Cotton Compensation and Economic Insecticide Applications

MISSISSIPPI STATE UNIVERSITY EXTENSION

Cotton has the ability to recover from damage or fruit loss. However, the goal of any production system is to avoid delayed maturity and yield losses. Compensation for fruit loss is highly dependent on several factors:

- Timing of damage
  - Vegetative versus reproductive stage
  - Early season (more time to recover) versus late season (less time to recover)
- Length and severity of damage
  - How long did damage occur?
  - How severe was the damage?
- Environmental conditions
  - Other stresses: weeds, pathogens, drought, nutrient deficiency, etc.
  - Fall weather: An extended period of warm weather in September and October can increase maturation of fruit on the upper and/or outer portions of the plant. On the other hand, early onset of cool weather can prevent fruit on upper and/or outer portions of the plant from maturing, thus negating the compensatory effect.

As the season progresses, the potential for insect damage increases and the time for crop recovery decreases. Thrips are the primary insect pest in seedling cotton; however, once the crop has moved into reproductive stages, tarnished plant bugs and bollworms become a greater concern (**Figure 1**). Both pests have the potential to be highly damaging, and they both occur later in the season when there is less time for compensatory fruit set.

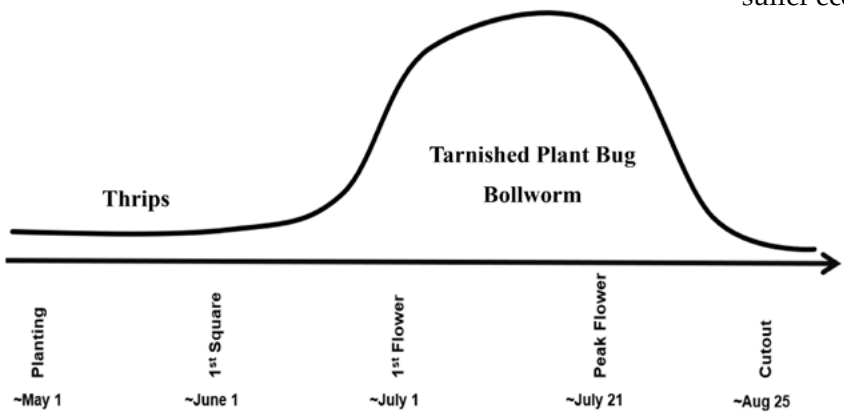

Figure 1. Thrips are the primary insect pest in seedling cotton. Once the crop has moved into reproductive stages, tarnished plant bugs and bollworms become a greater concern.

There are numerous examples of cotton fully compensating for insect damage and fruit loss with no impact on yield. Most crop scouts understand when to treat a pest population based on economic injury levels, but most do not fully understand how those decision levels are originally developed.

Rigorous research on individual pests in a target crop leads to the development of the commonly used economic threshold (ET) and economic injury level (EIL). Factors evaluated include the cost of the insecticide, the market value of the crop, and the loss caused to the crop per individual pest. The amount of crop loss per individual pest often takes into account the ability of the crop to compensate. Once the EIL is determined, the ET is set below the EIL to prevent an increasing pest population from reaching the EIL (where economic loss will actually occur). Therefore, we can often sustain some level of pest injury and not suffer economic loss.

Economic threshold: The pest density at which management action should be taken to prevent an increasing pest population from reaching the economic injury level.

Economic injury level: The smallest number of insects (amount of injury) that will cause yield losses equal to the insect management costs.

However, many factors can affect a plant's ability to compensate for injury, especially environmental conditions. While consultants, producers, and researchers are highly skilled at spotting insect pest damage, a biased opinion could result in unwarranted insecticide applications. This is why it is important to conduct a structured insect count to determine the crop's percent damage.

Late-season boll damage provides a prime example for economic loss versus non-economic damage from an insect pest. **Figure**

2 demonstrates the minimum number of damaged bolls needed at the respective location (top, middle, or bottom of the plant and first, second, or third position) per 10 feet of row to offset the cost of a diamide insecticide application (estimating $25 per acre total). These numbers are based on 1,400 pounds per acre of cotton and a market value of 63 cents per pound of lint. Cotton yield loss of 40 pounds of lint per acre would need to occur to equal the cost of the insecticide plus application. Yield loss of this magnitude is equivalent to about seven to nine bolls per 10 row feet. For example, to realize 40 pounds of yield loss, approximately 50 percent of the third-position bolls would need to be damaged.

In addition to understanding structured insect counts, it is important to remember what parts of the plant contribute the most to yield. Because first- and second-position bolls located in the middle and bottom of the plant contribute the greatest economic return, they should be weighted more heavily in the decision process.

Summary

The objective of this publication is to provide information about how ETs are derived. Remember that cotton plants can compensate for some fruit damage/loss and not all injury translates to economic loss. Regular scouting and best management practices should always be your primary considerations for triggering insecticide applications. Structured and random samples are extremely important in making the decision to treat for an insect pest. Environmental conditions and other plant stresses can influence these decisions. Always take into consideration the agronomic expertise of those involved in producing the crop. For more information about pests and crop-specific ETs, see the current *Insect Control Guide for Agronomic Crops* (Mississippi State University Extension Publication 2471) at *http://extension.msstate.edu/publications/publications/insect-control-guide-for-agronomic-crops*.

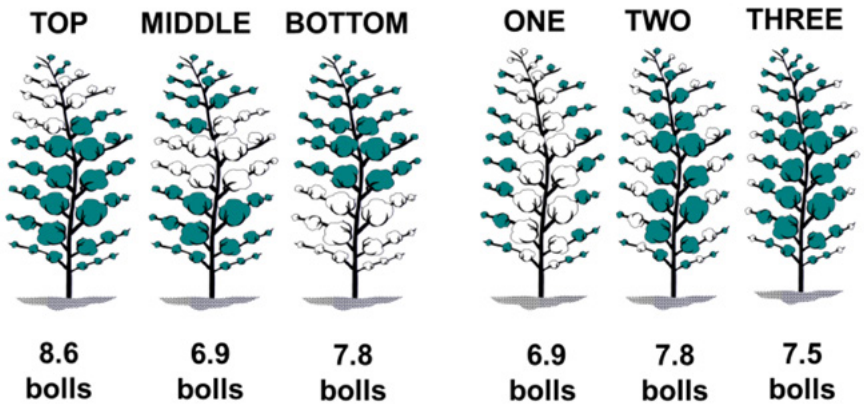

Figure 2. Minimum number of damaged bolls needed at the respective location (top, middle, or bottom of the plant and first, second, or third position) per 10 feet of row to offset the cost of a diamide insecticide application.

Publication 3514 (POD-08-20)

By **Whitney Crow**, PhD, Assistant Professor, Delta Research and Extension Center; **Angus Catchot**, PhD, Extension Professor, Entomology; **Darrin Dodds**, PhD, Professor and Head, Plant and Soil Sciences; **Don Cook**, PhD, Associate Research Professor, Delta Research and Extension Center; and **Jeff Gore**, PhD, Research Professor, Delta Research and Extension Center.

Produced by Agricultural Communications.