

UMUT-CSU Collaborative Rangeland Restoration Project Updates

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Collaborative projects (UMUT-CSU)



2023 Activities

- Implemented Kiva Point Seeding in early March
- 4 seed ball greenhouse experiments
 - 2 undergraduate REU students (NSF - Rocky Mountain Advancing Minority Participation /Native American Cultural Center)
- Monitored RestoreNet, Kiva Point in May & Sept 2023
- Met with Tribal Council to update on projects and goals - November 2023



Collaborative projects (UMUT-CSU)



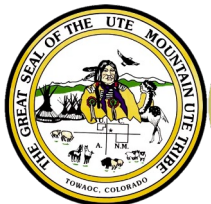
UMUT RestoreNet



Goals: Test restoration treatments at small plot scales to figure out what works for the canyon

Progress: Established site in May 2021 |
Monitored plant recruitment 2x yearly since
| Site visits from UMUT youth camps

2023 Updates: Install 100m x 100m plots
(soil health focus), Analyze





RestoreNet Treatments



Outplanting



Pits



Tamarisk
Mulch



Mulch



ConMods



Polymer Beads



Treatment effects

- ❖ Relatively low seeded species success
- ❖ BUT.....



Show some
promise!

Outplanting Success

- ❖ Once plants are germinated, they can survive and thrive!
- ❖ “Restoration islands” could be a tool informed by this finding
- ❖ Most successful species:
 - Western wheatgrass
 - Winterfat
 - Ricegrass
 - Blue & Black gramma
 - Palmer’s penstemon



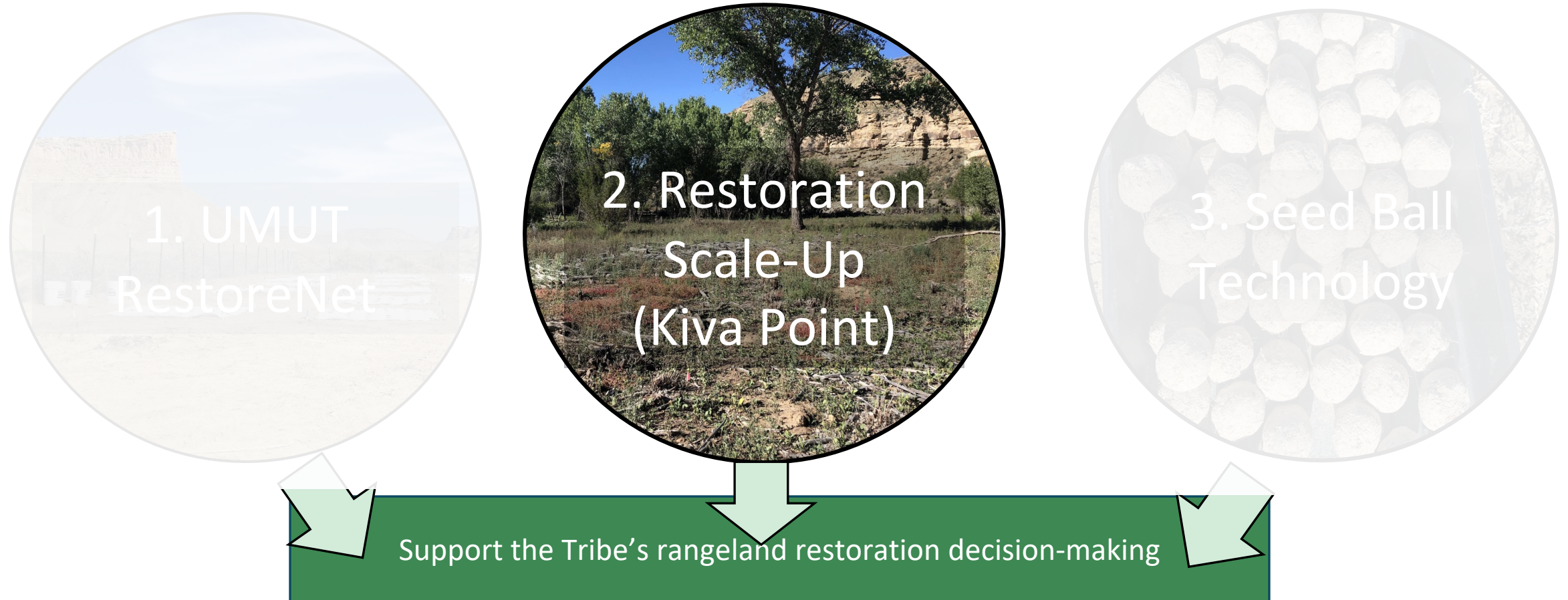


RestoreNet Year 2 Takeaways

- Recruitment from seed is low (expected)
- Pits are the most effective treatment tested so far, Tamarisk mulch has also been effective
- Restoration islands may be a promising method
- Treatments may increase native species from the ecosystem, just not seeded species
- Other treatments could potentially aid seeding success (discuss ideas at end)
 - Compost at Southwest Colorado Research Center
 - Others?



Collaborative projects (UMUT-CSU)

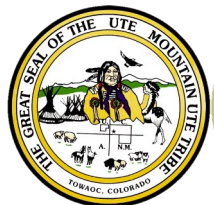


Kiva Point



Goals: Evaluate the effectiveness of climate-adaptive restoration treatments.

Progress: Weed Treatment Nov. 2022 | Installed restoration treatments March 2023 | Monitored May, Sept 2023



Kiva Point Treatments



Control



Broadcast Seeding



Coarse Woody Debris

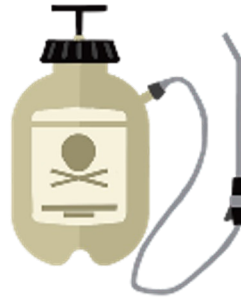


Media Luna Rock Structures



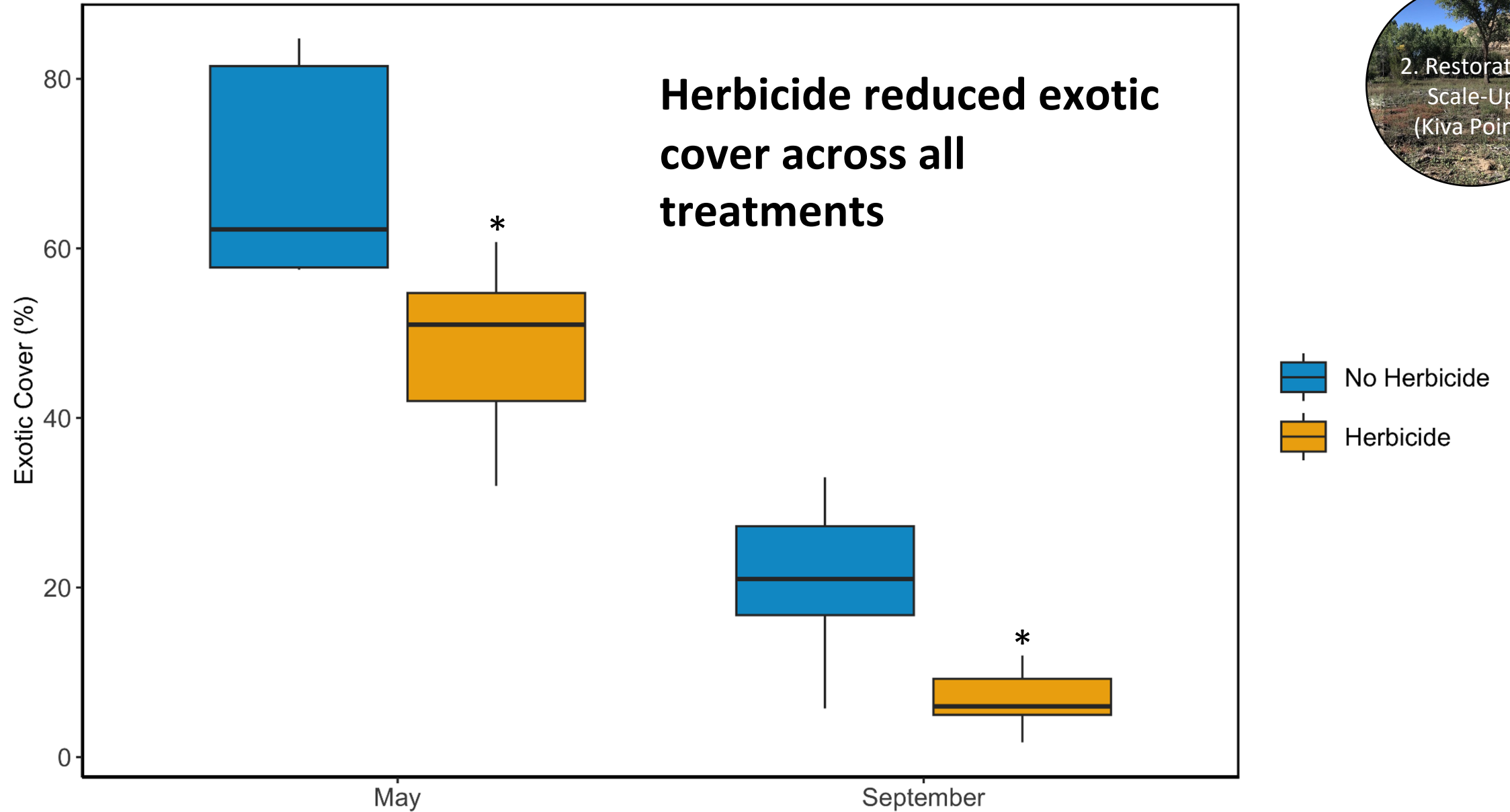
Seedballs

X



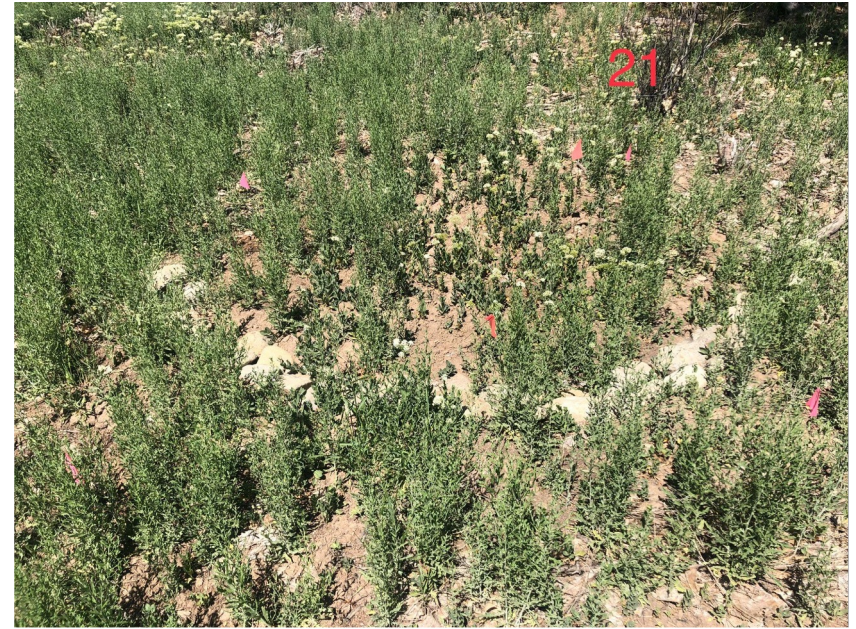


Herbicide reduced exotic cover across all treatments



Kiva Point Takeaways

- Limited native recruitment but some differences across treatments
- Herbicide works
- Other weeds (not targeted by herbicide used) still an issue



Collaborative projects (UMUT-CSU)



What is a seedball?

Seed + Clay + Tackifier + Optional Amendments

Seedballs may be useful because:

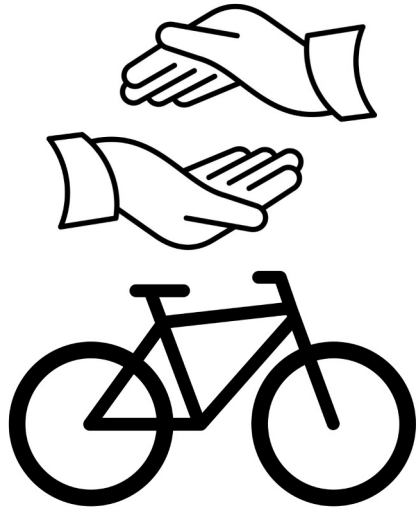
- Protect seeds from potential predators
- Protect seeds until germination conditions are ideal (e.g. large precipitation event)
- Improve seed distribution and seeding efficiency
- Easy way to add amendments
- May improve germination and establishment success

but our understanding of seedballs is limited...

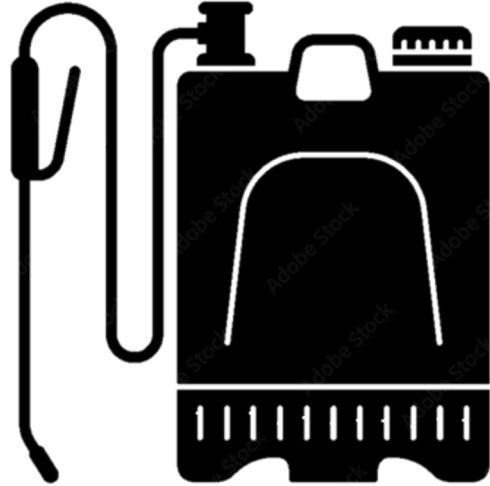




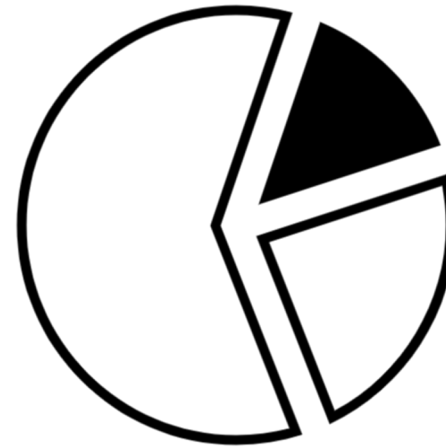
Seedball Experiments



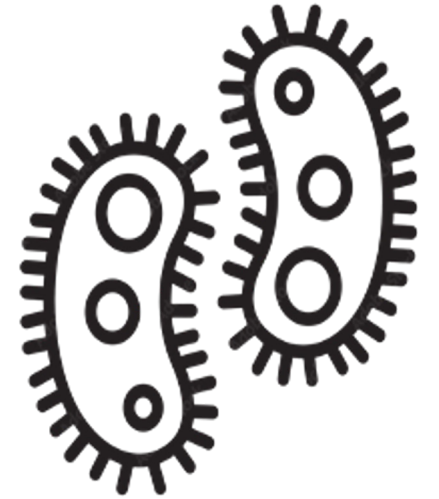
METHOD



HERBICIDE
PROTECTION



COMPOSITION



SOIL
MICROBIAL
ADDITIONS

METHOD



Which method of making seedballs supports germination better?

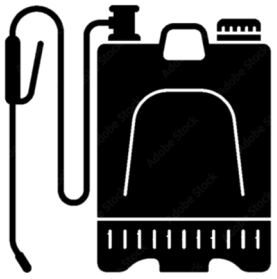
Finding: Bike-made seedballs increased germination over hand-made and control



Bike-made



Hand-made



HERBICIDE PROTECTION

To what extent, do seedballs, activated charcoal, or the combination provide protection against recently applied herbicide resulting in increased germination rates?

Finding: The addition of activated carbon to seedballs offers protection against recently applied herbicide.

Seedballs



or



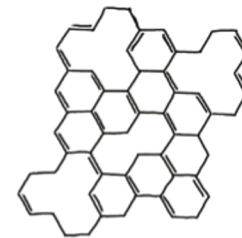
Broadcast

X



Herbicide

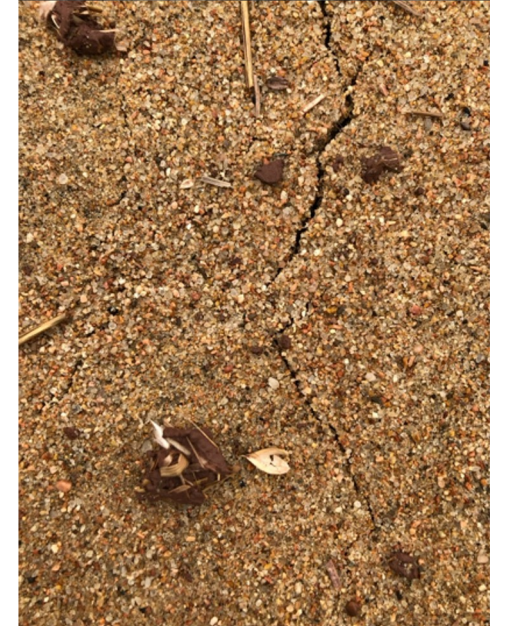
X

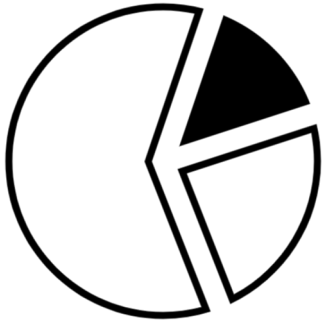


Activated Carbon

= 8 treatments x 4 replicates

3. Seed Ball Technology





COMPOSITION



How do seed ball composition and additions of granular and powdered activated carbon influence native plant germination and growth?



Finding: Activated carbon additions result in higher seedling recruitment, granular carbon performs better than powdered carbon.





SOIL MICROBIAL ADDITIONS

Biocrust: surface dwelling communities of: cyanobacteria, lichen, and moss.

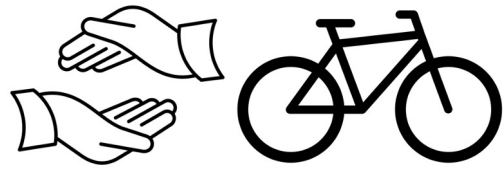
Benefits: soil stability, water retention, improved fertility.

Does adding biocrust inoculum to seedballs help promote seed germination and growth compared to broadcast seeding?

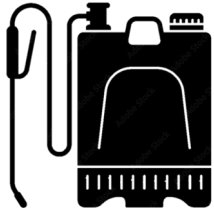
Finding: Soil microbial additions (biocrust) improved germination both in and out of seedballs. The quantity of biocrust inoculum needed is far lower in seedballs.



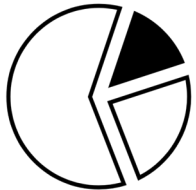
Seedball Experiments: Takeaways



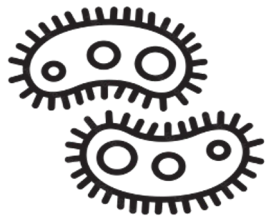
Bike-made balls work best.



Carbon additions to seedballs provide protection against recent herbicide application.



Granular carbon additions to seedballs improve recruitment.



Soil microbial additions improve germination in and out of seedballs.

Soil pits and tamarisk mulch increase seedling recruitment

Planting seedlings improves outcomes → restoration “islands”

“Best” seed balls =
- Bike-made
- Include activated C (herbicide protection)
- Include beneficial soil microbes



Support the Tribe's rangeland restoration decision-making

- Herbicide works
- Small differences between treatments (opportunities with more weed management)

2023 Summary



Looking forward: 2024

- Rangeland plant ID tour/visit to RestoreNet w/Tribal Council (April)
- Broader UMUT Rangeland Restoration Partnerships meeting (Ben coordinating)
- RestoreNet & Kiva Point Monitoring - May/Sept 2024
- Wrap up KP field (Sept 2024)
- KP Data analysis and reporting - Fall 2024 (Emily S.)

Questions & discussion



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Questions for UMUT IDT

- ❖ Do you want to see more outreach with these ongoing projects so other Tribal members can learn from them?
- ❖ Next Steps: RestoreNet treatments of interest?
- ❖ Restoration research questions surrounding new UMUT solar array project?