

Agency/Organization: US Geological Survey

Project Name: Development of Resilient Plant Materials for Desert Restoration

Project Number: 2023-USGS-2382A

Reporting Period: April 1, 2026 – June 30, 2026

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QUESTION 1: What did you accomplish during this reporting period? How did these accomplishments help you reach the goal of your project? If relevant, what indicators or benchmarks were used to determine your progress?

After sorting, counting, and weighing Arizona lupine seeds from drought treatments imposed in the greenhouse during early, middle and late fruit maturation, we randomly assigned seed lots from the treatments to the varied watering treatments maintained in the garden. We planted and caged seeds in the USGS Searchlight, Nevada common garden during early January and assessed the initial emergence of seedlings in March. We maintained our garden watering treatments and assessed emergence through mid-May, by which time all previously emergent seedlings had senesced under dry spring conditions: < 1 mm precipitation during January, 12 mm during 16 – 19 February, no measurable rainfall after 19 February, and temperatures increased beyond those expected to promote germination of a winter annual species. Ungerminated seeds remain in cages and will be visited in the future.

We re-planted seeds of fringed amaranth in the greenhouse to supplement the treatment levels we were able to implement (early and late flowering) during previous grow-outs. We are meeting our seedling emergence goal, and once these plants mature, we will count and sort fringed amaranth seeds for planting into the common garden when seeds of this species would naturally disperse and germinate. To promote seedling emergence in our greenhouse trials of desert chia, we are incorporating a smoke treatment (as per published information) to enhance germination of the seed source obtained through GRIN since previous emergence for this source has remained low.

To maximize diversity of forbs for our forb conditioning experiment, we obtained permission from the City of Boulder City to collect fresh seeds of native forbs important to desert tortoise habitat. We collected wingnut cryptantha from a site within the same seed transfer zone as the common garden. We sowed seeds into pots in the greenhouse and we are currently imposing drought treatments during early, middle, and late fruit maturation. Fruits are forming on the first cohort of plants, and once plants senesce, we will collect, sort, and count wingnut cryptantha seeds so that they are ready for planting in our experimental array in the common garden during winter-spring 2026/27. We also collected desert chicory seed, which we will couple with desert chia when we apply smoke treatments to promote germination.

After out-planting the pre-conditioned shrub seedlings to the USGS Searchlight, Nevada common garden in late February (M26), we monitored the transplant stress of these plants in early April and mid-May (M28). After out-planting, we protected each seedling with a closed wire mesh cage and watered all plants with the equivalent of 8.5 mm (0.33") precipitation weekly. In early April, we implemented a drought stress treatment on half the number of

outplants by decreasing the amount of water delivered weekly while continuing to water the control plants at the same rate as before. In late May, we removed cages from half the number of individuals to allow herbivore access. In mid-June, we monitored the abiotic (drought) and biotic (herbivore) stress of these pre-conditioned shrub seedlings (M30).

These Milestones are instrumental in our greenhouse pre-conditioning trials and in our garden evaluations of plant materials so we can develop our final deliverables for this project.

QUESTION 2: What, if any, problems were encountered? Briefly describe those problems and the manner in which they were dealt.

None.

QUESTION 3: What, if any, proposed activities were not completed? Briefly describe those activities, the reasons they were not completed and your plans for carrying them out.

None.

QUESTION 4: What is the calculated percent of work completed?

We are approximately 20% toward project completion.

QUESTION 5: Do you foresee any upcoming problems with future project activities? If so, how do you propose to overcome those problems?

None anticipated.

QUESTION 6: Is there anything else you want to tell the DCP about this project?

We have nothing additional to note concerning this project.

QUESTION 7: What was produced during the reporting period?

During the reporting period, we produced this Quarterly Progress Report (D11).