SUMMARY OF INSECTICIDE EFFICACY TRIALS FOR CONTROL OF TARNISHED PLANT BUG IN LOUISIANA

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Abstract

Chemical control is the primary IPM tactic used for tarnished plant bug, *Lygus lineolaris* Palisot de Beauvois, management in Louisiana cotton. However, tarnished plant bug populations in Louisiana are currently demonstrating resistance to many recommended insecticides. During 2009, multiple field trials evaluated commercial and experimental insecticide efficacy against tarnished plant bug in Northeast Louisiana. Although the post-treatment efficacy ratings showed considerable variability, many of the products provided significant levels of control. Unfortunately, many of those same products did not consistently reduce numbers of tarnished plant bug nymphs below the action threshold level of two-three insects / five row ft. These results provide a summary of insecticide effectiveness and will be used to support the 2010 cotton IPM recommendations.

Introduction

Louisiana cotton, *Gossypium hirsutum* L., is subject to a complex of arthropod pests that are capable of reducing the economic value of this crop (Bagwell et al. 2005, Williams 2009). Hemipteran pests are an increasing problem in US. cotton, the most detrimental being *Lygus spp.* (Williams 2009). Factors influencing a shift from the most common yield-limiting problems with heliothines to the current problems with hemipteran pests include the wide-spread use of transgenic *Bacillus thuringiensis* (Bt) cotton cultivars that target heliothines, and the success of the U.S. boll weevil eradication programs (Roberts 1999; Williams 2008, 2009). These two factors have reduced the frequency of broad-spectrum insecticide applications to cotton fields (Roberts 1999).

In 2008, the plant bug (*Lygus spp*.) complex was ranked as the number one arthropod pest affecting U. S. cotton profits. The tarnished plant bug (TPB) has been a primary pest of cotton across the mid-southern United States for the past ten years. Cotton is most susceptible to economic injury caused by TPB after squaring is initiated, but remains vulnerable throughout all fruiting stages (Tugwell et al. 1979). Several IPM options are currently recommended to manage TPB, but chemical control is the primary tool (Bagwell 2005). Current recommendations in Louisiana are to apply insecticides for control of TPB when an action threshold of two-three insects per five row ft is reached. To compound this problem, Mid-South populations of TPB have demonstrated varying levels of resistance to pyrethroid, organophosphate, neonicotinoid, and cyclodiene insecticides (Snodgrass and Gore 2007). Therefore, the objective of this study was to summarize the efficacy of insecticides used to control TPB in Louisiana in 2009.

Materials & Methods

The performance of seventeen insecticides or insecticide combinations in selected formulations and rates were evaluated for efficacy against TPB in 2009 (Table 1).

Table 1. Insecticides evaluated against TPB in 2009.

Common Name	Trade Name(s)	Formulation(s)
Acephate	Orthene	97SP/90SP
Aceto Dicrotophos	---	8EC
Fanfare	Bifenthrin	2EC
Bifenthrin + Imidacloprid	Brigadier	2EC
Clothianidin	Belay	2.13EC
α-cypermethrin	Declare	0.86EC
Dicrotophos	Bidrin	8EC
Dinotefuron	Scorpion	3.24EC
Flonicamid	Carbine	50WG
Imidacloprid	Trimax Pro	4.44SC
Imidacloprid + Cyfluthrin	Leverage	2.7SE
Imidacloprid + β Cyfluthrin	Temprid / Leverage360	2.94SC
Λ-cyhalothrin	Warrior T	1SC
Λ-cyhalothrin + Thiamethoxam	Endigo	2.06ZC
Novaluron	Diamond	0.83EC
Thiamethoxam	Centric	40WG
Tolfenpyrad / NAI 2302	---	2.3EC

All studies were performed in Northeast Louisiana at the Northeast Research Station (NERS, LSU AgCenter) near St. Joseph, LA (Tensas Parish) or at the Macon Ridge Research Station (MRRS, LSU AgCenter) near Winnsboro, LA (Franklin Parish) in 2009. The general methods and experimental protocol for measuring insecticide efficacy against TPB was similar among all field trials. At the NERS and MRRS, cottonseed (Bollgard 2 cultivars) was planted into a Commerce silt loam and a Gigger-Gilbert silt loam, respectively. All plots consisted of four rows (centered on 40 inches) and 50 feet in length. Treatments were placed in a RCB design with four-five replications. All cultural practices and IPM strategies recommended by Louisiana Cooperative Extension Service were used to optimize plant development and manage non-target insects across the test sites.

Insecticides were applied to plots using a John Deere 6000 tractor and compressed CO_2 system calibrated to deliver 12 GPA through TeeJet TX-10 hollow cone nozzles (2/row) at 48 psi at the NERS. Similar equipment was calibrated to deliver 6 GPA through TeeJet TX-8 hollow cone nozzles (2/row) at 50 psi at the MRRS. Insecticide treatments were applied two-five times for each of the trials. Insecticide efficacy was evaluated by recording the total number of tarnished plant bug nymphs per sample of 10 row ft per plot with a black 2.5 ft shake-sheet. A non-treated control was included in each trial in order to more accurately assess treatment effects. Seasonal mean TPB densities across all applications were subjected to ANOVA and means separated according to (DNMRT) (P=0.10).

Summary

There was considerable variability in individual insecticide performance between trials. These trials were conducted during the period of June 20-September 15 across at least three generations of tarnished plant bugs. This variation in trial space and time allowed insecticide efficacies to be compared within each trial, but not among trials.

Tarnished plant bug infestation levels greatly exceeded the state's action thresholds when these trials were initiated. Seasonal mean levels in the non-treated plots ranged from 15.2 – 64.0 nymphs per 10 row ft. Significant insecticide effects were detected in all eight trials. Dose responses for many single products were observed, but there was considerable variation in these results as well. Several experimental treatments (both single products and

combinations) at one or more rates performed as well or better than the standard, organophosphate, neonicotinoid, or pyrethroid treatment included within a specific trial. In general, the combination of two insecticides resulted in a higher percentage of control. Many of the treatments did not consistently reduce numbers of tarnished plant bug nymphs below the action threshold level of two-three insects per five row ft.

The highest level of control provided by any of the insecticide treatments used in these trials was ≈ 80%. Many of the available products are currently providing marginally acceptable control in field situations and future performance can not accurately be predicted.

Insecticide resistance in Louisiana populations of tarnished plant bug is a significant issue and these results should serve as a warning of potential problems with several of these products. Field trials demonstrating efficacy data along with resistance monitoring of this pest can provide beneficial information to more efficiently combat this pest.

References

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