

Project Year-End Summary Report 2020

Title of Project: Seed Testing for Priority Chihuahuan Desert Restoration Species

Begin your answers in the box right beside each question and the space will expand to accommodate. Limit your report to two pages if possible. More detailed presentations, articles or posters are welcome separately.*

1. Organization or Individual who Received the Grant: New Mexico State University-Department of Animal and Range Sciences

2. Amount of Grant: \$ 1,500

3. Was additional outside funding obtained? (check box that applies) Yes No

Source(s) if you checked "yes." New Mexico Department of Transportation, NM Bureau of Land Management, Institute for Applied Ecology

4. Briefly, how was the grant money from the Carter Conservation Fund used?

Part of the funds (\$702) were used to test the purity, dormancy and germination rates for 20 native seed species. Samples of wild collected seed from the Chihuahuan Desert ecoregion were sent to the New Mexico State Seed lab for analysis. After using the seed test results to inform seeding rates, the collections were subsequently seeded in a dust mitigation research project in southern New Mexico. The remainder of the funds, while originally planned to be used for seed testing, have not yet been used because of project level complications and restrictions at NMSU surrounding Covid-19. In 2021 we hope to continue research operations and will use the remaining portion of these valuable funds to test additional Chihuahuan seed accessions.

5. Write an abstract or summary of the activities performed and the progress that was made this year on your project. Save any conclusions, lessons learned, and benefits achieved for the final section 6.

In April 2020 our Chihuahuan Desert research collaborators at the Institute for Applied Ecology sent seed samples from 20 native grass, forb and shrub species to the NMSU State Seed Lab for analysis. The seed lab tested each species for purity and germination potential. The species tested included shrubs, grasses and forbs. Some of these are commercially available but some are novel species with restoration potential that haven't made into the market yet. The species tested included shrubs *Atriplex obovata* (mound saltbush), *Atriplex canescens* (four-wing saltbush). Grass species included *Bothriochloa barbinodis* (cane bluestem), *Bouteloua aristidoides* (needle grama), *Bouteloua barbata* (sixweeks grama), *Bouteloua curtipendula* (side oats grama), *Chloris virgata* (feather fingergrass), *Digitaria californica* (Arizona cottontop), *Hopia obtusa* (vine mesquite), *Setaria leucopila* (streambed bristlegrass), *Sporobolus airoides* (alkali sacaton), and *Sporobolus wrightii* (big sacaton). The forbs species included *Baileya multiradiata* (desert marigold), *Hoffmanseggia glauca* (Indian rushpea), *Machaeranthera tanacetifolia* (tansyleaf tansy aster), *Thelesperma megapotamicum* (cota), *Verbesina encelioides* (cowpen daisy), and *Xanthisma gracile* (slender goldenweed). Test results were received in May 2020, and those were used to inform seeding rates in a dust mitigation project on the Lordsburg Playa. In July the seed lots were seeding in restoration research plots in a comparative study along with commercially produced seed. Monitoring efforts are set to begin in the spring of 2021.

6. State any conclusions. Include any lessons learned that would assist others. What benefit to you, the community or the environment has resulted or do you hope will result from your use of our funding?

Understanding the quality of a seed lot is crucial to successful restoration of degraded landscapes. A main goal of the conservation and restoration community in the Southwest is to increase the success of dryland restoration in our arid region. Seed tests illuminate the potential of a seed lot by providing data about the germination and dormancy rates within an accession. These data can then be used to calculate appropriate seeding rates which is decisive in successfully restoring a degraded habitat. Making these decisions without seed test data can lead to overseeding, resulting in outcompeted weak seedlings, or underseeding, which can lead to weed infestation and lack of plant establishment allowing erosion. This is especially important in arid regions such as the Chihuahuan desert which face increased restoration challenges because of water limitations. Making informed seeding rate decisions in these environments is critical.

This year NMSU was closed, or research greatly restricted, a significant part of the year, inhibiting our ability to fulfill our seed testing goals. However, despite the pandemic, almost half of the funding directly benefited the success of a restoration research project in the Lordsburg Playa led by our partners with the Institute for Applied Ecology, NM Department of Transportation, and Bureau of Land Management. Using these test results allowed our lab, IAE, and the restoration community in general to understand how much pure seed was available for each plot, and experimental design was tweaked after learning from these test results. This increases confidence in the design of the research plots and will contribute to the overall success of the project. These seed test results also benefit the Southwest restoration community more broadly by providing data about the biology of novel species, whose ecological value may be known but which might not be produced commercially yet. We tested a few novel species in this category including *Verbescina encelioides* and *Hoffmanseggia glauca*. These results can be shared with partners who are also in the process of finding effective methods to increase the success in dryland restoration efforts. There is still a lot of work needed to make locally sourced native plant materials widely available in the Southwest and each investment in a native seed test contributes to this effort.

Here is an example of the seed test results:

Purity Test Grams Used: 0.2150 Seed Kind : Variety Pure Seed % Alkalai Sacaton : Sporobolus airoides 95.81		Purity Test Crop Seed % Inert Matter % Weed Seed % Coating % 0.00 4.19 0.00 0.00				
Purity Test Grams Used: 0.2150 Weed Seeds None Found		Purity Test Grams Used: 0.2150 Crop Seeds None Found				
Germination Test						
Seed Kind : Variety	Seeds	Germ %	Abnormal %	Dead %	Dormant %	Hard %
Alkalai Sacaton : Sporobolus airoides	400	21	3	76	0	0
Tetrazolium Test						
Seed Kind : Variety	Seeds	Viable %	Hard Seed %			
Alkalai Sacaton : Sporobolus airoides	200	89	0			

Notes

Inert material consists of broken seed, chaff and plant material.

The purity % describes how much of a seed lot is made up of pure live seed, and how much consists of other inert material. If applicable, this test would also identify any seed found of a different species, which is especially important when there is non-native or invasive species within the seed lot. The germination tests identifies what percentage of the sample germinated when introduced to warm moist

conditions. A low germination rate in native seeds is common since many native species can go dormant at certain temperatures or seasons. The tetrazolium test is a way to understand what portion of a seed lot is viable, even if currently dormant. It uses a chemical to identify individuals with live embryos even if they are dormant at the time of testing. The combination of these tests result in a pure live seed count, which can then be used to increase or decrease the seeding rate for a project.

Please send your completed form as an email attachment to cartergrantapps@gmail.com.

* To remain in good standing for any future funding from the Native Plant Society of New Mexico, plan to write an article (600-1000 words) for our quarterly newsletter, **or** create and present a poster at our annual statewide conference, **or** send us a copy of a published article connected with the past year's work, **or** work with a local chapter of NPSNM to make an illustrated, educational presentation.

Our next state conference is scheduled for August 20-22 in Alamogordo. Contact our Otero chapter for additional information. Find information about our regional chapters on our website www.npsnm.org. Write to cartergrantapps@gmail.com at any time with questions.