

STATE OF COLORADO
Annual Report for Calendar Year 2004
to the W-6 Technical Committee
Compiled by Mark A. Brick
June 23, 2005

Orders for germplasm from the NPGS constituted delivery of 2514 accessions from both clonal repositories and Plant Introduction Stations. Eighty six requests were filled for 36 individuals which constitute approximately a 50% increase from the previous year. Orders were made from the following locations: COR, NSGC, NC-7, W-6, S-9, NSGC, GEN, MIA, NE-9, and NR-6, RIV, NR6, PARL, GSHO, and the NCGRP.

The following is a report of germplasm activities in Colorado during the 2003 calendar year from scientists that responded to a request for information.

1. Walter Messier, Chief Technical Officer at Evolutionary Genomics, LLC, Aurora, CO ordered accessions to extract genomic DNA for genomics research (2 *Hordeum vulgare* subsp. *Vulgare*, 3 *Pennisetum glaucum*, 6 *Panicum miliaceum* subsp. *Miliaceum*, 1 *Setaria italica* subsp. *italica*, 2 *Avena fatua*, 10 *Avena sativa*, 6 *Sorghum bicolor*, 2 *Hordeum vulgare* subsp. *Spontaneum*, 22 *Hordeum vulgare* subsp. *vulgare*, 1 *Oryza nivara*, 3 *Oryza rufipogon*, 1 *Triticum aestivum* subsp. *Aestivum*, and 1 *Triticum aestivum* subsp. *Macha*.
- . The seeds and germplasm we used to extract nucleic acids (a destructive process that consumed all available material during extraction of nucleic acids). The nucleic acids were then analyzed for subsequent sequencing of genes-of-interest in our genomics project. No plant material was released to the public that was derived from any NPGS germplasm we received. To date, no publications have resulted that present information about the germplasm received (although we anticipate several publications in the next 12-18 months).
2. Personell at the USDA, ARS National Center for Genetic Resources Preservation, Fort Collins, Colorado ordered 638 accessions. Most of their work is reported elsewhere in the NPGS system and is not repeated herein.
3. Dr. Linneau Skoglund, Busch Agricultural Resources Inc. received 2 *Hordeum vulgare* accession for research. She reported that new accessions were used to replace seed stock for net blotch differentials. A poster will be presented at the North American Barley Researchers Workshop in Red Deer, Alberta this summer that reports the reaction of 16 isolates on a set of 25 differentials. No publications were reported.
4. Dr. Cecil Stushnoff received 5 *Malus* (apple) accessions to further evaluate and characterize antioxidant properties of apple. No germplasm releases or publications were reported.

5. Dr. Jungua Peng, Dep. Soil and Crop Sciences, Colorado State University received 101 *Triticum* accessions, to evaluate for resistance genes for Russian wheat aphid. The material will be used to identify and transfer useful genes to commercial wheat cultivars and molecular mapping.
6. Dr. Linda Hansen and Lee Panella, USDA/ARS, Fort Collins CO ordered 76 *Beta* accessions from W6. They filed the following report:
Thirty *Beta vulgaris* accessions were tested for resistance to one or more of three diseases of sugar beet, Cercospora leaf spot (caused by the fungus *Cercospora beticola*), Rhizoctonia root rot (caused by *Rhizoctonia solani* AG-2-2) and beet curly top (caused by *Beet curly top virus*). Tests were conducted in field nurseries under field conditions.
7. Phyllis Pineda Bovin, a biologist with the USDI National Park Service received one accession of *Achnatherum* for use in revegetation in 2002. The accession was planted and seed produced was increased for revegetation purposes. No germplasm or plant material was released.
8. James Quick., Dep. Soil and Crop Sciences, Colorado State University received 7 *Triticum turgidum* subsp. *durum* accessions, to evaluate for resistance to foliar head blight. All were found to be susceptible. No germplasms or releases were made.
9. Dr. Scott Haley, Dep. Soil and Crop Sciences, Colorado State University received 82 accessions of *Triticum aestivum* subsp. *aestivum* and *Triticum turgidum* subsp. *durum* to screen for resistance to a new biotype of Russian wheat aphid that was found in Colorado and neighboring states in May 2003. No germplasm was released to the public. No publications have yet resulted from screening these materials. One publication, documenting screening of various germplasm resources with the new biotype was reported.
10. Gordon Cisar, Carrgill Inc., Ft. Collins, CO, received 1284 *Triticum aestivum* subsp. *spelta*. to evaluate agronomic and adaptation to the Corn Belt, the accessions were evaluated for leaf rust and other pathogen resistance genes. Selected material will be used for a Goertzen soft wheat breeding program. No publications or germplasm releases occurred.
11. Zhizheng Chen, Cargill Specialty Canola Oils, Fort Collins, CO received 31 *Brassica* accessions. He reported that all seed germinated well and all lines exhibited significant diverse phenotypes, especially among the *B. nigra* collection. The germplasm was used for disease resistance tests. He reported a few lines had relatively better resistance than most *B. napus* varieties. No material was released and no publications reported.
12. Pasquale Galante, Boulder, CO received 12 *Malus sieversii* accessions. He reported that he gave two accessions to a nursery in Fort Collins, two to a food bank that provides apples to the poor, one to a lady in Estes Park that wanted to plant them in her back yard, and four he is trying to germinate at the present time. He sounds like he may be another “Johnny Apple Seed”. No germplasm releases or publications resulted.
13. Glen Hildreth, Summit Plant Laboratories, Inc., Fort Collins, CO received two cultivars of

cranberry (Vaccinium macrocarpon). They filed the following report:

Our motivation stemmed from an inquiry we received from a grower in the Northeast looking to propagate private field selections. We used germplasm we received from the Corvallis unit in order to get some hands on experience with micropropagation. Our development work utilized published methods and has now progressed from lab micropropagation to greenhouse establishment. None of this germplasm has been released to the public or in any other way disseminated outside our operation. If we feel that cranberry field transplants can be added to our product offering, we will most likely discard the material received from the NPGS and utilize material obtained directly from individual growers. No publications will be generated with the information that we have gained by using these accessions.

We have in the past utilized the NPGS for other genera in ways very similar to the one mentioned above. It is a service and resource that is very valuable to our operation when investigating the commercialization of new products.

14. Dr. Suresh Bhamidi, Department of Microbiology, Immunology and Pathology, Colorado State University, Fort Collins, CO provided the following report:

I received seeds of *Glycine max*, *Arachis hypogea*, *Capsicum frutescens*, *Solanum melongena*, *Brassica rapa* subsp. *oleifera*, *Hyoscyamus muticus*, *Astragalus membranaceus*, *Medicago sativa*, *Phaseolus vulgaris*, *Trigonella foenum-graecum*, and *Rubus phoenicolasius*.

All seeds were germinated well (with some differences in germination rates) and were without any seed borne pathogens. The seeds were cultured on MS solid medium then transferred to liquid medium to get the root exudates. The root exudates were used as bioactive compounds to check their action as antimicrobials and antioxidants. We are still working on some of them to have better understanding and thus do not have a complete report on mechanism of action. We have not released any product from these plant materials and they have not been commercialized in any manner. No publications were reported. In our future publications using this material we would acknowledge its usage and the source.

Thanks again for providing the material and your help is highly appreciated.

15. Dr. Gayle Volk, National Center for Genetic Resource Preservation, Ft. Collins Colorado filed the following report.

As always, we request germplasm from the NPGS to perform collaborative research with many sites. This year we requested apple and pear samples for several ongoing projects.

We published a paper in JASHS that describes the genetic diversity of *Malus sieversii* accessions collected from Kazakhstan and maintained in Geneva. This paper describes the relationships among accessions from 2 collection sites and proposes strategies to back up these accessions as seeds rather than as clones in the NPGS. We have now finished genotyping (using SSRs) another 500+ accessions from Kazakhstan that represent accessions from the other 10 collection sites. We expect to publish at least 2 more papers from this part of the project.

We received an NRI Rosaceae grant to genotype wild *Malus* accessions from China and Europe. We are currently receiving leaf material from all of these accessions from Geneva, so next year

we'll have many more apple leaf accessions on your lists.

We received replicate sets DNA samples of 150 wild *Pyrus communis* from Corvallis. We have a collaborative project with Joseph Postman and Nahla Bassil to genotype the wild accessions of *Pyrus communis* and determine genetic diversity. We will identify underrepresented ecogeographical regions and propose back-up strategies for this collection.

Our SSR data for *Pyrus* and *Malus* will be entered into GRIN. We received open pollinated seeds of *Vitis* and *Malus* accessions in Geneva to determine optimum storage conditions for these species.

Germplasm registrations and publications:

Brick, M.A., J.B. Ogg, and J.J. Johnson, H.F. Schwartz, and F. Judson. 2005. Registration of Grand Mesa Pinto Bean. *Crop Sci.* 45:413.

Haley, S. D. F. B. Peairs, C.B. Walker, J.B. Rudolph, and T.L. Randolph . 2004. Occurrence of a New Russian Wheat Aphid Biotpe in Colorado. *Crop Sci.* 44: 1589-1592.

Panella, L. and L.E. Hanson. 2004. Registration of FC724 monogerm, O-type sugar beet germplasm. *Crop Science.* 44:361-362.

Hanson, L.E. and L. Panella. 2004. Rhizoctonia root-rot resistance of *Beta* PIs from the USDA-ARS NPGS. 2003. Biological and Cultural Tests for Control of Plant Diseases. (online). 19:FC012. DOI: 10.1094/BC19. The American Phytopathological Society. St. Paul, MN.

Hanson, L.E. and L. Panella. 2004. Evaluation of *Beta* PIs from the USDA-ARS NPGS for resistance to *Beet curly top virus*, 2003. Biological and Cultural Tests for Control of Plant Diseases. (online). 19:FC013. DOI 10.1094/BC19. The American Phytopathological Society. St. Paul, MN.

Volk, G.M., Richards, C.M., Reilley A.A., Henk, A.D., Forsline, P.L., Aldwinckle, H.S. 2005. Ex situ conservation of vegetatively-propagated species: Development of a seed-based core collection for *Malus sieversii*. *J Am Soc Hort Sci.* 130: 203-210.

Volk, G.M., K. Rotindo and W. Lyons. 2004. Low temperature storage of garlic for spring planting. *HortScience* 39:571-573.

Volk, G.M., Maness N., Rotindo K. 2004. Cryopreservation of garlic (*Allium sativum* L.) using plant vitrification solution 2. *CryoLetters* 25: 219-226.

Volk, G.M., A. Henk, and C. Richards. 2004. Genetic diversity among US garlic clones as detected using AFLP methods. *J Am Soc Hort Sci.* 129: 559-569. (Cover photo)