CURRENT STATUS OF IPM IN COTTON

Gus Lorenz
University of Arkansas
Lonoke, AR
Jeff Gore
Mississippi State University, DREC
Stoneville, MS
Don Cook
Mississippi State University, DREC
Stoneville, MS
Angus Catchot
Mississippi State University
Mississippi State, MS
David Kerns
Texas A&M
College Station, TX
Glenn Studebaker
University of Arkansas, NEREC
Keiser, AR
Scott Stewart
University of Tennessee, WTREC
Jackson, TN
Nick Bateman
University of Arkansas
Stuttgart, AR
Sebe Brown
Louisiana State University
Alexandria, LA
Ben Thrash
University of Arkansas
Lonoke, AR

Introduction

According to a renowned entomologist integrated pest management (IPM) can be defined as the intelligent selection of available control techniques to control a pest or group of pests. The goals of IPM are: increase stability and safety of the food and fiber supply, reduce costs of crop production, reduce environmental risks and minimize reliance on pesticide usage. IPM utilizes cultural, biological, mechanical, legal and chemical control tactics to achieve those goals. The cornerstone of IPM is economic threshold (ET) and economic injury level (EIL). The threshold is the level of a pest population in a system where action is taken to avoid reaching a pest level where the economic injury level occurs. However, ET and EIL's that have been developed for many cotton pests have some problems. Many of these thresholds are not based on economics and do not take into account the value of the commodity or the cost of control. Also, there is the situation where subthresholds can occur over an extended period of time in the season and the impact is not well understood or accounted for.

One of the biggest limitations of this concept of ET and EIL can be our inability to make accurate and effective assessment of pest populations in the field. The correct sampling procedure is critical in the development of ET's. A good example of this situation is the plant bug. When plant bugs started becoming an increasing issue in cotton in the Midsouth, entomologists quickly realized that there was little agreement on the proper way to sample for plant bugs and there were considerable differences on opinion on what level of plant bugs constituted an ET. The Midsouth Entomologist group decided to address the issue. In just a few years we found that the sweep net was the best sampling tool for preblooming cotton, the black shakesheet was more efficient for postbloom cotton and that a threshold of 9-12 plant bugs per 100 sweeps and 3 plant bugs per 5 row feet on a shake sheet were solid thresholds that when used protected yield potential and was cost effective for the cotton producer.

In 2019, cotton production faces many challenges in insect pest management.

Thrips

With confirmed resistance to thiamethoxam (Cruiser) seed treatment growers have less options for control. Also, it appears that thrips may be becoming more tolerant to imidacloprid (Gaucho). Recent studies indicate the best alternatives to these seed treatments are acephate, in-furrow applications of imidacloprid, aldicarb. Cultural control tactics such as minimum tillage also may help to reduce thrips damage. When thrips pressure is high supplemental foliar applications of insecticides such as acephate, dicrotophos (Bidrin), Dimethoate, or spinetoram (Radiant) may be required to manage thrips.

Tarnished Plant Bug

Tarnished plant bug (TPB) is the number one pest of cotton in the Midsouth. In Arkansas, growers averaged 5 insecticide applications in 2018 for control of TPB. We have found through recent research that early planting, clean field edges and controlling wild hosts around fields can help reduce plant bug numbers, insecticides are very important in maintaining pest populations below ET. However, recent studies show that of all the products currently labeled for control, only sulfoxaflor (Transform) and novaluron (Diamond) effectively keep TPB numbers below threshold (Fig. 1). Also, recent studies have shown that in moderate and high populations of TPB, it is imperative

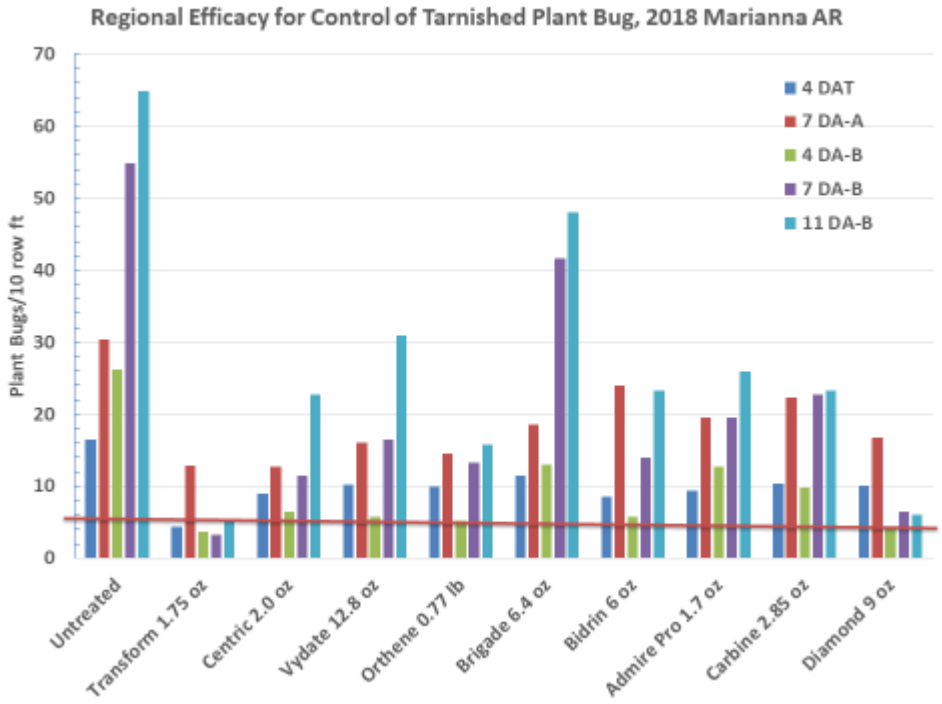

Fig.1. Efficacy of selected insecticides for TPB control (2018).

that shortening the time interval between successive applications can be critical in achieving control of this pest. To achieve acceptable control of this pest it is important to rotate chemistry, shorten time intervals and plant early. In the future, a lygus transgenic will become available to improve control.

Cotton Bollworm

Historically the cotton bollworm has been a pest of cotton in the Midsouth. With the development of B.t. cotton this threat was reduced, and the impact of tobacco budworm was removed. However, we have in recent years seen increasing damage to dual gene Bt from bollworm. The hypothesis is that these same Bt traits were put into corn and increased exposure to the Bt toxin in corn and cotton has led to the resistance to the toxin in bollworm. The loss of control means that supplemental foliar applications of chlorantraniliprole are needed to maintain bollworm populations below economic injury (Fig. 2.)

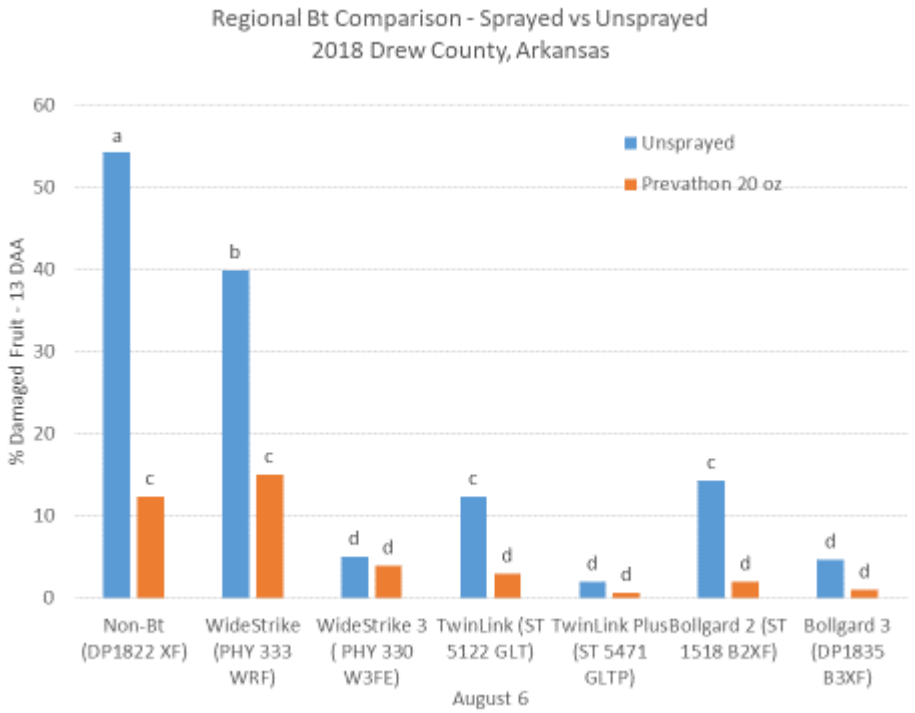

Fig. 2. Damaged fruit in conventional, dual gene and triple gene varieties in Arkansas, 2018.

The figure above clearly shows the increased level of fruit damage in dual gene Bt compared to three gene varieties.

With development of resistance and increased fruit damage, the question becomes should growers transition to triple gene varieties such as WideStrike 3, Bollgard 3 or Twinlink Plus? Recent trials indicate that yield potential for triple gene varieties is so much lower than dual gene varieties that growers can afford to spray one or even two times with a diamide and still make more money than triple gene varieties because the yield potential is so much better in the dual gene varieties. Currently, for dual gene varieties such as WideStrike and Bollgard II, the threshold is 6% fruit injury or 20-25 eggs per 100 plants. This egg threshold represents a change with the developing resistance to Bt cotton. However, in the three gene varieties we call for foliar applications when larvae reach 1/8" or longer and exceed 4 larvae per 100 plants or 6% damaged fruit.

Summary and Conclusions

Our cotton production system is a dynamic situation with transgenic cotton, shifting crop acreages, increasing costs of production, constantly changing commodity values. All of these things have an impact on pest status and population dynamics for insects in cotton. These changes necessitate the need for frequent re-evaluation of thresholds, sampling procedures and control tactics to meet the needs of our growers. To meet those needs we have to be flexible and that means recommendations can and do change! IPM will remain viable as long as we maintain the goals of IPM by remembering that cost effective control of insects is best achieved by spraying when needed and having the fortitude to not spray when it is not needed.