

## STATE OF COLORADO

Annual Report for Calendar Year 2013 to the W-6 Technical Committee

Compiled by Mark A. Brick, June 18, 2014

Orders for germplasm from the NPGS constituted delivery of accessions from both clonal repositories and Plant Introduction Stations. 4308 accessions were delivered that constituted 140 orders in Colorado during calendar year 2013. Fifty one of these orders were from the National Center for Genetic Resource Preservation or the USDA. This represented an significant increase in orders from the previous year (2,719 in 2012). Orders were made from the following locations: COR, CUT, DAV, GEN, GSOR, HILO, MAY, MIA, NC7, NE9, NR6, NSGC, NTSL, PALM, PARL, RIV, S9, SOY, and W6.

The following is a report of germplasm activities in Colorado during the 2013 calendar year from scientists that responded to a request for information.

1. Dr. Lee Panella, USDA/ARS, Sugarbeet Research Lab., Fort Collins CO received 61 *Beta vulgaris* accessions and filed the following germplasm evaluations:

Fifty sugar beet (*Beta vulgaris* L.) lines from the USDA-ARS Ft. Collins sugar beet program and four check cultivars were screened for resistance to *Beet necrotic yellow vein virus* (BNYVV), the causal agent of rhizomania, and storage rot in 2013. The rhizomania evaluation was conducted at the USDA-ARS North Farm in Kimberly, ID which has Portneuf silt loam soil and had been in barley in 2012. The field was fall plowed and in the spring, fertilized (90 lb N and 110 lb P<sub>2</sub>O<sub>5</sub>/A) on 19 Apr 13, sprayed with the herbicide Ethotron (2 pt/A), and roller harrowed. The germplasm was planted (density of 142,560 seeds/A) on 23 Apr. The plots were one row 10 ft long with 22-in row spacing and arranged in a randomized complete block design with 6 replications. The crop was managed according to standard cultural practices. Plant populations were thinned to 47,500 plants/A on 15 May. The trial relied on natural infection for rhizomania and storage rot development. The plots were rated for foliar symptom (percentage of plants with yellow, stunted, upright leaves) development on 22 Jul. The plants were mechanically topped and hand harvested with the aid of a single-row lifter on 7 Oct. At harvest, ten roots in the plots were rated for symptom development using a scale of 0 to 9 (0 = healthy and 9 = dead; Plant Disease 93:632-638), with disease index (DI) treated as a continuous variable. At harvest, eight roots per plot were also placed in a mesh-onion bag and placed in an indoor commercial storage facility (temperature set point 34°F) in Paul, ID on 7 Oct. On ? Feb14 after ? days in storage, the roots were evaluated for the percentage of root surface area covered by fungal growth. Data were analyzed in SAS (Ver. 9.2) using the general linear models procedure (Proc GLM), and Fisher's protected least significant difference ( $\alpha = 0.05$ ) was used for mean comparisons.

Rhizomania symptom development was uniform and other disease problems were not evident in the plot area. Three entries germinated poorly which resulted in very poor stand for entries 12, 16, and 19. Thus, these entries were not included in the analysis. The susceptible check (entry 51) had 72% foliar symptoms and a high root disease severity rating. The three check entries (52, 53, and 54) with resistance to BNYVV, had a range of symptoms and root ratings depending on the resistance source. Entries 1, 2, and 7 had both high foliar and root ratings which were similar or worse than the susceptible check. Most other entries had fewer foliar symptoms and a better root rating than the

susceptible check. Based on both BNYVV foliar ratings and the root rating, entries 21, 28, 29, 30, 33, and 37 had resistance that was similar to the most resistant check. If roots are compromised by BNYVV or lack storability, they will rot in storage as indicated by fungal growth on the root surface. The primary fungal growth was an *Athelia*-like Basidiomycete (Mycologia 104:70-78), but *Botrytis* sp., *Penicillium* sp., and *Phoma* sp. were also frequently present. Entries ? performed well for all variables. Some of these entries may serve as a starting point for identifying additional sources of resistance to both BNYVV and storage rots.

2. Don Eversoll, Fort Collins, Colorado 80525 received 4 *Zea mays* subsp. *Mays*. He filed this report:

Here are my notes on the history of four lots I planted last year of Mexican maize I received from the USDA NCRPIS in Ames, Iowa. The lot numbers were (1) Ames 19944, (2) Ames 19945, (3) PI 515353, and (4) PI 645922. I planted each, one row apiece, on March 15, 2013. I witnessed about 95% germination, the plants grew vigorously until they were about 16' tall on October 10. From mid-stage on, I noticed a lot of smut appearing on many of the stalks and ears, and Mark Millard confirmed to me that these races, indeed, have a propensity to produce smut. I tried to control it with applications of a fungicide, but there was so much of it all throughout the plant tissues that it was futile to eradicate it. About 20 ears did grow without evidence of smut, and I collected some of this seed and have it in cool storage now. This year, I requested more of the same seed, and Ames obliged. I planted it and am awaiting the results of testing with a couple of fungicides new for me, and will let you know what happens. I did give some seed last March, 2013, to Bill Jones, a neighbor at 1012 E. Province, Ft. Collins, CO, 80525, and he experienced similar results with regard to height and presence of smut.

I understand the folks around Nayarit, Mexico consider the smut to be a delicacy, and are likely to be happy when they see it on their corn. But, to me, the threat of all those spores invading my garden (sweet corn, pop corn, etc), is not very exciting.

3. Dr. Patrick Byrne, Department of Soil and Crop Sciences, Colorado State University, Fort Collins, CO received 2 *Triticum aestivum* subsp. *aestivum* accessions. He reported the following:

These two accessions were included in a 24-variety wheat trial grown under five soil moisture conditions. We had seed of 22 varieties, but needed seed of these two varieties to complete the set. We extracted DNA from the accessions and evaluated polymorphisms at vernalization, plant height, and photoperiod sensitivity genes. We analyzed the DNA data along with phenotypic traits measured in the field to find marker-trait associations. No plant material was released to the public that were derived or partially derived from any NPGS accession. This study comprised the practicum research experience for one of our undergraduate students. She presented the results at an undergraduate research forum and won 'College Honors' for her presentation.

4. Dr. Anireddy Reddy, Department of Biology, Colorado State University, Fort Collins, Colorado 80523 received 21 *Sorghum bicolor* subsp. *Bicolor* accessions to analyze gene expression and alternative splicing using next generation sequencing. He used the accessions to analyze

alternative splicing and gene expression. No germplasm was released to the public and no publications were reported.

5. Dr. Walter Messier, Walter Messier, Evolutionary Genomics, Inc., Lafayette, CO received 2 *Vitis aestivalis*, 1 *Vitis hybr.*, 3 *Vitis labrusca*, 3 *Vitis rotundifolia*, 3 *Vitis rotundifolia* var. *munsoniana*, 162 *Phaseolus vulgaris*, 115 *Vigna unguiculata*, 13 *Vigna unguiculata* subsp. *Cylindrical*, 1 *Vigna unguiculata* subsp. *Dekindtiana*, 2 *Vigna unguiculata* subsp. *Pubescens*, 53 *Vigna unguiculata* subsp. *Sesquipedalis*, 524 *Vigna unguiculata* subsp. *Unguiculata*, 1 *Phaseolus vulgaris*, 1 *Glycine pescadrensis*, 1 *Glycine latifolia*, 1 *Glycine microphylla*, and 2 *Glycine tabacina* accessions for research on a genomics project. The germplasm was used to prepare genomic DNA. No attempt was made to germinate nor grow this accession. The germplasm was destroyed during isolation of DNA. The germplasm was used to isolated DNA for genomics research. We didn't germinate or grow the germplasm. No plant material was released to the public in this or any recent previous year. No publications have been completed yet, although we plan to generate several within the next year. We thank the NPGS for their assistance.

5. Jack Erron Haggard, Hollar Seeds, Rocky Ford, Colorado 81067 received 4 *Cucumis melo* subsp. *melo* accessions. His report follows:

The accessions that I received were increased and the subsequent progeny were used as controls for experiments screening melon breeding lines for resistance to *Fusarium oxysporum* f. sp. *melonis* races 1 and 2.

Thank you for your work to facilitate this valuable service.

7. Joseph Saraceno, Biodome Industries Ltd, Wheat Ridge, Colorado 80033 received 7 *Fragaria x ananassa* plants from COR. He reported the following:

I used two accessions for breeding and considering re-releasing some such as Marshall and Vale. My main focus is on Flavor and popularizing the term Heirloom Strawberry to receive similar attention to tomatoes. The most promising crosses are all Mara Des Bois X White Varieties and Heirlooms. I actually have a lot of partner Ideas such as a website for runners where some varieties are from the "Corvallis Collection". Possibility of some USDA training in in-vitro cultures. in Ft Collins or Corvallis-"working off" accessions intern style.

I have had trouble receiving ANY notice of shipments, and didn't want to take a lot of gov time questioning. I have meaning to call since it seems like they have a new boss over there and I might get more response.

8. Amy Boczon, Department of Biology, Colorado State University, Fort Collins, Colorado 80523-1878 received 2 *Solanum chiquidenum*, 2 *Solanum paucisectum*, 1 *Solanum piurae*, 4 *Solanum tuberosum* subsp. *Andigenum* to evaluate for research purposes. She reported the following:

So far we have just been growing these accessions in our greenhouse and have not used them for research. What is intended is to make interspecific crosses and study pollen tube growth in styles. We have not released any plant material that would be derived or partially derived from any of these accessions. We have not published any work done with these accessions.

9. Mark Brick, Department of Soil and Crop Sciences, Colorado State University, Fort Collins, Colorado 80521 received 3 *Physalis peruviana* accessions to see if any were adapted to local growing conditions. The seed was germinated and grown in the greenhouse then transplanted to a common garden. All three accessions produced fruit for consumption. Early growth was vigorous and large plants resulted. One accession was shorter and had a bush habit compared to the indeterminate habit of the other two. Mid-season all 3 accessions developed *Fusarium* wilt conditions and either died or quit producing fruit. No germplasm releases or publications resulted from the work.
  
10. Ernie New, White Mountain Farm, Inc., Mosca, Colorado 81146 received 1 *Chenopodium album*, 2 *Chenopodium berlandieri* subsp. *Nuttalliae*, 1 *Chenopodium formosanum*, 2 *Chenopodium giganteum*, and 121 *Chenopodium quinoa* accessions to test for local adaptation to the San Luis Valley. He is a commercial quinoa grain producer looking for more adapted quinoa varieties for commercial production. He germinated the seed indoors and transplants seedlings outdoors. He reported that most are not adapted to his growing conditions and some are photoperiod sensitive.