

Developing Improved Strategies for Management of Replant Problems

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PROJECT SUMMARY

Objectives:

- Determine the biological causes of replant disease (RD).
- Develop improved management strategies for RD and other replant problems.

Background and Overview:

Replant disease (RD) commonly occurs when an almond orchard is replanted in soil used previously for production of almonds or other stone fruits. The disease suppresses root development on young trees and thereby reduces the rate of canopy development and cumulative crop yield. Evidence indicates RD is caused by a complex of soilborne microorganisms. RD is a separate problem from nematode damage.

RD can be controlled by pre-plant soil fumigation with chloropicrin or mixtures with 1,3-dichloropropene (e.g., Telone C35, Pic Clor 60), but fumigation is complicated by increasing regulatory restrictions designed to protect human health. The objectives of this project were selected with the overall goal of developing effective orchard replacement strategies that are less dependent on soil fumigation.

Work in 2011 included 1) further examination of the fungus *Cylindrocarpon* as a contributor to RD; and 2) testing non-fumigant RD control strategies. The rootstock work is a new element and involves testing resistance to RD as well as *Phytophthora* species.

Based on multi-locus DNA sequencing of *Cylindrocarpon* isolates from six RD-affected almond and peach orchards, we found that *C. macrodidymum* was by far the dominant species of *Cylindrocarpon* associated with almond RD. Therefore, we developed diagnostic quantitative

PCR primers for *C. macrodidymum* and tested them in healthy and RD-affected almond rootstock.

A field trial was established in Kern County for further testing of spot steam treatments (see reports of Hanson et al.) and first-year testing of soil and foliar fungicide treatments. The trial was planted in late spring, and further tree growth is needed for adequate treatment assessment.

A field trial was established in 2010-11 at USDA-ARS Parlier to evaluate resistance to the RD complex in 22 rootstocks (including peach, peach x almond, plum, and plum hybrid backgrounds). Most of these rootstocks are of interest for almond production. The rootstocks were planted into replicate fumigated and non-fumigated plots in April 2011. To date, all of the rootstocks, regardless of parentage, have expressed growth suppression in the non-fumigated plots (i.e., indicating a degree of susceptibility to RD), but some rootstocks have performed significantly better than others. In general, the vigor of peach x almond hybrid rootstocks seems to make them less prone to growth suppression induced by RD.

The same 22 rootstocks were tested for their resistance to *Phytophthora niederhauserii*, a species found killing almond trees in Fresno and Kern Counties and in Spain. Some of the rootstocks with plum parentage were more resistant to the pathogen.

Our results to date suggest that rootstocks can become increasingly important as first-line defenses against RD and other soilborne pathogens such as *Phytophthora* species.

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For More Details, Visit

- Poster location 5, Exhibit Hall, Session 1; or on the web (after January 2012) at AlmondBoard.com/AICposters
- 2010 - 2011 Annual Report CD (10-PATH1-Browne); or on the web (after January 2012) at AlmondBoard.com/ResearchReports
- Related Projects: Project No: 11-AIR6-Hanson/Fennimore