TOLERANCE AND WEED CONTROL IN GLUFOSINATE-TOLERANT COTTON ON THE TEXAS SOUTHERN HIGH PLAINS. B.C. Burns, P.A. Dotray, Texas Tech University Lubbock, TX 79409; and J.W. Keeling, Texas Agricultural Experiment Station, Lubbock, TX 79403.

ABSTRACT

Recent advances in biotechnology have paved the way for the development of glufosinate-tolerant cotton. In 1995, the bar gene was introduced into Coker 312 cotton for tolerance to glufosinate. Field studies from 1996 to 2000 confirmed this tolerance, and current studies are being conducted to test the glufosinate-tolerant gene in lines derived from the genetic backgrounds of commercially available cultivars (designated as 8000515 and 8000535). Cotton tolerance to glufosinate was evaluated in both glufosinate-tolerant stripper cotton lines when applied at selected growth stages, rates, and sequential timings. An additional field study was conducted in 2001 to evaluate weed control in glufosinate-tolerant Coker 312 using glufosinate alone and in combination with residual herbicides.

In the growth stage test, glufosinate was applied postemergence-topical (POST) at 0.54 lb ai/A to both glufosinate-tolerant lines at the cotyledon, 2- to 3-leaf, 7- to 8-leaf, first square, first bloom, peak bloom, and cut-out growth stages. In the rate test, glufosinate was applied POST to both glufosinate-tolerant lines at the 2- to 3-leaf stage at 0.36, 0.72, 1.44, and 2.88 1b ai/A. In the sequential tolerance test, glufosinate was applied POST at 0.36 lb ai/A to cotton at the cotyledon, 2- to 3-leaf, 4- to 5-leaf stages, and postemergence-directed (PDIR). Visual injury was evaluated 7, 14, and 21 days after treatment (DAT). Plant heights were recorded 14 and 21 DAT. Cotton plants were mapped at harvest and yield and fiber quality was determined.

No visual injury was observed in either glufosinate-tolerant line (8000515 and 8000535) from applications made at any growth stage, from cotyledon to cutout. No cotton injury was observed from glufosinate rates up to 2.88 lb ai/A or from up to three sequential applications. Treatments had no effect on plant height, first position bolls, or nodes per plant. Glufosinate applications did not adversely affect yield or fiber quality in either glufosinate-tolerant line.

Additional field studies were conducted in 2001 to evaluate weed control in glufosinate-tolerant cotton (Coker 312) using glufosinate alone and in combination with residual herbicides. Trifluralin at 0.75 lb ai/A was applied preplant incorporated (PPI) to all plots. Treatments included: 1) prometryn at 1.2 lb ai/A preemergence (PRE) followed by (fb) glufosinate at 0.36 lb ai/A POST; 2) glufosinate POST alone; 3) prometryn PRE fb glufosinate POST fb glufosinate POST; 4) glufosinate POST fb glufosinate POST; 5) prometryn PRE fb glufosinate POST fb glufosinate POST fb glufosinate PDIR; 6) glufosinate POST fb glufosinate POST fb glufosinate PDIR. After each glufosinate application, Palmer amaranth (*Amaranthus palmeri*), devil's-claw (*Proboscidea louisianica*) and silverleaf nightshade (*Solanum elaeagnifolium*) control was evaluated. Glufosinate controlled annual weeds such as devil's-claw that were not controlled by residual herbicides. Trifluralin fb glufosinate POST controlled devil's-claw 95% and silverleaf nightshade 35% compared to no control when trifluralin was used alone. Late-season Palmer amaranth control improved with two glufosinate applications. Two glufosinate POST applications improved silverleaf nightshade control (65%) over one application.

These studies indicate that both glufosinate-tolerant lines have excellent season-long tolerance to POST and PDIR glufosinate applications. In addition, glufosinate controlled devil's-claw and silverleaf nightshade that were not controlled by residual herbicides alone.