CROP SAFETY OF FIERCE (FLUMIOXAZIN + PYROXASULFONE) HERBICIDE IN ESTABLISHED KENTUCKY BLUEGRASS, GRANDE RONDE VALLEY OF NORTHEASTERN OREGON

D.L. Walenta

Introduction

A study was conducted in the Grande Ronde Valley of northeastern Oregon to evaluate crop safety and efficacy with Fierce herbicide (flumioxazin + pyroxasulfone) in established Kentucky bluegrass. Fierce is not registered for use in grasses grown for seed and previously had not been evaluated for potential fit in Kentucky bluegrass seed production.

Materials and Methods

The experiment was located in an established commercial field of 'Endurance' Kentucky bluegrass (KBG) in the Grande Ronde Valley of northeastern Oregon. The field was seeded during the spring of 2014, and a second seed crop was harvested in 2016. Early postemergent (EPOST) herbicide applications were made on October 12, 2015. Late postemergent (LPOST) herbicide applications were made on November 12, 2015. Conditions at the time of application are summarized in Table 1. All treatments were applied with a hand-held CO_2 sprayer delivering 22 gpa at 30 psi. To minimize drift potential, TeeJet air induction extended range (AIXR) 11002 nozzle tips were used for all applications. Plots were 8 feet x 25 feet and arranged in a randomized complete block design with four replications. Soil at the site consisted of an Imbler fine sandy loam (72% sand, 22.8% silt, 5.2% clay, 2.73% OM, 5.1 pH, and CEC of 16.0 meq/100g). Seed yield was not quantified in this study due to crop destruct requirements; however, the number of KBG panicles per 0.25 m^2 was determined to estimate potential seed yield.

Results and Discussion

Weed control evaluations were not possible due to lack of weed pressure. However, all EPOST treatments resulted in excellent volunteer Kentucky bluegrass control 30 days after treatment (DAT) (Table 2).

Crop injury evaluations were made 30 days after the EPOST application date, 20 weeks after the LPOST application date, and at crop maturity (Table 2; evaluation at crop maturity shown as KBG heads/0.25 m^2). Fierce applied pre- or early post-emergence at 3 oz/acre as a stand-alone treatment or in tank-mix combinations with either oxyfluorfen (Goal 2XL) or diuron resulted in acceptable crop injury (3–5%) 30 days after treatment. At crop maturity, however, these same treatments resulted in fewer panicles/0.25 m^2 (16–27% less), compared to the untreated check, but were not statistically different. Sequential LPOST applications of dimethenamid-P (Outlook) and Outlook + metribuzin after Fierce was applied EPOST resulted in unacceptable crop injury (16–17%) 20 weeks after treatment. Panicle number was reduced by 58% (compared to the untreated check) at crop maturity.

Flufenacet + metribuzin (Axiom DF) and metribuzin were also included in this study to evaluate the potential

Table 1. Conditions at time of herbicide application.

	Application timing	
	Oct. 12, 2015 (early postemergent)	Nov. 12, 2015 (late postemergent)
KBG growth stage	4–6 inches regrowth	> 6 inches regrowth
Volunteer KBG growth stage	1 inch, one leaf	1 inch, one to two leaves, 0 tillers
Air temperature (°F)	54	42
Relative humidity (%)	67	71
Cloud cover (%)	Clear	100
Wind velocity (mph)	Calm	7 mph from SW
Soil temp at surface (°F)	55	41
Soil temp at 1-inch depth (°F)	52	42
Soil temp at 2-inch depth (°F)	54	42
Soil temp at 4-inch depth (°F)	58	42

for grass weed control and crop injury in eastern Oregon Kentucky bluegrass seed production. Metribuzin was used as a tank-mix partner to increase the spectrum of weed control at LPOST application timing. All Axiom DF treatments were applied EPOST and resulted in 10–15% visible crop injury 30 days after treatment and 64–80% reduction in panicles at crop maturity. The most severe crop injury (65% visible injury and 85% reduction in panicles) was observed when Axiom DF was applied EPOST at 8 oz/acre, followed by LPOST application of Fierce at 3 oz/acre. This result suggests that late sequential applications of Fierce may increase crop injury.

Note: Flumioxazin + pyroxasulfone (Fierce), flufenacet + metribuzin (Axiom DF), and metribuzin are not registered for use in eastern Oregon Kentucky bluegrass seed production and were evaluated on an experimental basis only. Mention of products used in this trial should not be considered a recommendation for commercial use. Additional research needs to be conducted to determine whether improved grass and broadleaf weed control can be achieved and whether crop injury will prevent the use of these products in Kentucky bluegrass seed production.

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Table 2. Efficacy and crop safety of Fierce (flumioxazin + pyroxasulfone) in established Kentucky bluegrass in the Grande Ronde Valley of northeastern Oregon, 2016.

Treatment[2,3]	Application rate	Application timing	Crop Injury[1]		Volunteer KBG control[1]	KBG heads[1]
			Nov. 12, 2015	April 9, 2016	Nov. 12, 2015	June 25, 2016
	(per acre)		(%)		(%)	(number/0.25 m^2)
Check	—	—	0 b	0 d	0 b	669 a
Fierce	3 oz	EPOST	3 a	9 bcd	94 a	558 ab
Fierce +	3 oz	EPOST	4 a	7 bcd	95 a	537 ab
Goal 2XL	2 oz					
Fierce /fb/	3 oz	EPOST	3 ab	6 cd	92 a	489 b
Diuron 4L	20 oz	LPOST				
Fierce /fb/	3 oz	EPOST	4 a	16 b	94 a	281 c
Outlook	21 oz	LPOST				
Fierce +	3 oz	EPOST	5 a	17 b	92 a	277 c
Goal 2XL /fb/	2 oz	LPOST				
Outlook +	21 oz					
Metribuzin DF	4 oz					
Axiom DF	8 oz	EPOST	0 b	10 bc	93 a	243 cd
Axiom DF	10 oz	EPOST	0 b	15 bc	92 a	135 cd
Axiom DF /fb/	8 oz	EPOST	<1 b	11 bc	91 a	172 cd
Diuron 4L	20 oz	LPOST				
Axiom DF /fb/	8 oz	EPOST	<1 b	65 a	95 a	97 d
Fierce	3 oz	LPOST				
LSD (P = 0.05)			3	10	6	177

[1]Means with the same letter in the same column are not statistically different.
[2]Fierce = flumioxazin + pyroxasulfone; Goal = oxyfluorfen; Outlook = dimethenamid-P; Axiom DF = flufenacet + metribuzin
[3]fb = followed by