Project Year-End Summary Report

Title of Project: Conservation, Genetics, and taxonomic characterization of sotol (Dasylirion: Asparagaceae)

Begin answering in the shaded box right beside or below each question and it will expand to accommodate as you type. Use up to a total of two and a half pages for questions 1-8. More detailed presentations, a final report, articles or posters are welcome separately (See final instructions at the end of this form.)*

1. Organization name or Individual who received the grant: Sara Isabel Ruiz Flores

2. Amount of Grant: $ 3,000.00

4. Was additional outside funding obtained? (check box that applies) Yes ☐ No ☒
Other funding source(s) if you checked "yes."

5. Briefly, how was the grant money from the Carter Conservation Fund used?
The money for the grant was used in fieldwork, sequencing, and training. $1,000 was used for two fieldtrips over southern New Mexico, around Las Cruces and Carlsbad areas. $1,000 was spent in paying training in sequencing and data analysis at the Chicago Botanic Garden. The rest was spent in paying sequencing for some of the samples obtained in the field.

6. 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 sections, 7&8.)
This project consisted in three stages. First sample collection among New Mexico. Three populations were collected before obtaining the Grant in 2025, two extra populations were included in the sampling in 2026 (Figure 1). We expect to use this as a foundation for an extensive population characterization of sotol in New Mexico. Then, these samples were sent to Texas Tech University for sequencing using the target set Asparagaceae1726 specific for the family. The third part of the project was data analysis. The training in Chicago Botanic Garden was very useful to know how to process this data in

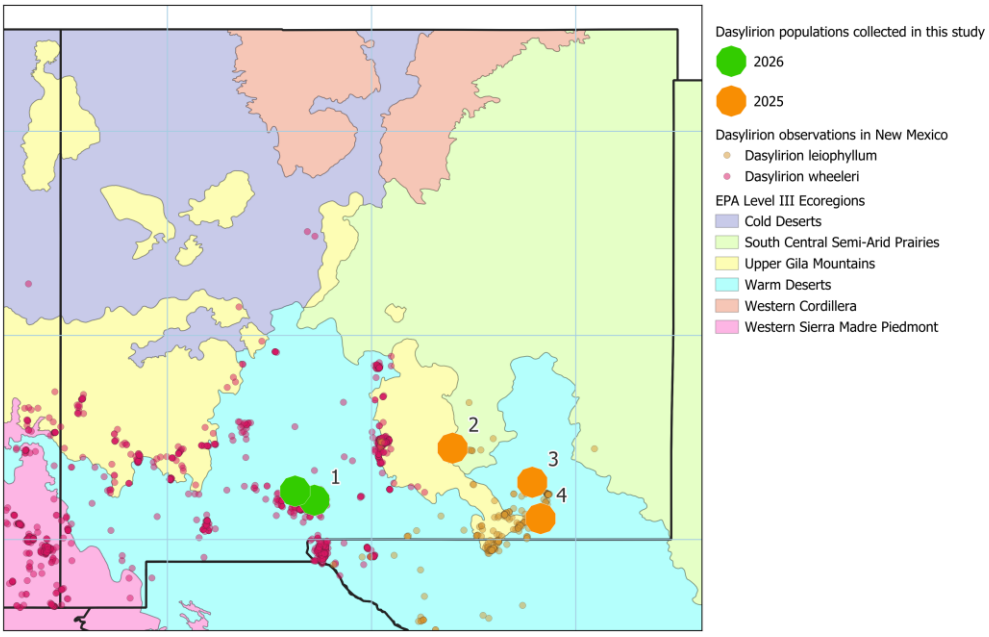
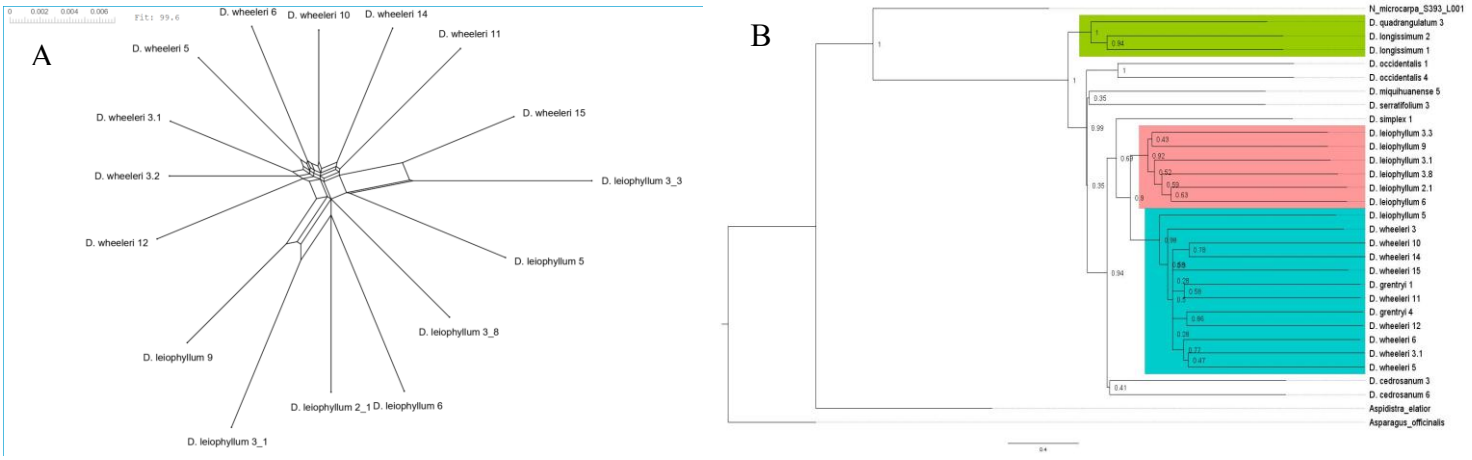


Figure 1. Populations collected in Southern New Mexico over Environmental Protection Agency (EPA) Level III Ecoregions. Pink and Orange dots represent *Dasylirion* observations.

terms of evolutionary biology, but also population genetic analysis. Thanks to this process, we learned that we need more tools to conduct these analysis for such a complex system as *Dasylirion*. It also helped to improve our data; some of our sequences were bad quality, but we still were able to get a good result. Phylogenetic and Network analysis were resulted from this data minding (Figure 2).



Phylogeny and Network análisis obtained from 806 nuclear single-copy genes, recombinant genes removed. A. Network analysis considering *Dasylirion leiophyllum* and *D. wheeleri* populations from New Mexico, each line represents genetic similarity. B. Phylogeny including *Dasylirion* species collected from herbaria as reference, and the populations included in this study. The major clades identified are highlighted in colors: pink = section Quadrangulatae, pink = *D. leiophyllum* complex, blue = *D. wheeleri* complex (Ruiz-Flores, 2026; Ruiz-Flores & Fuentes-Soriano *in progress*).

7. How does your project further a Native Plant Society mission area, namely: *plant or ecological education; conservation/restoration of native plants and/or their habitats; adds to botanical research; promotes appropriate use of native plants to conserve water, land and/or wildlife.*

My project adds to botanical research, especifically plants evolution, and it serves as a model for recently diversified groups in the Chihuahuan Desert. This Grant help to establish the foundation of a big project that focuses on sotol evolution and genetic characterization. The spirit industry wants to establish in Southern New Mexico, proposing sotol as a profitable crop for the area. This is where the very theoretical evolutionary history of the group becomes applicable; the research that is being made will strongly support the correct managemen and conservation of sotol populations.

8. Any other conclusions, lessons learned, benefits to you, the community or the environment hopefully result from your work as assisted by this grant.

There are two major conclusions:

1. *Dasylirion* is a very complex system that is still in evolution; understanding its genetics and population dynamics is crucial for its conservation and management.
2. Data can always be explored further; results will be improved if we invest time in it.

We will keep researching sotol to benefit its conservation thanks to this grant, which served as the foundation for my doctoral research, focused on the forces driving the evolution of sotol, characterize around 20 populations in New Mexico, and assemble the first reference genome for the genus *Dasylirion.*

Final Instructions

Please send your completed form as a PDF email attachment to cartergrantapps@gmail.com by November 1, 2026.

* *To remain in good standing for any future funding from the Native Plant Society of New Mexico, we ask that you educate our membership more fully in some way. This could be an article (250 words minimum, at least 1 high resolution illustration or photo) for our newsletter,* ***or*** *a paper or electronic copy or link to a published article connected with the past year's work,* ***or*** *by making an educational and visual presentation to one of our chapters. Contact information for our 7 area chapters is found on our website at www.npsnm.org under the Chapters tab.*

What are your intentions in this regard? I will write an article for the newsletter.

This year end report is submitted by (Type your name) Sara Isabel Ruiz Flores

My typed name is equal to my handwritten signature in testifying to the accuracy and truth of this report to the best of my knowledge today.

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Date 30/10/2026

Please contact us again at cartergrantapps@gmail.com if you have any questions or alternate suggestions.