FLUMIOXAZIN IN COMBINATION WITH POSTEMERGENCE HERBICIDES FOR ANNUAL BLUEGRASS CONTROL

T. Reed and P. McCullough

Department of Crop & Soil Sciences - University of Georgia; Griffin, GA

tvreed@uga.edu

INTRODUCTION

Annual bluegrass (*Poa annua* L.) resistance to postemergence (POST) herbicides may limit potential for successful control, and herbicides with new modes of action are needed in turfgrass. Flumioxazin is a protoporphyrinogen oxidase (Protox) inhibitor with potential for POST annual bluegrass control and preemergence (PRE) smooth crabgrass (*Digitaria ischaeum* (Schreb.) Schreb. ex Muhl.) control in bermudagrass (*Cynodon dactylon* (L.) Pers.). There is no documented annual bluegrass resistance to Protox inhibiting herbicides, and flumioxazin could effectively control biotypes resistant to other herbicide modes of action. In the Southern United States, flumioxazin may provide significant control of annual bluegrass with early winter treatments, but efficacy is reduced with late winter or early spring applications. Flumioxazin efficacy may be enhanced when tank-mixed with POST herbicides on mature annual bluegrass to provide more effective control.

OBJECTIVE

To evaluate tank-mixtures of flumioxazin with other herbicide modes of action for POST annual bluegrass control in winter, and residual smooth crabgrass control in spring.

MATERIALS AND METHODS

Experiments

- February to August 2012 and 2013, Griffin, GA on 'Tifway' bermudagrass. Turf was mowed during active growth with reel-mowers at 1.6 cm two days per week. Plots in 2013 were adjacent to plots in 2012.

Experimental Design and Treatments

- Randomized complete block with four replications of 0.9 x 3.0-m plots.
- Applications were February 29 in 2012 and February 28 in 2013 to dormant bermudagrass with a CO_2 pressured sprayer
- On the day of application, annual bluegrass cover across all plots was 71% and 37% in 2012 and 2013, respectively. Smooth crabgrass cover increased in nontreated plots from May to August, and measured 30% and 28% at 6 months after treatment (MAT) in 2012 and 2013, respectively

Measurements

- Visual ratings were taken 1, 2, 3, 4, 5, 6, 7 and 8 weeks after treatment (WAT) for annual bluegrass control. Evaluations for smooth crabgrass control were made 4, 5, and 6 months after treatment (MAT)

Data Analysis

- Analysis of variance at 0.05 probability level
- Predicted time for treatments to control annual bluegrass 50% (C_{50}) was determined with nonlinear regression analysis with the equation: $y = a + bx + cx^2$, where y is percent control, and x is time in weeks.
- Means were separated with Fisher's Protected LSD Test at α = 0.05

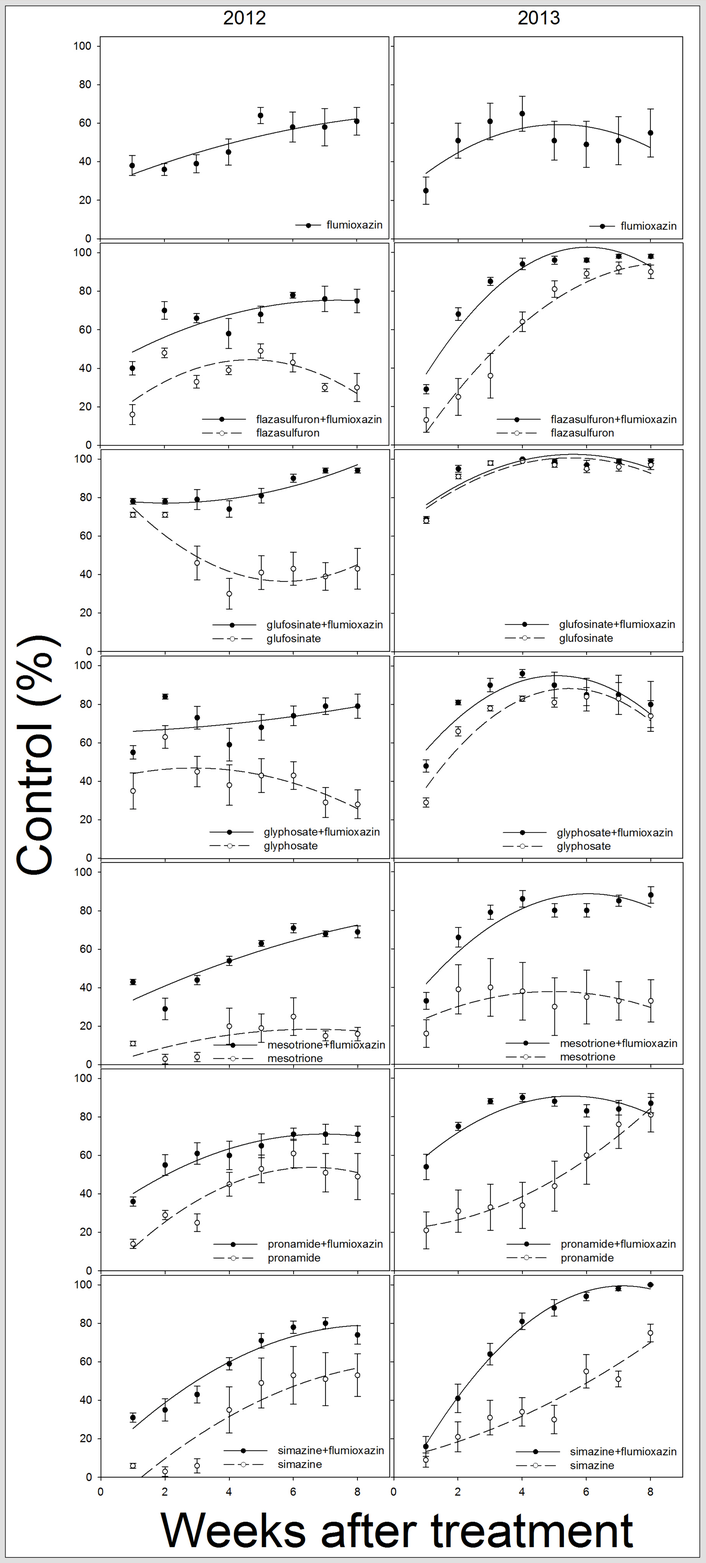

Figure 1. Annual bluegrass control following flumioxazin applications with various tank-mix partners in field experiments, 2012-2013, Griffin, GA

Treatment	Rate	C_{50} 2012	C_{50} 2013
	kg ai ha^{-1}	weeks	
flumioxazin	0.42	4.5	2.6
flazasulfuron	0.05	>8.0	3.2
glufosinate	1.26	<1.0	<1.0
glyphosate	0.42	>8.0	1.6
mesotrione	0.28	>8.0	>8.0
pronamide	1.68	4.9	5.3
simazine	1.12	6.5	5.7
flazasulfuron + flumioxazin	0.05 + 0.42	1.2	1.5
glufosinate + flumioxazin	1.26 + 0.42	<1.0	<1.0
glyphosate + flumioxazin	0.42 + 0.42	<1.0	<1.0
mesotrione + flumioxazin	0.28 + 0.42	3.4	1.5
pronamide + flumioxazin	1.68 + 0.42	2.0	<1.0
simazine + flumioxazin	1.12 + 0.42	3.0	2.4
	$LSD_{0.05}$	2.0	2.3

Table 1. Predicted time in weeks required for flumioxazin applications with various tank-mix partners to provide 50% (C_{50}) of annual bluegrass in field experiments, 2012-2013, Griffin, GA. Glyphosate rate in kg ae ha^{-1}.

Figure 2. Annual bluegrass control with nontreated (left) and flumioxazin at 0.42 kg ai ha^{-1} and glufosinate at 1.26 kg ai ha^{-1} (right) at 2 WAT.

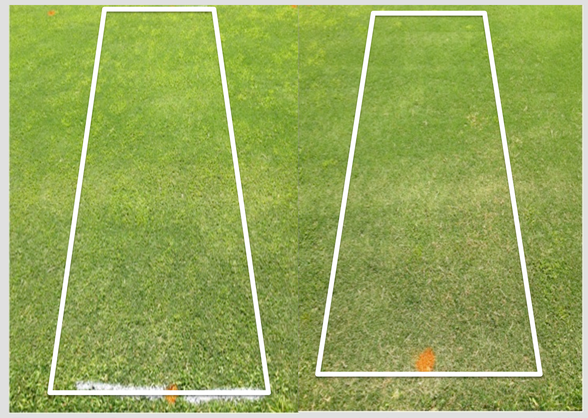

Figure 3. Smooth crabgrass control with nontreated (left) and flumioxazin at 0.42 kg ai ha^{-1} (right) at 5 MAT.

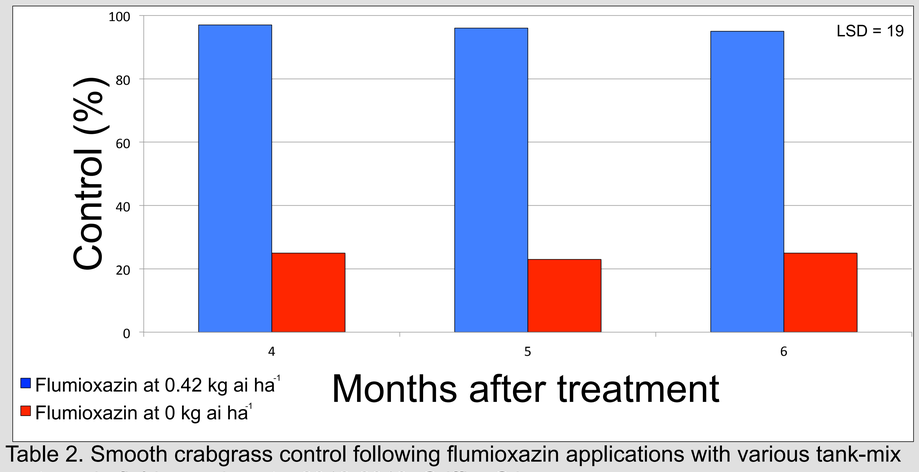

Table 2. Smooth crabgrass control following flumioxazin applications with various tank-mix partners in field experiments, 2012-2013, Griffin, GA

RESULTS AND DISCUSSION

- All tank-mixtures improved POST annual bluegrass control from flumioxazin alone at 8 WAT, and controlled annual bluegrass ≥70% and ≥80% in 2012 and 2013, respectively (Figure 1).
- In 2012, flumioxazin tank-mixtures with flazasulfuron, glufosinate, glyphosate, and pronamide reduced time to control annual bluegrass 50% by ≥2 weeks from flumioxazin alone. However, no tank-mixture significantly reduced the time to achieve 50% control in 2013 (Table 1).
- In 2012, treatments that contained glufosinate or glyphosate caused unacceptable injury (>20%) to bermudagrass at 2 WAT. Turf recovered with <20% injury at 3 WAT from all treatments. In 2013, no treatments caused unacceptable injury (data not shown).
- Treatments that included flumioxazin provided excellent (90 to 100%) control of smooth crabgrass at 4, 5, and 6 months after treatment (MAT) in both years (Table 2).

CONCLUSION

- Tank-mixing flumioxazin with other herbicide chemistries may improve speed of annual bluegrass control compared to flumioxazin alone.
- Late winter applications of flumioxazin provided excellent PRE smooth crabgrass control, but tank-mixing other herbicides did not improve residual control.