

Kentucky Bluegrass Variety Response to Primisulfuron

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Abstract

A replicated field trial was conducted at the Central Oregon Agricultural Research Center near Madras, Oregon to evaluate seedling Kentucky bluegrass (*Poa pratensis*) variety response to Beacon[®] (primisulfuron) herbicide. Primisulfuron injured some varieties more than others, and seed yield was reduced compared to the untreated check for 6 of the 15 varieties: ‘Valor’, ‘Bariris’, ‘Monte Carlo’, ‘A00-891’, ‘Bandera’, and ‘Bordeaux’. Primisulfuron had no effect on eight of the varieties and actually increased seed yield from ‘Atlantis’ and ‘Shamrock’.

Introduction

Beacon[®] (primisulfuron) is currently the only registered herbicide that effectively controls rough bluegrass (*Poa trivialis*) and downy brome (*Bromus tectorum*) in seedling Kentucky bluegrass. Observations in commercial seed production suggest that Kentucky bluegrass varieties can have varying levels of sensitivity to primisulfuron and is not recommended for use on sensitive varieties. Mueller-Warrant et al. (1997) reported differences in varietal sensitivity to primisulfuron but significant seed yield losses were not observed. Today, many of the varieties previously tested for sensitivity to primisulfuron are no longer extensively produced in Central Oregon. The objective of this research was to evaluate response of traditional and newer releases of Kentucky bluegrass varieties to primisulfuron application during the year of establishment.

Methods and Materials

A field trial was established at the Central Oregon Agricultural Research Center north of Madras, Oregon. The trial consisted of 15 varieties of Kentucky bluegrass that were chosen for evaluation in a variety trial, which was being conducted in a commercial field at Agency Farms (see “Kentucky Bluegrass Variety Evaluation under Nonthermal Residue Management” in this report). The soil was a Madras sandy loam and a soil test prior to seedbed preparation indicated a pH of 7.3 and soil organic matter at 1.6 percent. Based on the soil test the field was amended with 400 lb/acre of 16-16-16-8 fertilizer. Also, the trial area was treated with 107 lb/acre of metam-sodium (Vapam[®] 4.26 HL), which was applied through the irrigation system 3 weeks prior to planting to kill weed seeds in the soil. The trial was planted on August 10, 2007 with row spacing of 14 and 16 inches every other row. Kentucky bluegrass seeding depth was approximately 0.25 inch; the seeding rate was 5.8 lb/acre for all varieties except ‘A01-299’, which was seeded at 10 lb/acre because the seed had been harvested in July prior to planting. The trial was sprinkler irrigated and the first irrigation was made on August 13, 2007.

Broadleaf weed control consisted of broadcast applications of bromoxynil and MCPA on September 19, 2007 and again on April 25, 2008. The few remaining weeds were removed by hand. Another 140 lb/acre of 40-0-0-6 fertilizer was applied April 25, 2008. Fungicide, consisting of myclobutanil and sulfur, was applied on May 15, 2008 for powdery mildew.

The trial was arranged as a split-plot design, with 10-ft by 40-ft main plots and two 10-ft by 20-ft subplots. Subplots included an untreated check and primisulfuron. Main plots and subplots were randomized within four replicated blocks. The primisulfuron treatment was made as a split-application with 0.018 lb ai/acre (0.38 oz Beacon/acre) applied on September 26, 2007 when the Kentucky bluegrass had one to two tillers, followed by an additional 0.018 lb ai/acre (0.38 oz Beacon/acre) applied on April 18, 2008 when Kentucky bluegrass was 3 to 6 inches tall. The April 18 primisulfuron application was made just after the first irrigation of the spring. Primisulfuron was applied with a CO₂-pressurized backpack sprayer delivering 20 gal/acre at 40 psi.

Crop injury was determined by making visual evaluations on a percentage scale when Kentucky bluegrass was in a vegetative growth stage on April 18, 2008 and again when the Kentucky bluegrass was in a reproductive growth stage on July 3, 2008. Seed yield was measured by harvesting a sample of grass from each plot into burlap sacks when seed moisture for that variety was 24 to 28 percent. Harvest dates were as follows:

- July 5, 2008: ‘Shamrock’ and ‘Volt’
- July 7, 2008: ‘Atlantis’, ‘Crest’, and ‘Merit’
- July 8, 2008: ‘Bandera’ and ‘A00-891’
- July 9, 2008: ‘Rhapsody’, ‘Bordeaux’, and ‘A01-299’
- July 10, 2008: ‘Monte Carlo’, ‘Valor’, and ‘A00-1400’
- July 12, 2008: ‘Bariris’ and ‘Zinfandel’

These samples were air-dried and threshed in a Hege plot combine; seed samples were de-bearded and cleaned. Clean seed yield data were analyzed with paired t-tests comparing primisulfuron to the untreated check using the mixed model in SAS.

Results and Discussion

Primisulfuron injured some varieties more than others and seed yield was reduced compared to the untreated check for 6 of the 15 varieties: ‘Valor’, ‘Bariris’, ‘Monte Carlo’, ‘A00-891’, ‘Bandera’, and ‘Bordeaux’ (Table 1). Based on anecdotal information regarding primisulfuron injury to commercial fields of Kentucky bluegrass, yield losses from 80 to 90 percent may have occurred. The seed yield reductions observed in this study suggest that other factors are more likely the cause of severe crop injury.

Primisulfuron did not injure seven of the varieties included in this study, and actually increased seed yield of ‘Atlantis’ and ‘Shamrock’ (Table 1). We see no clear explanation for this increase. The metam-sodium was applied in order to avoid interference on treatment effects from grassy weed competition. There was very little weed pressure in the trial. Also, primisulfuron sometimes reduced lodging, as listed in Table 1, but there was no consistent correlation between reduced lodging and reduced seed yield from primisulfuron in these data.

Kentucky bluegrass can be injured from primisulfuron use and some varieties are more susceptible to injury than others. However, in this research most varieties were not injured. The seed yield reductions observed here suggest that other factors are likely to be involved in severe cases of crop injury from primisulfuron. The other factors include but are not limited to planting date, application timing, and weather conditions at the time of application. Based on our

experience we developed the following guidelines to avoid injury to seedling Kentucky bluegrass from primisulfuron.

1. Choose a tolerant variety, if possible.
2. Do not apply the full rate (0.76 oz Beacon/acre) in one application. Instead, split the application and apply 0.38 oz in the fall followed by an additional 0.38 oz in the spring.
3. In central Oregon, plant Kentucky bluegrass by August 15 to avoid having to apply during the erratic weather conditions that tend to occur in the fall.
4. If possible, avoid applying primisulfuron before or after major changes in daily high temperatures.
5. Only apply primisulfuron once Kentucky bluegrass has reached the one- to two-tiller stage.

References

Mueller-Warrant, G.W., D.S. Culver, S.C. Rosato, and F.J. Crowe. 1997. Kentucky bluegrass variety tolerance to primisulfuron. Pages 51-52 *in* W.C. Young III (ed.) Seed Production Research, Oregon State University.

Acknowledgements

We would like to thank our advisory committee, which consisted of Mike Weber, Jim Carroll, and Al Short for their direction and input on this project. We would also like to thank Bob Crocker for his expertise and help in managing and harvesting this trial.

Table 1. Response of newly seeded Kentucky bluegrass to primisulfuron (Beacon[®]) herbicide at the Central Oregon Agricultural Research Center, Madras, Oregon, 2007-2008.¹

Variety	Vegetative injury ²	Reduced heading ³	Lodging ⁴		Seed yield		Seed yield comparison ⁵
			Check	Beacon	Check	Beacon	
----- (% Visual) -----			----- (lb/acre) -----				
Atlantis	21	0	78	59	1,287	1,559	**
Merit	18	3	53	36	1,660	1,663	NS
Rhapsody	20	5	48	10	1,051	992	NS
Valor	23	18	56	2	972	704	**
Bariris	19	4	99	71	827	608	*
Crest	14	15	63	34	1,593	1,415	NS
Monte Carlo	15	18	38	1	1,095	894	*
Shamrock	9	0	79	68	1,581	1,827	**
A00-891	14	4	81	42	1,955	1,566	***
A00-1400	13	1	93	44	957	832	NS
Bandera	16	15	28	0	1,335	1,131	*
Bordeaux	25	9	95	31	1,290	979	***
Volt	14	6	79	78	1,473	1,349	NS
Zinfandel	15	8	40	16	1,007	835	NS
A01-299	30	9	78	30	912	898	NS

¹Primisulfuron (Beacon 75 DG) was applied at 0.38 oz product/acre on September 26, 2007 when Kentucky bluegrass had one to two tillers, followed by an additional 0.38 oz product/acre on April 18, 2008, when Kentucky bluegrass was 3 to 6 inches tall. All primisulfuron applications included R-11[®] nonionic surfactant at 0.25 percent v/v.

²Injury from primisulfuron compared to an untreated check, evaluated April 18, 2008.

³Reduced heading from primisulfuron compared to an untreated check, evaluated July 3, 2008.

⁴Evaluated July 2, 2008.

⁵Comparison made with a paired t-test. NS = Not Significant, * $P = 0.1$, ** $P = 0.05$, *** $P = 0.01$.