Influence of BIDRIN® and BIDRIN® XP II™ for Control of Tarnished Plant Bugs in Cotton

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Abstract

Regional studies were initiated to examine the effects of Bidrin® and Bidrin® XP™ II on tarnished plant bug (TPB) populations in cotton. During 2012, 14 field trials were conducted by University or Extension scientists located in AL, AR, LA, MO, MS and TN. TPB counts were roughly 3 to 7 fold higher than the established action threshold. Insecticide treatments provided a significant reduction in TPB compared with the untreated control (UTC), but most differences among insecticides were not significant. Sequential applications of Bidrin and other insecticide combinations applied during early bloom reduced TPB by 73% to 82% compared with the UTC, and differences among insecticide combinations were small. Applications at mid-bloom of Bidrin XP II and combinations based on Bidrin or Bidrin XP II averaged fewer TPB after first and second application compared with Endigo®, Leverage® 360, and Athena™. Adding Diamond® or Transform™ to Bidrin or Bidrin XP II consistently increased TPB control above Bidrin XP II alone. Findings from 2012 replicated trials document that Bidrin and Bidrin XP II are very useful tools for managing infestations of TPB in cotton.

Introduction

The tarnished plant bug (TPB), *Lygus lineolaris* (Palisot de Beauvois) is a primary pest in cotton that consistently infests cotton and causes economic losses. Insecticides are a key tool for reducing the impact on TPB infestations in cotton. Bidrin XP II, a premix of the dicrotophos (Bidrin) and bifenthrin (Discipline®), pairs the well-established efficacy of Bidrin against pests with piercing and sucking mouthparts with the pyrethroid bifenthrin, known to be particularly active on Lepidopteran pests. This combination is a broad spectrum tool for control of insects in mid to late season cotton. Regional studies were initiated by University or Extension scientists to examine the effects of Bidrin and Bidrin XP II on TPB infesting cotton. Bidrin-based combinations and sequential treatments were compared with commercially available products. Findings are reported.

Materials and Methods

Design. Each trial was established as a randomized complete block design with four replications. Plots contained 4-8 treated rows of cotton (50 ft. long). Trial locations are summarized in Table 1. Plant growth, weed, and pest management inputs were administered according to locally accepted practices.

Application. Trial program was partitioned into two protocols. Project 12C03I043 trials evaluated sequential applications of insecticides (Tables 1 and 2). First application was initiated during early bloom after reaching a threshold of 3 TPB per 5 row ft., and a second application was made approximately 7 days later. For Project 12C03I044 trials, applications of premixtures and product combinations were made at least 3 weeks into flowering (mid-bloom) and after reaching a threshold for TPB (Tables 1 and 3). Protocol requested subsequent applications on 14-day interval as needed.

Field Observations. Counts of total immature and adult TPB, as numbers per sample of 10 row ft. per plot with a black 2.5 ft. drop cloth, were requested at 0, 3 and 7 days after each application. An additional count at 12 days after second application was requested in 12C03I043 trials.

Data Analysis. Although some locations were excluded from analysis due to light infestations of tarnished plant bug (TPB) and post-treatment observation periods were inconsistent among cooperators, a core group of trials were analyzed for insecticide performance against TPB. After square root transformation, data were subjected to an analysis of variance and Student-Newman-Keuls means separation test (p=0.05, protected).

Table. 1 Summary of trial locations investigating Bidrin® and Bidrin XP II™ for control of tarnished plant bugs (TPB) in replicated cotton field trials, 2012.

Cooperator Institution	Trial Location (City, State)	Cotton Variety	Planting Date	Reason for Excluding from Analysis
Efficacy of Bidrin combinations for control of tarnished plant bug in cotton. Protocol 12C03I043				
Auburn University	Shorter, AL	PHY 375 WRF	4/30/2012	
University of Arkansas	Keiser, AR	UA48	5/9/2012	
University of Arkansas	Marianna, AR	DP 0912 B2RF	5/10/2012	
Louisiana State University	St. Joseph, LA	DP 1133 B2RF	5/8/2012	Second application not made
Mississippi State University	Glendora, MS	ST 5288 BG2F	5/1/2012	
Mississippi State University	Stoneville, MS	ST 5458 B2F	5/1/2012	Second application not made
University of Missouri	Portageville, MO	DP 0912 B2RF	5/16/2012	Very light infestation of TPB
University of Tennessee	Jackson, TN	PHY 375 WRF	5/11/2012	
Efficacy of Bidrin XP II for control of tarnished plant bug in mid to late bloom cotton. Protocol 12C03I044				
University of Arkansas	Marianna, AR	DP 0912 B2RF	5/10/2012	
Louisiana State University	St. Joseph, LA	DP 1133 B2RF	5/8/2012	Very light infestation of TPB
Mississippi State University	Glendora, MS	ST 5288 B2F	5/1/2012	
Mississippi State University	Stoneville, MS	PHY 375 WRF	6/6/2012	
University of Missouri	Portageville, MO	DP 0912 B2RF	5/16/2012	Very light infestation of TPB
University of Tennessee	Lauderdale Co, TN	FM 9250 LL	5/10/2012	

Table. 2 Treatment list of 12C03I043 insecticide protocol: Efficacy of Bidrin combinations for control of tarnished plant bug in cotton.

Insecticide	Active Ingredients	Product Rate (oz./acre)
Untreated Control	---	---
Bidrin® 8E fb Transform™ 50WG	Dicrotophos fb Sulfoxaflor	8 fb 1.5 wt/a
Orthene® 97S fb Transform™ 50WG	Acephate fb Sulfoxaflor	16 wt/a fb 1.5 wt/a
Bidrin® 8E + Diamond® 0.83E fb Transform 50WG	Dicrotophos + Novaluron fb Sulfoxaflor	8 + 6 fb 1.5 wt/a
Orthene® 97S + Diamond® 0.83E fb Transform™ 50WG	Acephate + Novaluron fb Sulfoxaflor	16 wt/a + 6 fb 1.5 wt/a
Centric® 40WG + Diamond® 0.83E fb Bidrin® 8E	Thiamethoxam + Novaluron fb Dicrotophos	2.5 + 6 fb 8
Transform™ 50WG fb Bidrin® 8E	Sulfoxaflor fb Acephate	1.5 wt/a fb 8
Bidrin® 8E + Transform™ 50WG fb Orthene® 97S	Dicrotophos + Sulfoxaflor fb Acephate	8 + 1.5 wt/a fb 16 wt/a
Orthene® 97S fb Orthene® 97S	Acephate fb Acephate	16 wt/a fb 16 wt/a

Table. 3 Treatment list of 12C03I044 insecticide protocol: Efficacy of Bidrin XP II for control of tarnished plant bug in mid to late bloom cotton.

Insecticide	Active Ingredients	Product Rate (oz./acre)
Untreated Control	---	---
Bidrin® XP II™	Dicrotophos + Bifenthrin	12.8
Endigo® 2.06ZC	Thiamethoxam + Lambda-cyhalothrin	5
Leverage 360 + NIS	Imidacloprid + Beta-cyfluthrin + NIS	3.2 + 0.25% v/v
Athena™	Avermectin B1 + Bifenthrin	13.5
Bidrin® 8E + Diamond® 0.83E	Dicrotophos + Novaluron	8 + 6
Bidrin® 8E + Transform™	Dicrotophos + Sulfoxaflor	8 + 1.5
Bidrin® XP II™ + Diamond® 0.83E	Dicrotophos + Bifenthrin + Novaluron	12.8 + 6
Bidrin® XP II™ + Transform™	Dicrotophos + Bifenthrin + Sulfoxaflor	12.8 + 1.5

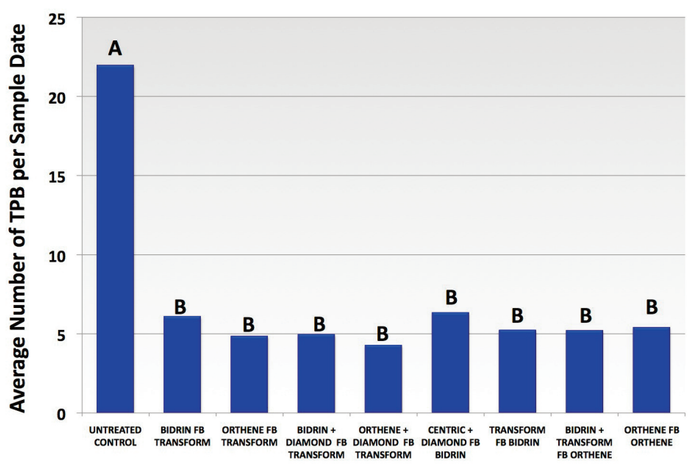

Figure 1. Seasonal mean numbers of tarnished plant bugs (TPB) per sample date found in cotton following insecticide treatment across 12C03I043 trial locations. Count is average of total numbers of immatures and adults per 10 row feet of drop cloth per sample date. Bars with the same letter above them are not significantly different (protected Student-Newman-Keuls at P<0.05). Data analyzed after square root transformation.

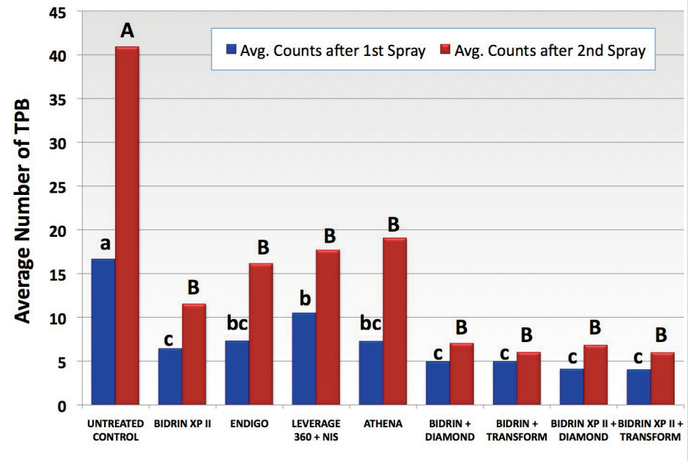

Figure 2. Mean numbers of tarnished plant bugs (TPB) (immatures and adults per 10 row feet of drop cloth) found in cotton following insecticide treatment across 12C03I044 trial locations. Within a bar color, bars with the same letter above them are not significantly different (protected Student-Newman-Keuls at P<0.05). Data analyzed after square root transformation.

Results and Discussion

Key Findings from 12C03I043: Efficacy of Bidrin combinations for control of tarnished plant bug (TPB) in cotton.

- Seasonal average counts of TPB in Untreated Control (UTC) plots were 3-4 times above the treatment threshold of 3 TPB per 5 row ft. (Figure 1).
- All sequential treatments averaged significantly less TPB compared with UTC. Each combination of insecticides averaged a similar reduction in TPB counts, and differences among treatments were small.

Key Findings from 12C03I044: Efficacy of Bidrin XP II for control of tarnished plant bug (TPB) in mid to late bloom cotton.

- Following first and second applications of insecticides, average counts of TPB in Untreated Control (UTC) plots were 3 and 7 fold higher, respectively, than threshold (Figure 2).
- Across all trials assessing the efficacy of Bidrin XP II alone and combined with Diamond and Transform, all insecticide treatments averaged significantly less TPB compared with UTC following each application.
- Following the second application, Bidrin XP II averaged the lowest TPB counts among the premixture products of Endigo, Leverage 360, and Athena. Under intense TPB pressure, combinations of Bidrin or Bidrin XP II with either Diamond or Transform averaged the lowest counts among all insecticide treatments, which translated to 83 to 85% control.
- Adding Diamond or Transform to Bidrin or Bidrin XP II consistently offered a small increase in TPB control compared with Bidrin or Bidrin XP II alone.

Conclusions

Across replicated, small plot trials implemented to investigate insecticide efficacy against tarnished plant bug (TPB) in cotton, counts of TPB in the untreated control were typically 3 to 7 fold greater than the established threshold of 3 TPB per 5 row ft., which offered a strong challenge to insecticides evaluated in these studies. Combinations of Bidrin with other insecticides applied sequentially during early bloom provided insect control similar to comparison treatments. Bidrin XP II provided slightly better control compared with other premix insecticides (Endigo, Leverage 360, and Athena), and combinations of Diamond or Transform with Bidrin XP II and Bidrin averaged the lowest TPB counts following the first and second applications. Results from 2012 field trials affirm previous findings; Bidrin and Bidrin XP II are very useful tools for managing infestations of TPB in cotton.

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