

# Development of Genomic Tools for Almond Rootstock Improvement

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## PROJECT SUMMARY

### Objectives:

1. Develop a set of molecular markers linked to disease-pest resistance to incorporate in rootstock breeding programs.
2. Produce and test diverse *Prunus* interspecific hybrids involving potential donor species with disease resistance characteristics.

### Background:

Development of improved almond rootstocks possessing field resistance/tolerance to soil borne pests and pathogens is a top priority for the California Almond Industry. Although some of the widely used rootstocks such as 'Nemaguard', peach and peach-almond hybrids, and other complex species hybrids resist infestation of root knot nematodes they are susceptible to other soil borne pests and diseases such as *Phytophthora* (crown and root rot), crown gall, *Armillaria* (oak root fungus) and lesion nematodes. Development and testing of diverse interspecific hybrids utilizing the wild *Prunus* spp. known to possess resistance to soil borne diseases is by far the best approach.

However, for most species the information on disease-pest interactions is not available rendering selection of species to use for hybridization difficult.

This project is focused on identifying the genomic variants known as Single Nucleotide Polymorphisms (SNPs) associated with resistance to soil borne diseases and pests such as crown gall, crown and root rot, oak root fungus, root knot nematodes, ring and lesion nematodes, and replant disorder.

SNPs are high-throughput genotyping markers which occur abundantly in plant genomes and are distributed uniformly throughout the genome. Thus, they can be used for fine scale mapping of resistance gene(s) locations. They facilitate genetic association analyses targeting resistance to diseases.

So far, the project has assembled 67,194 peach and almond SNPs from various online sources and they will be subjected to validation soon. A set of ~260 interspecific hybrids from ~25 different cross combinations are being micropropagated for disease evaluation.

This project is part of a larger project focused on all aspects of rootstock breeding in almond and walnut funded by a USDA Specialty Crop Block Grant.

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**Project Cooperators and Personnel:** John Preece, USDA/ARS, National Clonal Germplasm Repository, Davis, CA; Greg Browne, Dan Kluepfel, USDA/ARS, Crops Pathology and Genetics Research Unit, Davis, CA; Michael McKenry, University of California, Riverside, UC Kearney Ag Center, Parlier, CA.

### For More Details, Visit

- Poster location 6, Exhibit Hall, Session 1; or on the web (after January 2012) at [AlmondBoard.com/AICposters](http://AlmondBoard.com/AICposters)
- 2010 - 2011 Annual Report CD (10-HORT16-Aradhya/Ledbetter); or on the web (after January 2012) at [AlmondBoard.com/Research Reports](http://AlmondBoard.com/Research Reports)
- Related projects: 11-PATH1-Browne