WEED MANAGEMENT AND CROP TOLERANCE IN GLYTOL™ AND GLYTOL™ + LIBERTYLINK® COTTON IN THE SOUTHEAST US

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Abstract

In 1995, the first genetically modified cotton cultivar (with resistance to the herbicide bromoxynil) was commercialized. Three years later, the first stacked traits cotton (Bt and glyphosate) was being adopted by producers. Since then, many cotton cultivars have been modified for disease and pest resistance, morphological characteristics, and herbicide resistance. As of 2008, 94.6% of cotton planted in the United States was transgenic. Integrating additional types of herbicide resistance into cotton could continue to be economically beneficial to producers. Currently, cotton with resistance to both glyphosate and glufosinate is being studied for crop tolerance and weed control.

Eight sites were chosen across the southeast United States to evaluate the cotton for stand, height, injury, boll morphology, yield, and lint quality. The sites were: Sellers and Elko, South Carolina; Laurel Hill and Lewiston, North Carolina; Tuscaloosa, Alabama; Tallahassee, Florida; Brooks and Attapulgus, Georgia. Two sites, Macon County, Georgia and Rocky Mount, North Carolina, were also chosen to evaluate weed control. In each experiment, two lines were compared: a 'Coker' variety that contained only glyphosate-resistance (GlyTol) and a FiberMax® line that contained glyphosate-resistance (GlyTol) and glufosinate-resistance (LibertyLink). Two treatments were applied to the Coker line: no herbicide and four applications of glyphosate. Six treatments were applied to the FiberMax line: a non-treated control; four applications of glyphosate; four applications of glufosinate; sequential

applications of glyphosate and glufosinate (glyphosate, glufosinate, glyphosate, glufosinate); sequential applications of glufosinate and glyphosate (glufosinate, glyphosate, glufosinate, glyphosate); and four tank-mixed applications of glyphosate and glufosinate. Herbicide applications were made at the 1-3 true leaf, 6-8 true leaf, 14-16 true leaf, and 40-60% boll open stages. Injury and height data were taken several times throughout the season and yield and fiber data were taken at the end of the season.

Although the seeding rates for both lines were identical, a greater cotton stand was noted with FiberMax (2.9 plant/ft) as compared to the Coker (2.4 plant/ft). The Coker line also displayed a shorter overall plant, though only by four centimeters at the greatest difference. Across the eight sites, no visual crop injury was observed and no differences in boll morphology or boll opening were detected when comparing the cotton treated or not treated with herbicides. Coker cotton yields (960-980 lbs/A) were less than those of FiberMax cotton (1,040-1,090 lbs/A) but herbicide treatments did not impact cotton yield. The Coker line had significantly greater length, strength, micronaire, and uniformity. Within each line, herbicide treatments did not impact fiber quality.

The two weed sites contained Palmer amaranth (*Amaranthus palmeri*), though the population at Rocky Mount, North Carolina was glyphosate –sensitive and the population at Macon County, Georgia was glyphosate-resistant. The North Carolina population achieved 99-100% control of Palmer amaranth in early and late season ratings for all treatments, except the no herbicide control. The Georgia experiment had to be destroyed just prior to bloom thus only three of the four applications of herbicide had been made at time of trial destruction. For the Georgia population, glyphosate alone provided less than 16% control. The application sequence of glyphosate, glufosinate, and glyphosate, achieved 70% control early season and 47.5% control in the late season rating. With this system, Palmer amaranth was too large at time of the glufosinate application to be effectively controlled. In contrast, treatments beginning with glufosinate applied to 1-3 leaf cotton when Palmer amaranth was less than two inches provided complete control.