

## Kentucky Bluegrass Variety Response to Primisulfuron, Second Year

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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<sup>®</sup> (primisulfuron) herbicide. Primisulfuron had no effect on 9 of the 15 varieties and surprisingly, increased seed yield on 5 others: ‘Atlantis’, ‘Merit’, ‘Bariris’, ‘A00-1400’, and ‘A01-299’. Only ‘Rhapsody’ was injured with primisulfuron.

### Introduction

A trial was conducted last year to evaluate the response of traditional and newer releases of Kentucky bluegrass varieties to Beacon (primisulfuron) application during the year of establishment. From our results we concluded that some varieties had a marginal amount of sensitivity to injury from primisulfuron, but most varieties were not sensitive. The trial was repeated with a new planting of the same 15 varieties.

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 it 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 the 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 “Second Year of 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 6.7 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<sup>®</sup> 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 12, 2008 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. The trial was sprinkler irrigated and the first irrigation was made on August 15, 2008.

Broadleaf weed control consisted of an application of bromoxynil and MCPA on September 30, 2008. The few remaining weeds were removed by hand. Another 140 lb/acre of 40-0-0-6 fertilizer was applied April 29, 2009. Fungicide was applied on May 13, 2008 for powdery mildew, consisting of myclobutanil and sulfur.

The trial was arranged as a split-plot design, with 10- by 40-ft main plots and two 10- 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 a.i./acre (0.38 oz Beacon/acre) applied on September 23, 2008 when the Kentucky bluegrass had 1 to 2 tillers, followed by an additional 0.018 lb a.i./acre (0.38 oz Beacon/acre) applied on April 27, 2009 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 CO<sub>2</sub>-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 reproductive growth stage on July 1, 2009. Seed yield was measured by swathing each variety when seed moisture for that variety was at 24 to 28 percent. Swathing dates were as follows:

- 7/2/09: Shamrock, Volt
- 7/3/09: Atlantis, Crest, Merit, Bandera
- 7/4/09: Rhapsody, A00-891, Bordeaux, A01-299
- 7/7/09: Valor, Bariris, Monte Carlo
- 7/9/09: A00-1400, Zinfandel

After drying the plots were threshed in a Wintersteiger plot combine and then 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

Seed yield for 'A00-1400' was inexplicably low for the check, while the primisulfuron treatment was typical for the variety in other trials. This may or may not have had to do with the planter breaking down while planting 'A00-1400'. When the breakdown occurred it was not clear at what point the planter stopped working, so all four plots were replanted. When the crop emerged, it was obvious that all but the very end of the last plot had been double planted.

This year there was almost no injury from primisulfuron (Table 1). Primisulfuron had no effect on 9 of the 15 varieties and increased seed yield on 5 others: 'Atlantis', 'Merit', 'Bariris', 'A00-1400', and 'A01-299'. Only 'Rhapsody' was injured with primisulfuron, but that injury was only significant at the  $P = 0.1$  level. An attempt was made to combine the data from last year and this year into one analysis, but a significant interaction occurred for year\*variety\*treatment. The interaction was strongly associated with the varieties 'A00-891' and 'A00-1400'.

Five of the varieties appeared to have reduced amounts of heading prior to harvest, but none of that apparent injury was realized in reduced seed yield. There was no competition from weeds that would have interfered with the comparison between the check and primisulfuron. The

increased seed yield may have to do with the reduced lodging that typically occurred with primisulfuron. For 'Bariris' the lodging just prior to harvest was 100 percent in both the check and primisulfuron treatment; however it is likely that primisulfuron reduced lodging for a period of time during flowering, but then the stems eventually lodged.

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 support those from last year and suggest that other factors are more likely the cause of severe crop injury. 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 offer the following guidelines to avoid injury to seedling Kentucky bluegrass from primisulfuron.

1. Choose a vigorous variety, if possible.
2. Consider making a pre-emergence application of mesotrione (Callisto<sup>®</sup>) to suppress weedy grasses like cheatgrass and volunteer wheat, if cost effective. In some situations this may prevent the need for any fall application of primisulfuron. Spring applications of primisulfuron pose less risk for injury than fall applications.
3. 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.
4. In central Oregon, plant Kentucky bluegrass by August 15 to avoid having to apply primisulfuron during erratic weather conditions that tend to occur in the fall.
5. If possible, avoid applying primisulfuron before or after major changes in daily high temperatures.
6. Wait until Kentucky bluegrass has reached the one- to two-tiller stage to apply primisulfuron.

### **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.

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Table 1. Response of newly seeded Kentucky bluegrass to primisulfuron (Beacon<sup>®</sup>) herbicide at the Central Oregon Agricultural Research Center, Madras, Oregon, 2008-2009.<sup>1</sup>

Variety	Reduced heading <sup>2</sup>	Lodging <sup>3</sup>		Seed yield		Seed yield comparison <sup>4</sup>
		Check	Beacon	Check	Beacon	
		----- (% visual) -----		----- (lb/acre) -----		
Atlantis	0	69	39	1206	1462	**
Merit	0	66	41	1305	1595	**
Rhapsody	5	26	4	888	658	*
Valor	45	63	10	776	714	NS
Bariris	0	100	100	614	969	***
Crest	0	48	4	1261	1329	NS
Monte Carlo	60	50	19	743	753	NS
Shamrock	0	83	69	1682	1583	NS
A00-891	0	58	36	1311	1432	NS
A00-1400	25	59	74	663	1021	***
Bandera	3	15	0	1060	1121	NS
Bordeaux	35	81	46	890	930	NS
Volt	0	85	61	1211	1056	NS
Zinfandel	0	66	51	783	716	NS
A01-299	18	46	31	981	1208	*

<sup>1</sup>Primisulfuron (Beacon 75 DG) was applied at 0.38 oz product/acre on September 23, 2008 when Kentucky bluegrass had 1 to 2 tillers, followed by an additional 0.38 oz product/acre on April 27, 2009 when Kentucky bluegrass was 3 to 6 inches tall. All primisulfuron applications included R-11<sup>®</sup> non-ionic surfactant at 0.25% v/v.

<sup>2</sup>Reduced heading from primisulfuron compared to an untreated check, evaluated July 1, 2009.

<sup>3</sup>Evaluated July 1, 2009.

<sup>4</sup>Comparison made with a paired t-test. NS = not significant, \* for  $P = 0.1$ , \*\* for  $P = 0.05$ , \*\*\* for  $P = 0.01$ .