

Project Summary

Rocky Mountains Cooperative Ecosystem Studies Unit

Project Title: BLM WY Reclamation Seed Microcapillary Barriers

Discipline: Natural
Type of Project: Research
Funding Agency: Bureau of Land Management
Other Partners/Cooperators: University of Wyoming
Effective Dates: 7/1/2013 - 6/30/2018
Funding Amount: \$12,000

Investigators and Agency Representative:

BLM Contact:

Investigator: Jay Norton, Department of Ecosystem Science & Management, University of Wyoming, 1000 E. University Avenue, Laramie, WY, 82071; 307-766-5082; jnorton4@uwyo.edu

Project Abstract: Natural gas development and reclamation often result in altered soil chemistry that impedes germination and establishment of native plants used for reclamation (Mason et al., 2011). This is especially true in saline, semiarid environments, common in much of Wyoming where fragile soils with naturally low soil organic matter (SOM) contents typically lose 50% of their SOM, salt and clay contents increase at the surface (Day et al., 2013), and physical crusting can cause reclamation failures.

Even under undisturbed conditions, desert surfaces only rarely absorb and retain sufficient water to meet hydrothermal germination time for plant species, when proper winter, spring, and summer precipitation and temperature conditions converge (Perryman et al., 2001; Ziegenhagen and Miller, 2009). Exotic weeds and early successional native plants can establish under a relatively broad range of conditions, but some reclamation grasses, forbs, and shrubs have more particular requirements (Schuman et al., 1998). The low annual probability that proper conditions will be met can impede reclamation success.

Measuring and modeling the hydrothermal germination time of weeds and native species has been proposed as a way to improve species selection and successful restoration of wildlands following fires (e.g., Rawlins et al., 2012a; Rawlins et al., 2012b), and the PI will investigate the use of this approach for the same purpose in reclamation.

Seed of local site species is believed to be the best choice for revegetation of disturbed areas, having evolved and adapted to site conditions and biological factors. The additional moisture provided in this technique may have different effects on germination of developed cultivar or variety seed vs. that of locally sourced seed. To incorporate a consideration of commercial vs. locally-collected seed in this technical investigation, the PI will collect local seeds for at least one of the experimental sites. The PI will follow Seeds of Success (SOS) protocol resulting in a minimum number of high quality seed and voucher specimens being incorporated into the national SOS working collection and database.

Objective:

- 1. To utilize measuring and modeling of hydrothermal germination time, local weather/climate, and soil conditions to optimize seedbed conditions for enhanced reclamation of drastically disturbed rangelands.** This approach may be especially beneficial toward tailoring conditions for germination and survival of finicky native plant species, including Wyoming big sagebrush, Gardner saltbush, and key forbs, and tailoring against germination and survival of weeds.
- 2. To include locally-sourced seeds in one or more of our trial sites, to incorporate a comparison of performance of local vs. generic (commercially available cultivar or variety) seed.** The incorporation of this factor is related to other partnership efforts between the University of Wyoming and BLM Wyoming and reclamation operators. The results of this small trial should enable us to better assess appropriate performance characteristics, while the trial will establish plots that can be monitored over the long-term for relative local vs. generic seed performance.

Outcomes: June 30, 2018

Keywords: University of Wyoming, Bureau of Land Management, native plant, reclamation, seed microcapillary