IMPACT OF FOLIAR INSECTICIDE APPLICATION ON DUAL GENE COTTON

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Abstract

In 2012 several trials were conducted across Arkansas, Tennessee, Mississippi and Louisiana, to evaluate the efficacy of foliar insecticides for control of Heliothines, primarily cotton bollworm on conventional, Bollgard II, and WideStrike varieties. In most of the trials the foliar insecticide used was Prevathon (rynaxapyr or chlorantraniliprole). Some trials also included Belt (flubendiamide) or Tracer.

Introduction

Since the introduction of Bollgard in 1996, economic evaluations have been conducted by a number of researchers which indicate that in Arkansas, the most economical cultivar is the one that is highest yielding, regardless of technology associated with the cultivar (Bryant et al. 1997). Most studies show the efficacy of control advantage to single and dual gene technology but when compared economically, high yielding cultivars are the most economical in Arkansas (Bryant, et al., 2003). Recently, DuPont has developed Coragen (Rynaxypyr) and Bayer Crop Sciences has developed Belt (flubendiamide), these new insecticides are very effective for control of caterpillar pests. They have a similar mode of action that cause disruption of the calcium balance within insect muscle cells, leading to a rapid cessation in feeding as well as paralysis of target pests (Bayer Crop Science and DuPont technical fact sheet, 2009). Both new insecticides have broad spectrum caterpillar pest control and both have very good residual activity (Hardke, 2008). Cotton bollworm and tobacco budworms accounted for only 0.27% reduction in yield in 2009; however, with the high populations encountered in Arkansas during the 2010 growing season, damage levels rose to 2.67%, this equated to cost of control plus loss of yield of over $14 million (Williams 2009, 2010). While plant bugs are considered the number one pest in Arkansas cotton, caterpillar pests can be equally or even more devastating to the bottom line for our producers. Many of the acres planted with dual gene *B.t.* varieties in 2009 and 2010 required supplemental foliar applications for bollworms. Applications targeting bollworm/budworms have increased from 0.6 applications and acre in 2008 to 1.7 applications per acre in 2010 (Williams, 2008, 2009, 2010). A similar trend was seen with the single gene bollgard varieties as well. Bollgard I raised from 0.5 applications per acre to 1.2 applications per acre before Dual gene cotton was forced into the marketplace in 2004 (Williams 2001-2005). The objective of this study was to evaluate supplemental foliar applications on Bollgard II, WideStrike and conventional cotton to ascertain the benefit of these products in each type of cotton.

Methods

Each location selected a conventional, Bollgard II, and WideStrike variety. Treatments included untreated check Prevathon at 14 and/or 20 oz/ A, Belt at 3 oz/ A and/or Tracer at 2.9 oz/ A. Regardless of infestation an application was made the first week of full bloom. Subsequent treatments were made as needed depending on extension threshold. All trials were sprayed for other pests such as plant bugs, aphids, etc as needed. Scouting was accomplished pre-application and at 3, 7, 10, 14, and 21 d post application. Harvest data was taken at all locations.

Results

Seasonal total larval counts indicated significant differences only in the conventional variety, while both Bollgard II and WideStrike varieties showed little difference and relatively low numbers (Figs1-3).

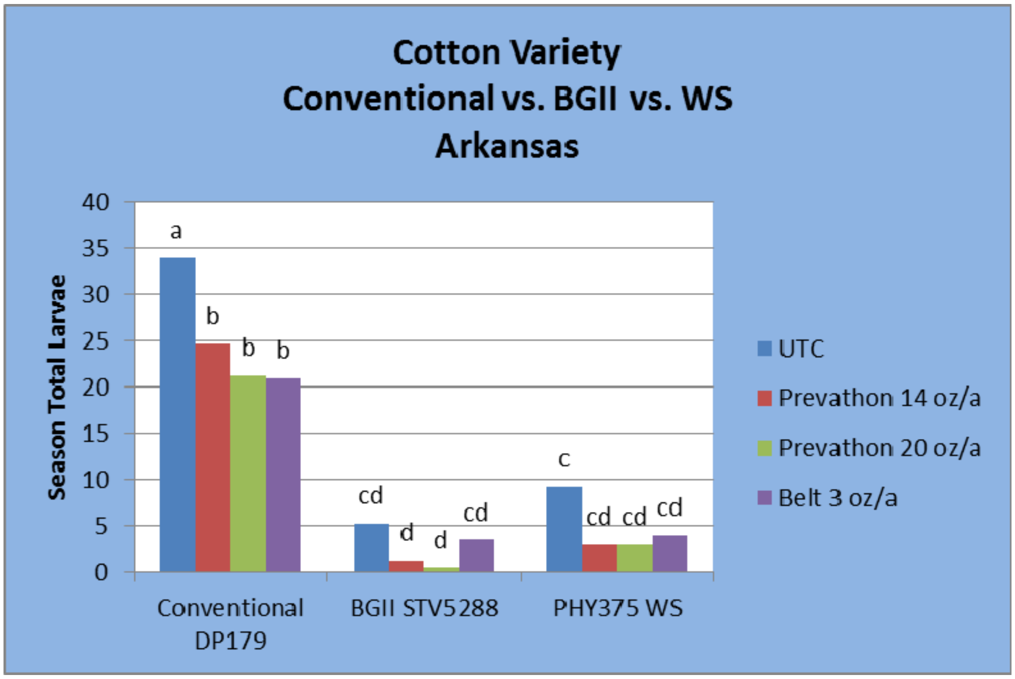

Figure 1. Season total larvae from Arkansas trial.

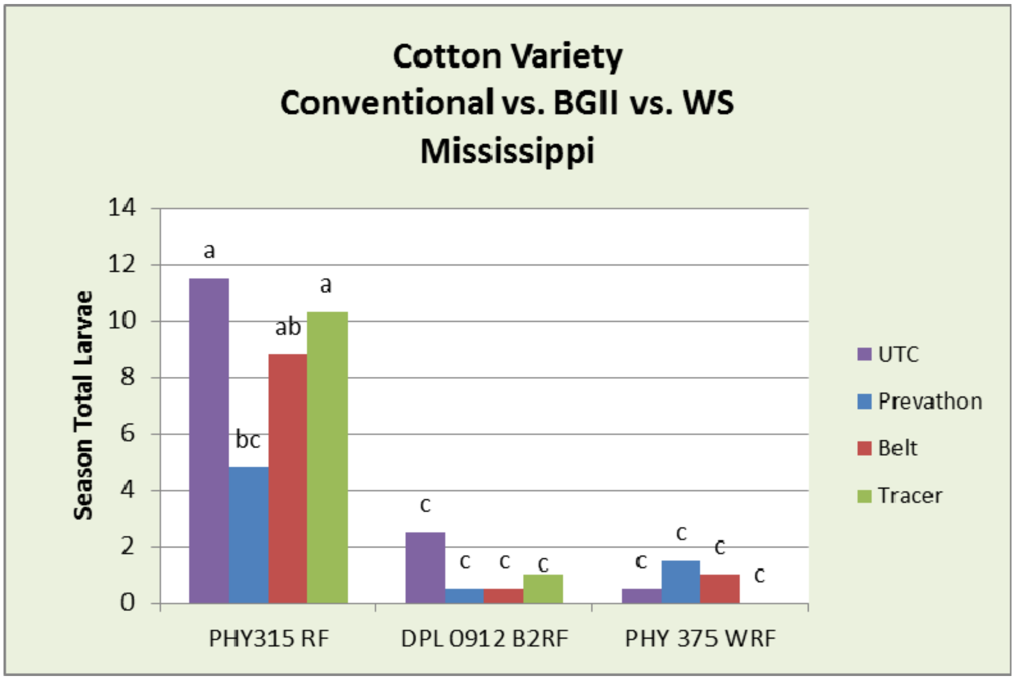

Figure 2. Season total larvae from MS trial.

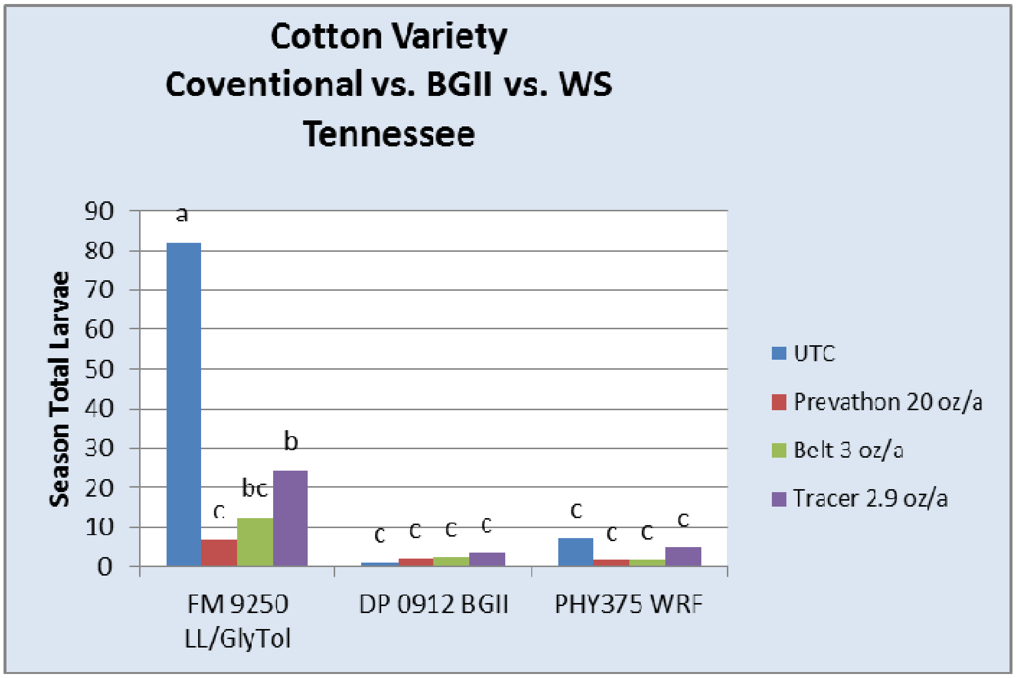

Figure 3. Season total larvae from Tennessee trial

Damage totals for all locations were similar to seasonal larvae differences with major differences occurring in the conventional cotton and very few differences in the dual gene cotton varieties (Figs 4-6). The exception was the Louisiana location which results were hard to explain. Harvest totals indicated in Arkansas that conventional cotton had significant increase in yield with all foliar treatments compared to check, both dual gene varieties had more yield compared to conventional cotton; and, the foliar applications of Prevathon increased yield over the untreated check in Bollgard II and WideStrike cotton (Fig 7). A similar trend was seen in MS (Fig 8). No differences in yield were observed in LA (Fig 9). In TN no differences in yield were observed between dual gene varieties which had higher yields compared to the conventional. This marked difference might indicate foliar applications were made late. However, the Prevathon application did have a higher yield compared to the other foliar treatments and the untreated check.

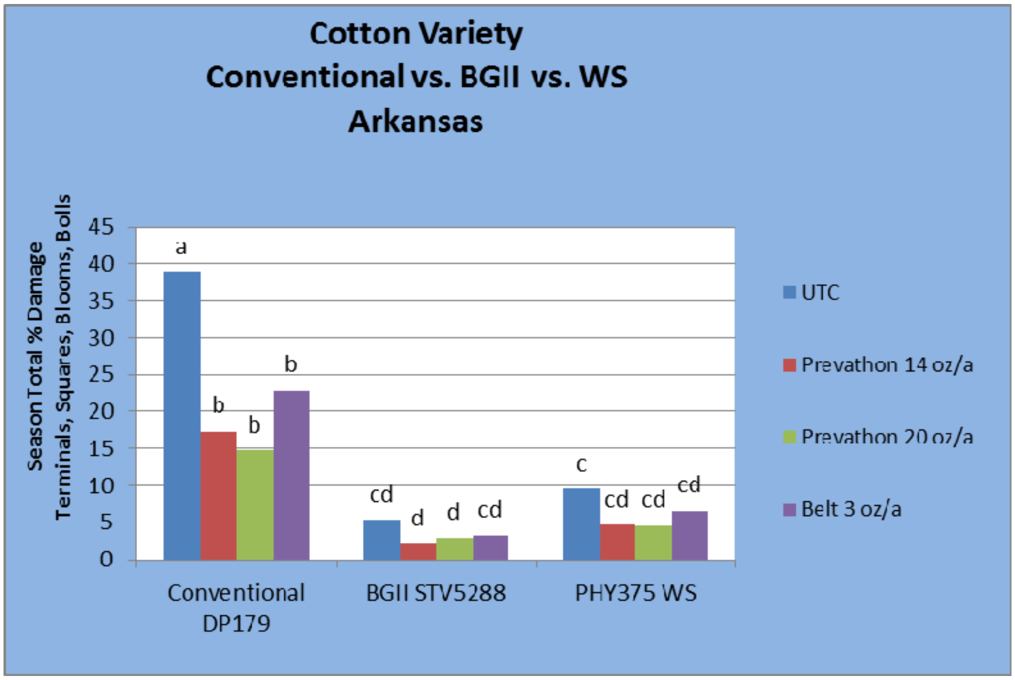

Figure 4. Season % total damage of terminals, squares, blooms, and bolls from Arkansas trial.

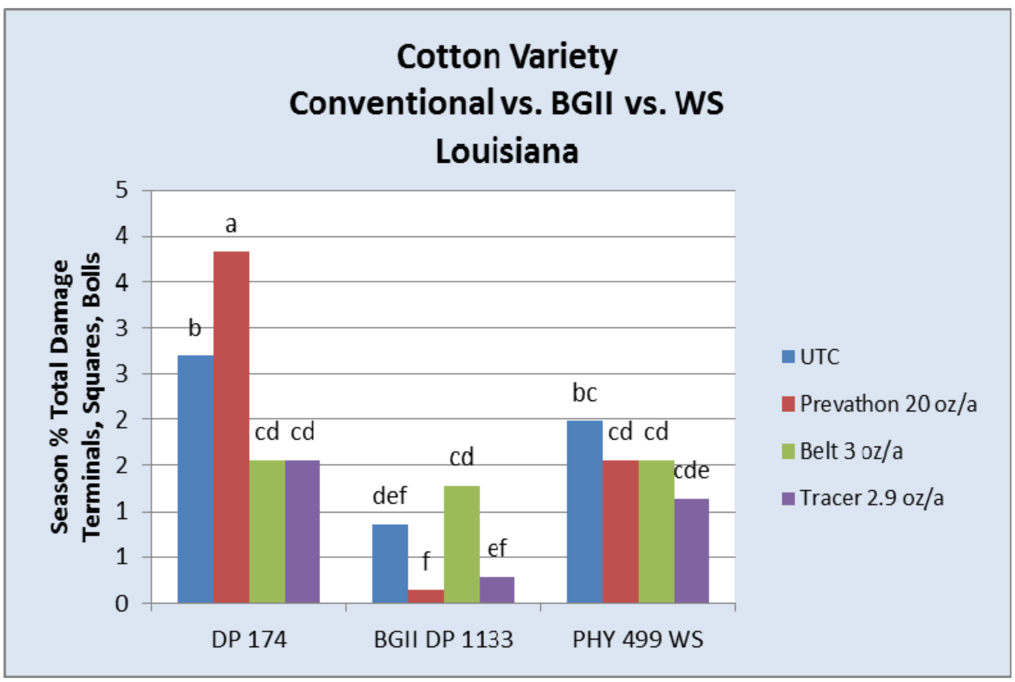

Figure 5. Season % total damage of terminals, squares, and bolls from Louisiana trial

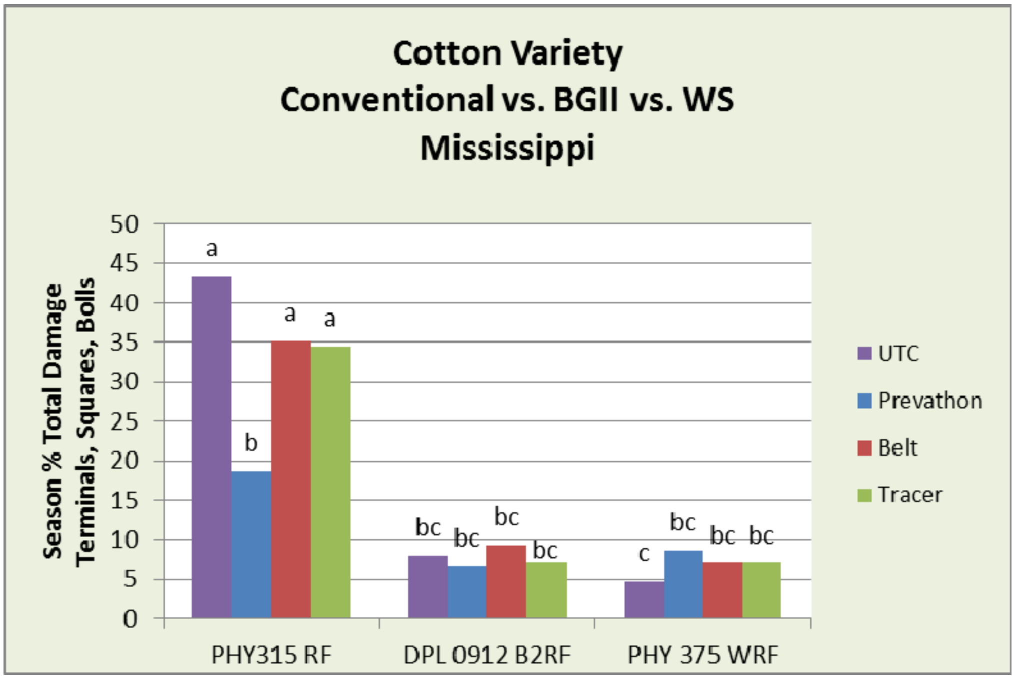

Figure 6. Season % total damage of terminals, squares, blooms, and bolls from Mississippi trial.

Harvest totals indicated in Arkansas that conventional cotton had significant increase in yield with all foliar treatments compared to check, both dual gene varieties had more yield compared to conventional cotton; and, the foliar applications of Prevathon increased yield over the untreated check in Bollgard II and WideStrike cotton (Fig 7). A similar trend was seen in MS (Fig 8). No differences in yield were observed in LA (Fig 9). In TN no differences in yield were observed between dual gene varieties which had higher yields compared to the conventional. This marked difference might indicate foliar applications were made late. However, the Prevathon application did have a higher yield compared to the other foliar treatments and the untreated check.

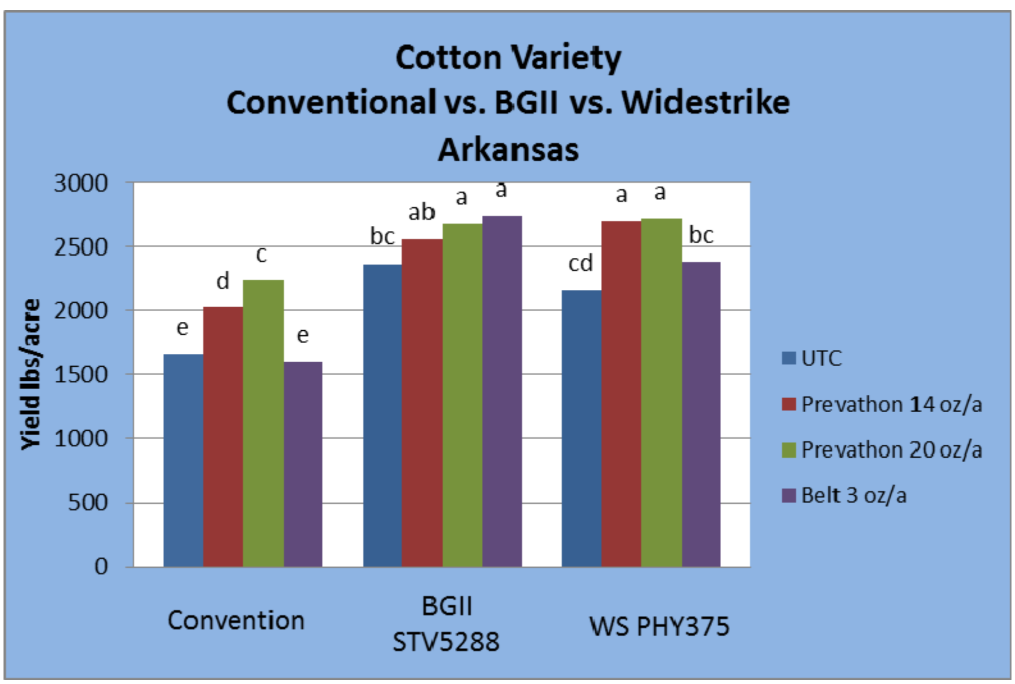

Figure 7. Yield in lbs/acre from Arkansas trial.

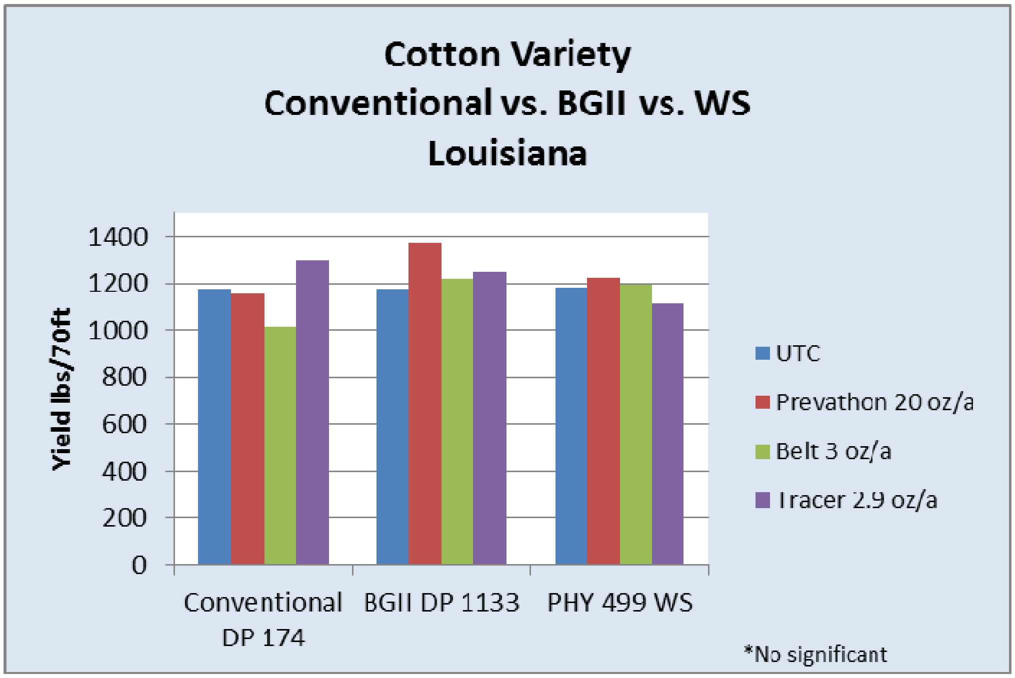

Figure 8. Yield in lbs/70ft. from Louisiana trial.

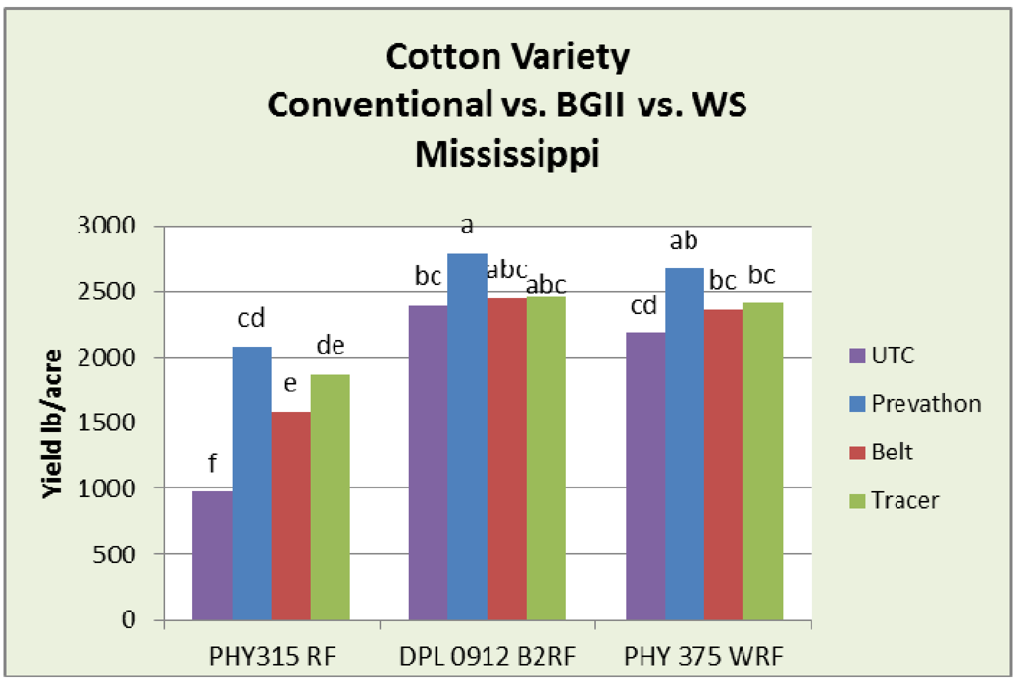

Figure 9. Yield in lbs/acre from Mississippi trial.

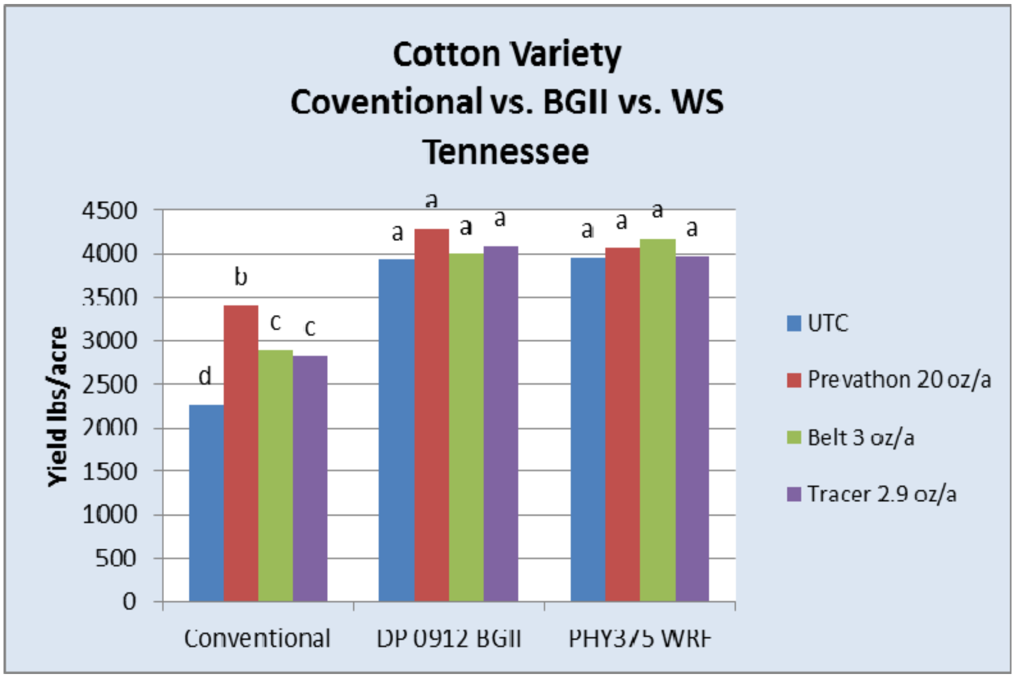

Figure 10. Yield in lbs/acre from Tennessee trial.

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