

Strategy for Restoring Central Oregon Rangeland at South Junction from Medusahead to a Sustainable Bunchgrass Environment, 2007-2009

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Abstract

Medusahead and downy brome (also known as cheatgrass) are annual grassy weeds that degrade range and wild lands of the Pacific Northwest. Trials were conducted at two locations north of Madras, Oregon from 2007 to 2009. Each location consisted of trials on two sites, one where bunchgrasses remained despite significant populations of medusahead and a second nearby location where few to no bunchgrasses remained. Treatments consisted of herbicides only and herbicides followed by planting of different bunchgrass species. Herbicide-only applications controlled medusahead and cheatgrass, which allowed bunchgrass size to increase. For planted bunchgrasses, moderate stands were established during the spring of 2009. Bunchgrasses that established best following herbicide applications were Sandberg's bluegrass, crested wheatgrass, and Sherman big bluegrass. Residual herbicide efficacy diminished during the second year, but continued to provide a significant reduction in competition from annual grasses in both the herbicide-only plots and herbicide followed by planting of bunchgrass.

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 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 feed for cattle and other wildlife. Furthermore, medusahead and cheatgrass dramatically increase the fuel load, creating hotter, more destructive range and forest fires. They also allow soil structure to deteriorate, setting the stage for increased soil erosion.

Rangeland restoration research in the Great Basin indicates that it is extremely difficult to convert directly from medusahead and cheatgrass domination to establishment of native species. However, species like crested wheatgrass (*Agropyron cristatum*) are able to get established and create a bunchgrass system where native grass can be successfully reintroduced over time.

Objectives of this project include: 1) evaluate the control of medusahead and cheatgrass with herbicides, 2) determine the subsequent effect of herbicides on recovering bunchgrass growth when competition from medusahead and cheatgrass are controlled, and 3) evaluate stand establishment of six bunchgrasses following herbicide applications where few bunchgrasses remain.

Methods and Materials

Trials were conducted at two locations on the Big Cove Ranch near South Junction north of Madras, Oregon. The bench location was upland with extremely shallow soil. The meadow location was low-lying with somewhat deeper soil. Each location consisted of trials on two sites, one site where bunchgrasses were still present despite high populations of medusahead (herbicide only), and a second nearby location where few to no bunchgrasses remained due to domination by medusahead (herbicide followed by planting).

Herbicide Only

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 CO₂-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.

Herbicide Followed by Planting Bunchgrass

The four herbicides listed above were also applied in large nonreplicated 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 single flood-type 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.

Following Plateau and Journey applications, six bunchgrass species were planted on December 12, 2007 at the bench location in 10-ft-wide plots replicated 3 times and at the meadow location in 20-ft-wide plots replicated 4 times. Seeding rate was 15 lb/acre using a 10-ft-wide Truax Rough Rider Rangeland drill planting 10 rows on 12-inch centers. Bunchgrass species were crested wheatgrass, intermediate wheatgrass (*Agropyron intermedium*), bluebunch wheatgrass (*Pseudoroegneria spicata*), Sandberg's bluegrass (*Poa sandbergii*), Sherman big bluegrass (*P. secunda*), and smooth brome (*Bromus inermis*).

Results and Discussion

Herbicide Only: During 2008, the first year after application at the meadow, all four herbicides controlled 100 percent of medusahead and cheatgrass (Table 1). Control was less consistent at the bench location (Table 2) where only Plateau and Journey provided 100 percent control of medusahead. Residual herbicide efficacy diminished during the second year, but continued to reduce competition, and as a result the bunchgrass growth was improved. (I'm not sure what happened to the formatting here—I don't know why the page bumped down)

Herbicide Followed by Planting Bunchgrass

During 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. Following increased precipitation during the spring of 2009, a modest stand established for some bunchgrasses species (Table 3). The best performers at the bench location were Sandberg's bluegrass, Sherman big bluegrass and crested wheatgrass. Crested wheatgrass and Sandberg's bluegrass were the top performers at the meadow location. Intermediate wheatgrass and bluebunch wheatgrass have not performed well at either location, and smooth brome has seen little stand establishment.

Table 1. Evaluation on September 19, 2008 of herbicide applications to small plots for control of medusahead at South Junction near Madras, Oregon.

Treatments ¹	Product /acre	Meadow location		Bench location
		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

¹Plateau = imazapic 2 lb ae/gal, Journey = imazapic 0.75 lb ae/gal + glyphosate 1.5 lb ae/gal, Matrix = rimsulfuron 25%, Landmark = sulfometuron 50% + chlorsulfuron 25%.

²Treatment included a silicon surfactant at 0.25% v/v.

Table 2. Evaluation on August 7 and 13, 2009 of herbicide applications to herbicide-only plots for control of medusahead and cheatgrass at South Junction, north of Madras, Oregon.

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

¹Plateau = imazapic 2 lb ae/gal, Journey = imazapic 0.75 lb ae/gal + glyphosate 1.5 lb ae/gal, Matrix = rimsulfuron 25%, Landmark = sulfometuron 50% + chlorsulfuron 25%.

²Treatment included a silicon surfactant at 0.25% v/v.

Mean separation with Least Significant Difference (LSD) at $P \leq 0.05$.

Table 3. Stand establishment of bunch grass varieties planted at the South Junction meadow location, near Madras, Oregon following herbicide application on December 28, 2007.

Varieties	Meadow location		Bench location	
	Plateau	Journey	Plateau	Journey
	Plants/40 ft row	Plants/40 ft row	Plants/20 ft row	Plants/20 ft row
Crested wheatgrass	33.2 ab	41.8 a	2.5 ab	2.5 ab
Intermediate wheatgrass	3.5 c	6.0 bc	0.8 bc	0.5 bc
Bluebunch wheatgrass	0.8 c	2.1 c	0.9 abc	1.1 abc
Sandberg's bluegrass	36.0 a	37.9 ab	2.4 ab	2.9 a
Sherman Big bluegrass	13.2 bc	22.6 abc	2.6 a	2.7 ab
Smooth brome	0 c	0.5 c	0.0 c	0.0 c

Mean separation with Least Significant Difference (LSD) at $P \leq 0.05$.