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

# EFFICACY OF WIDESTRIKE™ FOR CONTROL OF THE BOLLWORM/TOBACCO BUDWORM COMPLEX IN NORTHWEST LOUISIANA

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## Abstract

A trial was conducted in 2005 at the Red River Research Station in Bossier City, LA (Bossier Parish) to assess the efficacy of WideStrike™ cotton (PHY 475 WRF) in controlling the bollworm/tobacco budworm (BW/TBW) complex under field conditions. The trial was designed to evaluate WideStrike™ cotton for BW/TBW control compared to a non-transgenic cotton (PHY 415 RF) and a Bollgard II cotton (FM 960 B2R) under sprayed (based on thresholds) and non-sprayed conditions. In general, both transgenic cultivars (PHY 475 WRF and FM 960 B2R) had significantly less square damage and larval infestation compared with both the sprayed and non-sprayed PHY 415 RF cultivar. Boll damage and larval infestation in both the PHY 475 WRF and FM 960 B2R transgenic cultivars were not significantly lower compared with the sprayed PHY 415 RF. Only the non-sprayed PHY 415 RF yielded significantly less seed cotton per acre compared with the other treatments. WideStrike™ and Bollgard II® appeared comparable in BW/TBW complex control.

## Introduction

The 1996 commercial release of the first insect-resistant transgenic cotton, Bollgard® (Monsanto, St. Louis, MO), was a milestone in cotton IPM. Bollgard® cotton cultivars were effective in controlling a number of important cotton pests including the tobacco budworm, *Heliothis virescens* (F.), and the pink bollworm, *Pectinophora gossypiella* (Saunders). Bollgard® cotton was found to be less effective in controlling heavy populations of the bollworm, *Helicoverpa zea* (Boddie). Micinski (2001) demonstrated the value of insecticide applications during periods of high bollworm pressure. Bollgard® cultivars controlled these pests through the production of the Cry1Ac protein from *Bacillus thuringiensis* Berliner var. *kurstaki*. More recently, Monsanto introduced Bollgard II® cotton which expressed two Bt insecticidal proteins, Cry1Ac and Cry2Ab.

WideStrike™ (Dow AgroSciences) cotton cultivars express two proteins or endotoxins (Cry1Ac and Cry1F) from *B. thuringiensis*. The purpose of this study was to examine the efficacy of WideStrike™ compared to Bollgard II® in controlling the bollworm/tobacco budworm (BW/TBW) complex under field conditions. The trial was designed to evaluate both transgenic cottons under sprayed and non-spray conditions.

## Materials and Methods

Cotton was planted 11 May and again on 21 June. The second trial was planted because the first planting was severely damaged by hail on 16 June and its recovery was uncertain. Plots for both plantings were 4 rows X 40 ft (12.2 m) on 40-inch (1-m) centers. Experimental design was a RCB design with 4 replications. Treatments were as follows: 1) PHY 415 RF – unsprayed for BW/TBW, 2) PHY 475 WRF – unsprayed for BW/TBW, 3) FM 960 B2R – unsprayed for BW/TBW, 4) PHY 415 RF – sprayed at economic damage threshold, 5) PHY 475 WRF – sprayed at economic damage threshold, and 6) FM 960 B2R - sprayed at economic damage threshold. All non-lepidopteran pests were controlled as necessary across both planting dates. All cultivars used in the trial were Roundup Ready® Flex. PHY 415 RF was the non-transgenic cultivar in the study. Economic damage was determined according to the recommendations of the Louisiana Cooperative Extension Service for control of the BW/TBW complex in cotton.

Only the PHY 415 RF sprayed plots required lepidopteran insecticide applications during the studies. For the 11 May planting date, the sprayed PHY 415 RF plots were treated on 14, 19 July, and 15 August with Karate Z plus Tracer 4SC. For the 21 June planting date, the sprayed PHY 415 RF plots were treated on 17 August and 7 Sept with Karate Z plus Tracer 4SC. All applications were made at 0.033 + 0.09 lb ai/acre. Neither the PHY 475 WRF nor the FM 960 B2R plots on either planting date required insecticide applications for the BW/TBW complex since the economic damage threshold was never exceeded during the trial. Therefore, the sprayed and unsprayed plots for each cultivar were pooled for statistical analysis.

Data on terminal damage was collected from 40 terminals per plot from the 21 June planting date only. Data on square and boll infestation/damage were collected from both plantings during the season by examining 40 squares/bolls per plot on a weekly basis.

Yield data were collected from the 11 May planting date only. The center 2 rows of each plot were mechanically harvested on 21 Oct. All data were analyzed with ANOVA and means separated using DMRT (P=0.05).

## Results and Discussion

For the 11 May planting date, both mean square damage and larval infestation were significantly (P<0.05) greater in the unsprayed PHY 415 RF compared with the other cultivars (Fig. 1). Both PHY 475 WRF and FM 960 B2R had significantly less mean square damage and larval infestation compared with the sprayed PHY 415 RF. Mean boll damage was significantly lower in the PHY 475 WRF compared with either the sprayed PHY 415 RF or the FM 960 B2R (Fig. 1). No data were collected from the unsprayed PHY 415 RF because few bolls were present due to the high square damage. No significant differences in larval infestation of bolls occurred among treatments. The unsprayed PHY 415 RF yielded significantly less seed cotton per acre compared with the other cultivars (Fig. 2).

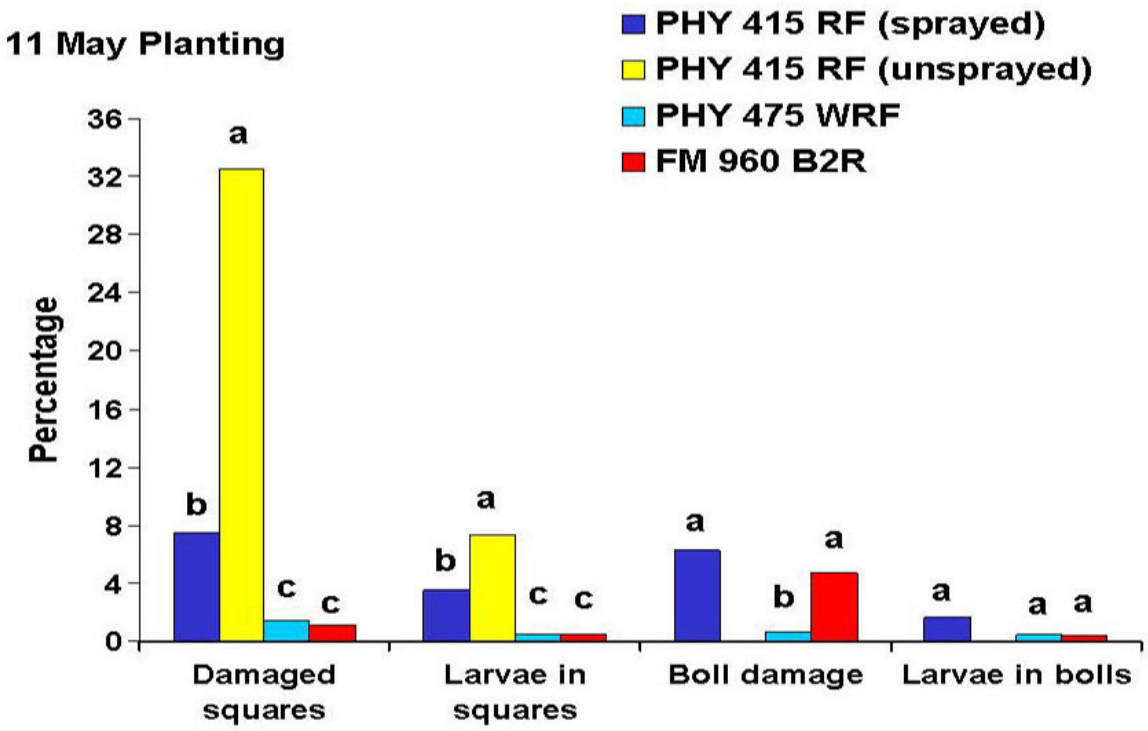


Figure 1. Bollworm/tobacco budworm damage and larval infestation in squares and bolls from the 11 May planting date.

Terminal and square damage in the 21 June planting date was significantly less in PHY 475 WRF and FM 960 B2R compared with either the sprayed or unsprayed PHY 415 RF (Fig. 3). Only FM 960 B2R had significantly fewer larvae in squares compared with either the sprayed or non-sprayed PHY 415 RF.

Significantly more boll damage and larval infestation in bolls occurred in the unsprayed PHY 415 RF plots compared with the other plots (Fig 4). No significant differences in boll damage or infestation occurred among the other treatments.

The bollworm was the primary Heliothine present during these two studies. The heaviest bollworm pressure came during mid- to late July and this explains why overall square damage was higher in the early planting (11 May) compared to the later planting.

The results of these trials confirm previous trials demonstrating the efficacy of WideStrike™ cottons against the BW and TBW (Bacheler and Mott 2004, Huckaba et al. 2003, Langston et al. 2004 and Smith et al. 2005).

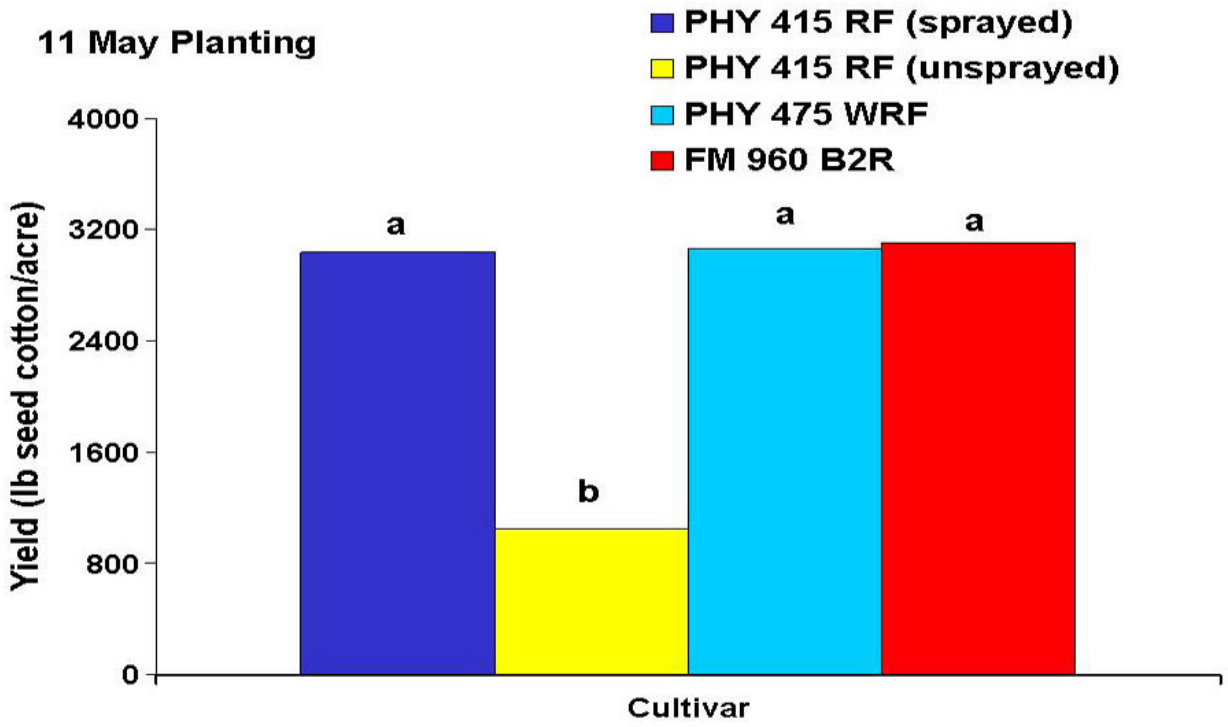


Figure 2. Yields in lb seed cotton per acre from the 11 May planting date.

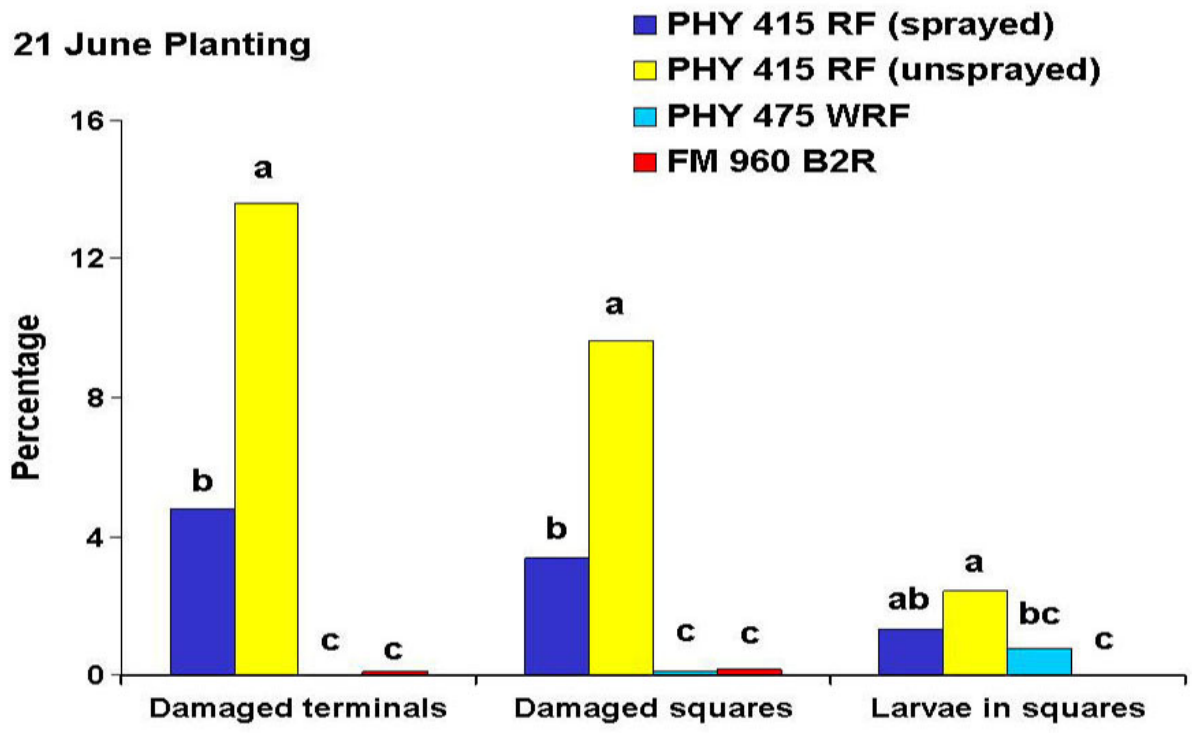


Figure 3. Bollworm/tobacco budworm terminal damage and damage and larval infestation in squares from 21 June planting date.

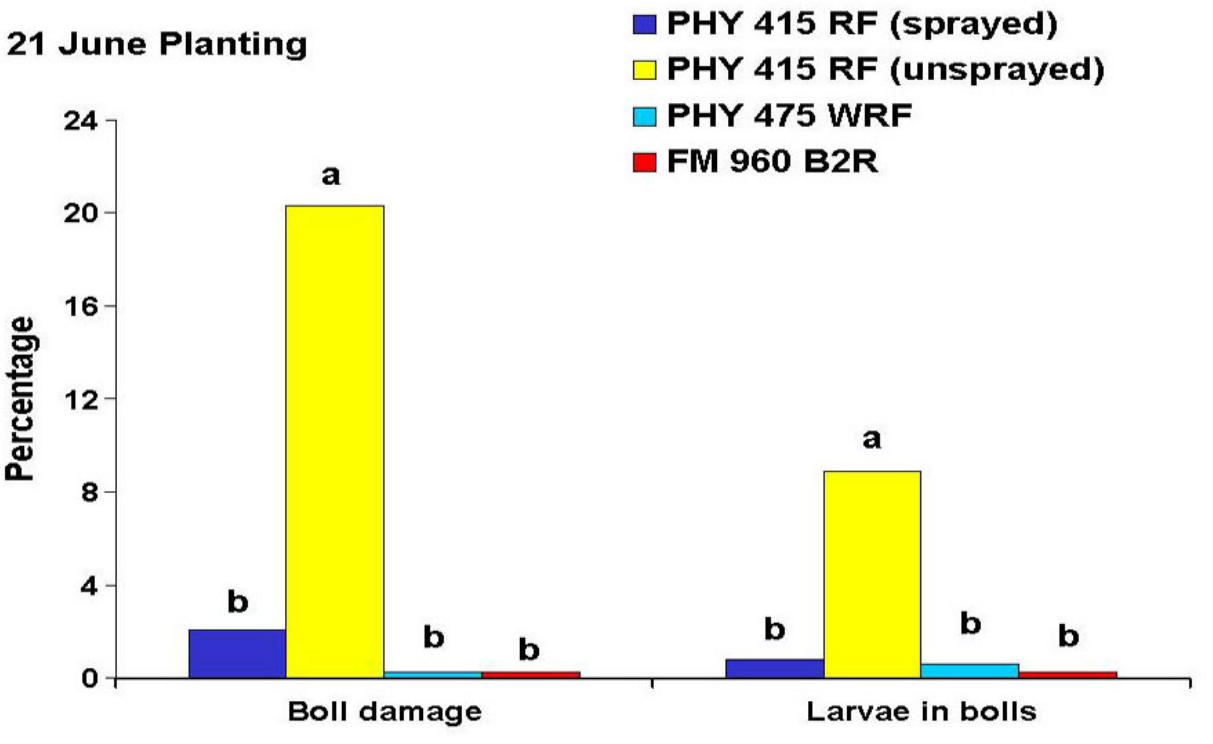


Figure 4. Bollworm/tobacco budworm damage and larval infestation in bolls from 21 June planting date.

## Conclusions

Both transgenic cultivars (PHY 475 WRF and FM 960 B2R) had significantly less square damage and larval infestation in squares compared with both the sprayed and non-sprayed non-transgenic PHY 415 RF. Boll damage and larval infestation in both the PHY 475 WRF and FM 960 B2R transgenic cultivars were not significantly lower compared with the damage and larval infestation in the sprayed PHY 415 RF. Only the non-sprayed PHY 415 RF yielded significantly less seed cotton per acre compared with the other treatments. The efficacy of the new WideStrike™ cotton was comparable to Bollgard II™ in regards to control of the BW/TBW complex.

## Acknowledgment

The authors would like to thank Dow AgroSciences, Indianapolis, IN, for its support for these trials.

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