PERFORMANCE OF LIBERTY-TOLERANT COTTON IN WEST TEXAS

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Abstract

Research was initiated in 1995 to develop Liberty- (glufosinate) tolerant cotton using genetic engineering techniques. In field experiments from 1997 to 1999, cotton growth and yield was not affected by Liberty (glufosinate) applications made at different growth stages, at various rates, and in sequential applications. The objectives of this research were to confirm the season-long cotton tolerance to various Liberty rates and sequential applications and to evaluate weed management systems in Liberty-tolerant cotton and compare this system to Roundup Ready (glyphosate-tolerant) and BXN (bromoxynil-tolerant) weed management systems. Experiments were conducted in 2000 at the Texas Agricultural Experiment Station located near Lubbock on an Acuff clay loam soil with 0.8% organic matter and pH 7.8. Herbicides were applied using a backpack or tractor-mounted compressed air sprayer that delivered 10 GPA at 3 MPH using 80015 spray tips. In the tolerance test, a Treflan at 0.75 lb ai/A was applied PPI to control Palmer amaranth (*Amaranthus palmeri*). Cotton was planted on 40-inch rows on June 6 and kept weed-free throughout the season. Liberty was applied at 3 rates (0.36, 0.72, and 1.44 lb ai/A) over 3 growth stages (1 to 2 leaf, 4 leaf, and peak bloom) and in individual and sequential applications. Unlike previous years, slight visual injury (leaf necrosis) was observed 7 days after treatment. Yields did not differ from the untreated check.

In the weed control experiment, cotton was planted on 40-inch rows on May 8. Varieties included Liberty-tolerant Coker 312, BXN47, and PM2326RR. Within each planted variety, treatments included Treflan (trifluralin) at 0.75 lb ai/A PPI followed by (fb) Caparol (prometryn) at 1.2 lb ai/A PRE fb cultivation, Treflan PPI fb a POST herbicide as needed (ASN), Caparol PRE fb a POST herbicide ASN, Treflan PPI fb Caparol PRE fb a POST herbicide ASN, and a POST herbicide only ASN. The POST herbicides used were Liberty at 0.36 lb ai/A in Liberty-tolerant cotton, Roundup Ultra (glyphosate) at 0.75 lb ae/A in Roundup Ready cotton, and Buctril (bromoxynil) at 0.5 lb ai/A in BXN cotton. Control of Palmer amaranth, devil's-claw (*Proboscidea louisianica*), and silverleaf nightshade (*Solanum elaeagnifolium*) were monitored throughout the growing season and dictated the POST herbicide ASN applications.

In the Liberty-tolerant cotton weed management systems, weed pressure in the Caparol fb POST and POST only plots suggested a POST application on May 24. Weed pressure in all plots suggested POST application on June 6 and June 21. On July 20 (73 DAP), all treatments controlled Palmer amaranth at least 83%, except for the Liberty only treatment, which controlled Palmer amaranth 79%. At this same rating date, devil's-claw and silverleaf nightshade were controlled at least 80% by all plots treated with Liberty. The Treflan fb Caparol fb cultivation controlled devil's-claw and silverleaf nightshade 61 to 75%. Similar lint yields were observed from all Liberty-treated plots. When compared to the POST only treatments in the other weed management systems, Liberty controlled Palmer amaranth (79%), devil's-claw (81%), and silverleaf nightshade (81%). This control was more effective than the control achieved from the Buctril only treatment (54%, 73%, and 73% control for Palmer amaranth, devil's-claw, and silverleaf nightshade, respectively) and similar to the control achieved from the Roundup Ultra only treatment (85%, 80%, and 80% control for Palmer amaranth, devil's-claw, and silverleaf nightshade, respectively). The Treflan PPI fb POST herbicide ASN improved Palmer amaranth control for all systems and eliminated one POST application.

These studies suggest that the transformation events in Coker 312 were successful and the gene for Liberty tolerance was expressed. Control of Palmer amaranth, devil's-claw, and silverleaf nightshade can be achieved using a Liberty-tolerant cotton system. Improved germplasm containing the Liberty-tolerant cotton gene will be tested in 2001 as well as work to further examine the use of Liberty in a Liberty-tolerant cotton weed management system.

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