

Revegetation of Cheatgrass-Infested Rangeland: Size Matters!

Identification and Biology: Many people are familiar with cheatgrass (*Bromus tectorum*); we have all picked its seeds out of our socks. This prolific seed producer ranges from 6 to 24 inches tall. Leaf sheaths and blades are covered with soft hairs, and the panicle is 2 to 6 inches long and droops to one side (Fig.1). Each seed has a distinctive awn, 3/8 to 5/8 inch long. Cheatgrass is a facultative winter annual plant; most individuals germinate and emerge in the fall, grow rapidly until winter, and resume growth very early in the spring, though it also emerges in the spring if conditions are right. Plants flower and produce seeds by early summer and then die by mid-summer.

Impacts and Management: Impacts of cheatgrass invasion range from decreasing forage value for livestock and wildlife to altering fire regimes. Preventing soil disturbance and maintaining healthy plant communities are key management strategies for this species. When an infestation occurs, herbicide applications and targeted grazing can be effective methods of control. However, when cheatgrass has dominated an area for a long time, simply controlling it may not be sufficient to restore the perennial plant community. In these cases, revegetation is necessary, and consists of site preparation to control cheatgrass followed by a fall-dormant seeding of perennial species using a rangeland drill or broadcast seeding methods.

Barriers to Restoration: Revegetation of cheatgrass-dominated rangeland often fails. One reason it fails is because cheatgrass and perennial grasses have different life histories: cheatgrass seedlings emerge in the fall and resume growth earlier in the spring relative to perennial grasses. This creates a 'priority effect', or a difference in performance due to one species establishing and actively growing by the time the other species emerges. The resulting size difference may result in poor establishment of perennial species because the larger cheatgrass plants take up more resources like soil water and nutrients than do smaller perennial seedlings.

Recent Research: Improving Perennial Seedling Survival: We conducted a greenhouse study to investigate whether allowing the perennial grass bluebunch wheatgrass (*Pseudoroegneria spicata*) to emerge first would give it a priority effects advantage and increase its competitive ability, and whether modifying nitrogen levels would affect competitive outcomes. To look at these questions, we established three size cohorts of bluebunch; it was either at the 2-leaf or 4-leaf stage when cheatgrass was planted into pots (Fig.2), or the two species were seeded at the same time. We subjected these plants to two nitrogen levels; either a low level (no N added) or a high level (N added to 275 lbs/ac), and looked at the treatments over a range of densities similar to what might occur in the field. We found that larger bluebunch avoided suppression by cheatgrass more effectively, and that it did so regardless of N level. When the two were seeded at the same time, a 10-fold increase in cheatgrass density decreased average bluebunch biomass by 57%. In contrast, when bluebunch had a four-leaf size advantage, the same increase in cheatgrass density only decreased bluebunch biomass by 13%. Larger bluebunch also suppressed cheatgrass more effectively; however, N enrichment decreased bluebunch's ability to suppress cheatgrass. These results suggest that management practices that encourage perennial grasses to emerge before cheatgrass could improve seedling establishment in revegetation projects. Further, avoiding conditions that lead to N increases, such as soil disturbance, could allow perennial grasses to better suppress cheatgrass.

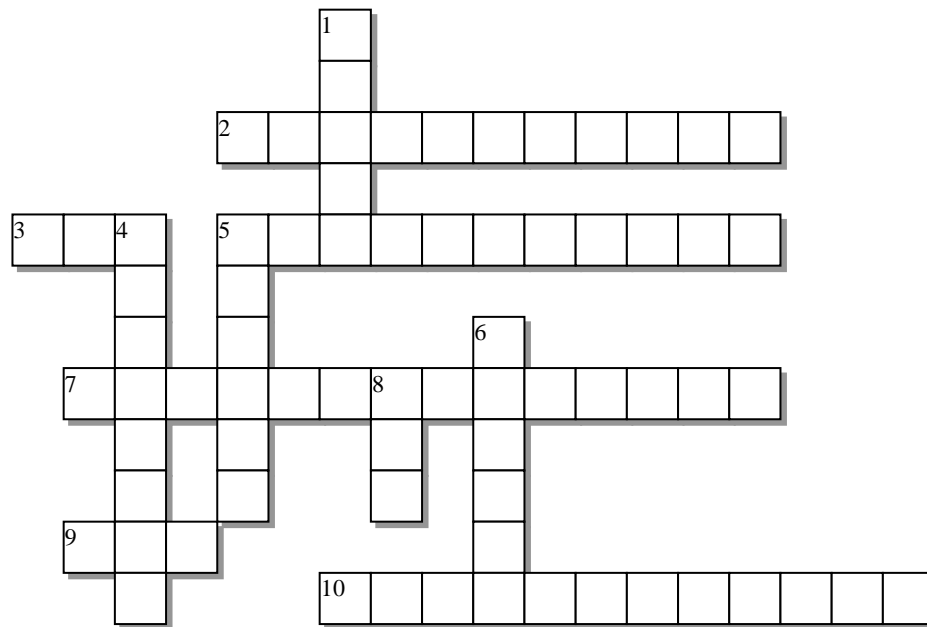


Figure 1. Illustration of cheatgrass plant, spikelet, and seed (source: USDA-NRCS PLANTS Database).



Figure 2. Taller bluebunch plants have a 2-leaf size advantage over shorter cheatgrass seedlings (source: Noelle Orloff).

Weed Post Puzzle: Test your knowledge of cheatgrass



Across:

- 2 - As a _____ winter annual, cheatgrass can emerge in the fall or spring, depending on when precipitation patterns are most favorable
- 3 - This appendage on the seed is typically 3/8-5/8 inches long
- 5 - Reducing soil _____ and maintaining healthy plant communities are two important management strategies for cheatgrass prevention
- 7 A plant ecology term for “the early bird gets the worm” (two words)
- 9 - For bluebunch seedlings versus cheatgrass, does size matter?
- 10 - This may be necessary if cheatgrass has dominated the site for a long time and desirable plants are scarce

Down:

- 1 - Wear gaiters or tall boots, unless you want to spend hours picking cheatgrass seed from these
- 4 - Enrichment with _____ decreased the ability of bluebunch to suppress cheatgrass
- 5 - Because the panicle _____ to one side, cheatgrass plants appear somewhat tired and lazy
- 6 - Cheatgrass emerges _____ perennial grasses in the spring, using available resources before other grasses can
- 8 - When planted at the same time, a ___ fold increase in cheatgrass density decreased bluebunch biomass by 57%

Solutions are posted to the MSU Extension Invasive Rangeland Weed website:
<http://www.msuxextension.org/invasiveplantsMangold/extensionsub.html>

