Revegetating medusahead (*Taeniatherum caput medusae*)-invaded rangeland.

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(Photocredit: Steve Dewey, Utah State University, Bugwood.org)
Perennial Vegetation & Community Resistance
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5+ Years of Reduced Annual Grass Cover
5+ Years of Reduced Annual Grass Density
5 Year Results Summary

- Annual grass was still 2x lower in treated/seeded plots than untreated controls.
- Perennial bunchgrasses were 17-59x higher in treated/seeded plots than untreated control.
- Bare ground was still 3x higher in treated plots than untreated control.
How do we get seeds to establish?

- Single-entry treatment/seeding often unsuccessful
- Waiting 1 year helps but requires multiple entries and can allow annual grasses to get a head start
Carbon Coating Seed Pellets

- Species seeded simultaneously with pre-emergent herbicides will likely experience nontarget damage.
- Activated carbon can be used to protect seeded species from herbicide damage because it has a high absorption capacity that can deactivate many herbicides.
Goldilocks and Activated Carbon

https://en.wikipedia.org/wiki/Biosolids
https://www.brettyoung.ca/west-canada-seed-crop-inputs/forages/ultracoat
Goldilocks and Activated Carbon

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Herbicide Protection Pods (HPP)

- Activated carbon is incorporated into a dough mixture containing seeds, water-sensitive binders, and other additives and then extruded through a rectangular die.
Crested wheatgrass HPP

- Crested wheatgrass seedling density was 300% greater at the end of the study when seeded in HPPs compared with seeded as bare seed when exotic annual grasses were simultaneously being controlled with imazapic.
Herbicide Protection Pods and Seedlings

- We expect that the benefits of HPPs over bare seed are primarily the result of activated carbon deactivating the preemergent herbicide around seeds.
- However, agglomerated seeds can improve seedling performance compared with seeds planted individually.
- Activated carbon may also increase plant growth by increasing nutrient availability and
- Activated carbon may limit allophty
More Field Testing

- Bottlebrush squirreltail (Elymus elymoides [Raf.] Swezey),
- bluebunch wheatgrass (Pseudoroegneria spicata [Pursh] A. Löve),
- Sandberg bluegrass (Poa secunda J. Presl),
- Siberian wheatgrass (Agropyron fragile [Roth] P. Candargy),
- Wyoming big sagebrush (Artemisia tridentata Nutt. subsp. wyomingensis Beetle & A. Young), and

175 g ae·ha⁻¹
Conclusions

• Simultaneously seeding vegetation with exotic annual grass control with an imazapic application would also allow seeded species 1 more yr of growth while exotic annual competition is reduced compared with the traditional approach.

• Once perennial bunchgrasses are established, they can be quite competitive with exotic annuals and are critical to limiting exotic annual grasses in the sagebrush ecosystem
Questions?