Blue Grama Response to Preemergence Herbicides Applied at Seeding

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ABSTRACT

Blue grama [Bouteloua gracilis (H.B.K.) Lag. ex Steud.] is a warm-season grass species that has shown potential as a reduced-input turfgrass. Weed competition can delay establishment of newly seeded blue grama and reduce quality of blue grama turf. Greenhouse and field research was conducted in 2006 and 2007 to evaluate the safety of preemergence herbicides applied directly after seeding blue grama. Blue grama herbicide injury, turf coverage, stand count, and shoot weight were evaluated. Preemergence control of large crabgrass [Digitaria sanguinalis (L.) Scop.] and common purslane (Portulaca oleracea L.) was also rated. Seeded blue grama exhibited acceptable tolerance to imazapic and metsulfuron-methyl, while moderate susceptibility was observed with both siduron and quinclorac. Mesotrione, pendimethalin, isoxaflutole, dithiopyr, and simazine all severely injured blue grama when applied at seeding time. Results from this study indicate that several herbicides may be safely applied preemergence to control problematic weeds during blue grama establishment.

INTRODUCTION

Blue grama is a warm-season grass species native to North America that has potential as a reduced-input turfgrass of intermediate quality (Mintenko et al., 2002). However, weed competition from annual grassy weeds, such as *Digitaria* and *Setaria* spp., and numerous broadleaf weed species interferes with seedling growth and development during the critical establishment period resulting in reduced turfgrass coverage, delayed establishment, and poor quality turf. Integrated weed management strategies may include the use of herbicides to successfully establish blue grama from seed. Previous research has determined seeded buffalograss tolerance to preemergence herbicides (Dotray and McKenney, 1996) as well as seedling blue grama turf tolerance to postemergence herbicides (Andersen and Schleicher, 2006). Additionally, Huffman and Jacoby (1984) found that blue grama germination was reduced by picloram and triclopyr applied preemergence at 4.5 kg a.i. ha^{-1} and 2,4,5-T at 9 kg a.i. ha^{-1}. However, germination was not suppressed by clopyralid up to 9 kg a.i. ha^{-1}. Little information is available on blue grama tolerance to preemergence herbicides applied at seeding.

OBJECTIVE

Determine the effects of selected herbicides applied preemergence on establishment of seeded blue grama and control of two weed species.

MATERIALS AND METHODS

- Site
  - N.E. Hansen Research Center near Brookings, SD.
- Layout and Experimental Design
  - Nine PRE herbicides (Table 1) applied at seeding to 1.8 m X 1.8 m field plots arranged in a randomized complete block design.
- Methods
  - Starter fertilizer (16-25-12) applied at 49 kg N ha^{-1} prior to seeding.
  - 'Bad River' blue grama and large crabgrass seeded at 146 and 25 kg PLS ha^{-1} on 26 July 2006 and 11 July 2007.
  - Plots irrigated to activate herbicides and provide optimal germination.
- Evaluation
  - Visual turfgrass injury (1 to 9 scale), percent blue grama coverage, large crabgrass and common purslane control rated at 7, 14, 21, 28, and 49 DAT.
- Analysis
  - Analysis of variance (ANOVA) was performed using the general linear model (GLM) procedure. Mean separations were calculated using Fisher's Protected LSD values at the 0.05 probability level.

Table 1. Herbicide treatments.

Trt #	Treatment Common name	Formulation	Rate (a.i.) kg ha^{-1}	Label for blue grama use[†]
1	control	-	-	-
2	siduron	50WP	6.72	No
3	mesotrione	4L	0.27	No
4	pendimethalin	3.8EC	1.68	No
5	isoxaflutole	4L	0.16	No
6	quinclorac	75D	0.84	No
7	dithiopyr	40WP	0.28	No
8	imazapic	2L	0.025	Yes[‡]
9	simazine	4L	1.12	No
10	metsulfuron-methyl	60D	0.04	No

[†]Source: www.state.sd.us/doa/

[‡]Five leaf stage.

RESULTS AND DISCUSSION

- Although greenhouse (data not shown) and field results will be discussed jointly in an upcoming paper, only field results are presented here.
- Blue grama tolerance to PRE herbicides applied at seeding was highly variable among treatments (Fig. 1, 2, and 4).
- Blue grama tolerance to imazapic and metsulfuron-methyl was acceptable at all evaluation dates; however, siduron caused moderate visual injury and reduced coverage 27 to 40%. Quinclorac caused minor visual injury, but did not reduce turfgrass coverage.
- Mesotrione, pendimethalin, isoxaflutole, dithiopyr, and simazine caused severe blue grama injury, turfgrass coverage reduction, and seedling death.
- All treatments except siduron, quinclorac and simazine provided acceptable preemergence control of large crabgrass (Fig. 3).
- All treatments except siduron, mesotrione, quinclorac, and dithiopyr provided acceptable preemergence control of common purslane (Fig. 3).

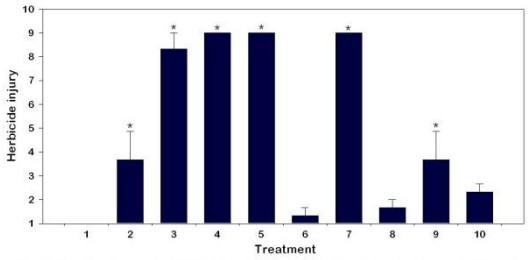

Fig. 1. Visual turfgrass herbicide injury 21 DAT. Asterisks indicate values significantly different from control according to Fisher's Protected LSD (P=0.05). Vertical bars represent standard errors of the mean.

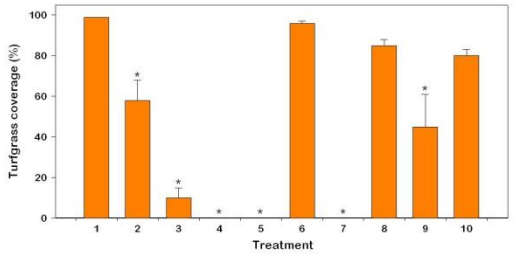

Fig. 2. Percent blue grama coverage 21 DAT. Asterisks indicate values significantly different from control according to Fisher's Protected LSD (P=0.05). Vertical bars represent standard errors of the mean.

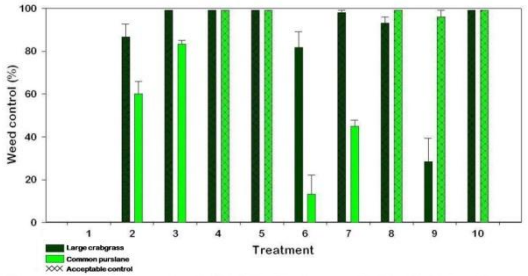

Fig. 3. Percent annual weed control 21 DAT. All values are significantly different from control according to Fisher's Protected LSD (P=0.05). Vertical bars represent standard errors of the mean.

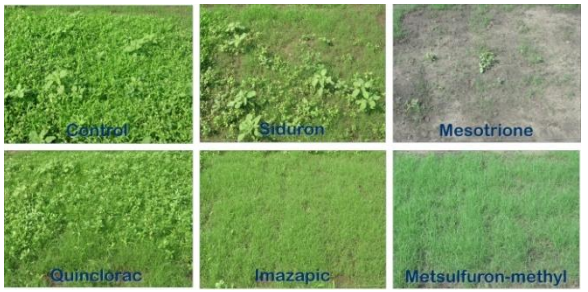

Fig. 4. Blue grama herbicide plots 21 DAT.

CONCLUSIONS

- Results of this study indicate that several preemergence herbicides may offer weed control options during seeded blue grama establishment.
- Imazapic and metsulfuron-methyl provide effective annual grass and broadleaf weed control with little detrimental effect on blue grama establishment from seed.
- Quinclorac may cause minor visual blue grama injury, but may not provide acceptable preemergence weed control of large crabgrass or common purslane.
- Siduron, mesotrione, pendimethalin, isoxaflutole, dithiopyr, and simazine applied at labled rates are unacceptable as PRE herbicides for blue grama establishment.
- Future research testing additional herbicide rates may be warranted.

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