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COTTON GROWTH AND DEVELOPMENT AFTER APPLICATION OF TRIFLOXYSULFURON (ENVOKE) IN COTTON

Jim L. Barrentine, Oscar C. Sparks, and Marilyn R. McClelland
Department of Crop, Soil, and Environmental Sciences
University of Arkansas
Fayetteville, AR

Abstract

Cotton injury has been a concern in Arkansas with the herbicide Envoke™ (trifloxysulfuron or CGA-362622). An experiment was conducted in 2003 at Marianna, AR, to evaluate cotton response to trifloxysulfuron, including visual injury, cotton growth and development using COTMAN, and yield. Trifloxysulfuron caused up to 30% cotton injury, primarily in the form of stunting, after 8-leaf postemergence applications. Internode growth was impacted, but growth and fruiting patterns were not. Trifloxysulfuron caused a 2- to 4-day delay in maturity, but seed-cotton yields were not affected. COTMAN is a valuable tool for measuring the effects of herbicides on cotton fruiting patterns and for comparing effects among herbicide treatments. However, it cannot substitute for visual injury assessments, which are of realistic concern to producers.

Introduction

Envoke™ (trifloxysulfuron or CGA-362622) is a sulfonylurea herbicide developed for postemergence over-the-top or post-directed applications in conventional or transgenic (Roundup Ready® or BXN™) cotton. It is also formulated with prometryn (Suprend™) for post-directed application. Envoke controls morningglory (*Ipomoea*) species, non-ALS-resistant pigweed (*Amaranthus*) species, sicklepod (*Senna obtusifolia*), and purple and yellow nutsedge (*Cyperus* spp.) (Porterfield et al. 2003). It has soil-residual activity that can be an advantage in transgenic cotton programs. Cotton injury, however, remains a concern. In 40 Arkansas field experiments, injury from Envoke ranged from 0 to as much as 70%. Although visual injury is usually transient and yields have not been reduced (Porterfield et al. 2002, 2003), Arkansas weed scientists are attempting to characterize injury and define conditions under which injury from Envoke can occur. As has been evident with glyphosate, visual injury and effects on cotton development are not always correlated (Barrentine et al. 2001). Characterization of effects of Envoke on cotton growth and development is therefore important. The objective of this study was to evaluate effects of Envoke on visual cotton response and on growth and development parameters using COTMAN, the decision-aid program (Danforth and O'Leary, 1998).

Materials and Methods

An experiment was conducted in 2003 at Marianna, AR, on a silt loam soil. The experimental design was a randomized complete block with four replications and 13- by 40-ft plots. Paymaster 1218BR cotton was planted June 3. Plots were maintained weed-free and were furrow-irrigated as needed. Treatments included a package mixture of glyphosate plus metolachlor applied over-the-top (OT) to 2- to 3-leaf cotton followed by (fb) trifloxysulfuron OT at 0.004 and 0.007 lb ai/A to 8-leaf cotton fb Suprend (prometryn plus trifloxysulfuron) at 1 lb ai/A post-directed (DIR) to 12-leaf cotton; glyphosate plus metolachlor (2- to 3-leaf cotton) fb trifloxysulfuron at 0.004 lb/A (8-leaf) fb 0.007 lb/A (12-leaf); glyphosate (Roundup WeatherMax), 0.75 lb ae/A OT to 2- to 3-leaf cotton fb glyphosate 0.75 lb/A DIR (8-leaf) fb prometryn (Caparol) plus MSMA or flumioxazin (Valor) plus MSMA (12-leaf); and pyrithiobac (Staple) at 0.031 lb ai/A plus glyphosate (2- to 3-leaf) fb fluomioxazin plus MSMA (12-leaf). Herbicides were applied in 20 GPA output volume. Treatments at 2- to 3-leaf cotton were applied June 16, 8-leaf treatments were applied July 7, and 12-leaf treatments were applied July 22. Data collected included visual cotton injury ratings, COTMAN data, end-of-season mapping, and cotton yield. Data were analyzed by analysis of variance, and means were separated with LSD at P=0.05.

Results and Discussion

Trifloxysulfuron caused moderate cotton injury (24 to 30%), primarily in the form of stunting, after the 8-leaf application, compared to untreated and glyphosate-treated cotton. Plants were still stunted (9 to 14%) when post-directed treatments were applied. Seed-cotton yield, however, was not reduced.

The number of squaring sympodia at first flower (8.3 to 8.8) and the number of sympodia with retained first-position squares at first flower (6.8 to 7.2) were not affected by herbicide treatment. Cotton plants treated with trifloxysulfuron were significantly shorter at first flower than cotton treated with glyphosate or pyrithiobac plus glyphosate (average of 27.2 for trifloxysulfuron treatments and 30.4 inches for other treatments). Trifloxysulfuron also caused small reductions in height-to-node ratios (HNR), indicating that internode growth was impacted by the herbicide. The HNR parameter determined by COTMAN correlated to the visual injury observed in the field. Although growth and fruiting patterns were not impacted by trifloxysul-

furon treatments (Figure 1), trifloxysulfuron followed by trifloxysulfuron or trifloxysulfuron plus prometryn caused a 2- to 4-day delay in maturity compared to untreated cotton. End-of-season mapping indicated that herbicide treatment did not affect percent retention of first- or second-position bolls on nodes one through ten, number of outer bolls, number of sympodial branches, or final plant height.

Summary

Although cotton injury can appear significant after over-the-top postemergence application of trifloxysulfuron, cotton growth and development is not affected enough to reduce cotton yield. The only parameter measured by COTMAN that reflected the visual injury attributed to trifloxysulfuron was HNR. COTMAN is a valuable tool for measuring the effects of herbicides on cotton fruiting patterns and for comparing effects among herbicide treatments. However, it cannot substitute for visual injury assessments, which are of realistic concern to cotton producers.

References

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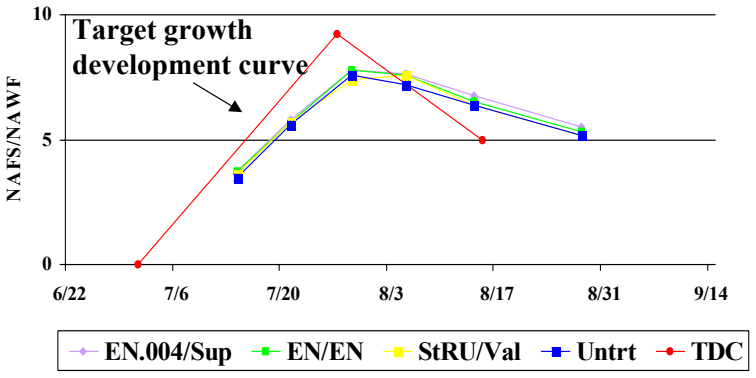

Figure 1. Growth patterns for cotton treated with trifloxysulfuron fb Suprend (EN.004/Sup) or trifloxysulfuron (EN/EN) and Staple + glyphosate fb flumioxazin (Valor) + MSMA (StRU/Val) at Marianna, AR, 2003.