Identification of Almond Rootstocks with Resistance to *Armillaria* Root Disease

Project Leader: Kendra Baumgartner[1] and Dan Kluepfel[2]
USDA/ARS, 363 Hutchison Hall, University of California, Davis, One Shields Ave., Davis, CA 95616
[1](530)754-7461, kbaumgartner@ucdavis.edu [2](530) 752-1137, dakluepfel@ucdavis.edu

PROJECT SUMMARY

Objectives:

- Identify *Armillaria*-resistant rootstocks for almond, by first screening a set of commercially-available *Prunus* rootstocks
- Determine the relationship between the results of our infection assays in the lab and field observations

Background and Discussion:

Armillaria root disease affects all almond regions of California. The causal fungus, *Armillaria mellea,* colonizes and kills the roots, and then decomposes the root wood as its source of nutrition. Such destruction to the roots significantly reduces crop yield and growth, inhibits nutrient and water uptake from the soil, and eventually kills infected trees. Soil fumigants like methyl bromide are only effective at preventing Armillaria root disease to the extent that they reach and penetrate residual roots. We are screening rootstocks as an effective, long-term solution.

To screen *Prunus* rootstocks for *Armillaria* resistance in the lab, we use an infection assay that has been used to screen rootstocks of grape and walnut. The approach is to propagate plants in a tissue-culture medium, which supports both the plant and the pathogen. Experiments are replicable within a one-year period. However, we did not know initially whether this assay would reflect field observations. While known resistant and susceptible rootstocks behaved as expected in the screen, the behavior of a rootstock in the field can be very different – likely due the influence of natural conditions that may affect root susceptibility (e.g., root system architecture, beneficial soil microbes). Thus, relative resistance seen in the lab cannot be assumed to be the same in the field at this time. This is just a screen.

The inoculations included two species of *Armillaria*: A. mellea (native to almond production areas of CA) and *A. tabescens* (native to peach-production areas of the southeastern US). Plants were inoculated with a homogenized 6-day culture of the three strains of *Armillaria*. On a weekly basis, dead plants were tallied for 2 months post-inoculation (MPI).

In this screen, Krymsk 86 was more resistant compared to Marianna 2624 (resistant control) while Hansen 536 was more susceptible compared to Nemaguard (the susceptible control). Therefore, in future screening experiments, Krymsk 86 and Hansen 536 should be used as resistant and susceptible controls. Krymsk 1 was similar to Marianna 2624, and Lovell was similar to Nemaguard in relative susceptibility (note that resistance observed in lab may not translate to field).

Across all six rootstocks, the strains of the pathogen behaved similarly. Both strains of *A. mellea* were equally virulent. The strain of *A. tabescens* was in all rootstocks less virulent.

Project Cooperators and Personnel: Craig Ledbetter, USDA-ARS, Parlier; Roger Duncan, UCCE-Stanislaus County; Joe Connell, UCCE-Butte County; Javier Castillon, Duarte Nursery/Dry Creek Laboratories, Hughson, CA; Malli Aradhya, USDA-ARS, Davis

For More Details, Visit

- Poster location 65, Exhibit Hall A and B during conference; or on the web (after January 2014) at www.almondboard.com/researchreports
- 2012.2013 Annual Report CD (12-PATH7-Baumgartner); or on the web (after January 2014) at www.almondboard.com/researchreports
- Related Projects: 13-PATH1-Browne; 12-HORT16-Aradhya/Ledbetter; 13-HORT4-Duncan