Effects of Sequential Herbicide Application on Cheatgrass and Native Rangeland Vegetation

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INTRODUCTION

Cheatgrass (*Bromus tectorum* L.) is one of the most significant invasive weeds of North America[3,4]. Because eradication may not be a feasible goal, it may be desirable to manage cheatgrass in low-density stands below the 'impact' stage of invasion[2,5]. Little work has investigated managing such stands by single or sequential herbicide applications. Further, many studies focus on results only in the couple years following herbicide application and fail to address how long a single herbicide application will provide effective control of cheatgrass.

- Thunder Basin Grasslands Prairie Ecosystem Association (TBGPEA)
  - cheatgrass control efforts from 2006 to present[6]
  - treated various areas for cheatgrass with imazapic in the fall at 70 g ai/acre[6]
  - provided field sites for this study

Since the TBGPEA possesses a continuum of treated sites, we were able to reapply treatments in plots at sites that had been treated 1 year to 5 years prior.

OBJECTIVES

- Determine at what point in time following an initial herbicide application a reapplication is needed for continued control of cheatgrass
  - How does the plant community (above- and belowground) respond to herbicide reapplications?
  - Does it respond differently to different herbicides?

MATERIALS AND METHODS

- 7 field sites with 3 replications in a RCBD
  - 5 sites treated previously with imazapic
    - retreated in 2011
    - range from a 1-year retreatment interval to a 5-year retreatment interval
  - 2 sites newly treated in 2011
    - *Hesperostipa comata* dominated
    - *Pascopyrum smithii* and *Bouteloua gracilis* co-dominated

Fig 1: Thunder Basin Grassland, WY, USA

- Fall preemergent herbicide applications (Oct 2011)
  - imazapic (at both 70 and 105 g ai/ha)
  - propoxycarbazone sodium (59 g ai/ha)
  - rimsulfuron (52.5 g ai/ha)
  - tebuthiuron (170 g ai/ha) and aminopyralid (92 g ai/ha)
- Vegetation Response (May/June 2012)
  - biomass production
  - percent cover
    - 50 points with line point intercept
      - canopy and basal
    - 100 points with Samplepoint software[1]
      - canopy only

RESULTS

- Cheatgrass cover was observed only at:
  - 5-year retreatment interval site
  - Both 2011 sites
- All herbicide treatments reduced cheatgrass biomass ($p<.0001$; Fig 2) and increased perennial grass biomass ($p=.0379$) at the *H. comata* site

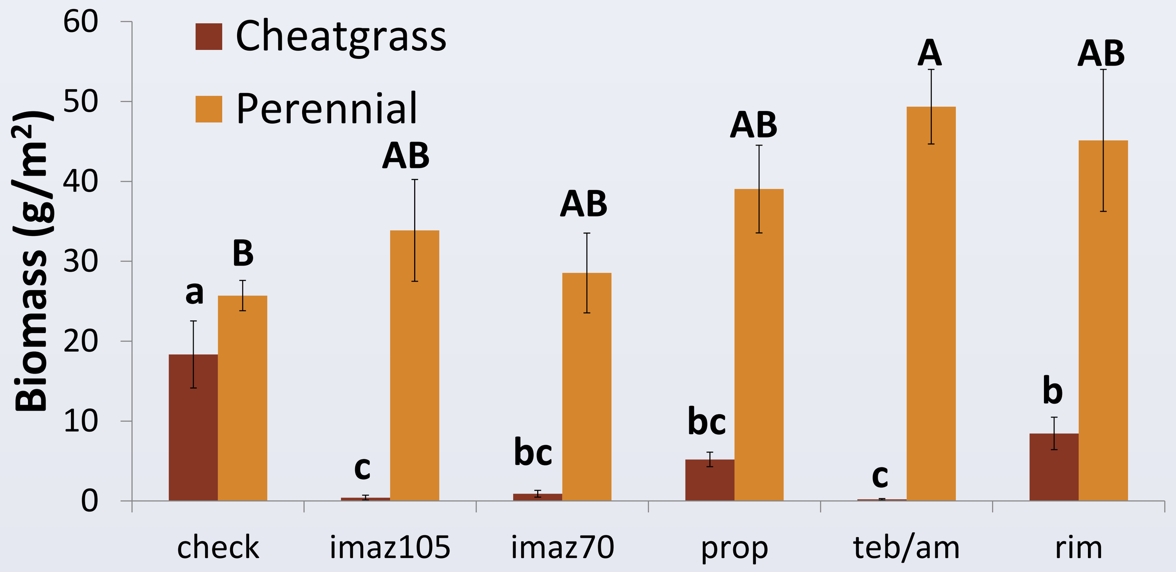


Fig 2: Cheatgrass and perennial grass biomass by herbicide treatment at the H. comata site (± 1 std error). Letters denote significant differences – lowercase for cheatgrass, uppercase for perennial grasses.

- From line point data, the tebuthiuron/aminopyralid treatment increased perennial grass canopy cover at the 2011 sites ($p<0.05$)
- From Samplepoint data, the tebuthiuron/aminopyralid and imazapic at 105 g ai increased perennial canopy cover at the *P. smithii*/*B. gracilis* site ($p=.0008$)
- From Samplepoint data, the tebuthiuron/aminopyralid treatment and imazapic treatments reduced cheatgrass canopy cover at the *H. Comata* site ($p=.0061$; Fig 3)

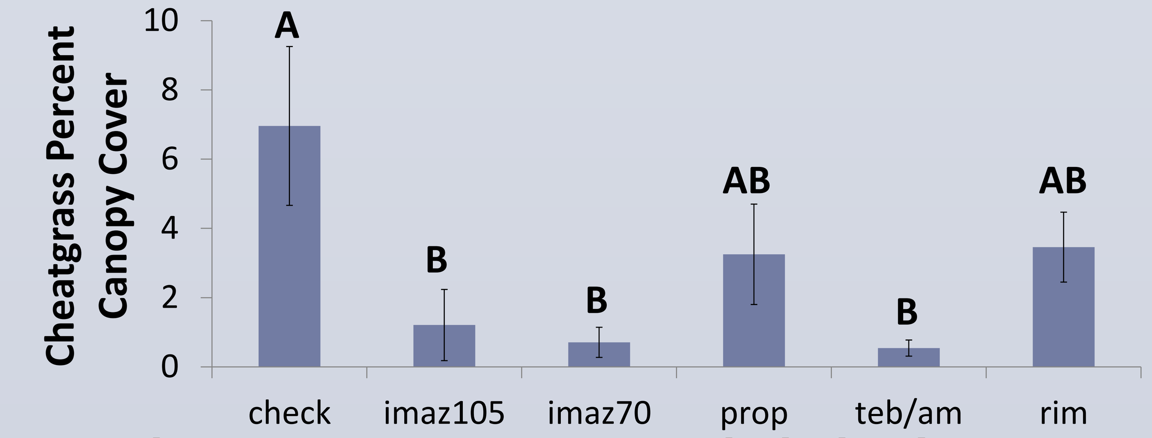
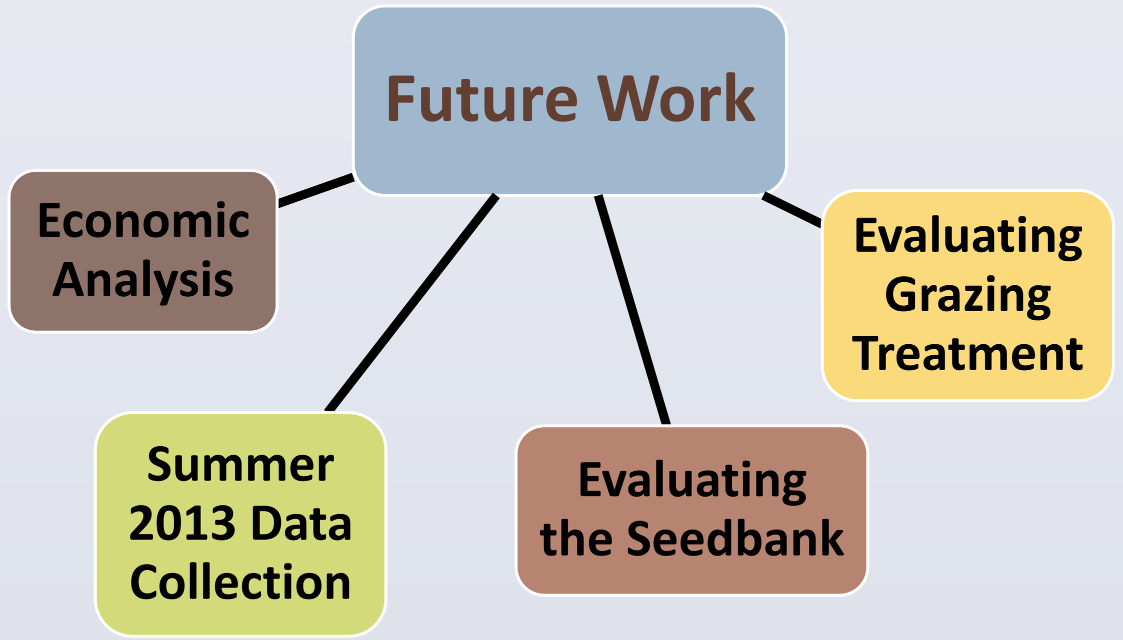


Fig 3: Cheatgrass percent canopy cover by herbicide treatment at the H. comata site (± 1 std error). Letters denote significant differences.

- All herbicide treatments had little effect on vegetation cover at the other sites ($p>0.05$)

CONCLUSIONS

1. This was a drought year with peak biomass in late May/early June. Lack of growth may have impacted our ability to detect differences between treatments.
2. The observation of cheatgrass cover only at the 5-year retreatment interval site indicates a potential cheatgrass reinvasion.
3. Although treated repeatedly with herbicide, desirable native grasses did not show significant damage – and even showed increased biomass production or percent canopy cover in some instances.



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