

LIBERTY TOLERANT COTTON: WEED CONTROL AND CROP TOLERANCE

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Abstract

Acres planted with herbicide-tolerant cotton varieties have steadily increased since their introduction in 1995. Recently, the bar gene was introduced into Coker 312 cotton plants for tolerance to Liberty (glufosinate). Field studies from 1996 to 2000 confirmed Liberty-tolerant Coker 312 tolerance to Liberty. Currently, the Liberty-tolerant gene is being tested in lines derived from the genetic backgrounds of two commercially available varieties of cotton. These lines were evaluated for Liberty tolerance and will not necessarily become the Liberty-tolerant varieties released. Cotton tolerance to Liberty was evaluated in both Liberty-tolerant stripper cotton lines when applied at selected growth stages, rates, and sequential timings. Weed control in Liberty-tolerant cotton using Liberty alone and in combination with residual herbicides was evaluated in Liberty-tolerant Coker 312.

In the growth stage test, Liberty was applied postemergence-topical (POST) at 0.54 lb ai/A to both Liberty-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, Liberty was applied POST to both Liberty-tolerant lines at the 2- to 3-leaf stage at 0.36, 0.72, 1.44, and 2.88 lb ai/A. In the sequential tolerance test, Liberty 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) late-season. 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 to either Liberty-tolerant line (8000515 and 8000535) was observed from any growth stage, rate, or sequential Liberty application. Treatments had no effect on plant height, first position bolls, or nodes per plant. Liberty applications did not adversely affect yield or fiber quality of either Liberty-tolerant line.

Additional field studies were conducted in 2001 to evaluate weed control in Liberty-tolerant cotton (Coker 312) using Liberty alone and in combination with residual herbicides. Treflan at 0.75 lb ai/A was applied preplant incorporated (PPI) to all plots. Treatments included: 1) Caparol at 1.2 lb ai/A preemergence (PRE) followed by (fb) Liberty at 0.36 lb ai/A POST; 2) Liberty POST alone; 3) Caparol PRE fb Liberty POST fb Liberty POST; 4) Liberty POST fb Liberty POST; 5) Caparol PRE fb Liberty POST fb Liberty POST fb Liberty PDIR; 6) Liberty POST fb Liberty POST fb Liberty PDIR. After each Liberty application, Palmer amaranth (*Amaranthus palmeri*), devil's-claw (*Proboscidea louisianica*) and silverleaf nightshade (*Solanum elaeagnifolium*) control was evaluated. Liberty controlled annual weeds such as devil's-claw that were not controlled by residual herbicides. Treflan fb Liberty POST controlled devil's-claw 95% and silverleaf nightshade 35% compared to no control of these weeds using Treflan alone. Late-season Palmer amaranth control was improved with two Liberty applications. Two Liberty POST treatments improved silverleaf nightshade control (65%) over one application (30%).

These studies indicate that both Liberty-tolerant lines have excellent season-long tolerance to POST and PDIR Liberty applications, and Liberty controlled both annual and perennial weeds not controlled by residual herbicides alone.