Identification of Almond Rootstocks with Resistance to Armillaria Root Disease

Project No.: **15-PATH7-Duncan/Baumgartner**

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Objectives:

1. Use a large potted-tree assay to confirm results from a previous Baumgartner laboratory assay, which identified *Armillaria*-resistant rootstocks.
2. Test additional rootstocks that were not previously screened by the Baumgartner lab.

Interpretive Summary:

Armillaria root disease affects all almond regions of California. We set out in 2012 to screen eight commercial rootstocks, using a laboratory assay that involves propagating the plants in tissue culture medium and then inoculating the medium with the fungal pathogen. With this assay, we identified Krymsk 86 as the most resistant. Krymsk 1 was also relatively resistant, compared to the resistant control, Marianna 2624. Now we are attempting to validate these findings in large potted plants, as a step toward future field experiments.

This current trial is in its early stages and there are few data to report at this time. Trees have grown satisfactorily in the test pots and it will take more time for adequate levels of infection and signs of disease to occur in susceptible rootstocks. Only ten inoculated trees had shown obvious signs of Armillaria root rot disease at the time of this report. This small sample size is insufficient to draw valid conclusions from this experiment. This project will continue for two more years.

Materials and Methods:

In October, 2015, twenty-five potted, sapling trees each on eleven rootstocks commercially available for planting in California almond orchards were planted and inoculated with *Armillaria mellea*. A list of tested rootstocks is shown in **Table 1** below. Test trees raised in 4” x 4” x 9”

plastic containers were acquired from commercial nurseries. Trees were then replanted into 15-gallon plastic containers filled with Victory Mix® potting soil (Vernalis CA). After planting, each tree was inoculated with wood segments colonized by *Armillaria mellea*. To prepare the inoculum, small peach branches were collected from the field and cut into small segments 3-5 cm long. These segments were sterilized in an autoclave and then exposed to growing cultures of *Armillaria mellea* from the Baumgartner Lab. Wood segments were incubated for about two weeks to allow for pathogen colonization. At planting time, colonized wood segments were placed next to the crowns of each tree 3-5 cm below the soil line. Trees were irrigated with a single 0.11 gpm Spot Spitter® DS emitter (Roberts Irrigation Products, Inc.) directed at the tree crowns for five minutes twice daily and fertilized as needed through the season. Trees were monitored weekly for signs of disease.

Table 1. List of rootstocks tested for tolerance to *Armillaria mellea*.

- Nemaguard (*Prunus persica*)
- Marianna 26-24 (P*. munsoniana x P. cerasifera*)
- M-40 (*P. munsoniana*)
- Viking (Nemaguard x *P. dulcis*) x P. *blireiana*
- Atlas (Nemaguard x *P. dulcis*) x P*. blireiana*
- Krymsk 86 (*P. persica x P. cerasifera*)
- Rootpac R (*P. cerasifera x P. dulcis*)
- Hansen (*P. persica x P. dulcis*)
- Empyrean 1 (*P. persica x P. davidiana*)
- Citation (*P. salicina x P. persica*)
- Sam-1 (almond hybrid?)

Results and Discussion:

During the spring of 2016, ten trees showed signs typical of Armillaria root rot disease (rapid decline and collapse of above-ground portion of trees). Affected trees were exhumed and sent to the Baumgartner Lab for disease confirmation. Isolation of the pathogen by the Baumgartner lab confirmed that these trees were infected with *Armilaria mellea* (**Table 2**). Signs of disease occurred during March and April, after which no more trees have shown signs of root disease. Trees will continue to be monitored through the rest of 2016. At the end of one year, surviving trees will be harvested and examined for incidence and severity of root / crown infection by the fungus. This study will be repeated, beginning in the fall of 2016. Inoculation techniques may be modified to increase the rate of infection.

Table 2. Preliminary Rootstock Infection Rates by *Armillaria mellea*	
	Percent of Trees Killed by *A. mellea*
Nemaguard	4
Empyrean 1	8
Atlas	4
Viking	8
Marianna 26-24	4
Marianna 40	12
Krymsk 86	0
Rootpac R	0
Citation	0
SAM-1	0
Hansen	0

Research Effort Recent Publications:

None.