Biology and Management of Almond Scab and Alternaria Leaf Spot

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PROJECT SUMMARY

Objectives:

- Identify pathogenic species of *Alternaria* using molecular methods.
- Determine if sexual reproduction occurs within orchard populations of *F. carpophilum*.
- Evaluate new and registered fungicides for their efficacy in disease management.
- For scab management, evaluate the effect of dormant applications on sporulation of infected twig lesions.
- Establish baseline sensitivities, monitor for sensitivity shifts in pathogen populations to different fungicides, and characterize molecular mechanisms for SDHI resistance.
- Improve the Disease Severity Value (DSV) model by using dew point and temperature for forecasting infection periods and timing of fungicide treatments.

Background and Discussion:

Scab (*Fusicladium carpophilum*) and Alternaria leaf spot (*Alternaria alternata* species group) have become important diseases in almond production. In 2013, Alternaria twig infections were identified on cv. Wood Colony and thus, both diseases include twig infections.

Previously, we modified the DSV model to predict infection periods for Alternaria leaf spot to time fungicide treatments. In 2014, we continued to evaluate if daily temperatures, incidence of dew periods, and precipitation can be used in forecasting. Results were inconclusive. Thus, treatments based either on the DSV model with sensors on the outer perimeter of the canopy at a height of 3-5 m (10-16 ft) or a calendar-based timing that begins in May and continues into late June/early July in approximately three-week intervals are currently recommended.

We continued to develop sustainable management programs where several classes of fungicides are mixed or rotated, so that no single class is over-used. For both diseases we demonstrate that in the presence of QoI resistance, effective disease and resistance management can be obtained with properly timed applications of currently registered fungicides belonging to several FRAC groups. For Alternaria leaf spot, polyoxin-D (Ph-D), FRAC 3 fungicides (e.g., Quash, Inspire), pre-mixtures (e.g., Luna Sensation, Luna Experience, Quadris Top, Inspire Super, Merivon), and mixtures (e.g., Ph-D/Quash) are among the most effective treatments.

For scab, dormant treatments with chlorothalonil (e.g., Bravo)/oil again provided long-lasting suppression of twig sporulation. This allows spring-time application timings (until May-June) for scab which coincide with those for Alternaria leaf spot and possibly other summer diseases such as rust and hull rot. Effective spring-time fungicides (two applications starting with twig sporulation) are chlorothalonil (proposed label change to 60 days PHI), Quash or Inspire Super (FRAC 3), Syllit (FRAC U12), compounds containing FRAC 7, FRAC 11 (if the pathogen population has not developed resistance), or Ph-D (FRAC 19). Under high scab disease conditions, a three-spray program should include dormant applications with chlorothalonil-oil (or copper-oil) and two petal-fall applications. Under lower disease pressure, a dormant treatment or in-season treatments alone can be considered.

Several cross-resistance groups among SDHI (FRAC 7) sub-groups of fungicides are present in *Alternaria* and *Fusicladium* spp. In some cases rotations between certain sub-groups could provide resistance management. However, as genotypes of pathogen populations are generally not known and genotype composition may change, rotation between FRAC groups but not SDHI subgroups is recommended. In *Alternaria* spp., some of the cross-resistance groups are correlated with certain mutations in two sub-units of the target gene. Sequence analysis for isolates of *F. carpophilum* is ongoing. Many isolates of this pathogen are insensitive to SDHI fungicides.

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- Poster location 21, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase
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