MANAGING TARNISHED PLANT BUG POPULATIONS IN COTTON IN ARKANSAS

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Abstract

The tarnished plant bug is a major pest of cotton in the mid-Southern United States. Increasing levels of insecticide resistance has been measured in this important pest. It is important to evaluate possible methods of delaying resistance development, such as combining and/or rotating different classes of insecticide chemistries and their efficacy against this insect. Trials were conducted in 2012-2013 looking at insecticide combinations and rotations and their efficacy against tarnished plant bugs. Results show that combinations and/or rotations did increase efficacy in some, but not all instances. All insecticide treatments did significantly increase yield over the untreated check in both years.

Introduction

The tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is one of the most important pests of cotton in Arkansas and the mid-Southern United States (Williams 2013). Applying recommended insecticides when bugs reach treatment level is the most commonly used options to control this pest (Studebaker 2013). However, increasing levels of resistance to insecticides are beginning to make some chemistry less effective (Hollingsworth et al. 1997, Holloway et al. 1998, Snodgrass and Scott 1988, Snodgrass and Elzen 1995, Snodgrass 2006). Therefore, it is important to evaluate commonly used insecticides and combinations of these insecticides for their efficacy in controlling tarnished plant bugs. Two efficacy trials were conducted in 2012 and 2013 in NE Arkansas against tarnished plant bug. In both trials, tank-mixes of various chemistries and rotations of different chemistries were evaluated.

Materials and Methods

Both trials were conducted at the Northeast Research and Extension Center, Keiser, AR. Trial 1 was conducted in 2012 and Trial 2 was conducted in 2013. Plots were 8-rows wide by 50-ft long. Treatments were replicated 4 times arranged in a randomized complete block design. Treatments were applied with a high clearance sprayer calibrated to deliver 10 gpa through 2 hollow cone nozzles per row. Plots were sprayed when tarnished plant bug numbers reached 3 per 5 row feet. Plant bug numbers were estimated by taking 2 shake sheet samples per plot at 3, 6, 7, and 11 days after application. When treatments reached threshold again, applications were repeated. A total of 3 applications were applied in trial 1 and 2 applications in trial 2. All plots were taken to yield by harvesting the center 4 rows of each plot. All data were analyzed using Agriculture Research Manager (ARM) version 8 software (Gylling Data Management). Means were separated at P=0.05 level.

Results and Discussion

In 2012, all treatments significantly reduced tarnished plant bug numbers by 3 and 6 days after treatment (Table 1). Numbers did rebound above treatment level by 6 DAT 2 (Table 1). There did not appear to be any benefit to tank mixes or rotation of chemistries. All treatments did significantly increase yield (Table 1).

Table 1. Tarnished plant bug counts and yields from Trial 1.

Treatment/form.	Rate/ acre (oz. form.)	App. code	No. TPB (nymphs + adults)/10 row feet 3 DAT-A	6 DAT-A	3 DAT-B	6 DAT-B	7 DAT-C	11 DAT-C	Seed Cotton Yield lb/acre
Untreated			14.1 a	17.4 a	12.1 a	17.5 a	15.5 a	9.9 a	1414 b
Bidrin 8 EC alt.	8.0	A, C	5.7 b	4.3 b	2.8 b	9.8 b	5.8 b	2.0 bcd	2335 a
w/Transform 50WG	1.5	B							
Acephate 97 S alt.	16	A, C	5.7 b	6.5 b	0.7 b	9.5 b	5.5 b	1.5 cd	2352 a
w/Transform 50WG	1.5	B							
Bidrin 8 EC	8.0	A, C	8.5 b	6.0 b	0.5 b	7.3 b	5.8 b	0.4 d	1970 a
+ Diamond 4 EC alt.	6.0	A, C							
w/Transform 50WG	1.5	B							
Acephate 97S	16	A, C	8.8 b	5.6 b	1.1 b	8.5 b	4.8 b	2.2 bcd	2205 a
+ Diamond 4 EC alt.	6.0	A, C							
w/Transform 50WG	1.5	B							
Centric 40 WG	2.5	A, C	5.9 b	8.3 b	0.6 b	10.3 b	7.3 b	3.8 bc	2200 a
+ Diamond 4 EC alt.	6.0	A, C							
w/Transform 50WG	1.5	B							
Transform 50 WG	1.5	A, C	5.9 b	3.0 b	0.4 b	7.0 b	8.8 b	6.1 bc	2168 a
alt. w/Bidrin 8 EC	8.0	B							
Bidrin 8 EC	8.0	A, C	5.9 b	4.2 b	1.2 b	11.5 b	6.8 b	4.1 bc	2310 a
+Transform 50 WG	1.5	A, C							
alt. w/Acephate 97S	16	B							
Acephate 97S	16	A, B, C	5.9 b	4.8 b	1.2 b	12.8 b	5.8 b	5.0 bc	2212 a
P>F			<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01

Means within a column followed by the same letter do not significantly differ (*P*=0.05, FPLSD).

In 2013 there was unusually high rainfall during the month of July when tarnished plant bug numbers were high, making it difficult to make timely applications and evaluations. The excessive rainfall also adversely affected yields (Table 2). There was a rainfall event within 24 hours of the first application which did seem to affect the Transform applications more than the other treatments (Table 2). In general, it appears that those treatments in combination with Diamond seemed to fare better under the adverse conditions experienced in this trial.

Table 2. Tarnished plant bug counts per 10 row feet and yields from Trial 2.

Treatment/form.	Rate/ acre oz. form.	App. code	4 DAT-A	7 DAT-A	5 DAT-B	11 DAT-B	Seasonal Total	Seed Cotton lbs/acre
Untreated			12.5 a	11.8 a	11.5 a	15.5 a	51.5 a	433.6 b
Bidrin 8 EC alt.	8	A	5.0 bc	3.3 d	5.8 bc	11.5 ab	25.4 bc	830.5 a
w/Transform 50WG	1.5	B						
Bidrin 8EC +	8	A	5.4 bc	3.5 d	4.0 bc	10.8 b	23.0 bc	761.9 a
Diamond 4 EC alt. w/	16	B						
Transform 50 WG	1.5	B						
Bidrin 8 EC	8	A	4.5 bc	5.5 cd	3.8 bc	8.3 bc	22.2 bc	715.4 a
+ Diamond 4 EC alt.	6	A						
w/Transform 50WG	1.5	B						
+ Diamond 4 EC	6	B						
Transform 50 WG +	1.5	A	2.9 bc	10.3 ab	8.0 ab	8.3 bc	29.9 b	808.5 a
Bidrin 8 EC	8	B						
Transfor 50 WG alt.	1.5	A	7.0ab	8.0 abc	3.0 c	4.5 cd	22.2 bc	886.9 a
w/ Bidrin 8 EC +	8	B						
Diamond 4 EC	6	B						
Transform 50 WG +	1.5	A	2.8 c	5.5 cd	5.8 bc	7.3 bcd	21.1 bc	774.2 a
Diamond 4 EC alt. w/	6	A						
Bidrin 8 EC +	8	B						
Diamond 4 EC	6	B						
Centric 40 WG alt.	2.5	A	4.9 bc	6.8 bcd	4.5 bc	73.5 d	19.2 c	759.5 a
w/ Transform 50 WG	1.5	B						
+ Bidrin 8 EC	8	B						
P>F			<0.01	0.01	<0.01	<0.01	<0.01	<0.01

Means within a column followed by the same letter do not significantly differ (*P*=0.05, FPLSD).

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References

Agriculture Research Manager version 8. 2012. Gylling Data Management, Inc. Brookings, South Dakota.

Hollingsworth, R.G., D.C. Steinkraus and N.P. Tugwell. 1997. Response of Arkansas populations of tarnished plant bugs (Heteroptera: Miridae) to insecticides, and tolerance differences between nymphs and adults. J. Econ. Entomol. 90:21-26.

Holloway, J.W., B.R. Leonard, J.A. Ottea, J.H. Pankey, J.B. Graves and G. Snodgrass. 1998. Insecticide resistance and synergism of pyrethroid toxicity in the tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), pp. 947-949. *In* Proc. 1998 Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Snodgrass, G.L. and W.P. Scott. 1988. Tolerance of the tarnished plant bug to dimethoate and acephate in different areas of the Mississippi Delta, pp. 294-295. *In* Proc. 1988 Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Snodgrass, G.L. and G.W. Elzen. 1995. Insecticide resistance in a tarnished plant bug population in cotton in the Mississippi Delta. Southwestern Entomol. 20:317-323.

Snodgrass, G.L. 2006. Status of resistance in tarnished plant bug, pp. 1633-1638. *In* Proc. 2006 Beltwide Cotton Conf., National Cotton Council, Memphis, TN.

Studebaker, G.E. 2013. Cotton insect control, pp. 66-76. *In* Insecticide recommendations for Arkansas, Univ. of Arkansas Div. of Ag publication MP144, Little Rock, AR.

Williams, M.R. 2013. Cotton insect losses 2012. p. 546–586. *In* Proc. Of the 2013 Beltwide Cotton Conf., National Cotton Council, Memphis, TN.