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Almond Digest

June 2013

2013 Bacterial Spot on Almond Field Day

Sponsored by the University of California
Cooperative Extension

July 12, 2013 -- 9:00-11:00 a.m.

Travaille and Phippen, Inc.
12700 East Graves Road
Manteca CA 95336

Agenda

9:00 a.m. **Registration, CE credit, Welcome and Introduction**
Brent Holtz, UCCE Farm Advisor, San Joaquin County

9:30 a.m. **Symptoms of Bacterial Spot on almond and differentiation from Leaffooted Bug damage**
Roger Duncan, UCCE Farm Advisor, Stanislaus County
Brent Holtz, UCCE Farm Advisor, San Joaquin County
Nick Gatzman, PCA, Travaille and Phippen, Inc.

10:00 a.m. **Isolation and Identification of the Bacterial Spot pathogen, *Xanthomonas arboricola* pv. *pruni***
Themis Michailides, Plant Pathologist UC Davis/Kearney Ag Center
Jim Adaskaveg, Plant Pathologist, UC Riverside

10:30 a.m. **Management Strategies for Bacterial Spot and possible approaches in California almond production**
David Doll, UCCE Farm Advisor, Merced County
Jim Adaskaveg, Plant Pathologist, UC Riverside
Themis Michailides, Plant Pathologist, UC Davis/Kearney Ag Center

1.5 Hours of Continuing Education have been approved by California Certified Crop Advisers.
Approval from Department of Pesticide Regulation is pending.

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Bacterial Spot on Almond found in the San Joaquin Valley

by Brent Holtz, David Doll, Roger Duncan, John Edstrom, Themis Michailides, and Jim Adaskaveg

We have visited and received samples from orchards in Merced, Stanislaus, and San Joaquin Counties that have been showing symptoms of amber colored gum exuding from almonds. The damage has been predominantly on the variety 'Fritz,' but reports are coming in of similar damage on 'Monterey', 'Padre', and 'Nonpareil'. Over the past few years, we have observed these symptoms at about the same time in mid-April to early May. The damage looked similar to leaffooted bug (LFB-*Leptoglossus clypealis*) or anthracnose symptoms. Concern was raised when 'Fritz' containing orchards sprayed proactively three times for LFB or anthracnose again experienced the same symptoms. Symptomatic nuts were sampled and submitted concurrently to Dr. James E. Adaskaveg, Professor of Plant Pathology UC Riverside, and Dr. Themis J. Michailides, UC Davis Plant Pathologist stationed at the Kearney Research and Extension Center. Drs. Adaskaveg and Michailides isolated consistently *Xanthomonas arboricola* pv. *pruni* from these infected tissues and both have positively identified the pathogen using molecular methods. Dr. Michailides being assisted by Dr. Jianchi Chen, a USDA Plant Bacteriologist located in Parlier.

Figure 1

Xanthomonas arboricola pv. *pruni* is a plant pathogenic bacterium capable of causing the disease 'bacterial spot' of Prunus species, such as almond and stone fruit. We will have to verify that this pathogen is in fact causing these symptoms using procedures known as Koch's postulates, which involves re-inoculating symptomless plants and re-producing symptoms and re-isolating the pathogen, but the evidence looks pretty convincing. Drs. Adaskaveg and Michailides are currently conducting Koch's postulates. Dr. Michailides isolated *Xanthomonas* spp. from almond leaves and fruit showing similar symptoms in 2006 from samples provided by John Edstrom in Colusa County. This finding was published in a UC Cooperative Extension Newsletter from Colusa County in 2006. Koch's postulates were not preformed at this time.

Figure 2

Symptoms of infected nuts include the production of amber colored gum from spots on the hull (Figure 1). Cutting into the hull, there is no presence of LFB feeding, but there is a lesion about the size of a pencil eraser (Figure 2). Lesions may enlarge, become sunken and orange in color, or exude an orange slime similar to

anthracnose symptoms. Leaves may show spots (Figure 3), turn yellow, and drop prematurely. Twigs may show visible lesions or cankers (Figure 4), which may be a source of overwintering inoculum. Infected nuts may stick on spurs and be found in close proximity to mummy nuts from the previous year, still showing dried up lesions (Figure 5).


Figure 3

Bacterial spot, *Xanthomonas arboricola* pv. *pruni*, is a common problem in stone fruit and almonds throughout Europe, the Middle East, Australia and the Southeastern United States. This disease can be very damaging, with the severity of infection depending on rainfall, dew formation, and warm temperatures. Fruit and foliage are both susceptible to infection in humid regions, areas with regular late spring rains with warming temperatures, or in orchards where foliage is routinely wetted from irrigation. Another bacterial disease of almond that occurs on leaves, flowers, and fruit is known as bacterial blast and it generally occurs under wet and cold temperatures that occur in early spring. In Australia, many growers have been forced to abandon the two most severely affected varieties, Fritz and Neplus Ultra, due to extensive crop loss. Mission and Monterey were also shown to be susceptible in Australia while Nonpareil and Price were considered intermediate in their susceptibility. In Australia, infected nuts develop corky lesions that ooze orange colored gum that either drop prematurely or remain on trees after harvest as stick-tights. Circular or angular reddish lesions develop on leaf blades. Leaf spots may be discrete or may coalesce along margins and result in a tattered appearance (these symptoms are easily confused with shot hole but lesion size is slightly smaller). In Australia, defoliation follows and persists throughout the rainy period.


Figure 4

Management for bacterial spot will be much different than controlling LFB or anthracnose. It may involve trying to reduce inoculum levels by defoliating leaves with zinc sulfate in the fall, destroying mummies, and spraying fall, dormant, delayed dormant, and in season copper treatments to reduce overwintering inoculum. Intensive spray programs with copper and mancozeb have not controlled Bacterial Spot "down under" while in the South Eastern United States,

peach growers have applied copper plus the antibiotic oxytetracycline as preventative fall sprays with some success. Unfortunately, bacterial diseases are very difficult to control. Still, several materials such as mancozeb and new formulations of copper that do not cause plant injury are already registered on almonds and may provide some level of control under California conditions. Furthermore, new materials have been identified against *Xanthomonas* diseases on other crops that possibly may be registered on almonds. We have no evidence to date that leaffooted bug vectors this pathogen, but it is a concern that we consider for future research.

Figure 5

We will be hosting a 'Bacterial Spot on Almond Field Day' on July 12, 9 am-11 am at Travaille and Phippen, Inc., 12700 East Graves Road, Manteca, CA 95336.

We hope to identify symptoms and discuss possible control options for Bacterial Spot on Almond.

Please try to attend!

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2013 Bacterial Spot on Almond Field Day

Friday, July 12, 2013

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Brent Holtz, Farm Advisor
June 2013