A Novel Method for Removing Cheatgrass from Reclamation Seed

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Disturbances such as oil and gas extraction and surface mining create an opportunity for infestation by weeds such as downy brome (commonly called cheatgrass). Reclamation is implemented on these sites in an effort to restore native vegetation; however, cheatgrass seeds often contaminate native seed mixes used for reclamation. A recent 1.5 million-pound Bureau of Land Management seed purchase contained an estimated 230 million weed seeds, including 45 million cheatgrass seeds.

Since cheatgrass germinates at lower temperatures and more rapidly than native species, exposing cheatgrass seed to conditions that encourage its germination—and then withholding moisture—may kill cheatgrass while leaving desirable seeds unharmed. This could allow selective removal of cheatgrass from desirable seed before it is used in reclamation efforts.

Objectives

Two previous experiments tested this concept with limited success using various temperatures and durations of treatment. This experiment focused on improving the removal of cheatgrass contaminants from desirable seed using several drying methods following the germination treatment.

Materials and Methods

We conducted a germination treatment in which native seeds and cheatgrass contaminants were subjected to moisture for 12 days at 43°F. Following treatment, we subjected eight replicates of each native species and associated contaminants to one of five drying methods: 1) drying at room temperature on the laboratory bench, 2) a combination of mechanical removal (sieve) and drying on the laboratory bench, 3) drying at 14°F in the freezer, 4) drying at 86°F in a forced-air oven, and 5) drying at 140°F in the oven. Mechanical removal involved passing seeds through a 5/32-inch round, commercial sieve with the intention of retaining cheatgrass seedlings with an extended root or shoot.

After seeds were dried, we placed half the replicates of each species and their associated contaminants back into germination chambers, and we planted the remaining half in potting soil in the greenhouse. We conducted seedling counts after three weeks in the chamber and after 5.5 weeks in the soil.

Results and Discussion

Blue grama and thickspike wheatgrass had the highest survival compared to cheatgrass (Figure 1). Drying seeds in commercial dryers at 86°F and 140°F severely reduced cheatgrass survival while maintaining high blue grama survival. Results were similar for thickspike wheatgrass in the 86°F dryer. Squirreltail had the lowest survival among desirable species in almost all treatments. Bluebunch wheatgrass and Sandberg bluegrass also appeared to be negatively affected by treatments. The mechanical treatment result-

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Figure 1. End survival (%) of blue grama and thickspike wheatgrass and their associated cheatgrass contaminants for each drying method following the second-phase germination trial in the chambers.

Results show that selectively harming—and thereby removing—cheatgrass contaminants in native seed is possible. Blue grama and thickspike wheatgrass were identified in these experiments as good candidates for this kind of germination treatment; however, when treated seeds were planted in soil, cheatgrass survival appeared to be higher. More research is needed to understand how these methods would perform in field conditions.

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