Epidemiology and Control of Bacterial Spot of Almond in California

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PROJECT SUMMARY

Objectives:

- Distribution of bacterial spot in California almond orchards and genetic variability of pathogen populations
  - o Collection of almond fruit with symptoms resembling bacterial spot throughout California almond growing areas
  - o Isolation of the pathogen and identification of *Xap* using PCR primers
  - o Determination of the genetic variability by molecular methods
- In vitro sensitivity of *Xanthomonas arboricola* pv. *pruni* (*Xap*) against copper, mancozeb, and antibiotics
  - o Selected materials will be evaluated alone or in combination
- Management of bacterial spot in the field
  - o Dormant applications were done in 2013 and will be repeated in late fall 2014 using copper and copper-mancozeb combinations.
  - o Spring-time applications will include traditional and new formulations of copper with low phytotoxicity potential, antibiotics, and mixtures of copper-mancozeb and antibiotic-mancozeb.

Background and Discussion:

In the spring of 2013, bacterial spot was found at high incidence at locations in Colusa, San Joaquin, Stanislaus, Merced, and Madera Co. especially on cv. Fritz, and at lower severity also on cvs. Nonpareil, Butte, Carmel, and Price. In 2014, the disease was present again at several locations. The pathogen was identified as *Xanthomonas arboricola* pv. *pruni* (*Xap*), known to cause bacterial spot of peach in the eastern United States. It was isolated from symptomatic fruit in the spring, and from overwintering fruit mummies between December 2013 and February 2014, indicating their role as primary inoculum sources during infection periods. Isolates were rated as copper-sensitive with growth occurring at 20 ppm copper, but not at 30 ppm.

Field trials on the management of the disease were conducted. Delayed (late January) dormant treatments with copper, copper-mancozeb, or copper-mancozeb-captan significantly reduced the incidence of disease, but not early dormant treatments that were applied in mid-November or mid-December. In-season treatments were most effective when timed around rain events and before temperatures started to rise in the spring. Thus, major infection periods were identified.

All copper products significantly reduced disease. No copper phytotoxicity was observed after four applications when copper rates were successively reduced for the second and subsequent sprays. Other treatments with high efficacy included copper-Manzate (several copper products), Kasumin-Manzate, Kasumin-Captan, Kocide-Tanos, Mycoshield/Fireline (oxytetracycline; federally registered on peach for this disease), Serenade Optiva, and the new bacterial membrane disruptor Cerogenin. Kasumin was accepted into the IR-4 program. Based on our results, the most effective management program likely will include a late dormant (delayed dormant) bactericide application to reduce inoculum and at least one in-season application during the period after petal fall around rainfall events and rising temperatures to prevent new infections. To validate this, field trials will be conducted again in the coming field season.

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For More Details, Visit

- Poster location 22, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2015) at Almonds.com/ResearchDatabase