15	7/20	7/27	8/3	8/10
Untreated Check	2	7	54	29	31	23	42
Baythroid 2E (0.033)	1	12	72	21	3	8	30
Vydate 3.77L (0.33)	3	5	59	22	10	7	55
Regent 2.5E (0.038)	2	6	39	19	6	4	50
Regent 2.5E (0.05)	4	9	52	15	10	7	46
Monitor 4E (0.5)	3	4	46	20	17	9	37
Bidrin 8L (0.5)	0	8	46	17	8	10	39
LSD (p=0.05)	3.9	9.6	27.9	9.9	15.9	11.2	19.4

<sup>1</sup>Rate = lb ai/A

Application dates: 7/6, 7/10, 7/17, 7/24, and 7/28.