TARNISHED PLANT BUG CONTROL WITH REGENT AND ACTARA DURING 1997 AND 1998 IN SMALL PLOT AND LARGE PLOT EUP TRIALS

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Abstract

Tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), control with the experimental insecticides, Regent (class phenyl pyrazole) [2.5 EC 0.038-0.05 lb (AI)/acre] and Actara (class thiamethaozam) 25 WG [0.046-0.09 lb (AI)/acre] was as good or better than control obtained with Karate [0.028 lb (AI)/acre], Monitor [0.30 lb (AI)/acre], Vydate [0.25 lb (AI)/acre], and Baythroid [0.03 lb (AI)/acre] when evaluated in small plot and large plot Experimental Use Permit trials during 1997 and 1998. Harvested lint yields both years were slightly greater in the Regent [0.05 lb (AI)/acre] treatment than in the other treatments in both the small and large plot test trials. Actara and Regent both represent new classes of insecticides and will be useful in controlling tarnished plant bugs reducing insecticide resistance.

Introduction

The tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is a serious pest of cotton in the mid-south. Adults and nymphs damage the plant by feeding on terminals, squares, blooms, and bolls, and this feeding damage can cause yield loss. Williams (1998) reported that *Lygus spp.* rank third behind the boll weevil, *Anthonomus grandis* Boheman, bollworm/budworm, *Helicoverpa zea* (Boddie) and *Heliothis virescens* (F.), in yield loss. Tarnished plant bug populations highly resistant to pyrethroid insecticides with multiple resistance to organophosphate and cyclodiene insecticides were found in cotton in the Mississippi Delta in 1993 (Snodgrass 1996). Difficulty in controlling plant bugs in cotton with non-pyrethroid insecticides in 1994 was reported by Snodgrass and Elzen (1995). Pyrethroid resistance in plant bug populations is presently widespread in the Delta of AR, LA, and MS (Snodgrass and Scott 1996). Because insecticide resistance is widespread in the mid-south, and control of plant bugs on cotton is mainly by use of insecticides, research on how to use existing and new insecticides is needed.

Fipronil (Regent, Rhone Poulenc Ag Company) belongs to the phenyl pyrazole class of insecticides, and has been in world wide development as a cotton insecticide since 1989. Regent has been shown to have significant activity on thrips, plant bugs, and boll weevils (Burris et al. 1994, Shaw and Yang 1996, and Hamon et al. 1996). Scott et al. (1996) showed in a laboratory spray chamber bioassay that Regent at a 0.05 lb (AI)/acre controlled pyrethroid resistant plant bugs. Thiamethaoxam (Actara, Novartis Ag Company) belongs to the neonicotiniod class of insecticides. Actara has shown good activity on plant bugs.

The objective of the present study was to evaluate Regent and Actara along with standard insecticides for control of the tarnished plant bug. Tests were conducted in small and large plot Experimental Use Permit (EUP) trials.

Materials and Methods

Small Plot EUP Tests

Small plot tests to evaluate tarnished plant bug control were conducted in 1997 and 1998 in >DPL 33-B= cotton at Stoneville MS. Plot size was 16 rows by 80 ft, and all treatments were replicated three times. Treatments evaluated were: Regent 2.5 EC [0.05 and 0.038 lb (AI)/acre], Monitor [0.30 lb (AI)/acre], Actara [0.09 and 0.067 lb (AI)/acre], Karate 1EC [0.028 lb (AI)/acre], Karate Z [0.028 lb (AI)/acre], and an untreated check. Actara and Regent are both unregistered for use in cotton and were applied under an Experimental Use Permit. Treatments in both years were applied with a JD 6000 high clearance sprayer equipped with individual CO_2 pressurized 5 gallon stainless steel spray containers. All treatments were applied at 40 psi in water at a total spray volume of 5 gal/acre. Treatments in 1997 were applied on 1, 14, 22, and 29 July, and on 5, 15, and 18 August. In 1998, treatments were applied on 24 June, and 1, 17, 21, and 27 July.

Large Plot EUP Tests

Control of tarnished plant bugs in large plots of DPL 33-B cotton at Stoneville, MS, was also evaluated in 1997 and 1998 on a farm near Leland, MS. Treatments evaluated were: Regent 2.5 EC [0.05 lb (AI)/acre], Vydate [0.25 lb (AI)/acre], and Baythroid [0.03 lb (AI)/acre], and an untreated check (1998 only). Plot size was three to four acres (32 rows), and each treatment was replicated four times. Treatments in both years were applied with a JD 6000 high clearance sprayer. All treatments were applied at 40 psi in water with a total spray volume of 5 gal/acre. Treatments in 1997 were applied on 19 June, 2, 11, 31 July and 14 August. Treatments in 1998 were applied on 8, 17, 24, and 29 July.

Aerially Applied EUP Test

Control of tarnished plant bugs with aerially applied insecticides was evaluated in 1998 on a farm located near Leland, MS. Regent 2.5EC [0.05 lb (AI)/acre] and Vydate [0.25 lb (AI)/acre] were each applied to fifteen acre plots of DPL 33-B cotton (none replicated). There was also an untreated check. The two treatments were applied with a Air Tractor (402) at 3 gallons total spray volume per acre. Treatments were applied on 8, 20, 24, and 29 July.

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Tarnished plant bug populations were sampled in all tests three to four days post-treatment with a drop cloth in both years. Three feet of row in four areas were sampled in each replication in the small plot test. In the large plot EUP test, three feet of row was sampled in ten areas in each replication. Yield was obtained by hand harvesting three row feet in ten and twenty locations in small and large plots, respectively. Data from all replicated tests were analyzed using analysis of variance (SAS Institute 1987) and means were separated by least significant difference. In the aerial EUP, cost prohibited a replicated test. Averages are shown for treatments and check.

Results and Discussion

Small Plot EUP Tests

Average numbers of plant bugs per acre sampled with drop cloth for the small plot test during 1997 are shown in Figure 1. The untreated check had significantly higher populations of plant bugs than any of the insecticide treatments. There were no significant differences between the Actara treatment [0.046 lb (AI)/acre], Regent treatment [0.038 lb (AI)/acre], and both Karate treatments. The lowest mean number of plant bugs was found in the Regent treatment at 0.05 lb (AI)/acre, however numbers of plant bugs in this treatment were not significantly different than the mean numbers of plant bugs found in the Monitor treatment or Actara treatment at 0.093 lb (AI)/acre. In the small plot EUP tests during 1997, all treatments had significantly higher yields than the untreated check (Figure 2). Regent [0.05 lb (AI)/acre] had a significant higher yield than Actara [0.046 lb (AI)/acre] and Monitor [0.30 lb (AI)/acre]. Yields in the remaining treatments were not significantly different.

Average numbers of plant bugs per acre for the small plot EUP test in 1998 are shown in Figure 3. The untreated check had significantly higher numbers of plant bugs for the season than any treatment. Vydate [0.25 lb (AI)/acre] had significantly higher numbers of plant bugs than Actara [0.067 lb (AI)/acre]. Numbers of plant bugs in all other treatments were not statistically different. During 1998, all insecticide treatments again had significantly higher yields than the untreated check (Figure 4). Lint yield in the Regent [0.05 lb (AI)/acre] treatment did not differ from yield in the Regent [0.038 lb (AI)/acre] treatment, but it was significantly higher than the yield in all other treatments. Yields in the Vydate, Monitor, Karate (both formulations) and Actara (both rates) treatments were not significantly different.

Large Plot EUP Tests

Significantly higher numbers of plant bugs were found in the Baythroid treatment in the large plot EUP test in 1997 as compared to the Regent treatment (Figure 5). However, numbers of plant bugs found in the Regent treatment were not significantly different from the number found in the Vydate treatment. The untreated check had significantly higher seasonal averages of plant bugs than the 3 insecticide treatments in 1998 (Figure 6). Although mean numbers of plant bugs did not differ significantly among the 3 insecticide treatments, lower mean numbers were found in the Vydate and Regent treatments as compared to the Baythroid treatment. Lint yield in the large plot EUP trial in 1997 in the Regent treatment [0.05 lb (AI)/acre] was significantly higher than that in treatments with Vydate [0.25 lb (AI)/acre] and Baythroid [0.03 lb (AI)/acre] (Figure 7). The untreated check in 1998 had a significantly lower yield than the yields in the Regent, Baythroid, and Vydate treatments (Figure 8). Yield in the Regent treatment was significantly higher than the yields in the Vydate and Baythroid treatments.

Aerially Applied EUP Test

In 1998 in the aerial applied EUP (Figure 9) there was no differences in seasonal averages of plant bugs in the treatments of Regent [0.05 lb (AI)/acre] and Vydate [0.25 lb (AI)/acre]. Populations of both treatments were significantly lower than the untreated check. Also during 1998 (Figure 10), when Regent [0.25 lb (AI)/acre] and Vydate [0.25 lb (AI)/acre] were applied by air lint yields did not differ. Lint yield in the untreated check was lower than both treatments.

Summary

Plant bug control with both unregistered insecticides, Actara and Regent, was as good or better than the control obtained with the standard insecticides that they were tested with in the small plot EUP tests. Harvested lint yields were slightly greater with Regent [0.05 lb AI/acre] than other treatments in both years. In the large field plot EUP trials, Regent had lower mean numbers of plant bugs than the Baythroid or Vydate treatments. However, the difference was significant only for the Baythroid treatment in 1997. During both years, lint yields were slightly greater with Regent than that of Vydate and Baythroid. Actara and Regent both represent new classes of insecticides. In the present study, both insecticides were found to be very effective in controlling tarnished plant bugs in cotton. Because of the widespread insecticide resistance found in plant bugs in the mid-south, the registration of both insecticides would greatly help in the control and management of resistance in this pest.

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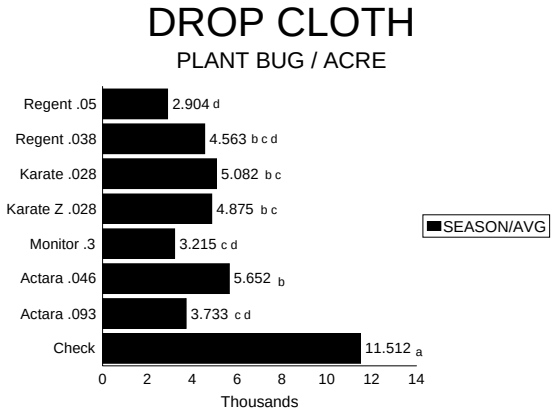

Figure 1. Seasonal averages of tarnished plant bugs in small plot insecticide trial, 1997.

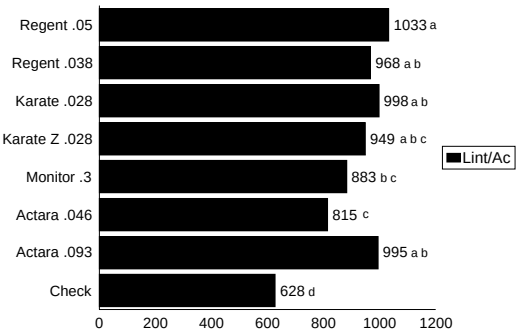

Figure 2. Lint yield for small plot tarnished plant bug trial, 1997.

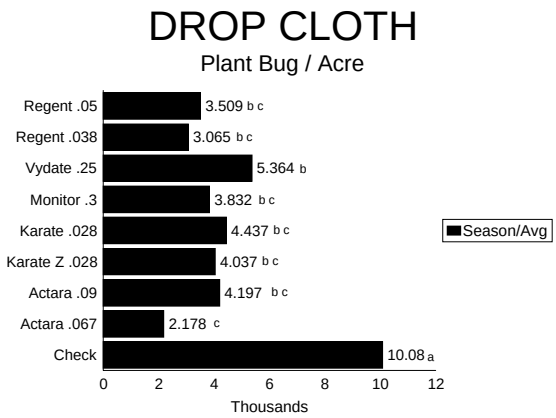

Figure 3. Seasonal averages of tarnished plant bugs in small plot insecticidal trial, 1998.

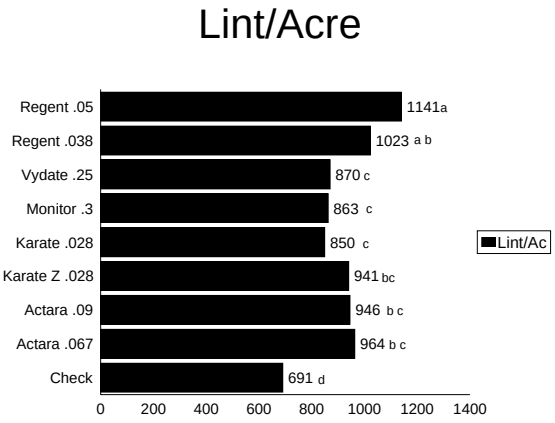

Figure 4. Lint yield for small plot tarnished plant bug trial, 1998.

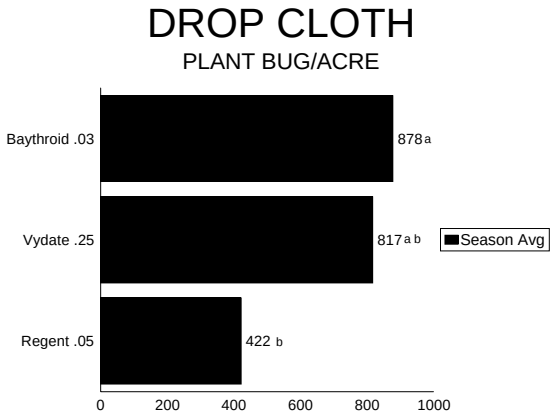

Figure 5. Seasonal averages of tarnished plant bugs in large plot EUP trial, 1997.

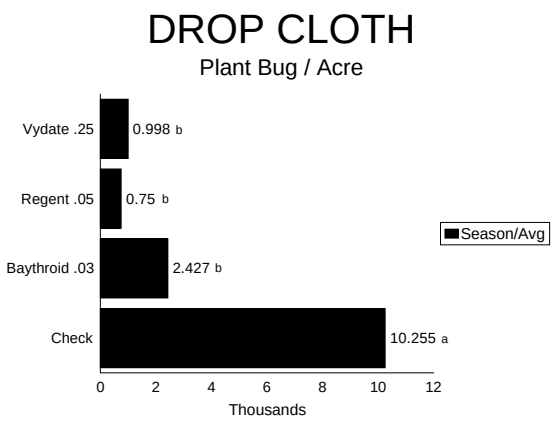

Figure 6. Seasonal averages of tarnished plant bugs in large plot EUP trial, 1998.

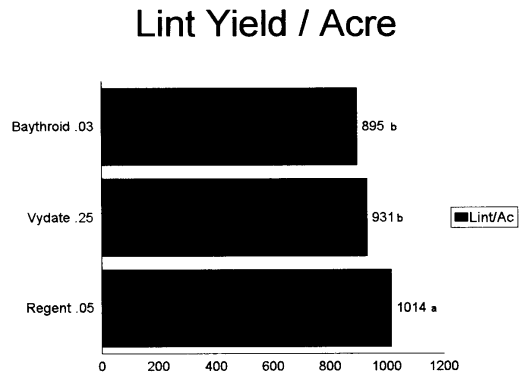

Figure 7. Lint yield for large plot tarnished plant bug trial, EUP 1997.

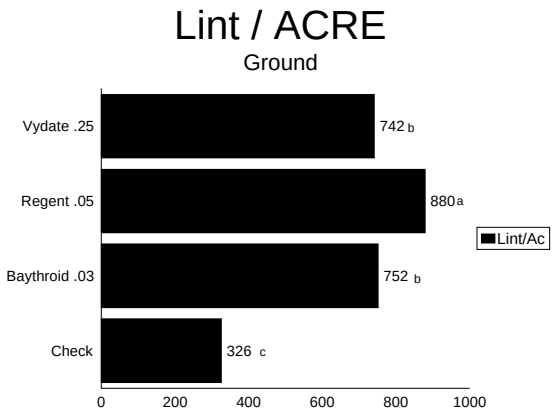

Figure 8. Lint yield for large plot tarnished plant bug trial, EUP 1998.

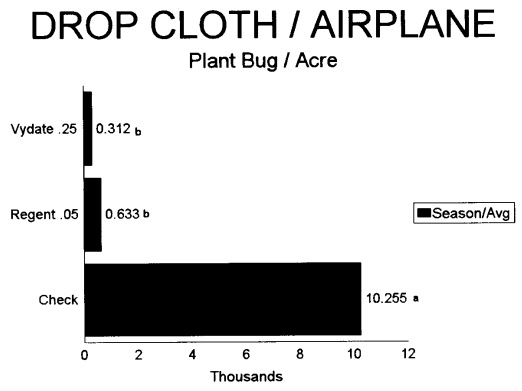

Figure 9. Seasonal averages of tarnished plant bugs in aerial applied EUP trial, 1998.

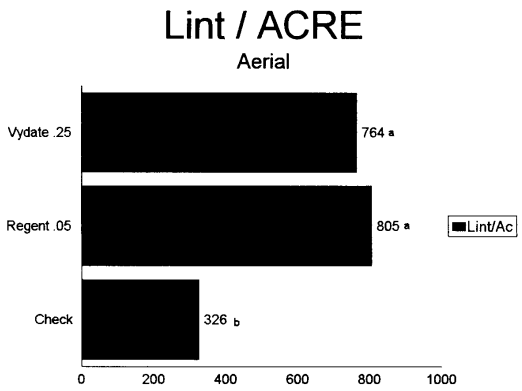

Figure 10. Lint yields for aerial applied EUP trial, 1998.