Biology and Management of Bacterial Spot of Almond in California

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PROJECT SUMMARY

Objectives:

- Determine 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, *Xanthomonas arboricola* pv. *pruni* (*Xap*) and identification of *Xap* using PCR
  - o Determination of the genetic variability by molecular methods
- In vitro sensitivity of *Xanthomonas arboricola* pv. *pruni* (*Xap*) against copper, mancozeb, antibiotics and selected biologicals
  - o Selected materials will be evaluated alone or in combination
- Management of bacterial spot in the field
  - o Dormant applications in late fall or winter using copper and copper-mancozeb combinations.
  - o Spring-time applications with traditional and new formulations of copper with low phytotoxicity potential, antibiotics, mixtures of copper-mancozeb and antibiotic-mancozeb, and biologicals

Background and Discussion:

Bacterial spot is caused by *Xanthomonas arboricola* pv. *pruni* (*Xap*) and is a new economically important disease on almonds in California. The bacterium requires rainfall or sprinkler irrigation for dissemination. The disease has been observed in Colusa, San Joaquin, Stanislaus, Merced, and Madera Co. mainly on cv. Fritz, and at lower disease levels on cvs. Nonpareil, Butte, Carmel, and Price. In 2015, the disease was present again at several locations. Disease levels were low due to low rainfall; however, in orchards with high-angle sprinklers, bacterial spot reached high levels by mid-summer. We isolated the pathogen from overwintering mummies and from symptomatic fruit in the spring of the last two years. Mummies still contained viable inoculum when collected in early July. Thus, mummies are a primary inoculum source for the disease. Twig cankers have not been found.

Field trials on the management of the disease were conducted in 2015. In contrast to 2014, none of the dormant treatments (applied either in mid-December or in late January) with copper or copper-mancozeb resulted in a significant reduction of bacterial spot. This was likely due to the very dry winter when pathogen dissemination was low. In-season treatments, which started at full bloom or petal fall significantly, reduced the disease when timed around warm temperatures and rain events.

The most effective treatments included copper (Kocide 3000, Badge, ChampION^{++}) and copper mixed with mancozeb or with kasugamycin (e.g., Kasumin). Copper phytotoxicity was observed on leaves after four or five applications even when copper rates were successively reduced in subsequent sprays. Minor leaf tip necrosis was present after four or more successive Kasumin applications. Other treatments that significantly reduced the disease included Mycoshield and the experimental USF2018A. Kasumin is in the IR-4 program to obtain an almond registration. The most effective management program likely will include a delayed dormant bactericide application and at least one or two in-season applications from bloom to petal fall around rainfall events and warm temperatures to prevent new infections.

Project Cooperators and Personnel: S. Haack, H. Förster, and D. Thompson, UC Riverside; R. Duncan, UCCE - Stanislaus County; B. Holtz, UCCE - San Joaquin County; D. Doll, UCCE - Merced County; L. Wade, Arysta LifeScience

For More Details, Visit

- Poster location 25 and 26, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2016) at Almonds.com/ResearchDatabase
- 2014 - 2015 Annual Reports CD (14-PATH5-Adaskaveg); or on the web (after January 2016) at Almonds.com/ResearchDatabase