Terminating Tarnished Plant Bug Insecticide Applications

The tarnished plant bug (*Lygus lineolaris)* has become the most economically important insect pest of cotton in Arkansas, Louisiana, Mississippi, Missouri, and Tennessee for a number of reasons, including resistance to several insecticides. Furthermore, multiple insecticide applications are needed for this pest throughout the season to minimize yield losses.

Termination of insecticide applications has been traditionally based on the accumulation of 350 DD60s once cotton plants have an average of five nodes above a first-position white flower.

Currently, insecticide termination is based on node above white flower counts and decision rules based on heat-unit accumulation to determine the point in cotton development when the last harvestable boll is considered safe from insect injury. However, a better understanding of when insecticides targeting plant bugs can be terminated without meaningful yield loss may lead to a reduced number of insecticide applications.

The objective of this research was to validate current recommendations and determine if a more user-friendly method for insecticide termination could be established, possibly decreasing the number of late-season applications without sustaining yield loss.

Methods

In 2015 and 2016, field experiments sponsored by Cotton Incorporated were conducted at 15 locations across the Midsouth. The field locations and number of sites included Arkansas (5), Louisiana (4), Mississippi (3), Missouri (1), and Tennessee (2).

Treatments

- Insecticide termination timing after:
  - Second week of flower
  - Third week of flower
  - Fourth week of flower
  - Fifth week of flower
  - Sixth week of flower
- Season-long control
- Untreated control

Results

- Not spraying for plant bugs during flowering reduced seed cotton yield approximately 1,000 pounds per acre.
- On average, terminating insecticide applications before the fifth week of flowering resulted in significant yield loss.
- Tarnished plant bug populations peaked between the third and fourth weeks of flowering, suggesting that cotton would be safe from injury following the fifth week (**Figure 1**).
- In the 15 individual tests, significant yield losses were never observed when insecticides were terminated after the fourth week of flowering (**Figure 2**).

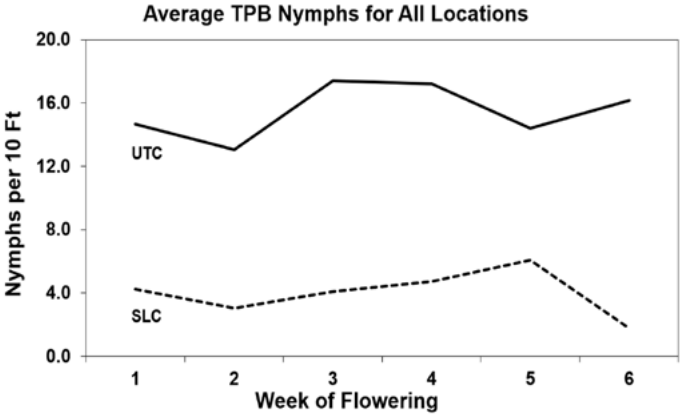

Figure 1. Average number of TPB nymphs across all locations for the untreated control and season-long control for each week of flowering.

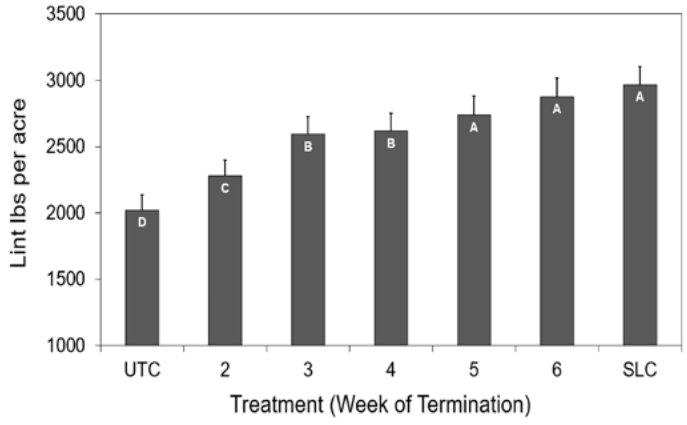

Figure 2. Yield for each week of insecticide termination for all locations.

Conclusion

Terminating applications after the fourth week of flowering could often be possible without significant yield losses, assuming adequate control was achieved before that point. However, in areas that have higher levels of insecticide resistance or when tarnished plant bug infestations are high, this same termination time interval could result in yield losses. Therefore, in areas with high levels of insecticide resistance, the conservative management decision would be to terminate applications after the fifth week of flowering. This aligns closely with the current termination timing recommendation of node above white flower five plus 350 heat units.

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It is often possible to eliminate one or more insecticide applications in cotton that is no longer susceptible to yield losses from tarnished plant bug. These insecticide applications are often made to prevent a "switch" in the top of the plant or because crop advisors are uncertain about when cotton is mature enough to be safe from economic damage.

Insecticide applications beginning after the fifth week of flowering do not protect yield enough to justify the cost of control and the increased selection pressure for insecticide resistance. Terminating insecticide application after the fifth week of flowering or based on node above white flower decision rules could eliminate the need for at least one insecticide application for tarnished plant bug management. This could save approximately $10-20 million in input costs across the Midsouth.

Cotton Incorporated

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