PLANT BUG EFFICACY OVER TIME IN THE MIDSOUTHERN US

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Abstract

Data from a total of 232 tarnished plant bug efficacy trials conducted in Arkansas, Mississippi, and Tennessee from 2005 – 2019 were combined to evaluate insecticide performance over time. There were no significant declines in efficacy over the evaluated time period, however efficacy did vary from year to year. Data from 2012 to 2019 indicates that acephate, dicrotophos, sulfoxaflor, and tankmixes of bifenthrin plus dicrotophos or acephate, provide the greatest control of tarnished plant bug in cotton at 2-7 days after treatment.

Introduction

Tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is the most damaging insect pest of cotton in Arkansas totaling just over $68 million in losses plus cost in 2019 (Cook, 2020). Plant bugs are a difficult pest to manage in cotton with growers averaging 4.5 insecticide applications per acre treated. Few currently labeled insecticides provide effective control of plant bugs meaning growers must tank mix products with multiple modes of action to obtain an acceptable level of control. With few effective modes of action, insecticide resistance is an issue growers continue to face (Snodgrass, 2009; Parys, 2018). Comparing insecticide efficacy over time may allow us to better understand how efficacy changes from year to year and possibly what to anticipate in the future.

Methods

A total of 232 efficacy trials that were conducted from 2005 – 2019 in Arkansas, Mississippi, and Tennessee were combined for analysis. Plots were sprayed using a Mud-Master sprayer fitted with either 80-02 dual flat fan nozzles or TXVS-6 hollow cone nozzles with 19.5 inch spacing. Spray volume was 10 gal/a at 40 psi. Plot sizes were 12.5 ft (4 rows) by 40 ft. Insecticide classes, active ingredients, and the rates included in this study can be found in table 1. All products, formulations, and rates were standardized to lb ai/a. Insecticide rates within 10% of the most commonly used rate were combined with the more common rate. Plant bug densities were determined by using a 2.5 ft drop cloth and taking 2 samples per plot (10 row ft). Plant bug densities were standardized within each sample date as percent control relative to the untreated control. Only samples collected 2-7 days after treatment (DAT) were included in the reported means. Sample dates where plant bug densities were lower than threshold (6 per 10 row ft) in the untreated check were eliminated.

Results

At 2-7 DAT, acephate, dicrotophos, sulfoxaflor, and tankmixes of bifenthrin plus dicrotophos or acephate, provided the greatest mean control of tarnished plant bug (Figure 1). From 2006 to 2019 the mean percent control provided by acephate ranged from 86.4% in 2007 to 48.8% in 2014 (Figure 2). Bifenthrin efficacy ranged from a high of 65% control in 2007 to 36% in 2018 (Figure 3). Bifenthrin efficacy appeared to generally decline from 2007 to 2018, however efficacy did appear to improve in 2019. Dicrotophos efficacy ranged from 47% in 2007 to 92% in 2006 (Figure 4). Thiamethoxam efficacy was lowest in 2010 with a mean of 46% and was greatest in 2006 with a mean of 76% (Figure 5). Mean efficacy for imidacloprid ranged from 33% in 2010 to 67% in 2015 (Figure 6). Sulfoxaflor appeared to have the least year to year variability of all the evaluated insecticides with means ranging from 83% in 2011 to 60.6% in 2014 (Figure 7).

Table 1. Insecticide classes, common names, active ingredients, and rates included in analysis.

Insecticide class	Common Name	Active Ingredient	Rate (lbs ai/a)
Organophosphate	Orthene	Acephate	0.75
	Bidrin	Dicrotophos	0.5
Pyrethroid	Discipline	Bifenthrin	0.1
Carbamate	Vydate	Oxamyl	0.384
Pyridinecarboxamide	Carbine	Flonicamid	0.088
Sulfoxamine	Transform	Sulfoxaflor	0.047
Neonicotinoid	Intruder, Strafer	Acetamiprid	0.013
	Admire Pro	Imidacloprid	0.0625
	Centric	Thiamethoxam	0.05
Benzoylurea	Diamond	Novaluron	0.039

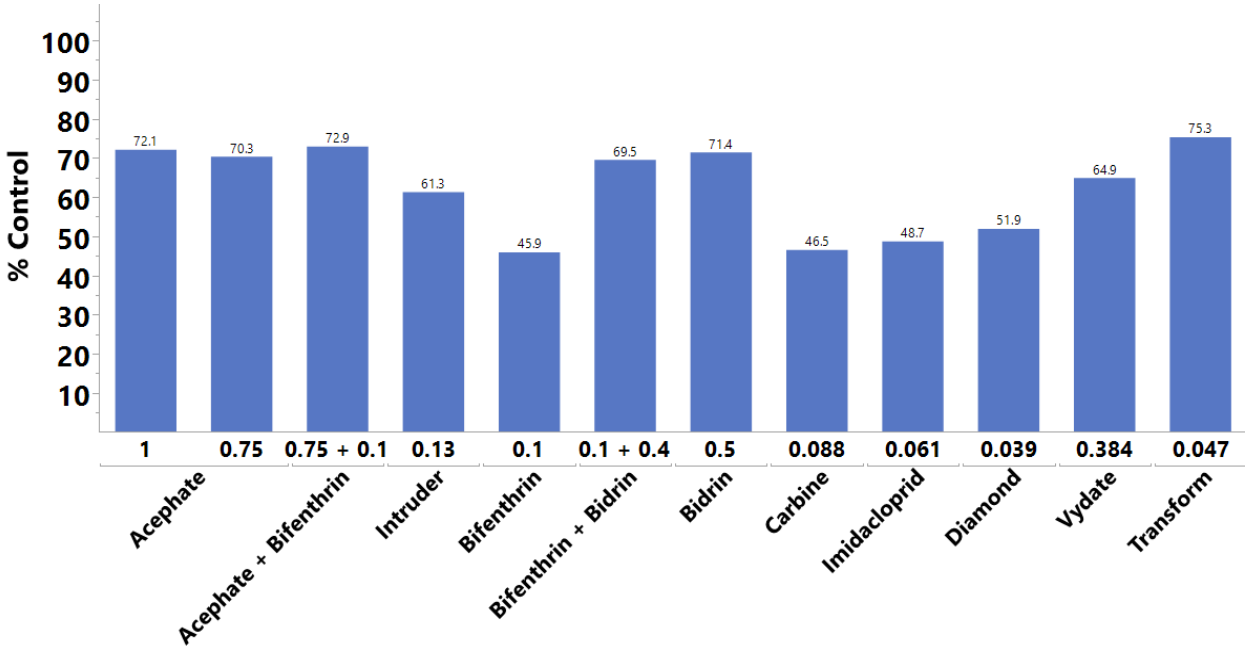

Figure 1. Mean efficacy of selected insecticides for control of tarnished plant bug 2-7 DAT in 2012 – 2019 in Arkansas, Mississippi and Tennessee.

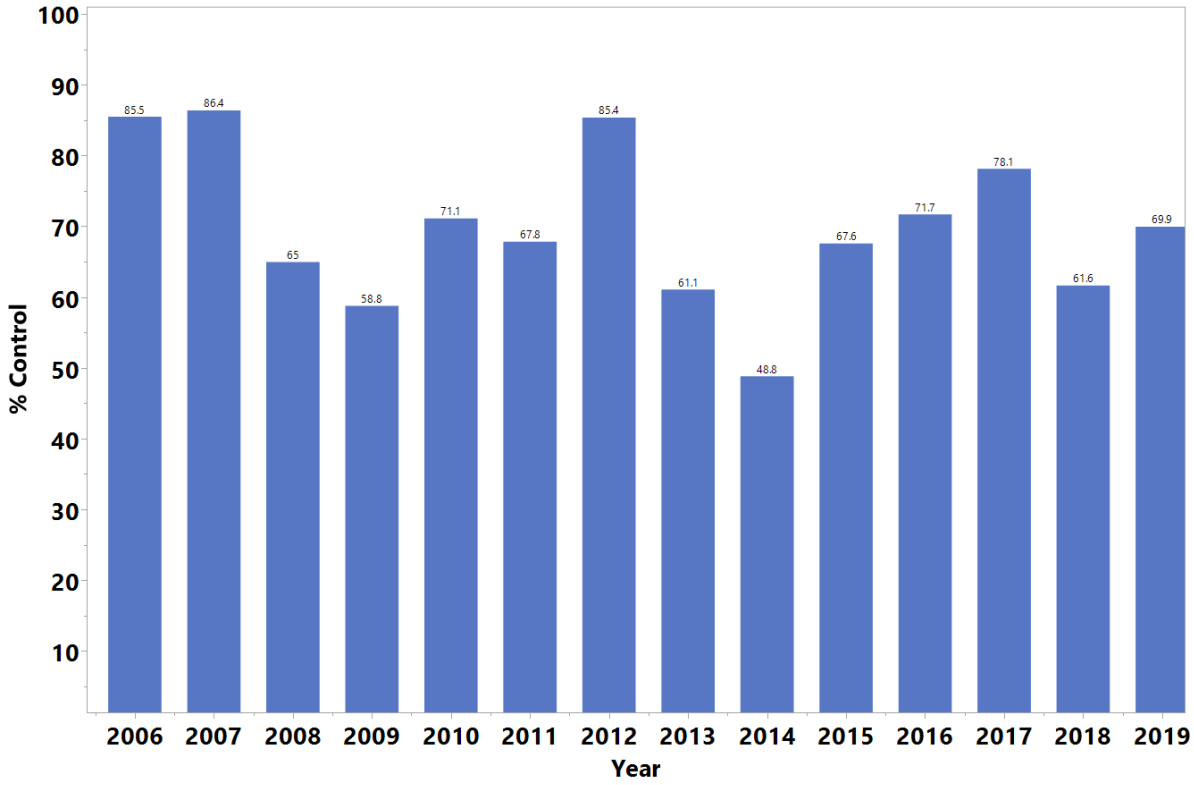

Figure 2. Mean acephate 0.75 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

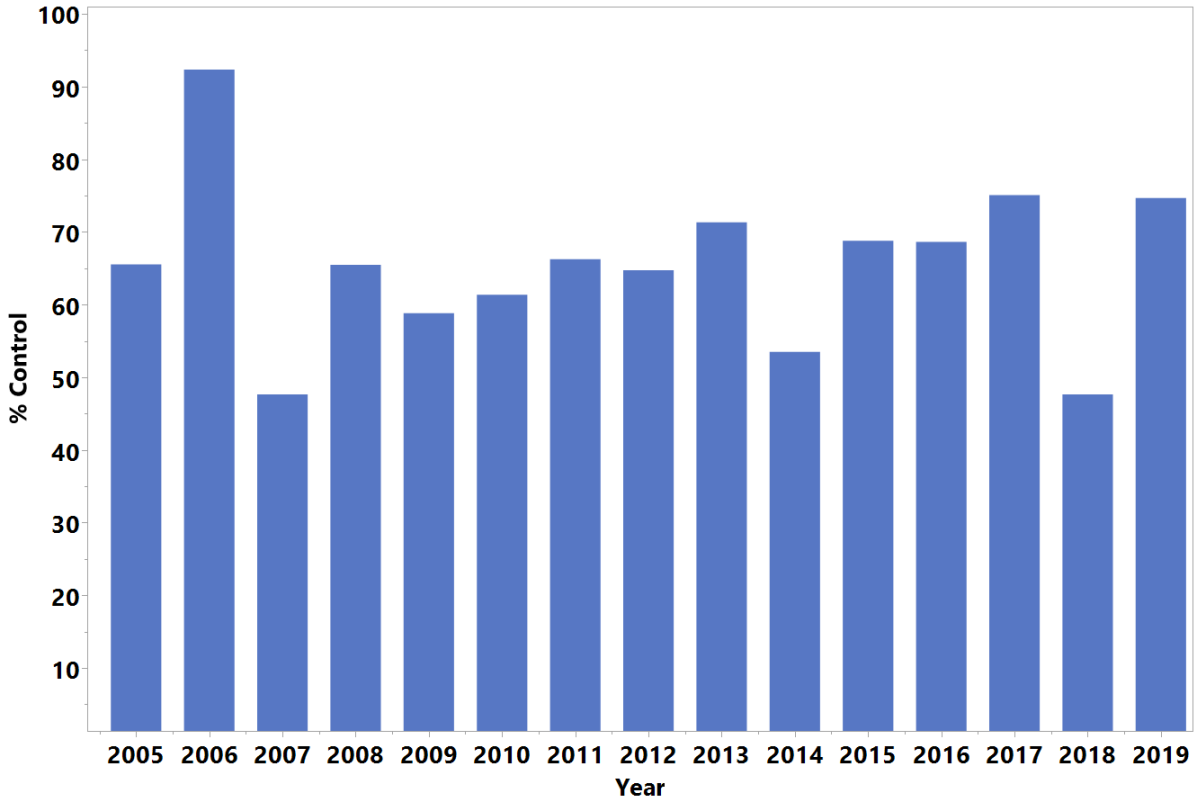

Figure 3. Mean dicrotophos 0.5 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

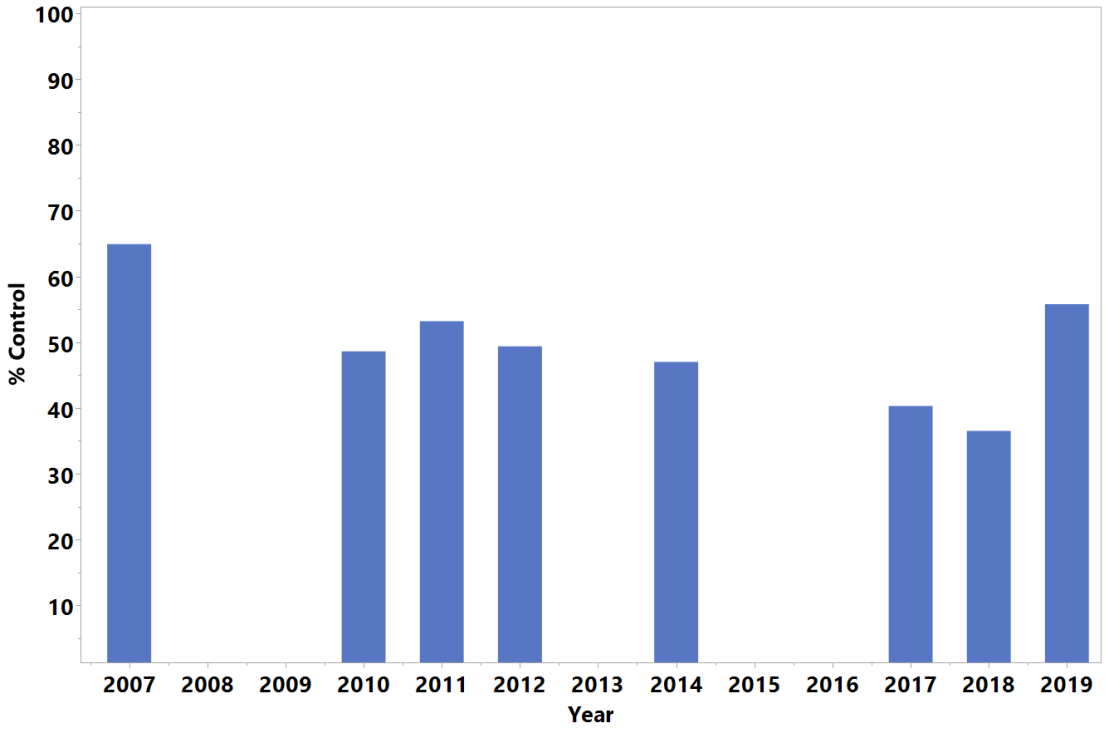

Figure 4. Mean bifenthrin 0.1 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

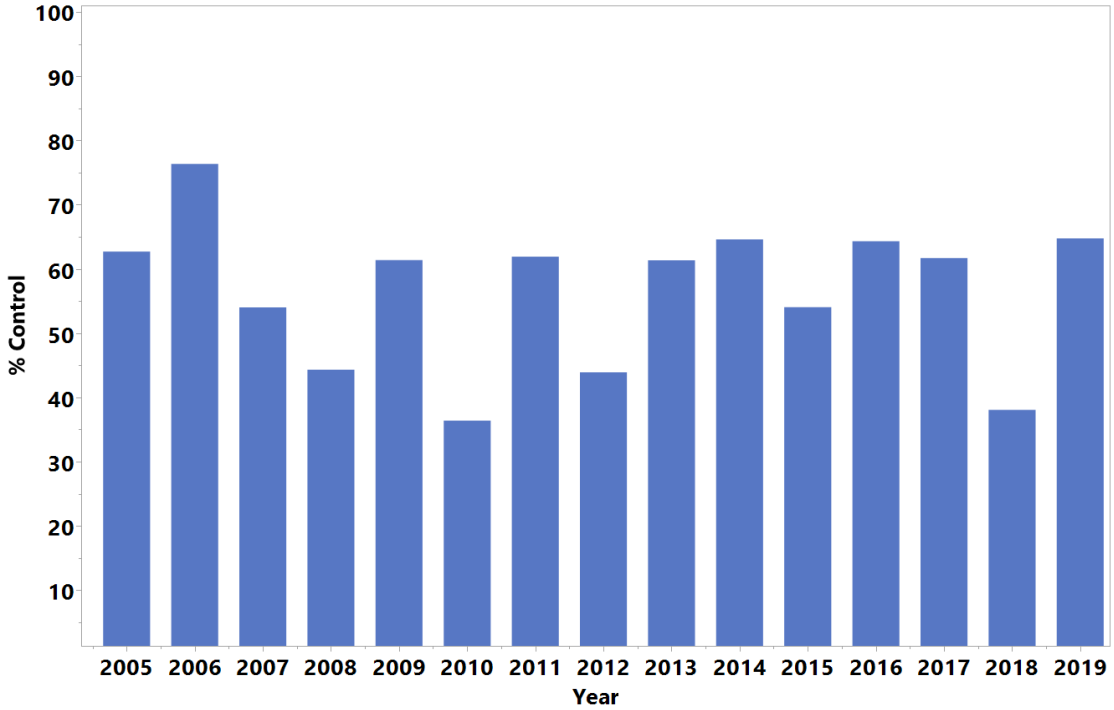

Figure 5. Mean thiamethoxam 0.05 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

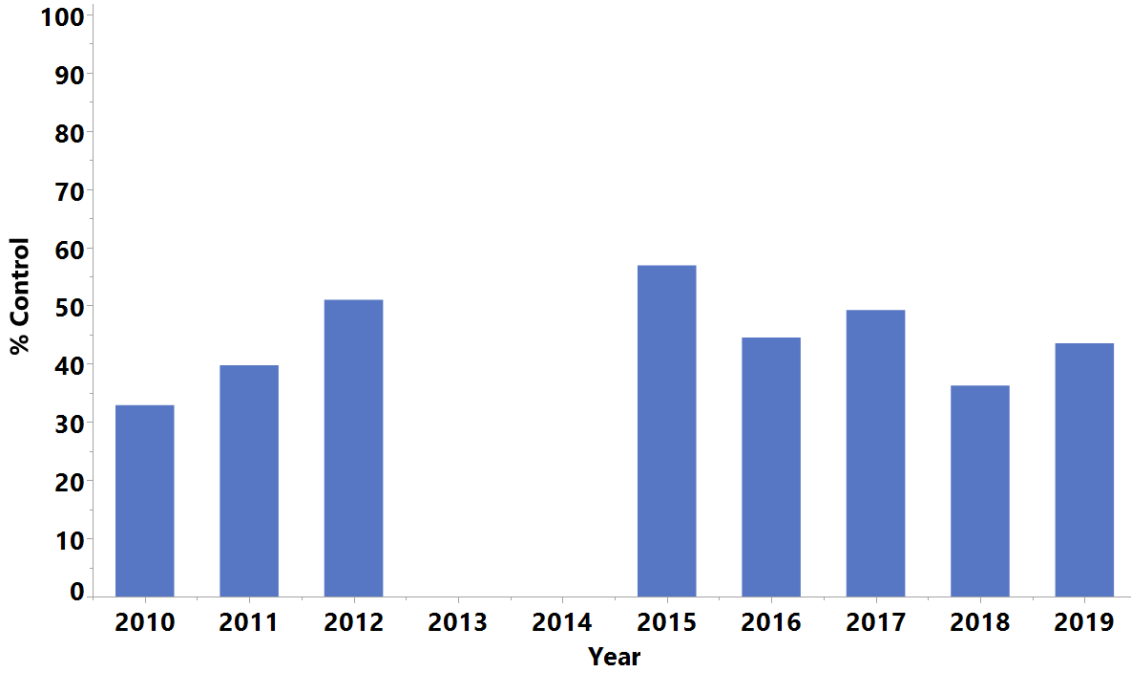

Figure 6. Mean imidacloprid 0.061 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

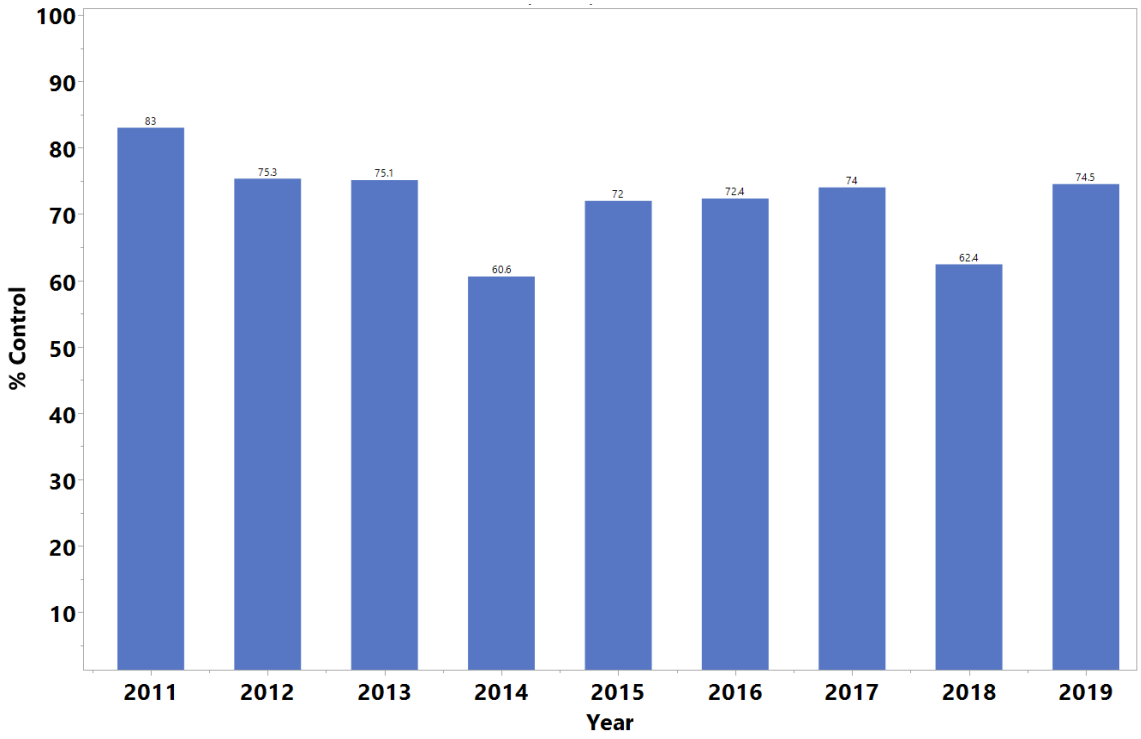

Figure 7. Mean sulfoxaflor 0.047 lb/a efficacy over time in Arkansas, Mississippi and Tennessee.

Summary

Acephate, dicrotophos, sulfoxaflor, and tankmixes of bifenthrin plus dicrotophos or acephate, provided the greatest mean control of tarnished plant bug from 2012-2019. Although no significant declines in efficacy were observed over the reviewed time period, this data provides insight on how insecticide efficacy can vary from year to year.

Acknowledgements

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References

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