Evaluating Insecticide Efficacy Against Tarnished Plant Bugs in Cotton

Introduction

In Mississippi and across the Midsouth, the tarnished plant bug (TPB) is consistently the most economically important insect pest of cotton. TPBs typically cause the most damage from first square to the early flowering growth stages. Depending upon the growth stage, tarnished plant bug sampling techniques and thresholds vary. Adult TPBs are often most abundant during the preflowering stage, while nymphs are more common during the flowering period. TPBs prefer to feed on squares compared to small or medium bolls. Abscission or square loss directly impacts yield and can occur through fruit set. High square loss during the preblooming window has the greatest potential to negatively impact yield, but square loss can occur throughout the season. Damaged squares that do not abscise often develop into flowers that have malformed anthers. Anther damage of greater than 30 percent can result in pollination issues and subsequently lower yield.

There are several insecticide options available to manage TPBs in Midsouth cotton, including products from the organophosphate, carbamate, neonicotinoid, pyridinecarboxamide, pyrethroid, insect growth regulator, and sulfoximine classes. Currently, there is confirmed TPB resistance to organophosphates, carbamates, pyrethroids, and neonicotinoids, and this resistance has led to increased input costs. Current recommendations across the Midsouth are to rotate insecticide modes of action and to tank mix compatible insecticides to achieve satisfactory control of TPBs.

The objective of this study was to assess the relative efficacy and crop protection provided by the multiple insecticides commonly used in Midsouth cotton production to control TPBs.

Methods

Field experiments were conducted from 2017 through 2021 at nine locations across Arkansas, Louisiana, Mississippi, and Tennessee. Treatments were applied at the labeled rate during the blooming window when TPB nymph populations reached or exceeded each state's respective economic threshold insecticide.

Results

- Tarnished plant bug nymph numbers were significantly reduced by all insecticide treatments (Figure 1).
- Admire Pro provided the least control (Figure 1), while Transform, Diamond, and Orthene provided the best control.
- No insecticide provided greater than 70 percent control of nymphs with a single application (Figure 1).
- All insecticide treatments resulted in significantly higher yields than untreated control (Figure 2).

Conclusion

For Midsouth cotton producers to effectively manage TPB, multiple insecticide applications at shorter application intervals will continue to be necessary to achieve acceptable control. Cultural practices such as optimized fertility, management of alternate host plants, early planting dates, and selected placement of cotton fields within the landscape should also be utilized to reduce TPB populations in cotton. Rotating among different insecticide classes and avoiding repeated use of the same insecticide class against multiple generations is discouraged when possible.

All treatments controlled TPB nymphs to varying levels and increased yield. The best sustained control was provided by Transform, Diamond, and Orthene. These products applied along or in combination with other insecticides are the backbone of current TPB insecticide management programs in the Midsouth. Sequential application of insecticide will be needed when TPB pressure is high or persists over time. Selection of insecticides and potential tank-mix partners will at least partly depend on other pests that may be present.

Treatments

Class	Common name	Trade name	Treatments (per acre)	Rate (ai per acre)
Neonicotinoid	Imidacloprid	Admire Pro	1.7 fl oz	0.060
Pyridinecarboxamide	Flonicamid	Carbine	2.85 oz	0.080
Neonicotinoid	Thiamethoxam	Centric	2 oz	0.062
Carbamate	Oxamyl	Vydate	12.8 fl oz	0.356
Organophosphate	Dicrotophos	Bidrin	8 oz	0.498
Organophosphate	Acephate	Orthene	0.75 lb ai	0.750
Insect Growth Regulator	Novaluron	Diamond	9 fl oz	0.057
Sulfoximines	Sulfoxaflor	Transform	1.5 oz	0.047

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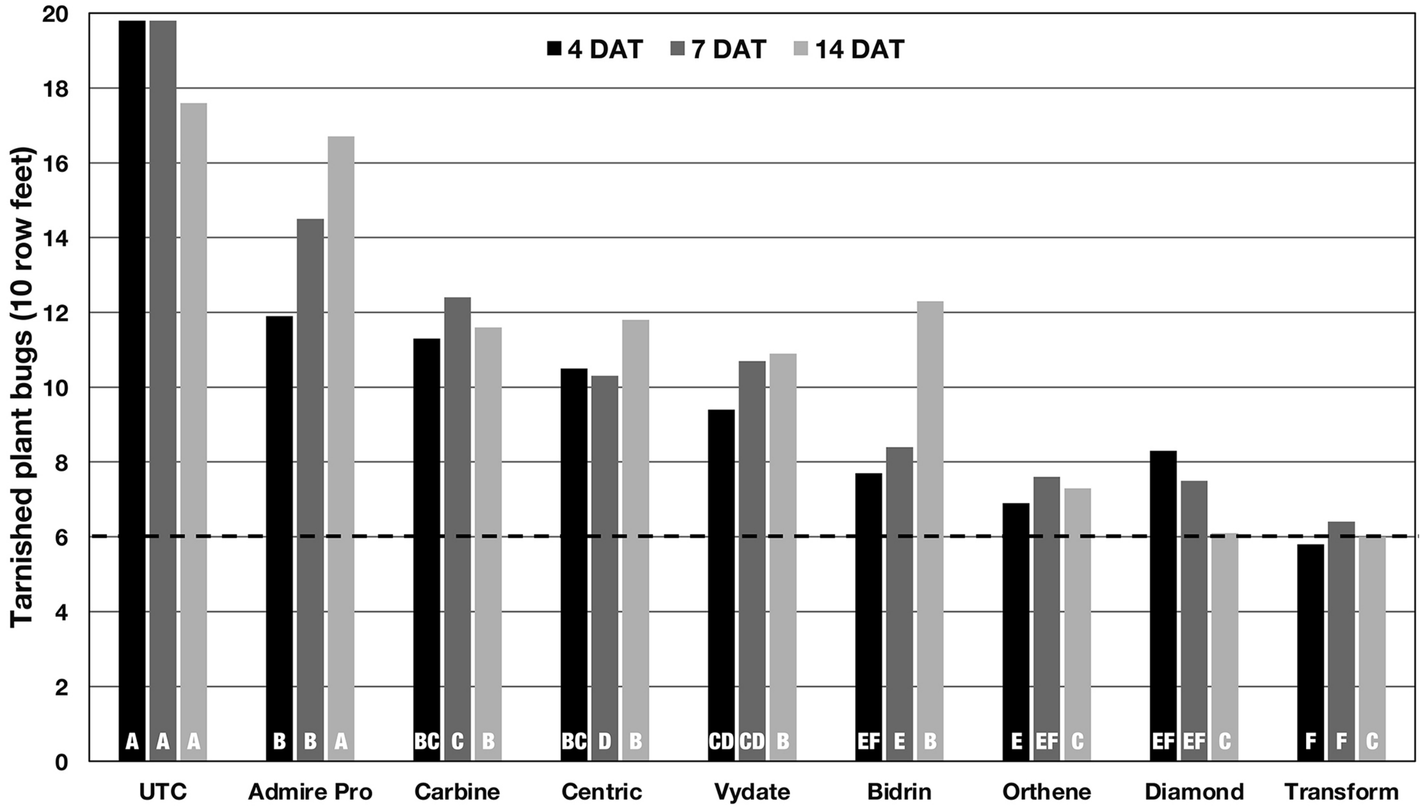

Figure 1. Seasonal tarnished plant bug means by treatment (UTC = untreated control, DAT = days after treatment). Means separated by a common letter are not significantly different (α=0.05).

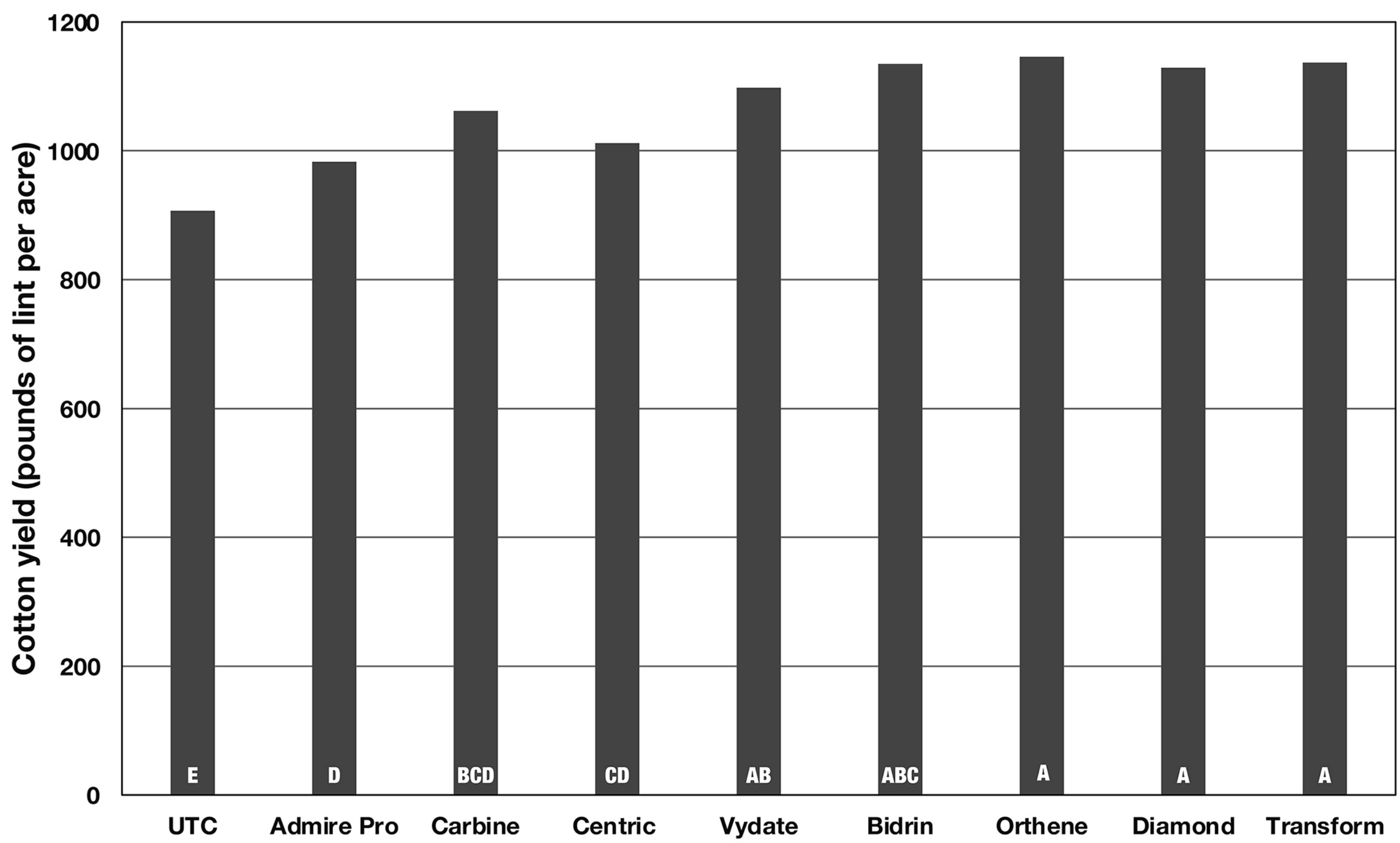

Figure 2. Mean lint yield (pounds per acre) by treatment (UTC = untreated control). Means separated by a common letter are not significantly different (α=0.05).

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