

## Report of the USDA National Clonal Germplasm Repository (NCGR), Davis, CA to W-6

Ed Stover, Research Leader and Curator

### Funding and Staffing update

Davis-NCGR funding has been essentially unchanged for FY 05-06, despite significant “salary creep”. Clay Weeks, the Prunus Horticulturist, has been on extended medical leave since August 2005 and is expected to be out until at least August 2006. During the second quarter of FY 06, we lost a biological science technician (Joe Wehrheim), and this salary permits us to maintain a sound fiscal basis. Loss of these two people has slowed progress in characterizing our collections.

Funding of \$106,000 has been obtained through five grants in 2006, with expectation of at least one additional year of funding of similar amounts from each source. \$56,600 was received from Viticulture Consortium West for development of a National Grape Registry, which will be a user friendly on-line database of all grape genetic resources in the US and was listed as an industry priority in recent ARS Grape Industry workshops. \$20,000 was obtained through the Nursery Industry Advisory Board for molecular fingerprinting of *Prunus* cultivars. \$10,050 in 2006 was provided by the California Fig Advisory Board for assessing phenology and fruit quality characteristics of many fig accessions (\$10,800 was awarded in 2005). \$2,140 was received from the Missouri Botanical Garden to assess genetic diversity in Eastern Himalayan walnuts. Unofficial notice has been received that we will also be funded \$18,000 by the Walnut Marketing Board, to assess resistance to crown gall across the entire NCGR *Juglans* collection, in collaboration with Davis ARS Plant Pathologist Dan Kluepfel.

**Maintenance of Collections-** The Davis NCGR has assigned a “Crop Point Person” to each collection so that each crop genus (and its relatives) has one person to focus on it. Detailed cultural management plans were developed and both fruit and budwood quality were widely praised as being the best in Davis NCGR history. With considerable help from National Program funding, micro-irrigation is now in place across most of the nursery/greenhouse/screenhouse area.

***Vitis***- 93% of the *Vitis* collection now resides in screenhouses to protect against Pierce’s Disease. Equipment for virus screening was purchased using National Program funds, and will be used to assess 400 accessions in 2006.

***Juglans***- With input from the *Juglans* CGC we have stabilized some accessions which were in decline and have developed a management plan that provides fairly normal cropping on part of each tree for nut evaluation, while producing excellent budwood for distribution, and maintaining tight spacing for land use efficiency.

***Actinidia***- Plants in our *Actinidia* collection have performed very poorly. Investigations and discussions confirm that site selection was inappropriate for plants in this genus. As appropriate and possible, plants have been repropagated, recollected, or dug up. They will be transferred to a new, better drained site in 2006.

### Acquisition of new accessions

From January 2005 through May 2006, Davis NCGR accepted 628 new accessions. Several species are new to the NPGS, and likely were never previously grown in the US.

## Distribution of material

In 2005 Davis NCGR had the largest germplasm distribution in its history. A total of 3027 accession orders were delivered to customers. Already, 2781 accessions have been distributed in 2006, suggesting a new record for distributions is likely this year.

## Research

***Vitis phylogeny project*** – Cluster and principal component analyses of both microsatellite (18 loci) and AFLP (6 primer combinations containing 791 polymorphic characters) data have been completed. A manuscript on genetic diversity and differentiation within and between different species, series, and sub-genera will be completed in 2006. Microsatellite data across 18 loci and 351 accessions comprising 52 taxa of *Vitis* are ready for uploading on to GRIN.

***Plum and apricot SSRs*** - Sixteen microsatellite loci have been used to fingerprint 500 plum and apricot accessions.

***Ficus SSRs***- Twelve microsatellite loci have been used to fingerprint 122 fig accessions. The entire collection will be completed in 2006. It is likely that a number of accessions will be found to be duplicates.

***Olea SSRs***- Sixteen microsatellite loci have been used to fingerprint 60 olive accessions. The entire collection will be completed soon. In collaboration with UC Santa Barbara, the National Park Service, and UC Davis his work is being extended to evaluating identities of early olive introductions into California.

***Punica AFLPs***- AFLP analysis has been used to assess genetic diversity within our pomegranate collection. Despite the diverse origins of our individual accessions, diversity was found to be very low.

***Iberian grape SSRs***- SSR fingerprints were taken on ~100 purported Iberian grape accessions and data are being shared with our Spanish and Portuguese counterparts to verify identities.

***Vitis characterization***-Conducted the first year of a study to characterize phenology, fruit quality and yield in 50 Iberian *Vitis* accessions.

***Olea characterization***-Detailed data in phenology and morphology were collected on our entire *Olea* collection in 2005-06. Data collection will be repeated in 2006-07.

***Ficus characterization***-Detailed data on phenology and fruit quality were collected on a significant subset of the fig collection.

## Publications:

1. Albrigo, L., H. Beck, L. Timmer, and E. Stover. 2005. Development and testing of a recommendation system to schedule copper sprays for citrus disease control. *J. ASTM International* 2(9): (in press).
2. Aradhya M., J. Dangl, B. Prins, and E. Stover. 2005. Use of genetic markers in grape at the National Clonal Germplasm Repository in Davis, California. *First International Grape Genomics Symposium* p. 62.(abstract).
3. Aradhya M., J. Dangl, B. Prins, and E. Stover. 2005. Use of genetic markers in grape at the National Clonal Germplasm Repository in Davis, California. *Proceedings First International Grape Genomics Symposium* (submitted).
4. Aradhya, M.K., Potter, D., and Simon, C.J. 2006. Cladistic Biogeography of Juglans (Juglandaceae) based on chloroplast DNA intergenic spacer sequences. In *Darwin's Harvest – New approaches to the origins, evolution, and conservation of crops*. Motley, T.J., Zerega, N., and Cross, H. (eds.). Columbia University Press, New York, 143-170.
5. Aradhya, M.K. Potter, D., and Simon, C.J. 2006. Molecular Phylogeny and biogeography of the walnut genus *Juglans* (Juglandaceae). *Botanical Journal of the Linnean Society* (in review).

6. Aradhya, M.K., Prins, B.H., Dangl, G.S., Simon, C.J., and Stover, E. 2005. Genetic diversity and phylogeographic structure of the genus *Vitis*: implications for conservation. *Abstract submitted to the First International Conference on Crop Wild Relative Conservation and Use, Wednesday 14<sup>th</sup> - Saturday 17<sup>th</sup> September 2005, Agrigento, Sicily, Italy.*
7. Bhat, R. G., Colowit, P. M., Tai, T. H., Aradhya, M. K., and Browne, G. T. 2006. Genetic and pathogenic variability in *Phytophthora cactorum* affecting fruit and nut crops in California. *Plant Disease* (in press).
8. Boman, B., Zekri, M., Stover, E. 2005. Methods for managing salinity in citrus production. *HortTechnology* 15:21-26.
9. Brenner, D.M., T. Ayala-Silva, B. Hellier, K. E. Hummer, M. Jenderek, L. F. Marek, J. B. Morris, R. Nelson, K. R. Reitsma, L. D. Robertson, S.M. Stieve, E.W. Stover and M.P. Widrlechner. 2005. Genetic resources of Omega-3 fatty acid crops. *Soil and Crop Sci.* (abstract).
10. Ferguson, L., E. Stover, and C. Crisosto. 2005. Problems in fig production and physiology. Third International Symposium on Fig p. 37. (abstract).
11. Hummer, K.E. and E. Stover. 2005. Trends and fashions in fruit cultivar production. *HortTechnology* 15: 490-491.
12. Motley, T.J., Cross, H., Zerega, N., and Aradhya, M.K. 2006. Appendix II. Molecular analyses. In *Darwin's Harvest – New approaches to the origins, evolution, and conservation of crops*. Motley, T.J., Zerega, N., and Cross, H. (eds.). Columbia University Press, New York, 370-378.
13. Postman, J., K. Hummer, E. Stover, R. Krueger, P. Forsline, L.J. Grauke, F. Zee, T. Ayala-Silva, and B. Irish. 2006. Fruit and nut genebanks in the US National Plant Germplasm System. *HortScience* (in press).
14. Stover, E. and M. Aradhya. 2005. Fig genetic resources and research at the U.S. National Clonal Germplasm Repository in Davis, California. Third International Symposium on Fig p. 18. (abstract).
15. Stover, E. and M. Aradhya. 2005. Fig genetic resources and research at the U.S. National Clonal Germplasm Repository in Davis, California. *Acta Hort.* (submitted).
16. Stover, E. and M. Aradhya. 2005. Fig genetic resources and research at the U.S. National Clonal Germplasm Repository in Davis, California. *Acta Hort.* (submitted).
17. Stover, E., M. Aradhya, C. Crisosto, and L. Ferguson. 2006. Screening the U.S. national fig collection for potential fresh fruit genotypes. *HortScience* (abstract).
18. Stover, E., M. Aradhya, and L. Ferguson. 2005. The fig: overview of an ancient fruit. *HortScience* 40:953 (abstract).
19. Stover, E., M. Aradhya, L. Ferguson, and C.H. Crisosto. 2006. The fig: overview of an ancient fruit. *J. Amer. Soc. Pomol.* (submitted).
20. Stover, E., M. Aradhya, B. Prins, J. Dangl, and P. Cousins. 2006. *Vitis* genetic resources and research at the U.S. National Clonal Germplasm Repository in Davis, California. Ninth International Conference on Grape Genetics and Breeding (abstract).
21. Stover, E., M. Aradhya, C. Weeks, and P. Forsline. 2006. *Prunus* genetic resources and research at the U.S. National Clonal Germplasm Repository in Davis, California. Third International Rosaceae Genomics Symposium (abstract).
22. Stover, E., W. Castle, and C.C.T. Chao. 2005. Trends in U.S. sweet orange, grapefruit, and mandarin-type cultivars. *HortTechnology* 15:501-506.
23. Stover, E.W., Greene D.W. 2005. Environmental effects on the performance of foliar applied plant growth regulators. *HortTechnology* 15:214-221.