COMPARING BOLLGARD II AND BOLLGARD II EXTEND CULTIVARS FOR CONTROL OF COTTON BOLLWORM, *HELICOVERPA ZEA* (BODDIE), IN THE MID-SOUTH

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Abstract

A preliminary study was conducted in Pine Bluff, AR on a grower field to compare the efficacy of *Bt* toxins in three non-dicamba tolerant Bollgard II cultivars and three dicamba tolerant Bollgard II Xtend cultivars. When grouped by technology, Bollgard II Xtend cultivars had greater bollworm damage than Bollgard II cultivars. Cultivars within technologies did not differ, implying no varietal effect.

Introduction

Herbicide resistant weeds are a major concern for cotton producers across the Mid-South. Multiple transgenic cultivars of cotton have been developed allowing growers to spray herbicides that would normally damage cotton plants. In recent years, new cotton cultivars tolerant to dicamba have been released to help combat herbicide resistant weeds.

The cotton bollworm (*Helicoverpa zea*, Boddie) is a major pest of post-bloom cotton in the Mid-South. In 2016, the cotton bollworm infested 100% of the cotton acreage in Arkansas (Williams, et. al., 2017). Cotton cultivars containing the *Bt* genes have been planted on a significant amount of Arkansas' cotton acreage since 1996 (Bryant, et. al., 2001). In 2002, Bollgard II, a new dual gene *Bt* cotton cultivar was introduced to improve caterpillar management (Jackson, et. al., 2007). Choosing a cotton cultivar will dictate the insect and weed control programs that will or can be used (Bryant, et. al., 2003).

Growers invest in transgenic cotton cultivars to increase control of herbicide resistant weeds and lepidopteran pests, but ultimately use them to maximize profit. Recently, dicamba tolerant cultivars were introduced in combination with dual gene *Bt* cultivars in order to help control herbicide resistant weeds and cotton bollworm. Anecdotal observations were made that dicamba tolerant *Bt* cotton cultivars appear to have lower efficacy on bollworm than non-dicamba tolerant *Bt* cultivars. The objective of this study was to evaluate these observations by comparing the efficacy of Bollgard II and Bollgard II Xtend cultivars for control of cotton bollworms.

Materials and Methods

A trial was conducted during the 2017 growing season on a grower field in Jefferson County, Arkansas. Plot size was 12.5 ft. (4 rows) by 40 ft., with treatments arranged in a randomized complete block design with 4 replications. Eight cultivars were planted consisting of two conventional cultivars, three Bollgard II, and three Bollgard II Xtend cultivars (Table 1). Damage ratings were taken at 66, 70, 76, 83, and 93 days after planting (DAP) by sampling 25 random squares, blooms, and bolls per plot. Plots were harvested using a John Deere two row picker. All data was analyzed using Agriculture Research Manager V.17 (Gylling Data Management, Inc., Brookings, S.D.) and Duncan's New Multiple Range Test (P=0.10) for mean separation means.

Table 1. A list of cotton cultivars used during cotton bollworm efficacy studies in 2017.

Cotton Cultivars by Transgenic Trait Package		
Conventional	**Bollgard II**	**Bollgard II Xtend**
DP399RF	ST4946B2RF	DP1646B2XF
DP1441RF	DP1555B2RF	DP1518B2XF
	DP1321B2RF	DP1522B2XF

Results and Discussion

All *Bt* cultivars sustained less damage than the conventional cultivars across planting dates. No differences were observed between the *Bt* cultivars at any of the individual sample dates (Figures 1-5).

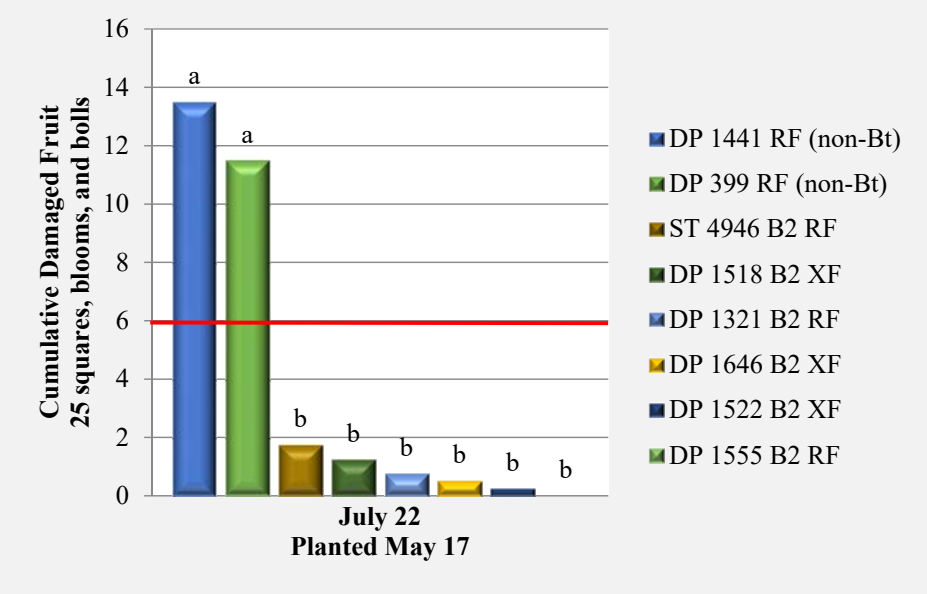

Figure 1: Cumulative fruit damage from cotton bollworm 66 DAP

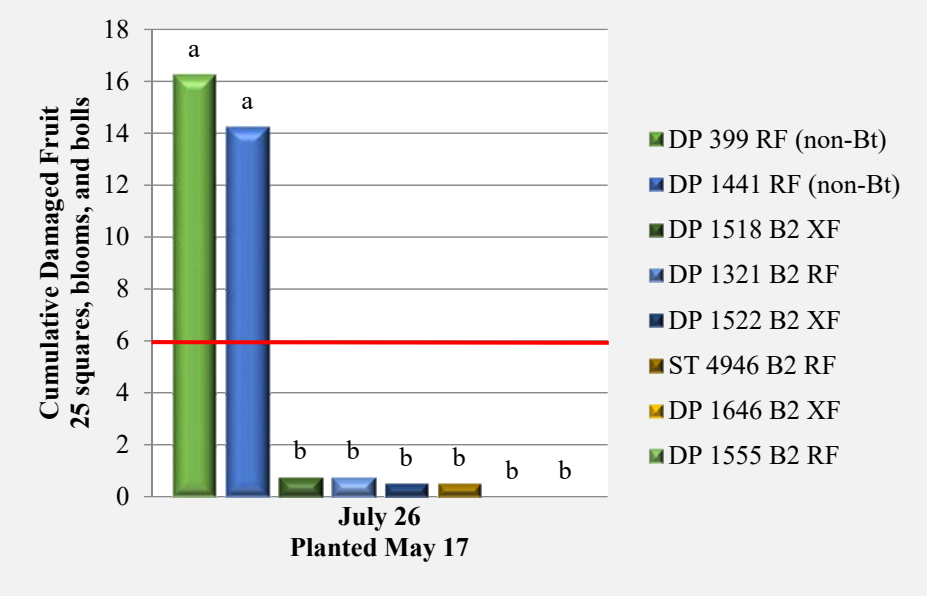

Figure 2: Cumulative fruit damage from cotton bollworm 70 DAP.

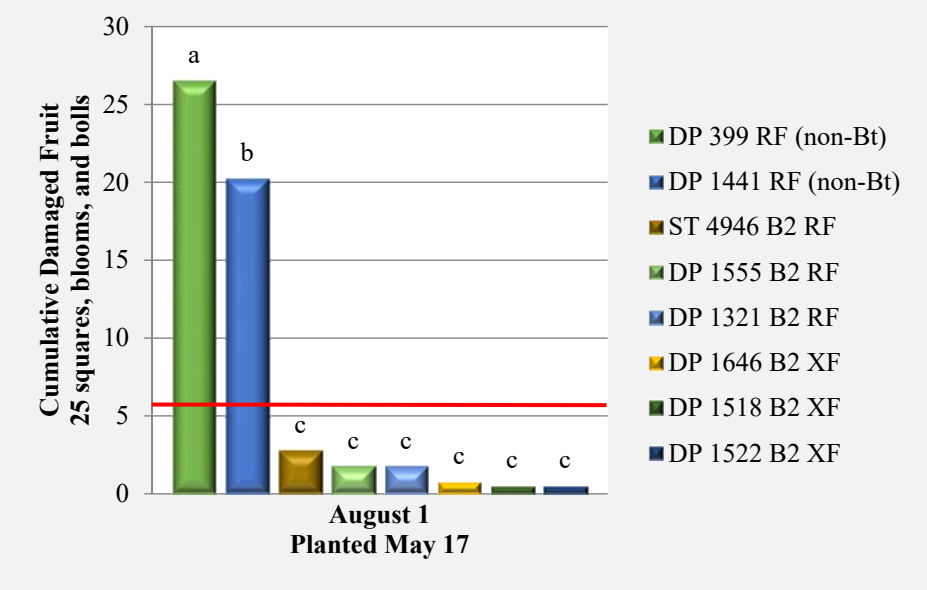

Figure 3: Cumulative fruit damage from cotton bollworm 76 DAP.

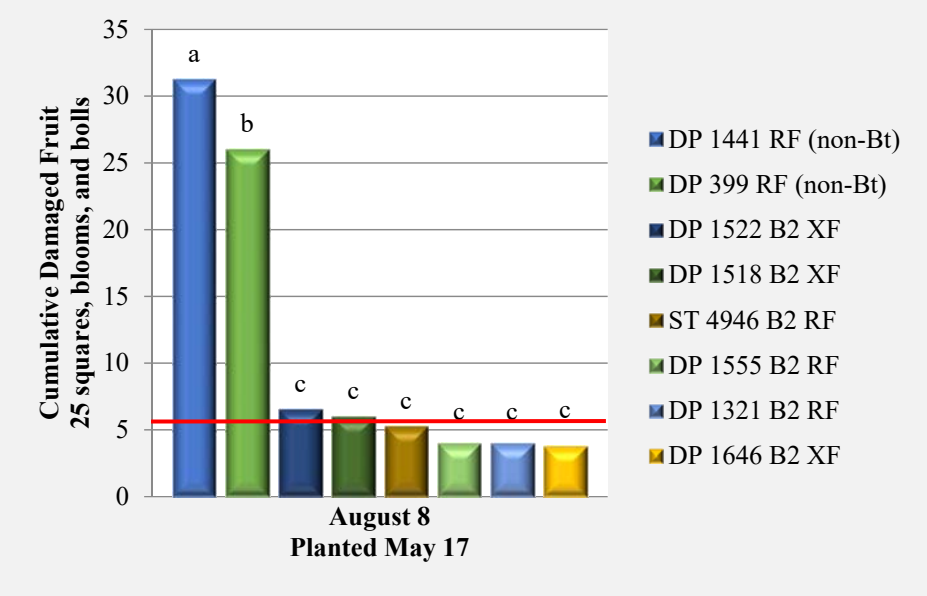

Figure 4: Cumulative fruit damage from cotton bollworm 83 DAP.

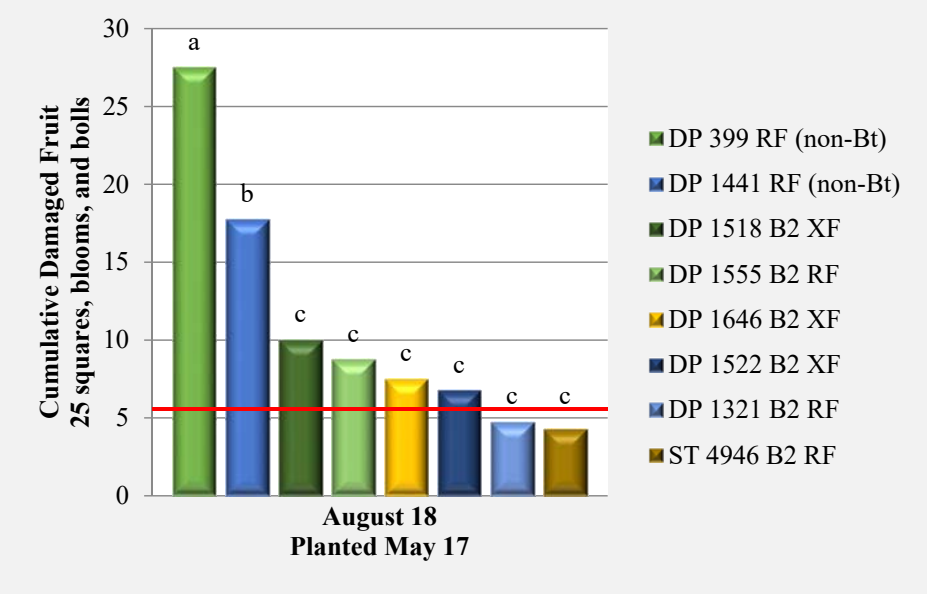

Figure 5: Cumulative fruit damage from cotton bollworm 93 DAP.

Xtend cultivars generally had no more damage than the Bollgard II cultivars across sampling dates. However, on the last two sampling dates, there appeared to be an increase in fruit damage in the Xtend cultivars. Because the objective of this study was to determine if Bollgard II and Bollgard II Xtend cultivars provided equal control of cotton bollworm, another analysis was conducted with cotton cultivars grouped as conventional, Bollgard II, or Bollgard II Xtend. This analysis indicated there was a greater amount of damage in Xtend cultivars compared to Bollgard II cultivars (Figures 6).

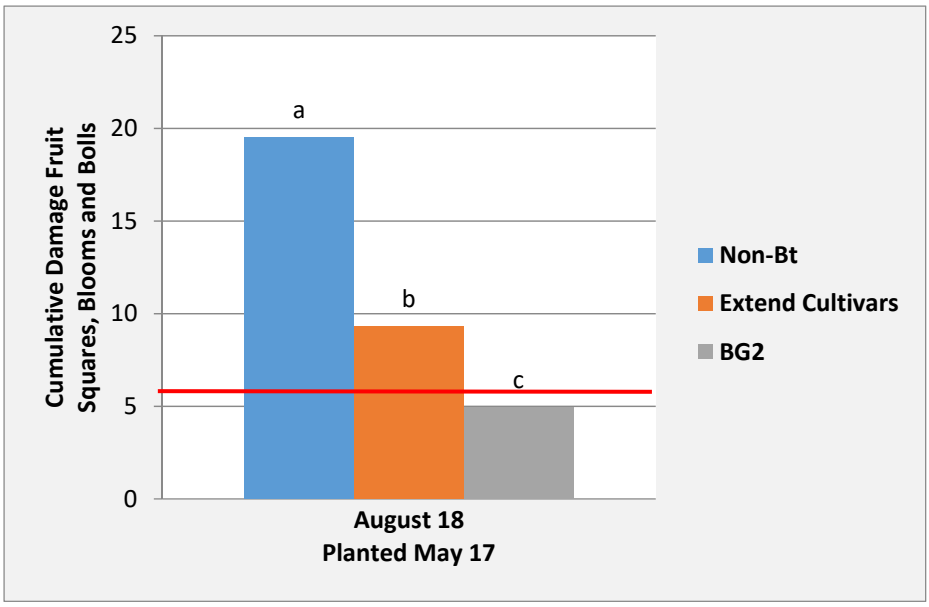

Figure 6: Season long cumulative cotton bollworm damage of fruit.

These data suggest that the new Bollgard II Xtend cultivars may not express *Bt* toxins as effectively as the non-Xtend Bollgard II cultivars resulting in less control of cotton bollworm. However, more work is needed to see if this trend is correct.

Acknowledgment

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