

**IMPACT OF PLANT HEIGHT ON INSECTICIDE EFFICACY
TO CONTROL TARNISHED PLANT BUG, *LYGUS LINEOLARIS*,
PALISOT DE BEAUVOIS, IN COTTON**

J. W. Sharp

R. D. Bagwell

J. T. Copes

**LSU AgCenter, Department of Entomology
Baton Rouge, LA**

Abstract

Insecticide spray coverage within the cotton plant canopy is a critical aspect of insecticide efficacy. This study evaluated the effects of cotton plant height on insecticide efficacy. Four tests were performed on commercial farms throughout Louisiana using a common plant growth regulator (PGR), mepiquat chloride, to manage plant heights. A non-mepiquat treated control was included as a paired treatment. Initial plant heights across the test sites prior to PGR application ranged from 19 to 50 inches. Insecticides (Bidrin 8L, 0.4 lb AI/acre or Orthene 90SP, 0.75 lb AI/acre) were applied to the mepiquat-treated and non-treated plots to control tarnished plant bug. Plant height was significantly reduced in the PGR-treated plots compared to that in the control plots. Insecticide efficacy measured 5-7 DAT was not affected by plant height and there was no difference in the percentage of “bug”-damaged bolls recorded at the end of the season. The 2008 results indicate that there was no impact of plant height (up to 50 inches) on insecticide efficacy and tarnished plant bug control.

Introduction

Tarnished plant bug, *Lygus lineolaris* (Palisot de Beauvois), is a primary pest of many cultivated and non-cultivated crops throughout the North America and is currently a key economic pest of cotton in the Mid-Southern region of the United States (Snodgrass 1994). Over the past decade there has been a trend of increasing control costs for this pest in cotton. This increase has occurred as a result of higher doses, more frequent applications, and the use of newly-registered compounds that inherently are more expensive to use. Another associated biological factor is the development of insecticide-resistant populations of tarnished plant bug. Louisiana populations have expressed resistance to acephate and pyrethroids (Snodgrass 2006). Insect resistance plays a significant role in field control failures with tarnished plant bug, but other factors may be contributing to the general losses in field efficacy (personal communication, R.D. Bagwell, LSU AgCenter, Winnsboro, LA).

Insecticide spray deposition throughout plants is influenced by plant canopy and plant height. Recent work has suggested that reducing the leaf area index can improve pesticide distribution into the lower canopy (Siebert and Stewart 2005). During 2004 to 2007, Delta Pine and Land DP 555 was planted on over 50% of Louisiana's cotton acreage. This cultivar exhibits an extremely vigorous growth habit and has the potential to reach extreme (>80 inches) plant heights. Many of the cotton fields that experienced poor control of insect pests, especially the tarnished plant bug were planted to DP 555. Therefore, the objective of this study was to determine if insecticide efficacy for tarnished plant bug control is influenced by cotton plant height.

Materials and Methods

Field trials were planned at fourteen locations on commercial farms across the cotton production parishes of Louisiana. The two treatments in this study included a single application of the PGR, mepiquat chloride (12 oz form/acre) and a non-mepiquat treated control. Treatments were paired and arranged in a RCBD and replicated four times. Plots (8 rows by 50 ft) were placed in the center of field to reduce insect variability near field borders. The PGR was applied to plants when they developed 10 main stem sympodial nodes. A CO₂ backpack sprayer calibrated to deliver the treatments at 12 GPA and 30 psi through TeeJet 110015VS spray nozzles (2/row). Initial plant heights across the test sites prior to PGR application ranged from 19 to 50 inches.

Insecticide recommendations for insect pest management were triggered by the agricultural consultants on mean numbers of insects across the test area and the remainder of the cotton field. However, each plot was sampled (10 row ft) prior to insecticide application to determine the actual number of tarnished plant bugs using a black shake sheet (2.5 x 2.5 ft). Multiple sprays were applied to nearly all of the fourteen locations during 2008. However, only

four sites among all locations met the prescribed protocol criteria of 1 tarnished plant bug nymph/shake sheet sample which prompted the collection of post-treatment data to measure insecticide efficacy. The insecticides (Bidrin 8L, 0.4 lb AI/acre or Orthene 90SP, 0.75 lb AI/acre) used for control of tarnished plant bug were applied to the entire field that contained mepiquat-treated and non-treated plots. Plots were rated 5-7 days after treatment for efficacy against tarnished plant bug using the same pre-treatment protocol. In addition, the percentages of bug-damaged bolls in each treatment were assessed just prior to harvest by sampling all bolls on 6 row ft in each plot. Data between the two treatments were compared using ANOVA.

Results and Discussion

Plant height was significantly reduced with the PGR application. At the time of insecticide application, the mean plant height of PGR-treated and non-treated plots was 28.0 inches and 36.9 inches, respectively.

Tarnished plant bug control at 5-7 days after treatment in PGR-treated and non-treated plots was 76.5 % and 70.9%, respectively, compared to the initial populations recorded pre-treatment (Fig 1). There was no significant difference in insecticide efficacy between plant heights. In a scatter plot of all data points, there appeared to be no relationship between plant height and percent control of tarnished plant bug (Fig. 2). No significant difference was detected in the number of bug-damaged bolls between treatments, as well. In the mepiquat-treated and non-treated plots, 4.9% and 5.0 % “bug”-damaged bolls were recorded (Fig. 3). These results indicate that plant height (up to 50 inches) and mepiquat chloride applications had no impact on tarnished plant bug control in Louisiana during 2008.

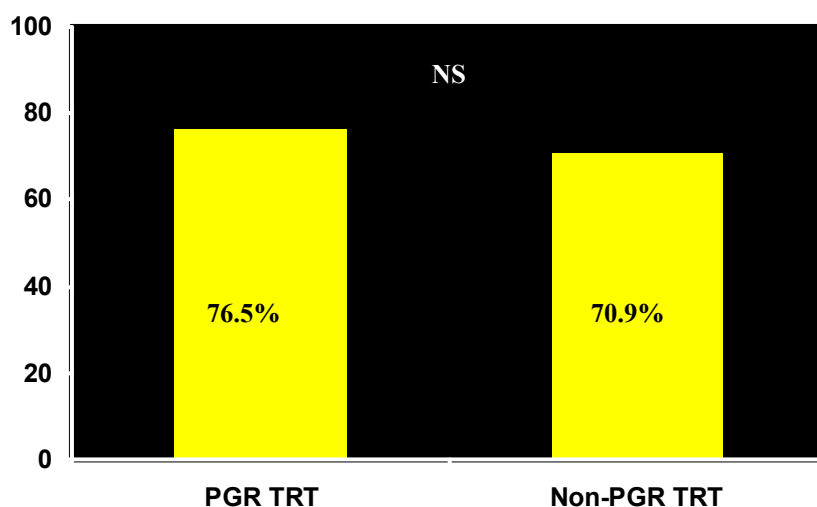


Figure 1. Summary (4 sites) of insecticide efficacy (% control) against tarnished plant bug on plants treated with a PGR, mepiquat chloride, and non-treated plants.

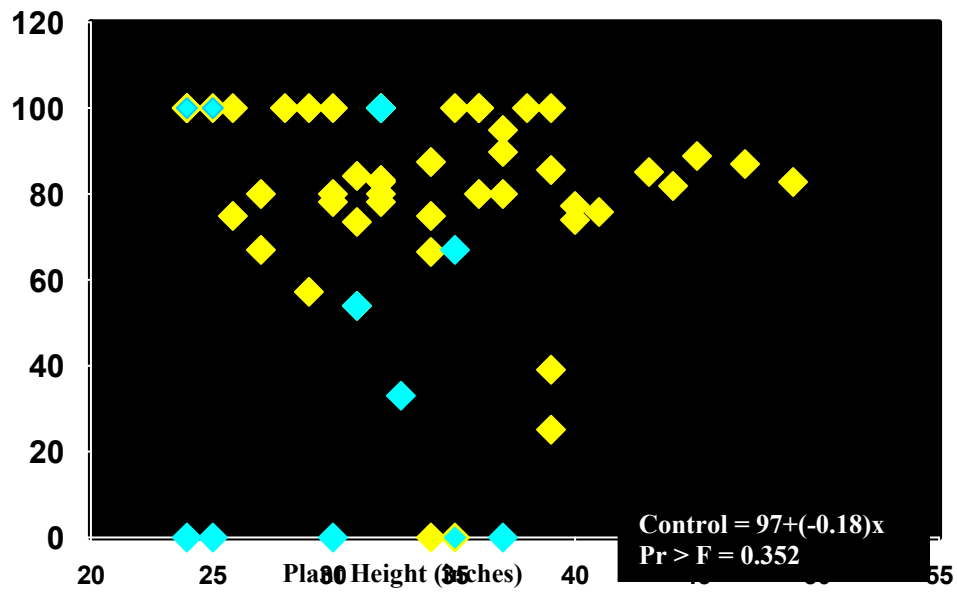


Figure 2. Scatter plot of data points for % control of tarnished plant vs corresponding plant heights (yellow \diamond = Bidrin, blue \diamond = Orthene).

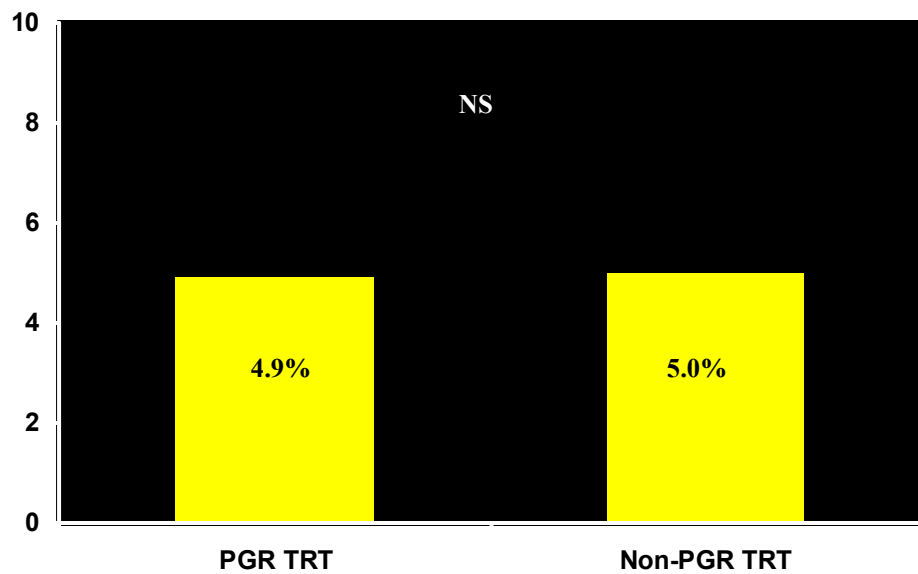


Figure 3. Summary (14 sites) "bug"-damaged bolls at harvest on plants treated with a PGR, mepiquat chloride, and non-treated plants.

References

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