Strategy for Restoring Central Oregon Rangeland from Medusahead and Cheatgrass to a Sustainable Bunchgrass Environment – South Junction

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Abstract

Medusahead (*Taeniatherum caput-medusae*) and downy brome or cheatgrass (*Bromus tectorum*) are annual grassy weeds capable of crowding out bunchgrasses, leaving rangelands with reduced forage for livestock and wildlife, and potentially more susceptible to devastating fires and soil erosion. Two sets of plots were established in the fall of 2007 at two locations north of Madras, Oregon, one where bunchgrasses remained despite significant populations of medusahead, and a second where few bunchgrasses were present. Treatments consisted of herbicide-only and herbicide followed by planting of six different bunchgrass species. Herbicide-only applications controlled medusahead and cheatgrass, which allowed bunchgrass size to increase. Inadequate moisture following applications of Matrix® and Landmark® resulted in poor weed control and poor establishment of bunchgrass species during the spring of 2008. Moderate stands were established during the spring of 2009, with an increase in stand establishment for crested wheatgrass in 2010. Bunchgrasses that established best following herbicide applications were crested wheatgrass, Sherman big bluegrass, and intermediate wheatgrass. Residual herbicide efficacy diminished during the second season, but continued to significantly reduce competition from annual grasses in both the herbicide-only plots and herbicide followed by planting of bunchgrasses. By the third season following herbicide application, no residual effect was visible with the exception of the herbicide-only plots at the bench location.

Introduction

Medusahead (*Taeniatherum caput-medusae*) is predominant on millions of acres of semi-arid rangeland in the Pacific Northwest. It is extremely competitive and crowds out all other vegetation on infested rangeland, including such undesirable species as downy brome (*Bromus tectorum*), also known as cheatgrass. Medusahead and cheatgrass often out-compete bunchgrasses that stabilize the soil and provide forage for livestock and wildlife. Furthermore, medusahead and cheatgrass dramatically increase the fuel load, creating potentially hotter, more destructive range and forest fires. They also allow soil structure to deteriorate due to their reduced root structure compared to perennials. This in turn encourages an increase in soil erosion.

Methods and Materials

Plots were established in the fall of 2007 at two locations on the Big Cove Ranch near South Junction, north of Madras, Oregon. Each location included two sites, one where bunchgrasses were still present despite high populations of medusahead, and a second nearby location where few to no bunchgrasses remained due to domination by medusahead. The objective of this project was to evaluate herbicide-only applications on

bunchgrass growth when competition from medusahead and cheatgrass are removed, and stand establishment of six bunchgrasses following herbicide application where few bunchgrasses remained.

Herbicide-Only Plots

During the fall of 2007 small plots were established at two locations where bunchgrasses remained. The herbicides Plateau® (imazapic), Journey® (imazapic + glyphosate), Matrix® (rimsulfuron), and Landmark® (sulfometuron + chlorsulfuron) were applied to 10-ft by 25-ft plots replicated 4 times. Plateau and Journey were applied October 13 and Matrix and Landmark were applied November 21, 2007. Application equipment was a CO_2-pressurized hand-held boom sprayer outfitted with TeeJet 8002 nozzles on a 9-ft boom operated at 40 psi and applying 20 gal water/acre.

During September of 2008, plots were evaluated visually for herbicide efficacy. Measurements that were taken included plant height for established crested wheatgrass at the bench location and intermediate wheatgrass at the meadow location. Plots were re-evaluated for herbicide efficacy and bunchgrass growth in August of 2009, and May and July of 2010.

Herbicide Application Followed by Planting Bunchgrass

The four herbicides were also applied where few to no bunchgrasses remained in single large plots 20 ft by 180 ft at the bench location and 40 ft by 480 ft at the meadow location. Applications were made using a 4-wheeler outfitted with a single Floodjet nozzle with an application width of 20 ft. Plateau and Journey were applied October 12 and Matrix and Landmark were applied December 28, 2007. The Matrix and Landmark portions of the plots were abandoned due to poor efficacy that was likely caused by inadequate precipitation following application.

Six additional species of bunchgrasses were planted following application of Plateau and Journey on December 12 in 10-ft-wide plots at the bench location replicated 3 times, and on 20-ft-wide plots at the meadow location replicated 4 times. Seeding rate was 15 lb/acre using a 10-ft-wide Truax Rough Rider Rangeland drill with a planting pattern of 10 rows on 12-inch centers. Bunchgrasses included crested wheatgrass (*Agropyron cristatum*), intermediate wheatgrass (*Agropyron intermedium*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa sandbergii*), Sherman big bluegrass (*Poa secunda*), and smooth brome (*Bromus inermis*).

Herbicide efficacy and stand establishment of bunchgrasses were visually evaluated each year of the project. During 2008 stand establishment was evaluated in April and June, and herbicide efficacy in September. For 2009, herbicide efficacy was re-evaluated in August and stand counts were made during late October and early November. In 2010, stand establishment was evaluated in April and June, and herbicide plots were evaluated for efficacy in May at the bench location and July at the meadow location.

Results and Discussion

Herbicide-only Plots

2008: All four herbicides applied to control medusahead provided 100 percent control of medusahead and cheatgrass at the meadow location during 2008 (Table 1). At the bench location, Plateau and Journey provided 100 percent control, while Matrix provided 98 percent and Landmark 68 percent control. Less than expected control by Matrix and Landmark at the bench location was likely the result of inadequate precipitation following application on November 21, 2007. Intermediate wheatgrass at the meadow location had significantly increased growth following herbicide applications compared to the untreated plot.

2009: Re-evaluation a year later found that residual efficacy for the four herbicides on medusahead decreased at both locations, but provided moderate residual activity (Table 2). A year later the previously established intermediate wheatgrass in the herbicide-only plots at the meadow location were again larger in size compared to plants in the untreated plots. There were no differences in plant height between the four herbicide treatments. Early grazing of the crested wheatgrass at the bench location prevented evaluation of that site.

2010: No residual efficacy for the four herbicides on medusahead was observed at the meadow location, while Plateau and Journey continued to provide 88 and 80 percent control of medusahead (Table 3). This level of control the third season following application is unexpected, based on previous research with these products in the same area. Previously established intermediate wheatgrass in the herbicide-only plots at the meadow location increased in size each season following herbicide applications. We are currently unable to determine whether this is in response to herbicide application or amount of annual precipitation. There were no significant differences in plant height between the four herbicide treatments. Early grazing of the crested wheatgrass at the bench location again prevented evaluation of that site.

Herbicide Application Followed by Planting Bunchgrass

2008: Establishment of the six bunchgrasses was inadequate at both locations probably due to lack of moisture. Based on a visual rating, the best performers under these conditions were crested wheatgrass, followed by intermediate wheatgrass and bluebunch wheatgrass.

2009: Following increased precipitation during the spring, a modest stand established for some bunchgrasses species (Table 4). The best performers at the bench location were crested wheatgrass, Sherman big bluegrass, and bluebunch wheatgrass. At the meadow location crested wheatgrass, intermediate wheatgrass, and Sherman big bluegrass were the top performers.

2010: An unusually wet spring and early summer resulted in increased growth and stand establishment of bunchgrasses (Table 5). At both the bench and meadow locations crested wheatgrass was the undisputed leader in its ability to establish a strong stand.

Planted rows were clearly visible, with less medusahead, yellow mustard, and other annual weeds present in the plots. At the bench location, there were moderate stands of Sherman big bluegrass, with modest stands of bluebunch wheatgrass and intermediate wheatgrass. The plot area at the meadow location was dominated by lush growth of yellow mustard, making it more difficult to obtain an accurate stand count where populations were moderate to weak. Intermediate wheatgrass and Sherman big bluegrass continue to have modest stands. Sandberg's bluegrass and smooth brome have not been able to successfully establish at either location.

Table 1. 2008 evaluation of herbicide applications to herbicide-only plots for control of medusahead at South Junction near Madras, OR.

		Meadow location		Bench location
Treatments[1]	Product /acre	Cheatgrass/Medusahead control (%)	Interm.wheatgrass height (inch)	Medusahead control (%)
Plateau	6 oz	100	19.6	100
Journey	1 pt	100	20.2	100
Matrix[2]	4 oz	100	17.4	98
Landmark[2]	0.75 oz	100	18.7	68
Untreated	-----	0		0

[1]Plateau = imazapic 2 lb ai/gal, Journey = imazapic 0.75 lb ai/gal + glyphosate 1.5 lb ai/gal, Matrix = rimsulfuron 25%, Landmark = sulfometuron 50% + chlorsulfuron 25%.
[2]Treatment included a silicon surfactant at 0.25% v/v.

Table 2. 2009 evaluation of herbicide applications to herbicide-only plots for control ofmedusahead at South Junction near Madras, OR.

		Meadow location		Bench location
Treatments[1]	Product /acre	Cheatgrass/Medusahead control (%)	Interm.wheatgrass height (inch)	Medusahead control (%)
Plateau	6 oz	90	25.3 a[2]	96
Journey	1 pt	90	24.2 ab	91
Matrix[3]	4 oz	35	21.5 b	33
Landmark[3]	0.75 oz	61	22.4 ab	5
Untreated	-----	0	--	0

[1]Plateau = imazapic 2 lb ai/gal, Journey = imazapic 0.75 lb ai/gal + glyphosate 1.5 lb ai/gal, Matrix = rimsulfuron 25%, Landmark = sulfometuron 50% + chlorsulfuron 25%.
[2]Mean separation (LSD) at $P \leq 0.05$.
[3]Treatment included a silicon surfactant at 0.25% v/v.

Table 3. 2010 evaluation of herbicide applications to herbicide-only plots for control of medusahead at South Junction near Madras, OR.

		Meadow location		Bench location
Treatments[1]	Product /acre	Cheatgrass/Medusahead control (%)	Interm.wheatgrass height (inch)	Medusahead control (%)
Plateau	6 oz	0	29.3 a[2]	88
Journey	1 pt	0	29.6 a	80
Matrix[3]	4 oz	0	20.3 a	0
Landmark[3]	0.75 oz	0	27.7 a	0
Untreated	-----	0	--	0

[1]Plateau = imazapic 2 lb ai/gal, Journey = imazapic 0.75 lb ai/gal + glyphosate 1.5 lb ai/gal, Matrix = rimsulfuron 25%, Landmark = sulfometuron 50% + chlorsulfuron 25%.
[2]Mean separation (LSD) at $P \leq 0.05$.
[3]Treatment included a silicon surfactant at 0.25% v/v.

Table 4. 2009 evaluation of stand establishment of bunchgrass varieties planted at the South Junction location following herbicide application on December 28, 2007.

	Meadow location	Bench location
	Plateau & Journey	Plateau & Journey
Varieties	bunches/plot	bunches/plot
Crested Wheatgrass	750	25
Intermediate Wheatgrass	96	7
Bluebunch Wheatgrass	30	10
Sandberg's Bluegrass	740	27
Sherman Big Bluegrass	358	27
Smooth Brome	6	0

Table 5. 2010 evaluation of stand establishment of bunchgrass varieties planted at the South Junction location following herbicide application on December 28, 2007.

	Meadow location	Bench location
	Plateau & Journey	Plateau & Journey
Varieties	bunches/plot	bunches/plot
Crested Wheatgrass	2021	54
Intermediate Wheatgrass	13	7
Bluebunch Wheatgrass	0	11
Sandberg's Bluegrass	1	0
Sherman Big Bluegrass	13	34
Smooth Brome	0	0