2006 Beltwide Cotton Conferences, San Antonio, Texas - January 3 - 6, 2006

PERFORMANCE OF WIDESTRIKE COTTON IN ARKANSAS, 2004-2005

G. M. Lorenz
University of Arkansas Division of Agriculture
Little Rock, AR
Kyle Colwell
University of Arkansas
Little Rock, AR
R. B. Lassiter
Dow AgroSciences
Indianapolis, IN
Jeremy Greene
University of Arkansas
Monticello, AR
Glenn Studebaker
University of Arkansas
Keiser, AR
Jarrod Hardke
University of Arkansas Cooperative Extension Service
Little Rock, AR
Craig Shelton
Univ. of Arkansas CES
Jonesboro, AR

Abstract

In 2004,WideStrike cotton was evaluated for control of cotton bollworm in a strip plot trial. Treatments included Phytogen 440 WR (Widestrike) with 0,1, and 2 foliar applications of Prolex and Phytogen 410 R (conventional cotton) treated 0 or 3 times. Results indicated that Widestrike untreated was similar to conventional cotton treated three times. In 2005 a small block and large block trial comparing WideStrike and Bollgard II were conducted. Results indicated very good efficacy for control of bollworms and fall armyworms for both dual gene products.

Introduction

WideStrikecotton (*Gossypium hirsutum* (L.)) containing the Cry1Ac and Cry 1F endotoxin of *Bacillus thuringiensis*, will become commercially available to cotton producers in 2005. It is anticipated that WideStrike will provide cotton producers with effective control of heliothines, tobacco budworm, *Heliothis virescens* F. and *Helicoverpa zea*, and other lepidopterous pests of cotton in Arkansas. The first transgenic, Bollgard, gave excellent control of tobacco budworm but control of bollworm, *Helicoverpa zea* (Boddie), and various other lepidopterous pest has achieved less reliable control and depended more on foliar insecticide treatments in conjunction with Bt variety (Lorenz et. al 2002).

WideStrike was developed to give additional control of lepidopterous pests and decrease the probability of population resistance of targeted pests with the additional toxin Cry1F. The only other transgenic with two endotoxins is Bollgard II, which contains Cry1 Ac and Cry2 Ab. Previously conducted studies have shown Bollgard® II to be effective in controlling bollworm, tobacco budworm and soybean looper (Allen et. al 2000; Stewart et. al 2000; Ridge et. al 2000). The purpose of this study was the examine the efficacy of WideStrike, sprayed and unsprayed, to conventional cotton, sprayed and unsprayed, for cotton for control of lepidopterous pests. Additional observations were made to compare agronomic characteristics of these varieties.

Materials and Methods

All trials were conducted at Hooker Farms in Jefferson County, AR in 2004-2005. In 2004, the treatments utilized in the trial were Widestrike Sprayed and unsprayed and Conventional sprayed and unsprayed. PHY 470 WR was planted May 10, 2004 along with the conventional PHY 410 R. The field was planted and subdivided into 16 row plots using 38 inch row spacing and 150 feet length. Foliar treatments of Prolex (0.016 ai/A) were made as needed according to statewide threshold recommendation. This resulted in 3 applications to conventional cotton in the

sprayed regimen WideStrike plots received either 0, 1, or 2 foliar applications (see Fig. 1). Treatments were applied with a John Deere Hi-Cycle 6500 using a compressed air delivery system using an 8 row boom with 19 inch nozzle spacing. The nozzles used for application were Tee-Jet TXVS 6. Operating pressure was 45 pounds per square inch and 9.17 gallons per acre of volume. Treatments were foliar applied on July 8, July 13, July 20, 2004. Observations were conducted on July 12, July 16, July 19, July 23, July 26, and July 29, 2004. Data was collected from random samples of 25 terminals, 25 squares, 10 blooms, and 10 bolls. Plots were machine picked on October 25, 2004.

In 2005 small plots trials **t**he treatments utilized in the trial were PHY 440 W and PHY 470 WR, 475 WRF, 410 R, and BG II (DPL 424). All varieties were planted May 6, 200. The field was planted and subdivided into a 4 row plots with 4 rows of Buffer between each plot. The trial was half treated and half untreated. Treatments were made according to statewide threshold recommendation. Treatments were applied with a John Deere Hi-Cycle 6500 using a compressed air delivery system using an 8 row boom with 19 inch nozzle spacing. The nozzles used for application were Tee-Jet TXVS 6. Operating pressure was 45 pounds per square inch and 9.59 gallons per acre of volume. Treatments were foliar applied on July 14, and August 4, 2005. Data was collected from random samples of 20 terminals, 40 squares, 40 blooms, and 40 bolls. Plots were machine picked on October 25, 2004. Bidrin was applied on July 24, 2005 for plant bug control on all plots a rate of 0.5 LB A/A. Data was processed using Agriculture Research Manager Version 7. Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10).

The treatments utilized in the large block trial were PHY 440, PHY 470, and BG II (DPL 424). All varieties were planted May 6, 2005. Treatments were applied with a John Deere Hi-Cycle 6500 using a compressed air delivery system using an 8 row boom with 19 inch nozzle spacing. The nozzles used for application were Tee-Jet TXVS 6. Operating pressure was 45 pounds per square inch and 9.59 gallons per acre of volume. Data was collected from random samples of 100 terminals, 100 squares, 100 blooms, and 100 bolls. Plots were machine picked on October 25, 2004. Bidrin was applied on July 24, 2005 for plant bug control on all plots a rate of 0.5 LB A/A. Data was processed using Agriculture Research Manager Version 7. Analysis of variance was conducted and Duncan's New Multiple Range Test (P=0.10).

Results and Discussion

In 2004 and 2005, trap counts were extremely low for budworm and larval collections indicated field populations were cotton bollworm only.

In 2004, in the first three weeks of July cotton bollworm pressure was extremely high and the conventional plot was treated weekly during this period for three applications. Widestrike plots were treated July 13 (1X) and July 20 (2X). However, resulting data showed that little difference occurred in the Widestrike plots regardless of whether they were sprayed once or twice and therefore the data was merged as a single unit for reporting purposes. Seasonal percent damage (Fig. 2) indicated extremely high damage in the unsprayed portion of the plot compared to sprayed conventional and Widestrike sprayed or unsprayed. Damage to conventional sprayed was close to that of Widestrike unsprayed. However, Widestrike sprayed had the least damage of all treatments. During the entire sampling period only 3 bollworms were observed and collected in the Widestrike unsprayed plot, the same was found in Widestrike sprayed. This compared to 52 bollworm larvae in the unsprayed conventional and 9 bollworms in the sprayed conventional plots. At harvest WideStrike treated and WideStrike untreated were not significantly different and had significantly higher yields than the conventional cotton (Fig. 2).

Fig. 1. Test design and observable worm damage in untreated areas.

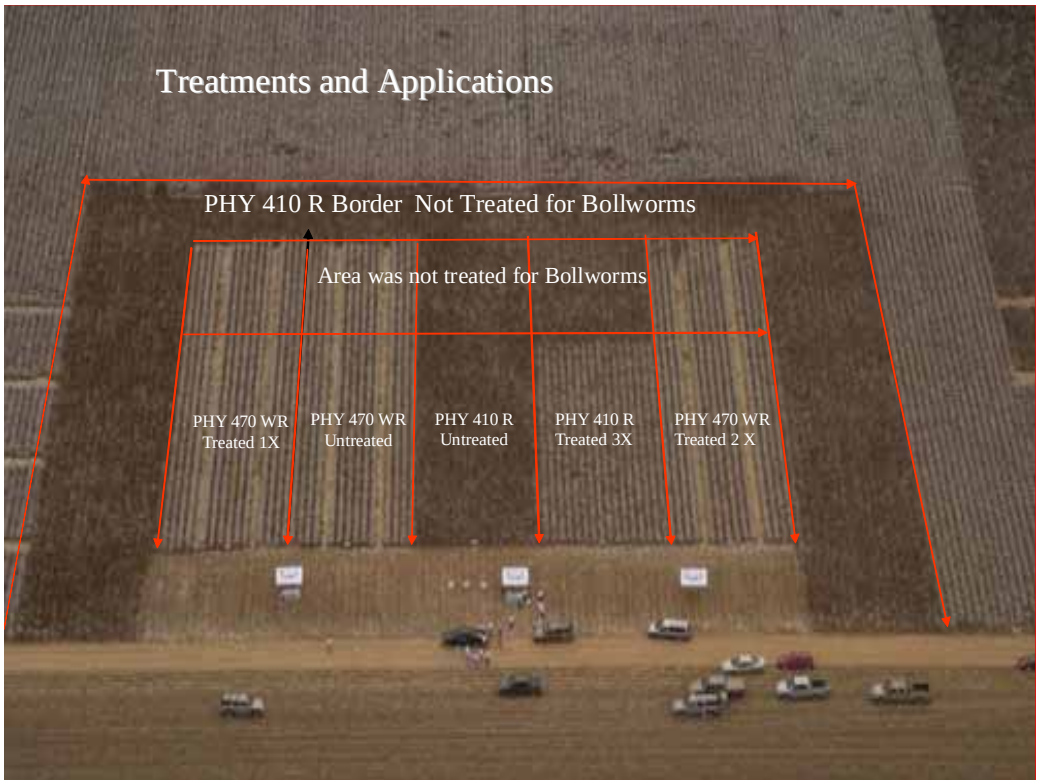
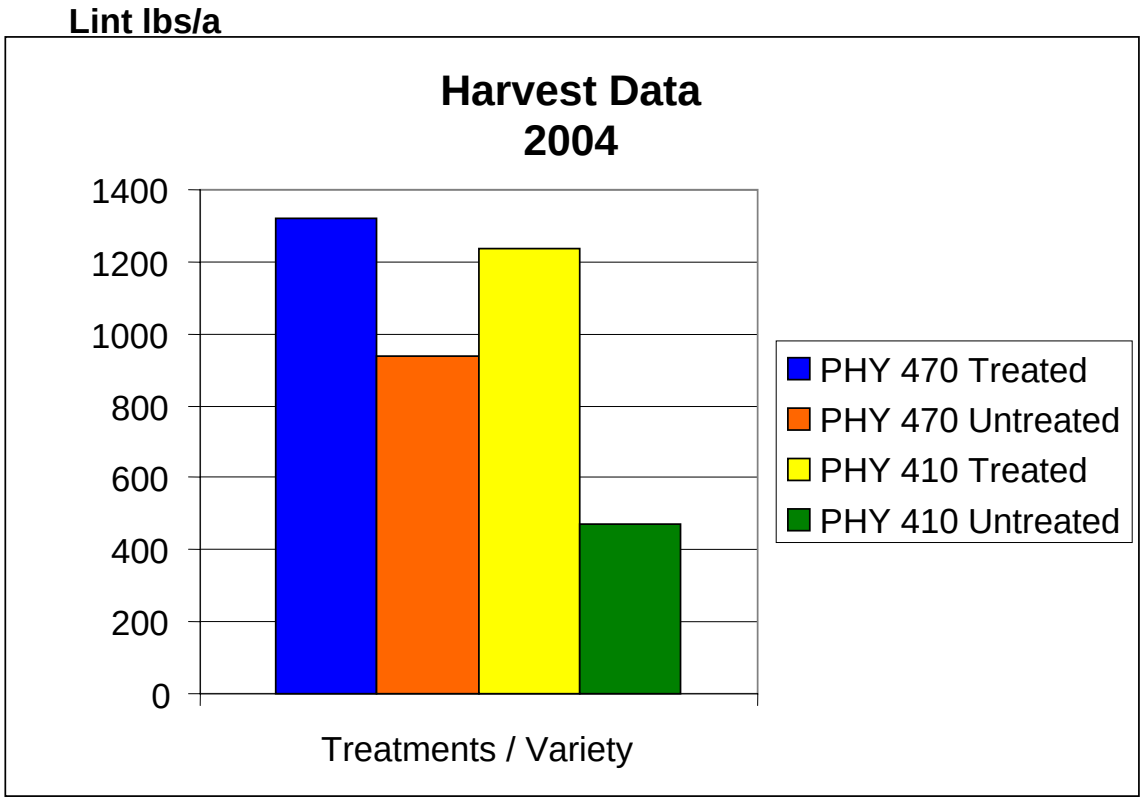


Fig. 2. 2004 lint yields for WideStrike and conventional cotton.



In 2005, small plots indicated treated plots had significantly less damaged fruit only for the PHY 410 R (conventional variety) in treated plots versus untreated, indicating excellent control of both bollworm and fall armyworm (Fig. 3). This same trend carried over into yield.

Large block trials indicated significantly higher damaged fruit in the untreated conventional compared to WideStrike and all Bollgard II treatments (Fig. 4.). The untreated conventional variety yielded significantly less than all Bollgard II treatments as well as WideStrike.

These studies indicate that both Bollgard II and WideStrike a very high level of control of bollworm and fall armyworm.

Acknowledgements

We would like to thank Dow AgroScience and Monsanto for their support on these studies. We also would like to thank Chuck Hooker for allowing us to a location for the study. We also acknowledge Donald Plunkett, Jefferson County Extension Agent, for helping with data observations.

References

Allen, C.T., M.S. Kharboutli, C. Capps, and L.D. Earnest. 2000. Effectiveness of Bollgard II cottton varieties against foliage and fruit feeding caterpillars in Arkansas. Pp. 1093-1094. *IN* Vol. 2:Proceedings Beltwide Cotton Conferences

Lorenz, G.M., D.R. Johnson, J. Hopkins, J. Reaper, A. Fisher, and C. Norton. 2002. Bollgard II performance in Arkansas, 2001. *IN* Proceedings Beltwide Cotton Conferences [CD-ROM].

Ridge, R.L., S.G. Turnipseed, and M.J. Sullivan. 2000. Field comparison of genetically modified cottons containing one strain (Bollgard) and two strains (Bollgard II) of *Bacillus thuringiensis kurstaki*. pp. 1057-1058. *IN* Proceedings Beltwide Cotton Conferences.

Steward, S.D. and K.S. Knighten. 2000. Efficact of BT cotton expressing two insecticidal protiens of *Bacillus thuringiensis* Berliner on selected caterpillar pests. pp. 1043-1048. *IN* Proceedings Beltwide Cotton Conferences.

Fig. 3. Seasonal damaged fruit for varieties in small block study, 2005.

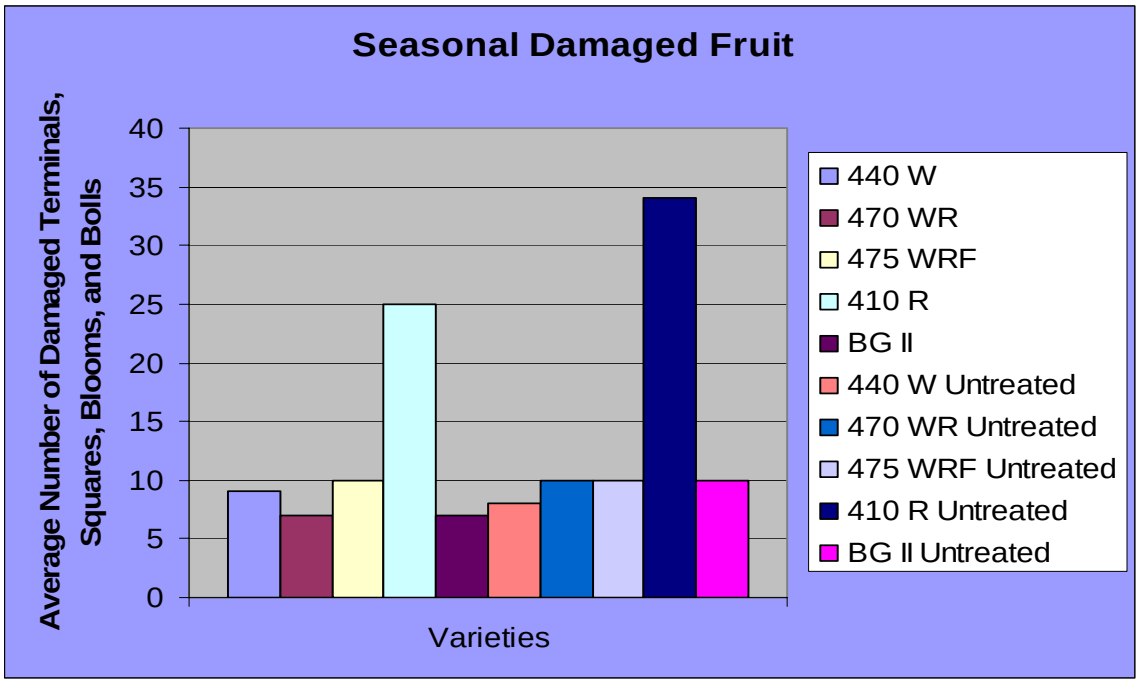


Fig. 4. Average seasonal damaged fruit in large block study, 2005.