

# *Lygus lineolaris*: “Tarnished Plant Bug”

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## INTRODUCTION:

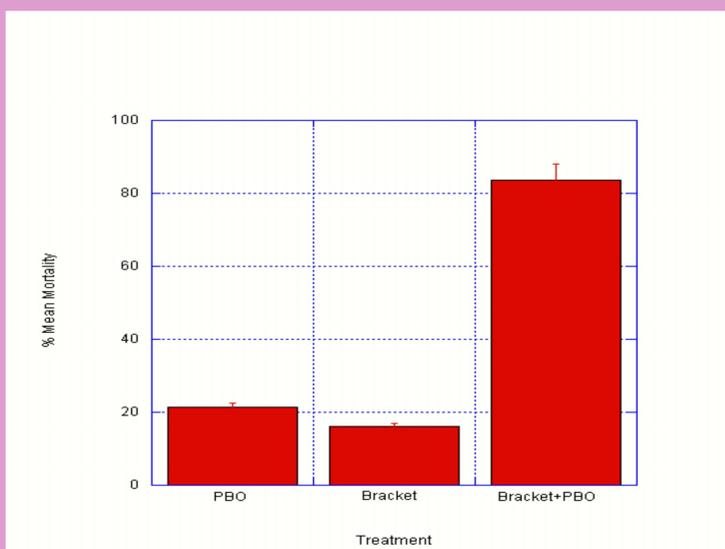
The tarnished plant bug (TPB), *Lygus lineolaris*, has emerged as an economically significant pest on cotton in the Mid-South area. Currently, management of this pest relies almost exclusively on chemical control (organophosphates, carbamates and neonicotinoids). Over the years, this pest has become increasingly resistant to several chemical insecticides. One insecticide that has commonly been used in the Delta to control TPB on crops is acephate (Bracket). Field surveys have shown that some populations of the TPB have become significantly less susceptible to many insecticides and insecticide classes. One of the potential mechanisms is that resistant insects may detoxify insecticide faster through over-expression of P450 genes. This study is to test whether piperonyl butoxide (PBO), a P40 inhibitor, could synergize acephate toxicity against tarnished plant bugs.

## MATERIALS AND METHODS:

A laboratory colony (originally provided by Mississippi State University) was used as a standard susceptible strain which had not been exposed to insecticides for eight years. To develop a resistant colony, 45,000 bugs were collected from various cotton fields and selected with insecticides for resistance. These TPB were then divided into three groups, one to be treated with PBO, one to be treated with acephate (Bracket) at 80 mg/L, and one to be treated with both PBO and acephate. The mortality rates of the bugs were then recorded.



## RESULTS AND DISCUSSION:



After spraying the lab resistant colony with a combination of PBO and acephate, it is obvious that they act synergistically on TPB mortality. PBO killed twenty-one percent of the bugs tested while Bracket killed approximately sixteen percent. When adding these two chemicals together, it would be expected that at least thirty-seven percent of the population of bugs are killed. This experiment proved this to be true by killing over eighty percent of the population. Results indicated that PBO could synergize acephate toxicity, and P450 genes might be associated with resistance development to acephate and other insecticides in TPB.

## REFERENCES:

Yu Cheng Zhu, Zibiao Guo, Yeuping He, Randall Luttrell. May 2012. Microarray Analysis of Gene Regulations and Potential Association with Acephate-Resistance and Fitness Cost in *Lygus lineolaris*. PLoS ONE 7(5)

Yu Cheng Zhu, Randall Luttrell. May 2012. Pesticide Biochemistry and Physiology: Variation of acephate susceptibility and correlation with esterase and glutathione S-transferase activities in field populations of the tarnished plant bug, *Lygus lineolaris*. Elsevier.

Yu Cheng Zhu, Randall Luttrell. January 2013. Elevated Metabolic Detoxification Associated With Multiple/Cross Resistance to Different Insecticide Classes in Tarnished Plant Bug.

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