Trunk and Scaffold Canker Diseases of Almond in California

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PROJECT SUMMARY

Objectives for current year:

- Survey almond orchards for trunk, scaffold and canker diseases (TSCD) in the main almond producing counties in California
- Characterize fungi associated with TSCD
- Identify new pathogenic species
- Improve diagnosis and management of TSCD

Background and Discussion:

Trunk and scaffold canker diseases (TSCD) of almond can cause significant yield and tree losses within orchards, while also reducing orchard life spans. Symptoms of TSCD include discoloration of vascular tissues, wood necrosis and gumming. Dieback of scaffold branches can occur and eventually the whole tree may die. Canker diseases are rather common in older orchards but concerns have risen among growers and farm advisors as TSCD diseases are also being detected in relatively young trees. To date, only a few pathogens are known to cause cankers in almonds including *Ceratocystis fimbriata*, Botryosphaeriaceae and *Phytophthora* spp. Recent studies in Spain and Iran have identified new fungal pathogens including *Calosphaeria pulchella* and *Phaeoacremonium* spp. associated with canker diseases in almond. In California, the main causes of TSCD are still poorly understood and diagnosis has been particularly difficult. Poor understanding of TSCD has also hindered attempts to control them.

During the year 2015, we visited 42 almond orchards with symptoms of TSCD in Fresno, Madera, Merced, Stanislaus and Butte counties. Over 200 cankers from either limbs, branches or trunk of diseased trees were collected and taken to the laboratory to be examined. Symptoms of TSCD were generally connected with injuries on trunks caused by harvesting equipment, pruning wounds on limbs and branches or cracks formed at the junction of scaffold branches and the trunk. To date, we have isolated roughly 200 fungal isolates from cankers in almond. Identification of the putative (reputed) pathogens are being carried out using morphology as well as using DNA based techniques including the polymerase chain reaction (PCR), amplification and sequencing of the internal transcribed spacer region (ITS) of the rDNA. Thus far, the main fungi associated with cankers in the tree crown were *Cytospora* spp., *Eutypa lata, Phomopsis* spp. and Botryosphaeriaceae spp. Occasionally, *Calosphaeria pulchella, Cadophora* and *Phaeoacremonium* spp. were also isolated from cankers. The disease Ceratocystis canker, characterized by peripheral gumming near shaker injuries on trunks, was common in mature almond orchards throughout California. The occurrence of *Ceratocystis fimbriata* in trunk cankers was confirmed following incubation in crispers of necrotic wood pieces and production of mycelia and pericethia of the fungus. Research is still underway to characterize all fungal isolates associated with cankers in almond. Pathogenicity in almond of the various isolates is being evaluated in the field and in green houses at The Kearney Agricultural Research and Extension Center (KARE). Surveys are continuing to explore the diversity of pathogens associated with TSCD in the main almond producing counties in California.

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For More Details, Visit

- Poster location 24, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase