

## State of New Mexico

### Annual Report for Calendar Year 2022 To the W6 Technical Committee

Compiled by Ian Ray

#### 2022 report:

Three individuals from New Mexico placed 4 orders and received 59 accessions from the W6 program in 2022. New Mexico State University was the largest user of these materials (70%), followed by the University of New Mexico (27%), and New Mexico Highlands University (3%). See Table below.

PI	Contact Info.	City	Public/Private/ Government/ Academic	Species (no. accessions)	Common name	Intended use
Ian Ray	iaray@nmsu.edu	Las Cruces	Academic	Medicago sativa ssp. sativa (4)	Tetraploid Alfalfa	Breeding & genetics research
Ian Ray	iaray@nmsu.edu	Las Cruces	Academic	Medicago sativa ssp. caerulea & falcata (37)	Diploid Alfalfa	Breeding & genetics research
Jennifer Rudgers	jrudgers@unm.edu	Albuquerque	Academic	Plantago patagonica (16)	Woolly Plantain	Ecological research
Julie Tumblety	jtumblety@nmhu.edu	Las Vegas	Academic	Asclepias speciose (1), Eutrochium purpureum (1)	Showy milkweed, Joe-Pye weed	Univ. pollinator & native plant demonstration garden

#### Notes:

Ian Ray, Plant & Environmental Sciences Dept., New Mexico State Univ.:

Four alfalfa entries consisted of standard tetraploid *M. sativa* checks. These were planted in October 2022 to help characterize 10 new NMSU alfalfa varieties for their fall dormancy/regrowth characteristics in fall 2023 and 2024.

Thirty-seven diploid alfalfa accessions for breeding & variety development. From among 83 PIs previously evaluated for multiple agronomic traits, these 37 accessions demonstrated superior vigor and persistence based on visual plot observations over three regrowth cycles in each of three years (2020-2022) under deficit irrigation management in southern NM. Seedlings of these diploid alfalfa populations will be screened for resistance to multiple pests/pathogens. Surviving plants will be intermated based on their subspecies designation (*falcata* or *caerulea*), and previous field-based vigor/persistence scores, to generate 3 *M. sativa* ssp. *falcata* and 3 *M. sativa* ssp. *caerulea* germplasms. These pest/pathogen resistant alfalfa materials will be made publicly available.

Jennifer Rudgers, Biology Dept., University of New Mexico:

We are conducting ecological research and testing different populations for interactions with soil fungi and drought. A response from postdoc, Lana Bolin, who is working with these seeds is below:

1. I had germination issues with these seeds, so my experiments testing population interactions with soil fungi and drought were unsuccessful. I am now using new seeds (ordered from USDA) to do germination trials.
2. No plant material was released to the public.
3. No publications.

Julie Tumblety, New Mexico Highlands Univ.:

Intended use statement: Educational pollinator and native plants demonstration garden for the university. This individual did not respond to the follow up inquiry.

### **2019 follow-up report:**

Nine individuals from New Mexico placed 13 orders and received 175 accessions from the W6 program in 2019. New Mexico State University was the largest user of these materials (63%), followed by a private breeding company (31%), the University of New Mexico (4%), and the general public (2%). Four germplasm recipients did not respond to the follow-up inquiry including, Tayli Larreategui and Michael Mann (Univ. of New Mexico); Brian Pickens and Elizabeth Novar (general public).

Five recipients responded to the follow-up inquiry, including Dr. Ian Ray, Harpreet Kaur, and Angie Swanson (New Mexico State Univ.), Loretta Sandoval (Zulus Petals Organic Farm and Seed Bank), Ben Gerstner (Univ. New Mexico). See below.

**PI:** Dr. Ian Ray (Advisor) and Harpreet Kaur (Graduate Student), New Mexico State University

**Species:** 89 accessions of *Medicago sativa* (alfalfa)

**Stake Holder:** Alfalfa Seed Industry and New Mexico Hay Growers

**Use/Impact:**

Three alfalfa accessions provided tolerant/susceptible controls for Fusarium Wilt tests to verify disease problems identified in alfalfa hay fields in north central New Mexico.

Seven alfalfa accessions consisted of fall dormancy class standard checks. These were planted in the field in Sept. 2019 to characterize 9 new potential NMSU alfalfa varieties for their fall dormancy/regrowth characteristics in fall 2021 and 2022. Three of these new varieties are demonstrating good potential for commercialization. Fall dormancy information from the above tests will be used when submitting these alfalfa materials for certification via the AOSCA National Alfalfa & Miscellaneous Legume Variety Review Board in 2023 & 2024.

Seventy-nine diploid alfalfa accessions of *M. sativa* ssp. *caerulea* and *falcata*, and four other diploid accessions, were seeded in a field near Las Cruces, NM, in Sept. 2019. These materials were evaluated for vegetative vigor, shoot height, and persistence, based on visual plot observations over three regrowth cycles (May, June, July) in each of three years (2020-2022) under deficit irrigation management. One hundred sixty-four superior plants from 23 *M. caerulea* accessions and 136 superior plants from 14 *M. falcata* accessions (Table 1 below) were dug from 3-year-old field plots in summer 2022. Each accession was then assigned to one of three general height categories (tall, medium, short). Within each subspecies, and also

using flower color as a subspecies indicator, all plants within a given height category were intermated to generate 3 *M. sativa* ssp. *falcata* and 3 *M. sativa* ssp. *caerulea* populations.

**Data/Publications:**

Table 1. Relative height of 37 diploid alfalfa accessions possessing good vegetative vigor and persistence over three years (2020-2022) at Las Cruces, NM under summer irrigation termination management.

M. sativa ssp.	PI	Height	M. sativa ssp.	PI	Height
Purple/varieg. flower			Yellow/varieg. flower		
caerulea/falcata?	204886	Tall	falcata/varia?	641387	Tall
caerulea/falcata?	222198	Tall			
caerulea/varia?	234818	Tall			
sativa/caerulea	235021	Tall			
caerulea/falcata?	258752	Tall			
sativa/caerulea	263154	Tall			
caerulea	577551	Tall			
caerulea	W6 39949	Tall			
caerulea/falcata?	W6 39972	Tall			
caerulea	210367	Medium	falcata	231731	Medium
caerulea	299045	Medium	sativa/falcata?	315472	Medium
caerulea	440500	Medium	falcata	577556	Medium
caerulea	440501	Medium	falcata	631818	Medium
caerulea	440505	Medium	falcata	641543	Medium
caerulea	464713	Medium	falcata	641544	Medium
caerulea	464718	Medium	falcata	W6 39982	Medium
caerulea	464719	Medium	falcata	W6 39995	Medium
caerulea	577546	Medium			
caerulea	641380	Medium			
sativa/caerulea	W6 40016	Medium			
sativa/caerulea	464712	Medium			
caerulea	243225	Short	falcata	577557	Short
caerulea	464722	Short	falcata	655519	Short
			falcata	631658	Short
			falcata	631807	Short
			falcata	631808	Short

Note: Total of 83 diploid accessions evaluated.

**PI:** Loretta Sandoval, Zulus Petals Organic Farm and Seed Bank

**Species:** 54 accessions of *Phaseolus vulgaris* (common bean)

**Stake Holder:** General public

**Use/Impact:** Pending.

**Data/Publications:** Condensed report below provided by Loretta Sandoval

“I had only conducted germination trials on some of the varieties to get ready for 2020 trials in 2019 to look at growth rate in sterile soil and was going to use these data to decide what to grow out in open field 2020. Unfortunately, with COVID and also water quality issues I have not done much else due to environmental issues with the acequia stream flow.

What happened is a business above us discharged material into the river that devastated our crops,... This included beans, corn, squash.... It drives the soil pH up to 8-9 which impacts Fe and causes chlorosis and also very little Rhizobia spp. were seen on the roots in areas we planted.... we still have not been able to grow in areas of the fields impacted and are remediating our soil now and not watering with acequia water (dry farming in virgin areas now unimpacted soils). ...I put the seed in cold storage...(low moisture, low temperature (40F). This year I am growing other beans (large quantities we have of past grow out of our own beans) to test the soil areas without using rare crops and these areas are improving,... we realized we had to resolve this water issue and have been working with both UNM law clinic to understand NEPA requirements and also our state legislature to protect our water source.

I still will complete these trials, just did not see this coming (this poor water situation) and we as landowners had to deal with this and put all out energy into studying these chemicals. We have not grown many crops since 2019 because of this issue, our fruit trees were also impacted.

Please let me know if you have any questions about the seed, it is stored now temporarily.”

**PI:** Angie Swanson (Graduate Student), New Mexico State University

**Species:** 22 accessions of the following genera: Artemisia, Descurainia, Tradescantra, Helianthus, and Krascheninnikova.

**Stake Holder:** Commercial mining operations

**Use/Impact:** The original plan for this bioremediation research was to grow plants in soil contaminated with radioactive heavy metals and to determine which species would be most effective at phytoremediation in western New Mexico.

**Data/Publications:** None. Encountered difficulty germinating the seeds; even after multiple attempts. Had to abandon the original plan and to switch to growing other commercially available plant species with reliable germination.

**PI:** Ben Gerstner (Graduate student), University of New Mexico

**Species:** 3 accessions of Tragopogon genus

**Stake Holder:** Plant evolutionary biologists

**Use/Impact:** The original plan for this study was to conduct genetic analyses to examine differences between progenitors of the species complex and to resynthesize polyploids of the Tragopogon complex.

**Data/Publications:** None. “Unfortunately, I have no information to provide. I planted a few seeds late in 2019, and then was unable to enter the greenhouse for all of 2020 (due to Covid) and had to change my dissertation work away from greenhouse work and never planted the remaining seeds.”