Interspecific Breeding Germplasm for Rootstock Research and Development

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PROJECT SUMMARY

Objectives:

- Evaluate efficacy of marker expression in different interspecies hybridization/ introgression lines.
- Assess the marker inheritance patterns in segregating populations from the first objective.
- Determine whether inheritance patterns from the second objective may be sufficient to determine probable parentage of unknown or ambiguous rootstock clones or selections.

Background and Discussion:

Changes in planting practices, including the quantity and quality of land and irrigation water, have led to the need for a new generation of almond rootstocks, and a number of public and private efforts have been initiated to develop and test new candidates. Germplasm derived from other species, either directly or through species hybridization, is often pursued to attain the greatest range of vigor, stress and disease tolerance and desirable horticultural traits. However, the acquisition of such exotic germplasm is often difficult and time-consuming. At UC Davis, a diverse germplasm has already been developed combining almond, peach, as well as related species including *P. argentea, P. bucharica, P. davidiana, P. fenzliana, P. domestica, P. mira, P. orthosepala, P. scoparia, P. tangutica* and *P. webbii*.

In this project, selected germplasm from the UCD almond and peach breeding programs with value for rootstock improvement are being identified, catalogued, propagated and genotyped. Detailed pedigree relationships, as well as trait expression data, have been transferred to the RosBreed website (www.rosbreed.org) and published to allow end-user analysis.

This germplasm demonstrates extensive diversity both genetically and in the range of traits useful to rootstock improvement programs. Field evaluations have identified unique and potentially useful characteristics in parents and progeny, including modification of tree architecture from *P. scoparia* hybrid rootstocks, drought tolerance in a peach by *P. argentea* hybrid, and a pronounced invigoration of scion growth in several advanced interspecies introgression lines. Disease and nematode evaluation plots are concurrently being developed in cooperation with UCD, USDA, nursery and grower cooperators. The genetic characterization of parent species, species-hybrids and subsequent breeding progeny is being continued using over 500 molecular markers showing a fairly uniform distribution over all eight of the Prunus chromosomes. Field crosses have generated over 8000 additional seed. Progeny population sizes range from only a few to several hundred individuals depending upon the difficulty of the cross. Over 20 clonal genotypes as well as over 2000 seed from interspecies introgression lines have so far been distributed to cooperating researchers, including nurseries and growers for rootstock trait evaluations. Traits evaluated include drought and salt tolerance, verticillium resistance, crown gall, phytophthora and waterlogging resistance, nematode resistance, compatibility with Nonpareil, and capacity for rootstocks to develop more compact scion tree size.

Project Cooperators and Personnel: J Preece, C. Crisosto, J. Fresnedo, D. Kluepfel, M. Aradhya

For More Details, Visit

- Poster location 47; Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase
- 2014 - 2015 Annual Reports CD (14-HORT10-Gradziel); or on the web (after January 2016) at Almonds.com/ResearchDatabase
- Related projects: 15-HORT4-Duncan; 15-PATH1-Browne; 15-HORT16-Aradhya/Kluepfel; 15-PATH7-Duncan/Baumgartner