

Agency/Organization: US Geological Survey

Project Name: Development of Resilient Plant Materials for Desert Restoration

Project Number: 2023-USGS-2382A

Reporting Period: October 1, 2025 – December 31, 2025

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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?

We received seeds of both FORB and SHRUB species that we requested from BLM and the Germplasm Resources Information Network for collection locations that are geographically and climatically similar to the USGS Searchlight, Nevada common garden (seed transfer zone 25, "STZ25"). This common garden is where we will evaluate seed and nursery stock during the field trials that will follow our greenhouse pre-conditioning trials to develop drought- and herbivore-resistant plant materials.

After beginning pre-conditioning and stress treatments on FORB species in our greenhouse, we began monitoring vigor of pre-conditioned seedlings (M14). We continued monitoring along with reseeding when seedlings didn't emerge or died, and we implemented pre-conditioning and stress treatments on additional cohorts of plants (see Question 2). We completed the sorting, counting, and weighing of Arizona lupine seeds so that they are ready for planting in the common garden. Seed lots from early, middle and late pre-treatments from the greenhouse were randomly assigned to the drought treatments that will be implemented in the garden after planting.

After starting pre-conditioning and stress treatments on SHRUB seedlings in the greenhouse (M15), we began monitoring the vigor of these pre-conditioned SHRUB seedlings in mid-November (M17). We concluded pre-conditioning treatments on the shrub seedlings in late December (M21).

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.

After implementing dormancy break treatments on forb seeds, we saw emergence and survival of a sufficient number of seedlings for one species, Arizona lupine (*Lupinus arizonicus*) and partial emergence and survival for two others, fringed amaranth (*Amaranthus fimbriatus*) and desert chia (*Salvia columbariae*). We applied pre-conditioning and three levels of stress treatments to individuals of Arizona lupine and monitored their vigor; we were able to apply only one level of stress to individuals of fringed amaranth and desert chia (late flowering) due to low numbers of surviving plants for those species. Mojave Desert forbs have different temperature requirements

for germination, which allows for their co-existence in habitat. Once temperatures in the greenhouse represented a fall transition, specifically declining night-time temperatures, we re-planted seeds of fringed amaranth and desert chia. Despite low seedling emergence for this second cohort of fringed amaranth during a window of fall temperatures, plants produced flowers, but needed additional time to implement pre-conditioning treatments (i.e., impose early flowering pre-treatment). Desert chia seeds were also re-planted, and we had sparse emergence of seedlings that remain in the rosette stage (i.e., too early to implement middle and late pre-conditioning treatments). We have requested and received an amendment to extend the dates for completing pre-conditioning and stress treatments on these additional species.

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 12% 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 (D09).