Restoring Central Oregon Rangeland at Warm Springs and Ashwood from Ventenata and Medusahead to a Sustainable Bunchgrass Environment, 2008-2009

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Abstract

Medusahead, ventenata, and downy brome (also known as cheatgrass) are annual grassy weeds that degrade range and wildlands of the Pacific Northwest. Trials were conducted at two locations, one near Ashwood and the other on the Warm Springs Reservation. Each location consisted of trials at two sites, one where bunchgrasses remained despite significant populations of medusahead or ventenata and a second nearby location where few bunchgrasses remained. Treatments consisted of herbicides only and herbicides followed by planting of different bunchgrass species. Herbicide-only applications provided 100 percent control of medusahead and ventenata at both locations. At the Warm Springs location Landmark® and Matrix® provided 100 percent control of cheatgrass, while Plateau® and Journey® provided somewhat less control at 93 and 96 percent. A moderate stand of bunchgrass species was established at the Warm Springs location, but not at Ashwood.

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 cheatgrass or downy brome (*Bromus tectorum*). A new species in the region is ventenata (*Ventenata dubia*), that is currently increasing its expansion across the Pacific Northwest. These weedy annual grasses often out-compete bunchgrasses that stabilize the soil and provide feed for cattle and other wildlife. Furthermore, medusahead, ventenata 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 from medusahead, ventenata or 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, ventenata, and cheatgrass achieved with herbicides, 2) determine the subsequent effect of herbicides on recovering bunchgrass growth when competition from medusahead, ventenata, and cheatgrass are controlled, and 3) evaluate stand establishment of six bunchgrasses following herbicide applications in areas where few bunchgrasses remain.

Methods and Materials

Trials were conducted at two locations, one on the Warm Springs Reservation north of Madras and the other near the town of Ashwood, Oregon. The Ashwood location was near the top of a ridge with extremely shallow soil. The Warm Springs location was in more of a meadow location with heavier soil. Each location included two sites, one where bunchgrasses were still present despite significant populations of medusahead or ventenata (herbicide only), and a second nearby location where few to no bunchgrasses remained due to domination by medusahead or ventenata (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. Herbicides were applied November 19 using 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. A suitable site at Ashwood could not be found, so an alternate site was located on the bench above South Junction.

Plots were evaluated for herbicide efficacy on June 12 at Warm Springs and June 16 at the alternate Ashwood site. Plant height of established bluebunch wheatgrass (*Pseudoroegneria spicata*) (Warm Springs) and intermediate wheatgrass (*Agropyron intermedium*) (alternate Ashwood site) was measured as an indicator of plant vigor.

Herbicide Followed by Planting Bunchgrass

The four herbicides listed above were also applied in large nonreplicated plots 20 ft by 288 ft. Herbicides were applied using the same methodology as the herbicide-only plots on December 11 at Ashwood and December 12 at Warm Springs. Application was made just prior to planting at Warm Springs and immediately following planting at Ashwood.

Six species of bunchgrasses were planted in 20-ft-wide plots replicated 3 times. Seeding rate was 15 lb/acre using an 8-ft-wide John Deere 1500 power drill planting 10 rows on 9-inch centers. Bunchgrasses included squirreltail (*Elymus elymoides*) (Warm Springs)/crested wheatgrass (Ashwood), intermediate wheatgrass, bluebunch wheatgrass, Sandberg's bluegrass (*Poa sandbergii*), Sherman big bluegrass (*P. secunda*), and smooth brome (*Bromus inermis*).

Herbicide treatments were evaluated for efficacy on June 12 at Warm Springs and June 16 at Ashwood. Stand counts for bunchgrasses in the planted plots at Warm Springs were taken on June 24, 2009; inadequate germination or plant survival prevented stand counts from being taken at Ashwood.

Results and Discussion

Herbicide Only

All four herbicides provided control of ventenata and medusahead at Warm Springs and medusahead on the alternate Ashwood site. This effectively removed the competition for established bluebunch wheatgrass at Warm Springs (Table 1), and intermediate wheatgrass at the alternate Ashwood site (Table 2). All four herbicides provided 100 percent control of medusahead and ventenata at both locations. Plateau and Journey provided 90 and 96 percent control of cheatgrass, compared to 100 percent control with Matrix or Landmark. As observed in previous research, Landmark can stunt existing bunchgrasses the first year after application.

Herbicide Followed by Planting Bunchgrass

All four herbicides provided near 100 percent control of medusahead and ventenata at both locations. Establishment of the six bunchgrasses was moderately successful at Warm Springs (Table 3) and unsuccessful at Ashwood. There is evidence that some germination occurred at Ashwood, but the southeast-facing slope dried out early, preventing stand establishment. This lack of stand establishment at Ashwood may have been affected by herbicide application prior to planting rather than following planting, as is standard procedure that was followed at Warm Springs.

At the Warm Springs location Sherman big bluegrass achieved the best stand establishment, followed by Sandberg's bluegrass, intermediate wheatgrass, and smooth brome, whereas bluebunch wheatgrass and squirreltail had poor stand establishment.

Table 1. Herbicide application November 19, 2008 to herbicide-only plots for control of venetada, cheatgrass, and medusahead on the Warm Springs Reservation, OR.

Treatments[1]	Product /acre	Venetada control (%)	Cheatgrass control (%)	Medusahead control (%)	Bluebunch wheatgrass height (in)[2]
Plateau	6 oz	100 a	93 b	100 a	23.7 a
Journey	1 pt	100 a	96 ab	100 a	22.5 a
Matrix[3]	4 oz	100 a	100 a	100 a	23.0 a
Landmark[3]	0.75 oz	100 a	100 a	100 a	21.7 a
Control	---	0 b	0 c	0 b	23.8 a

[1]Plateau = 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%.
[2]No significant difference.
[3]Treatment included a silicon surfactant at 0.25% v/v.
Mean separation with Least Significant Difference (LSD) at $P \leq 0.05$.

Table 2. Herbicide applications November 19, 2008 to herbicide-only plots for control of cheatgrass and medusahead at the alternate Ashwood, OR location.

Treatments[1]	Product /acre	Cheatgrass/Medusahead control (%)	Intermediate wheatgrass height (in)
Plateau	6 oz	100 a	24.7a
Journey	1 pt	100 a	25.4 a
Matrix[2]	4 oz	100 a	26.2 a
Landmark[2]	0.75 oz	100 a	20.7 b
Control	---	0 b	25.0 a

[1]Plateau = imazapic 2 lb ae/gal, Journey = imazapic 0.75 lb ae/gal + glyphosate 1.5 lb ae/gal, Matrix = rimsulfuron 25%t, Landmark = sulfometuron 50% + chlorsulfuron 25%.
[2]Treatment 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 on the Warm Springs Reservation, OR following herbicide application on December 12, 2008.

Varieties	Plateau	Journey
	plants/40-ft row	plants/40-ft row
Squirreltail	0.7 b	1.5 b
Intermediate Wheatgrass	12.5 ab	20.7 a
Bluebunch Wheatgrass	3.8 b	1.3 b
Sandberg's Bluegrass	17.5 ab	20.3 a
Sherman Big Bluegrass	32.2 a	10.6 ab
Smooth Brome	10.7 b	15.7 a

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