

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

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Abstract

The tarnished plant bug is a very significant insect pest of cotton. In 2011, US-EPA registered Bidrin® XP II™, a new premixture of dicrotophos and bifenthrin, for use in cotton. A vital component of developing a new product in production agriculture is evaluation by independent agricultural consultants in a commercial setting. Regional studies consisting of side by side demonstration trials were initiated to examine the effects of Bidrin® XP II™ on tarnished plant bug populations and other pests in cotton. During 2011 and 2012, 54 demonstration trials were conducted by independent crop consultants located in AR, LA, MO, MS, SC, TN, and VA. Numbers of surviving tarnished plant bug and incidence of stink bug damage to cotton bolls was significantly lower with Bidrin XP II than comparison treatments, including premixtures (Endigo® and Leverage®) and combinations (acephate + pyrethroid and abamectin + pyrethroid). Results from 2011 and 2012 field trials demonstrate that Bidrin XP II is a useful tool for managing infestations of tarnished plant bug and other pests 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 of TPB infestations in cotton. Bidrin XP II, a premix of 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.

Product assessment by crop protection professionals in commercial situations is a significant component of developing new products and technologies in agriculture. In 2011 and 2012, paired treatment demonstration trials were initiated across the mid-south region to examine the effects of Bidrin XP II on cotton infested with tarnished plant bugs and other pests, such as stink bugs, Lepidopteran pests, and spider mites. In each commercial-scale test, insecticide treatments were applied with commercial equipment, and insect counts and plant damage were assessed by licensed, independent crop consultants. Findings are reported.

Materials and Methods

Design. Each trial was established as a large scale, paired comparison of Bidrin XP II and an insecticide premixture or combination that is commercially registered and offered for sale. Each site was planted with a locally adapted variety. Trial locations are summarized in Table 1 and Table 2. Plant growth, weed, and pest management inputs were administered according to locally accepted practices, and both plots within each trial were treated identically.

Application. Applications of Bidrin XP II at a rate of 10.5 or 12.8 fl. oz. per acre were made with commercial equipment. Treatment began at or after first bloom and after reaching a threshold for TPB, and comparison treatments were applied on the same day at commercially recommended use rates.

Field Observations. Counts of TPB, as numbers per 50 sweeps, were reported after treatment (post-count) in 2011 trials and before (pre-count) and after treatment in 2012. In six trials, TPB counts were reported per drop cloth, and counts were converted to per 50 sweeps using the ratios provided Multistate Evaluation of Tarnished Plant Bug Sampling Methods in Blooming Cotton. Consultants provided observations on other pests including stink bugs (percent damaged “quarter sized” bolls), aphids (# per terminal), spider mites, and Bollworms if present.

Data Analysis. Data were analyzed across locations within each year, and significant differences were determined using a paired t-test. Three locations from the trials from 2012 were excluded from analysis due to incomplete insect counts.

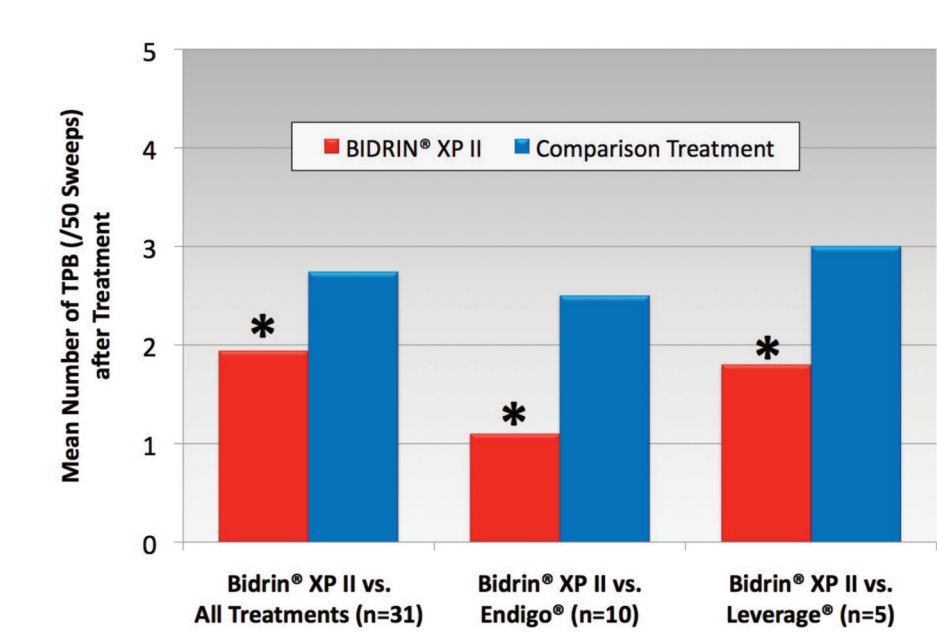


Figure 1. Mean numbers of tarnished plant bugs (TPB) after treatment with insecticides evaluated in Bidrin® XP II™ demonstration trial program in 2011. Count is average of numbers of TPB per 50 sweeps. N = sample size; based on paired t-test analysis, * indicates treatments are significantly different at P<0.05.

Table 1. Number of trial locations by state and year investigating Bidrin XP® II™ for control of tarnished plant bugs in demonstration cotton field trials.

State	2011	2012
Arkansas	14	14
Louisiana	1	2
Missouri	1	4
Mississippi	9	3
South Carolina	2	0
Tennessee	2	0
Virginia	2	0
Total	31	23

Table 2. Mean numbers of tarnished plant bugs (TPB) before (pre-count) and after (post-count) treatment with insecticides evaluated in Bidrin® XP II™ demonstration trial program in 2012. Count is average of numbers of TPB per 50 sweeps.

Comparison Treatment	Trials	Bidrin® XP II Success Rate*	Bidrin® XP II Success Rate*			
			Bidrin® XP II		Comparison Treatment	
			Pre-Count	Post-Count	Pre-Count	Post-Count
Acephate + Pyrethroid	9	89%	11.5	1.3	12.3	4.0
Endigo®	7	86%	8.4	2.4	8.8	6.3
Leverage®	2	100%	5.5	1.0	5.5	3.0
Abamectin + Pyrethroid	2	100%	7.6	2.8	7.6	3.8
Pooled (Total)	20	90%	9.4	1.8	9.9	3.8

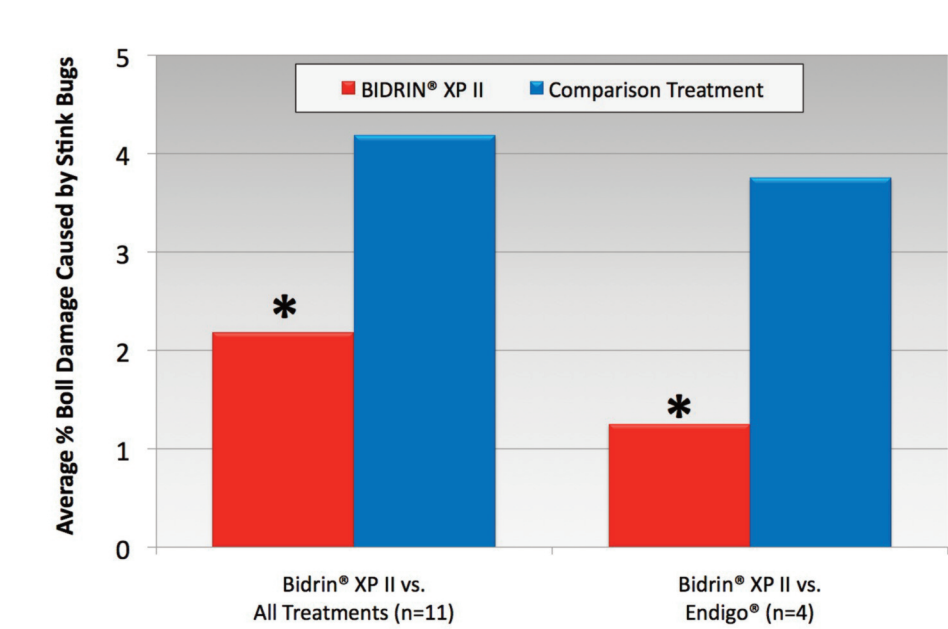


Figure 2. Mean cotton bolls (%) damaged by stink bugs following treatment with insecticides evaluated in Bidrin® XP II™ demonstration trial program in 2011. N = sample size; based on paired t-test analysis, * indicates treatments are significantly different at P<0.05.

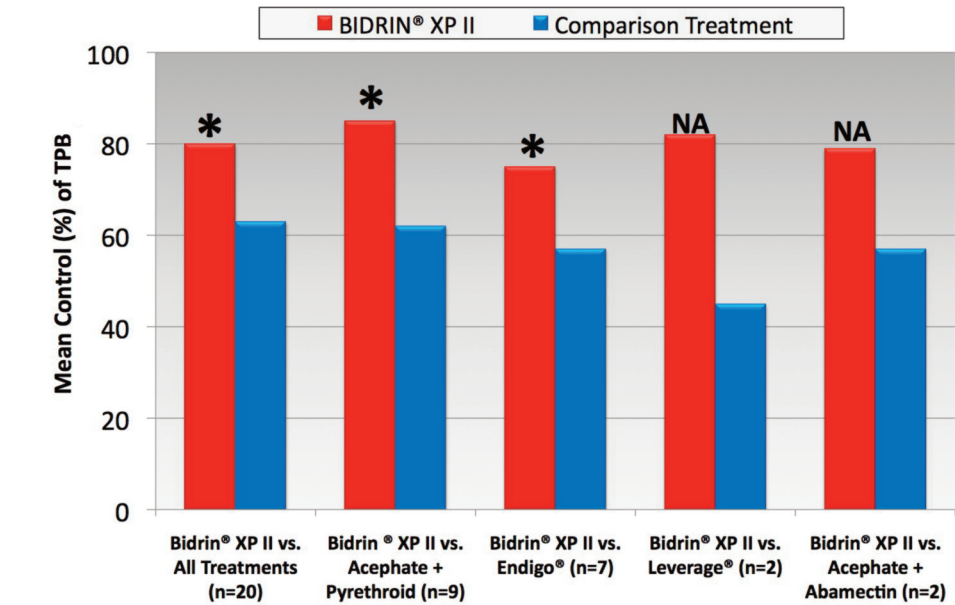


Figure 3. Mean control (%) of tarnished plant bugs (TPB) with insecticides evaluated in Bidrin® XP II™ demonstration trial program in 2012. Control calculated as percent difference before (pre-count) and after (post-count) treatment. N = sample size; NA = t-test not applicable due to limited sample size; based on paired t-test analysis, * indicates treatments are significantly different at P<0.05.

Table 3. Change in spider mite population from before to after treatment with insecticides evaluated in Bidrin® XP II™ demonstration trial program in 2012. Numbers based primarily on qualitative assessment of spider mite density.

Treatment	Trials	Change in Spider Mite Population after Treatment		
		Dropped	Unchanged	Increased
Bidrin® XP II™	12	8	4	0
Comparison Treatment	12	2	7	3

Results and Discussion

Key Findings from 2011 Trials:

- Whether compared among trial locations (n=31), with Endigo (n=10), or with Leverage (n=5), Bidrin XP II averaged significantly lower numbers of tarnished plant bug (TPB) than the comparison treatment (Figure 1).
- At eleven locations that observed stink bug damage to cotton bolls, Bidrin XP II averaged significantly less damage than all comparison treatments (n=11) and Endigo (n=4) (Figure 2).

Key Findings from 2012 Trials:

- Bidrin XP II averaged fewer TPB per 50 sweeps compared with acephate + pyrethroid, Endigo, Leverage, or abamectin + pyrethroid (Table 2).
- An alternative approach is to classify each paired comparison as a win or loss with a win meaning Bidrin XP II averaged fewer TPB than the comparison treatment. Depending upon the comparison, Bidrin XP II yielded a success rate of 86% to 100% (Table 2), which suggests good to excellent consistency for Bidrin XP II.
- In 2012, cooperators reported pre-treatment and post-treatment counts of TPB, and percent control of TPB was calculated (Figure 3). In three comparisons with sufficient sample size for a t-test, Bidrin XP II provided significantly greater control of TPB than the comparison treatment (all treatments, acephate + pyrethroid, and Endigo). This pattern held true for comparisons of Bidrin XP II with Leverage and acephate + abamectin.
- At twelve locations that observed spider mites, populations tended to decline with Bidrin XP II relative to comparison treatments (Table 3).

Conclusions

Evaluation of Bidrin XP II by crop protection professionals is an important step in defining and developing product expertise for production agriculture. Across two years of testing in a commercial evaluation program with crop consultants, Bidrin XP II consistently outperformed premixtures (Endigo and Leverage) and combinations (acephate + pyrethroid and abamectin + pyrethroid). Numbers of surviving tarnished plant bugs (TPB) and incidence of stink bug damage to cotton bolls was significantly lower with Bidrin XP II than comparison treatments. Results from 2011 and 2012 field trials confirm other research that Bidrin XP II is a useful tool for managing infestations of TPB and other pests in cotton.

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