

State of Oregon Annual Report for Calendar Year 2007
W-6 Technical Committee

Compiled by Shawn A. Mehlenbacher

Oregonians continue to use the PI system extensively. Users include state and federal researchers as well as private seed companies and private individuals.

Progress Reports:

1. **James Myers** and **Peter Boches**, Dept. of Horticulture, Oregon State University, Corvallis, OR 97331

PI290858 'Purple Smudge' Tomato was characterized to confirm that the purple pigment originally described by P.A. Young in 1963 is anthocyanin and results published (see list at end of report). Crosses have begun with other anthocyanin-producing tomato accessions to see if the purple smudge allele has an additive effect when combined with other anthocyanin inducing genes and whether it is allelic to *Aft*. Please note that the passport information for this accession should be updated with a reference to the original article Young, P.A. 1963. Smudged fruits. Tomato Genetics Cooperative Newsletter 13:33-34.

2. **Erica Bakker**, Dept. of Horticulture, Oregon State University, Corvallis, OR 97331

Brachypodium germplasm was used for a study of population structure and selective pressures on weediness genes in invaded regions in California. *B. distachyon* germplasm used for this study includes: PI170218, 185133, 185134, 226452, 226629, 227011, 233228, 239713, 239714, 245730, 254867, 254868, 287783, 372187, 422452, and 533015. We used *B. phoenicoides* as an outgroup for evolutionary analyses. A manuscript was prepared for submission to Molecular Ecology ("Strong population structure and worldwide selective sweeps characterize weediness gene evolution in the invasive grass species *Brachypodium distachyon*").

3. **Shawn Mehlenbacher**, Dept. of Horticulture, Oregon State University, Corvallis, OR 97331

M.S. student Vidyasagar Sathuvalli identified RAPD markers linked to EFB resistance from the Spanish cultivar 'Ratoli', Georgian selection OSU 759.010, and resistant selection OSU 408.040, grown from seeds collected at the research farm of the University of Minnesota. Resistance from all three sources is under simple genetic control. Resistance was assigned to map locations based on linkage with microsatellite markers. The map locations are different from 'Gasaway' and from each other. Crosses have been made to study the inheritance of EFB resistance from Russian selection OSU 495.072 and the Serbian cultivars 'Crvenje 3/96' and 'Uebov'. Both greenhouse inoculation and exposure of potted trees under a structure topped with diseased wood are being used for disease phenotyping. Eastern filbert blight resistance was identified at Rutgers University in seedlings collected in southern Russia and the Crimea in 2002. Recent releases include 'Sacajawea' with quantitative resistance to eastern filbert blight, and 'Santiam' and 'Yamhill' with complete resistance conferred by a dominant allele from 'Gasaway'. The performance of 'Gamma', released as a pollinizer, in replicated trials indicates that it is also suitable for planting as a cultivar.

The incompatibility alleles of several cultivars and selections were identified using fluorescence microscopy. The most common alleles in seedlings from Azerbaijan were 4, 10, 18

and 31. The leading cultivar 'Ata Baba' is $S_4 S_{31}$. In seedlings from Georgia, the alleles of leading cultivar 'Anakliuri' ($S_4 S_{20}$) were found. An assortment of rare alleles was found in seedlings from both countries.

M.S. student Tufan Gökirmak characterized hazelnut germplasm using 21 microsatellite markers. The results were recently published in *Genetic Resources and Crop Evolution*. Of 270 accessions characterized, 198 had unique fingerprints. The other 72 had fingerprints identical to one of the 198 accessions.

4. **Steve Castagnoli**, Oregon State University, Mid-Columbia Experiment Station, 2990 Experiment Station Drive, Hood River, Oregon 97031-9512.

Pea pear accessions from the Corvallis Repository are being evaluated as alternative pollinizers for European pear cultivars in high-density orchards. The accessions being evaluated are: PI 46582 (*P. x phaeocarpa*), PI541013 (*P. calleryana* 'Capital'), PI541643 (*P. fauriei*), PI541730 (*P. calleryana* x *P. fauriei*), PI541731 (*P. dimorphophylla* x *P. calleryana*), PI541738 (*P. fauriei* x *P. betulifolia*-1), PI617510 (*P. betulifolia*), and PI617526 (*P. betulifolia*-2 x *P. calleryana*-2). The European pear cultivars are: d'Anjou, Forelle, Bartlett, Bosc, and Comice. Notes will be recorded on flowering phenology to identify accessions whose bloom sufficiently overlaps that of standard cultivars. Cross-compatibility will be evaluated using PCR and controlled pollinations conducted in the field. Their horticultural characteristics will also be evaluated. Preliminary results suggest that pea pears having cross-compatibility with important European pear cultivars can be identified. To ensure good bloom overlap, multiple pollinizers may be required for each European pear cultivar.

5. **Richard Roseberg** and **Brian Charlton**, Oregon State University, Crop and Soil Science Department, Klamath Basin Research and Extension Center, Klamath Falls, Oregon 97603.

At the Klamath Basin Research & Extension Center (KBREC), they have been studying the agronomic requirements of teff (*Eragrostis tef*) for several years. These studies have included evaluation of available germplasm for potential varietal improvement. The objective is to evaluate the agronomic and forage quality of teff accessions, and to select improved lines with the goal of potential release of improved cultivars. In 2006, 367 accessions provided by the USDA Plant Germplasm System were visually screened. In 2007, we continued to evaluate the most promising 73 accessions from the previous year's group. In 2008 we will test (using saved seed) 38 separate lines for more detailed forage yield and quality analysis.

6. **Jennifer Lorang**, Dept. of Botany & Plant Pathology, Oregon State University, 2082 Cordley Hall, Corvallis, Oregon 97331-2902.

Accessions of cereal grains were used in pathogenicity research. The taxa received (20 *Avena sativa*, 6 *Oryza sativa*, 3 *Hordeum vulgare* subsp. *vulgare* and one *Triticum aestivum* subsp. *aestivum*), were screened for sensitivity to the fungal toxin victorin. Victorin is the major pathogenicity factor in Victoria blight of oat. One goal of this work was to identify taxa that are both sensitive to victorin and susceptible to Barley Stripe Mosaic Virus, a virus which can be used to silence genes of interest in some cereal cultivars. Unfortunately, none of the taxa screened were useful for this purpose.

7. **Zuzana Vejlupkova** and **John Fowler**, Dept. of Botany & Plant Pathology, Oregon State University, 2082 Cordley Hall, Corvallis, Oregon 97331-2902.

Maize inbreds from the Ames station were used for part of a multi-year study of pollen competitive ability and pollen fitness. They will also study pollen gene expression using microarray analysis.

8. **Chad Finn** and **Michael Dossett**, USDA-ARS Hort Crops Research Lab, 3420 NW Orchard Street, Corvallis, OR 97339

Black raspberry (*Rubus occidentalis*) germplasm collection and evaluation is continuing, with the goal of identifying genotypes with excellent vigor, productivity, fruit quality and field tolerance to diseases in the Pacific Northwest. Michael Dossett's M.S. thesis research clearly indicated a lack of genetic diversity in available *R. occidentalis* cultivars, which stimulated further collection and evaluation activity. Michael is continuing his graduate studies at Oregon State University. His Ph.D. research emphasis includes evaluation of black raspberry seedlings for resistance to the large raspberry aphid (*Amphorophora agathonica* Hottes), a major vector of the North American strain of black raspberry necrosis virus (BRNV). To date, about 7,000 seedlings representing 129 wild populations have been screened for aphid resistance. These populations represent 26 states and two Canadian provinces across the native distribution of *R. occidentalis*, plus 25 accessions from the Corvallis Repository. Aphid resistance was identified in ORUS 3778-0 from Ontario, Canada and ORUS 3817-0 from Maine. Two resistant selections from each population were crossed with susceptible cultivars 'Munger' and 'Black Hawk' to study inheritance. Single resistant seedlings were identified in ORUS 4109-1 from Michigan and ORUS 4145-1 from South Dakota. In September 2007, about 1,350 seedlings representing 78 wild populations were planted in the field after being screened for aphid resistance. They are expected to fruit beginning in 2009.

9. **Mark Azevedo**, USDA-ARS National Forage Seed Production Research Center (NFSPRC), 3450 SW Campus Way, Corvallis, Oregon 97331-7102

Five species of C-4 grasses were received and included in a study on the effects of treatment with a unique compound produced by selected strains of *Pseudomonas* bacteria which have been shown to inhibit the germination of certain grassy weeds. This work has been published in the journal Biological Control.

10. **Mohamed Sedegui** and **Nancy Osterbauer**, Oregon Department of Agriculture, 635 Capitol St. NE, Salem, Oregon 97301-2532.

The Oregon Department of Agriculture received one *Mespilus germanica*, three *Pyrus* sp., one *Rubus* sp., and two *Vaccinium* sp. from the USDA Clonal Germplasm Repository in Corvallis for use as controls in virus certification and testing programs.

11. **Chad Miebach**, Radix Research, Inc., 9176 Bates Road, Aumsville, Oregon 97325.

Germplasm was requested and used in research related to forage breeding at Radix Research. The various *Poa bulbosa* and *Poa binata* accessions received in 2007 were for confirmation and education of plant taxonomy and physiology, and potential future use in hybridizations. They have been planted in the field for evaluation. The various *Plantago depressa* and *Plantago lanceolata* lines were requested for confirmation and education of plant taxonomy and physiology, and potential future use in hybridizations. They have been planted in the field for evaluation. Chad notes that "the educational value of this program alone is

priceless, not to mention the procurement and security of integral, invaluable ecotypes. I am grateful for such a service."

12. **Virginia Lehman**, Blue Moon Farm, LLC, 811 Mountain River Drive, Lebanon, Oregon 97355.

A number of accessions from the *Lolium*, *Cichorium*, *Festuca* and *Trifolium* genera have been used to attempt to develop new varieties with superior traits to resist environmental stresses such as drought or heat stress. As a private researcher, it would be very difficult without the assistance of the germplasm stored in the W-6 repository. She expresses appreciation of the PI system.

13. **Tami Brown**, NexGen Turf Research (formerly Advanta Seeds Pacific), 33725 Columbus St SE, Albany, OR 97322.

Several accessions of grass species were used as checks in their nurseries. All of the cultivars that we requested performed as expected with one exception: PI600867 (*Festuca rubra* commutata 'Shadow' was contaminated with another fine fescue species and we had to cease work with this variety. Thank you, please let me know if there is any more that you require.

14. **Jerry Hall**, Grassland Oregon, Inc., 4455 60th Ave NE, Salem, Oregon 97305.

Accessions of *Camellina sativa* were requested for use in breeding to create a high seed yielding cultivar adapted to the Willamette Valley. At this time I am in the very early stages of the process. He is doing the *Camellina* breeding as a hobby; it is not related to his employment at Grassland Oregon. I will be planting out the material below for observation trials this fall. We moved to a new location later than I had anticipated and as a result we were not able to plant last fall. I planted samples out in April, 2008 in Macleay, OR and the plots received minimal inputs. The following lines had extremely poor germination: Ames 26673, 26674, 26676, 26677 and PI304269. Two samples did not germinate: PI304271 and PI258367. Lines were evaluated for pod set and seed yield and single plant selections were made from various lines. Seed from single plants were harvested and plants will be established from the best seed yielding plants in the coming spring. Plants will be evaluated for establishment. Poor establishing plants will be removed prior to flowering. The plants exhibiting the best flowering will be allowed to intercross. The elite plants (ones with the best branching and greatest seed yield potential) may be selected at this time and hand-pollinated.

15. **Joanie Cooper**, 7920 SE Amity Road, Amity, OR 97101.

Scions of *Pyrus*, *Cydonia*, *Sorbus*, and *Mespilus* and cuttings of *Actinidia* were offered by the Home Orchard Society to the general public at their annual spring event. The Society teaches grafting and growing and has produced hundreds of trees now growing locally. They appreciate the Repository's generosity and recognize it as a wonderful resource. The Home Orchard Society maintains a trial at Clackamas Community College. Each year underperforming varieties are removed and promising new ones are added.

16. **Joyce Takeyasu**, 7280 Parktree Lane NE, Keizer, Oregon 97303.

Accessions of *Perilla* were requested. *Perilla* is a popular Asian herb with multiple uses. The leaves, which have purported medicinal properties, are consumed as a potherb and garnish. The leaves also contain an essential oil used for flavoring. The seeds are edible as well or can be

pressed to obtain an oil high in linolenic acid. The objective of this study was to determine the suitability of growing *Perilla* as a seed crop in western Oregon.

Seeds of a *Perilla* sp. (accession PI 596291 lot 93ncai01) were obtained from the North Central Regional Plant Introduction Station in Ames and started outdoors in cell trays in May. Out of a total of 213 seeds, 70 seeds germinated, of which 57 had a more vigorous growth habit than the remaining 13 plants. The plants were transplanted to a field near Clatskanie in June. Fertilizer was applied at planting and again in early July, and hand weeding performed as necessary to keep weeds down. There were no insect or disease problems to report. The plants were extremely frost sensitive and freezing overnight temperatures on October 25-27, 2007 killed the plants. No seeds were harvested as the seeds were still watery and undeveloped. The short growing season in western Oregon is problematic for *Perilla* seed production. Although seeding and transplanting in this study could have occurred earlier, unpredictable spring weather can delay direct seeding until May in some years. Without earlier seed maturity or use of a greenhouse to extend the season, *Perilla* is an unlikely candidate as a seed crop in western Oregon.

Observations on plant growth and development are presented in the following table:

Date	Plant Height (inches)	Stage of Growth
17 Jun 2007	2-4	vegetative
07 Jul 2007	6-8	vegetative
24 Jul 2007	12	vegetative
06 Aug 2007	18-24	vegetative
11 Sep 2007	36-42	bud formation
06 Oct 2007	48	mid-bloom
27 Oct 2007	48	late bloom/seed set

Publications:

- Boches, P. and J. Myers 2007. Occurrence of anthocyanin in cultivated tomato. The Tomato Genetics Cooperative Report 57:14-19.
- Banowitz, G.M., M. Azevedo, D.J. Armstrong, A.B. Halgren, and D.I. Mills. 2008. Germination-Arrest Factor (GAF): Biological properties of a novel, naturally-occurring herbicide produced by selected isolates of rhizosphere bacteria. Biological Control 46:380-390.
- Chen, H., S.A. Mehlenbacher and D.C. Smith. 2007. Hazelnut accessions provide new sources of resistance to eastern filbert blight. HortScience 42:466-469.
- Gilmore, B. S. 2007. Genetic resistance to white mold (*Sclerotinia sclerotiorum* (Lib.) De Bary) in scarlet runner beans (*Phaseolus coccineus* L.). PhD. thesis, Oregon State University.
- Haggard, J.E. 2007. Characterization of physiological resistance to white mold and search for molecular markers linked to resistance via advanced backcross QTL analysis in an interspecific cross between *Phaseolus coccineus* and *P. vulgaris*. M.S. thesis, Oregon State University.
- Gökirmak, T., S.A. Mehlenbacher and N.V. Bassil. 2008. Characterization of European hazelnut (*Corylus avellana*) cultivars using SSR markers. Genetic Resources and Crop Evolution (DOI 10.1007/s10722-008-9352-8).

- Mehlenbacher, S.A., D.C. Smith and R.L. McCluskey. 2008. 'Sacajawea' hazelnut. HortScience 43:255-257.
- Mehlenbacher, S.A., A. N. Azarenko, D. C. Smith, and R. L. McCluskey. 2007. 'Santiam' hazelnut. HortScience 42:715-717.
- Molnar, T.J., D.E. Zaurov, J.C. Goffreda and S.A. Mehlenbacher. 2007. Survey of hazelnut germplasm from Russia and Crimea for response to eastern filbert blight. HortScience 42:51-56.