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

Project No.: **12-PATH7-Baumgartner**

Project Leader: Kendra Baumgartner
USDA-Agricultural Research Service
UC Davis
One Shields Avenue
Davis, CA 95616
530.754.7461
kbaumgartner@ucdavis.edu

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

Objectives:

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

Interpretive Summary:

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 propose to identify resistant rootstocks as an effective, long-term solution. Currently, we are screening the following rootstocks: Empyrean 1 (Barrier 1), Lovell, Nemaguard, Bright 5, Hansen 536, Krymsk 1 (VVA 1), Krymsk 86 (Kuban 86), and Marianna 2624. We have completed one replication of the experiment, which was initiated in 2013, and the second and third replications will be complete in December 2013.

Materials and Methods:

We use an infection assay for screening rootstocks in the lab (Baumgartner et al., 2010). Rather than trying to recreate a field infection of plants grown in a soil-based medium, we grow plants in tissue-culture medium, which supports both the plant and the pathogen. With this infection assay, we have overcome the major barriers of the greenhouse approach, namely eliminating ‘escapes’ and bringing about consistent, repeatable levels of mortality. We can replicate experiments within a one-year period. We used this assay to screen walnut

rootstocks (Baumgartner et al., 2013). We have since adapted this assay to *Prunus* through a series of experiments to determine the proper incubation period between inoculation and mortality and to characterize variation in aggressiveness among strains of the pathogen.

Results and Discussion:

As the experiment is still in progress, we have no results to report yet. We expect our final results in December 2013. Screening this set of rootstocks is an important first step toward identifying *Armillaria*-resistant rootstocks for almond. It is an experiment that we can accomplish in a relatively short period of time, and the results will set the stage for additional rounds of testing. However, we recognize that growers need more evidence than just lab trials to have confidence that the results will hold in the field. Accordingly, a future stage of the research is to establish field trials based on our findings in the lab.

Research Effort Recent Publications:

None yet, as the work is still in progress.

References Cited:

Baumgartner K, Bhat R, Fujiyoshi P, 2010. A rapid infection assay for *Armillaria* and real-time PCR quantitation of the fungal biomass *in planta*. *Fungal Biology* 114: 107-119.

Baumgartner K, Fujiyoshi PT, Browne GT, Leslie C, Kluepfel DA, 2013. Evaluating Paradox walnut rootstocks for resistance to Armillaria root disease. *HortScience* 48: 68-72.