STATE OF COLORADO

Annual Report to the W-6 Technical Committee for Calendar Year 2018
Compiled by Pat Byrne, June 16, 2019

Orders for germplasm from the NPGS included delivery of accessions from both clonal repositories and Plant Introduction Stations. A total of 2,718 accessions was delivered in Colorado, constituting 117 orders to 55 unique addressees. This represented an increase in number of accessions from the previous year (2,450 accessions in 2017), but the number of orders was about the same (123 orders in 2017). Orders were shipped from the following locations in 2018: COR, DAV, GEN, HILO, NC7, NE 9, NR6, NSGC, NSSL, OPGC, PVPO, RIV, S9, SOY, TOB, and W6.

When broken down by recipient institution (see table below), by far the largest recipient was USDA's National Laboratory for Genetic Resources Preservation (NLGRP) in Fort Collins, accounting for 60% of accessions shipped. Companies accounted for nearly 15% of accessions, led by Cargill, which develops canola varieties at its Fort Collins location. Universities received 6.6% of accessions, mostly shipped to Colorado State University, and the Denver Botanic Gardens received 6.3% of accessions. Institution type could not be determined for 7.4% of accessions.

Institution type	**No. of items**	**Percent**
Federal agencies	1695	62.4
NLGRP	1633	60.1
Other agencies	62	2.3
Companies	402	14.8
Cargill (canola)	331	12.2
Other companies	71	2.6
Universities	248	9.1
Colorado State Univ.	179	6.6
Other universities	69	2.5
Denver Bot. Gardens	171	6.3
Miscellaneous, not stated	202	7.4
Total	**2718**	**100.0**

An email request for information on germplasm use was sent to 55 Colorado recipients. The following is a report of activities in Colorado during the 2018 calendar year from 15 germplasm recipients who responded to the request. One company reported that NPGS germplasm was involved in commercial varieties and another research listed several publications. Several recipients planned to use the germplasm for demonstrations and teaching.

1. NLGRP (responses received from Gayle Volk and Maria Jenderek): Several staff members

received germplasm from the NPGS active sites for long-term preservation as a security backup. Gayle Volk reported the following papers published in 2018 that used or reference NPGS germplasm:

Byrne PF, Volk GM, Gardner C, Gore MA, Simon PW, Smith S. 2018. Sustaining the Future of Plant Breeding: The Critical Role of the USDA-ARS National Plant Germplasm System. Crop Science 58:451-468. doi: 10.2135/cropsci2017.05.0303

Volk G, Samarina, L, Kulyan R, Gorshkov V, Malyarovskaya V, Ryndin A, Polek ML, Krueger R, Stover E. 2018. Citrus genebank collections: international collaboration opportunities between the US and Russia. Genetic Resources and Crop Evolution. 65:433-447. DOI 10.1007/s10722-017-0543-z

Gross BL, Wedger MJ, Martinez M, Volk GM, Hale C. 2018. Identification of unknown apple cultivars demonstrates the impact of local breeding program on cultivar diversity. Genetic Resources and Crop Evolution. 65:1317-1327. https://doi.org/10.1007/s10722-018-0625-6 ARIS LOG 346615

Volk G., Shepherd AN, Bonnart RM. 2018. Successful cryopreservation of Vitis shoot tips: Novel pre-treatment combinations applied to nine species. CryoLetters 39(5): 322-330.

2. Beverly Farrar of the Aspen Springs Horticultural Club in Pagosa Springs evaluated eight accessions for suitability to local conditions and to identify potential profitability.

3. Walter Messier of Evolutionary Genomics, Inc., Lafayette, CO, received one accession for DNA/RNA extraction and subsequent genetic analysis.

4. Cindy Newlander of Denver Botanic Gardens reported that the accession of pod corn will be used for seasonal displays highlighting common food crops.

5. Reza Afshar of Colorado State University received accessions of winter and spring faba bean to evaluate yield and quality in western Colorado environments. Traits to be evaluated include crop growth, winter survival, biomass, pod and grain yield.

6. Scott Haley of Colorado State University received a historical set of Colorado wheat varieties to conduct DNA analysis, increase seed supplies, and plant demo plots in 2020.

7. Deborah Ray of Colorado State University received two accessions of a watermelon wild relative for field evaluation in a drought tolerance trial. She reported that germination was poor (30 and 60%) and the plants were later overwhelmed by hail damage.

8. Tad Trimarco of Colorado State University received an accession of maize or teosinte to determine how genotype affects microbial response to drought stress.

9. Magda Garbowski of Colorado State University will evaluate functional traits and conduct genetic analysis on the restoration species, *Elymus trachycaulus* (slender wheatgrass).

10. Malcolm Schluenderfritz (institution not stated) is researching the possibility of producing perennial, cold hardy *Cucurbita* crops for food, oil and fodder. He plans to grow and multiply the accessions this summer and will attempt crosses with other *Cucurbita* species.

11. Anna Murphy of Hilleshog Seed is testing sugarbeet germplasm in field and greenhouses for tolerance to various diseases. She reports that her company has released commercially available varieties that include NPGS germplasm, in particular for their disease tolerance characteristics.

12. Tyler Windes of Amkha Seed is using the accessions received in the company's breeding program. They are incorporating genetics from several specific cultivars and wild species to increase disease resistance and lower input requirements.

13. Ryan Paul of Colorado State University is using the Brassica accessions in experiments to test chemical induction of glucosinolates by parasitized cabbageworms. The research to date has screened accessions for chemical diversity.

14. Pat Byrne of Colorado State University received seed of 10 maize accessions to use in a demonstration field plot for a plant breeding course; and seed of a historical wheat variety to evaluate root traits.