Perennial Grass Establishment Following Cheatgrass Control Using Herbicides

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Introduction

The introduction and subsequent invasion of cheatgrass (*Bromus tectorum*) onto millions of acres of western rangelands has resulted in astronomical changes to native plant communities.

Wildlife, grazing, recreational and aesthetic values are significantly affected as cheatgrass has increased the chance, rate, spread and season of wildfires. With each passing wildfire season more and more critical habitats are being converted to cheatgrass dominance. Whisenant (1989) estimated the wildfire frequency return in big sagebrush communities to be 60-110 years, now these frequencies are as common as every 5-10 years, simply too short a period of time to allow for the return of critical browse and herbaceous species.

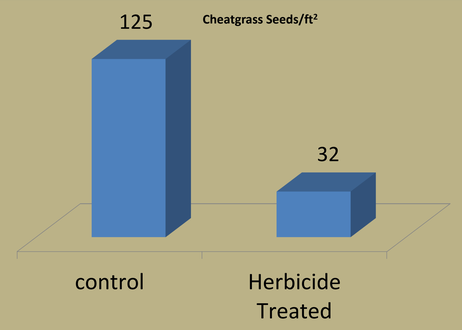
Cheatgrass Suppression

The establishment of long-lived perennial grasses is the best known method at suppressing cheatgrass above-ground densities and fuel loads, therefor decreasing the frequency of wildfires and allowing critical browse and herbaceous species to return to the site.

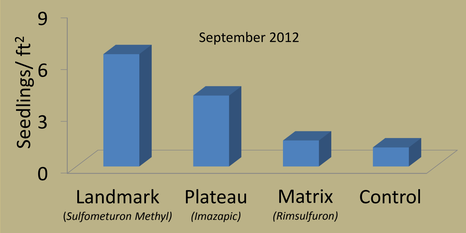
The use of herbicides to control cheatgrass is a valuable tool. Evans et al. (1970) reported that as little as 4 cheatgrass plants/ft² could outcompete long-lived perennial grasses such as crested wheatgrass (*Agropyron* cristatum). Soil active herbicides can reduce this competition by decreasing cheatgrass densities and seed banks. Thus promoting perennial grass species germination, emergence and establishment on cheatgrass dominated rangelands. Herbicide use must be done very cautiously though. The mis-use of these herbicides can have very damaging affects on rangelands and can result in the registration of the herbicide for rangeland use to be revoked, removing it from the management "tool box".

Seed Banks

Cheatgrass seed bank densities significantly ($P < 0.05$) decreased from 125.6 seeds/ft² in the control plots to 32.3 seeds/ft² in the herbicide treatments (average all herbicides). Rimsulfuron had the least effect on cheatgrass seed bank densities as this herbicide still yielded 80.5/ft² compared to Imazapic, 3.5/ft², which was the most effective.



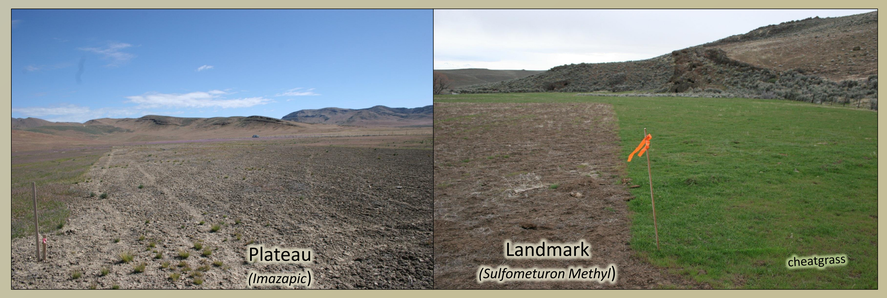
Perennial Grass Establishment



Siberian wheatgrass seedlings emerged in March 2012 at fairly high densities, 22.5/ft² in the Sulfometuron Methyl plots, but by mid-June dry summer conditions started to take a toll. By September 2012 the Sulfometuron plots yielded 6.5/ft² followed by Imazapic, 4.1/ft², and Rimsulfuron 1.5/ft², respectfully. The control plots that were also seeded yielded 1.1/ft². Actual establishment of these seedlings will be recorded in the fall of 2013.

Results

Sulfometuron Methyl yielded the highest control of cheatgrass above-ground densities from 76.6/ft² down to 0.8/ft² (99%) followed by Imazapic, 53.4/ft² down to 1.4/ft² (97%) and Rimsulfuron, 39.2/ft² down to 1.8/ft² (95%) (Figure 1).



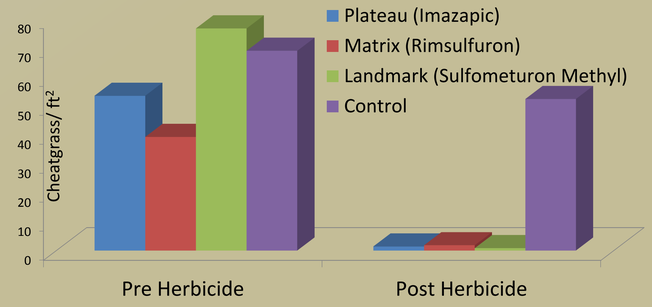


Figure 1. Above-ground cheatgrass densities

Conclusion

Our ultimate goal is to decrease the frequency of wildfires on Great Basin rangelands and allow critical browse and herbaceous species to return to these rangelands and improve wildlife, grazing, recreational and aesthetic values of Great Basin rangelands.

The application of Sulfometuron Methyl and Imazapic, at the rates tested, were successful at promoting the establishment of long-lived perennial grass. While Rimsulfuron had some control of cheatgrass it did not promote perennial establishment. Rimsulfuron did not control lower successional species such as Russian thistle (*Salsola tragus*) which was released by the decrease of cheatgrass and lead to increased competition and perennial establishment failure. In summary, integrated range improvement practices using *effective* herbicides can help preserve a healthy sustainable rangeland.

Methods

In the Fall (2010) we treated 12 plots (75' x 150') with 1) Imazapic 6 oz/ac, 2) Rimsulfuron 4 oz/ac, and 3) Sulfometuron Methyl 1.75 oz/ac rates using a ground spray rig in a completely randomized block design. Treated plots were fallowed for one year and seeded in the fall of 2011 to Siberian wheatgrass (*Agropyron fragilla* ssp.*sibericum*) at 7 lbs/ac rate. Ten randomly selected fixed quadrats (3/ft²) were established to record Siberian wheatgrass emergence and survival from March through September 2012. Cheatgrass densities were recorded prior and post herbicide application. The study site, Antelope, is approximately 160 miles east of Reno, Nevada and is a xeric, degraded Wyoming big sagebrush (*Artemisia tridentata* ssp. *wyomingensis*) community. The soil is a silty loam (7-9" precipitation).