

# Biology and Management of Almond Brown Rot, Jacket Rot, Shot Hole, Rust, and Hull Rot

**Project Leader: Jim Adaskaveg**

Dept. of Plant Pathology and Microbiology, University of California, Riverside, Riverside, CA 92521  
(951) 827-7577 jim.adaskaveg@ucr.edu

## PROJECT SUMMARY

### Objectives:

- Evaluate new fungicides and organic compounds, and develop efficacy data based on spectrum of activity, systemic action, and persistence for brown rot, jacket rot, shot hole, gray mold, rust, and hull rot.
- Establish baseline sensitivities of fungal pathogen populations against new fungicides and determine shifts in fungicide sensitivity.
- Evaluate almond genotype susceptibility to foliar diseases that develop naturally in the almond variety trial at UC Davis (UCD) under simulated rainfall.
- Seek cultural practices and fungicide treatments for reducing hull rot.

### Background and Discussion:

In 2012-13, we conducted field and laboratory studies on the evaluation of new treatments against major foliar and fruit diseases of almond in California. New fungicides evaluated all belong to existing classes (e.g., FRAC Groups or FG 3, 7, 9, 11, 19, 33, M3, M5, and U12). Additionally, several pre-mixtures and rotation programs, as well as a natural product were evaluated. FG 7 fungicides are assigned to three sub-groups that differ in their anti-fungal activity due to differences in the target binding site. This reduces cross-resistance among some of the sub-groups; however, cross resistance is still possible. In vitro studies were conducted to characterize this cross-resistance in some almond pathogens. With fungicide stewardship, the arsenal of available fungicide treatments will help prevent the selection and build-up of resistant pathogen populations when applied in rotation or mixture programs. The use of pre-mixtures is a resistance management strategy, and additionally, the

spectrum of activity is generally expanded so that several diseases can be targeted by a single treatment.

In our research, highly effective single-fungicides and pre-mixtures were identified for the management of brown rot blossom blight, gray mold, shot hole, and rust. Brown rot, shot hole, and gray mold incidence was generally low in the spring of 2013, and shot hole was observed on leaves only, but not on fruit. Single-fungicides of several classes, and especially several pre-mixtures and rotation programs provided excellent disease control.

Studies on the management of hull rot were conducted in orchards with *Rhizopus stolonifer*, *Monilinia fructicola*, or both pathogens. Hull rot caused by *R. stolonifer* could be managed with a single application of either one of several fungicide classes during early hull split. Hull rot caused by *Monilinia* species, however, was less effectively reduced using the same treatments and timings. In a trial where different application timings were evaluated, we found the early-June timing was critical, indicating that *M. fructicola* infects the developing almond fruit at an earlier stage than does *R. stolonifer*.

Occurrences of the new powdery mildew-like disease of almond were not reported in 2012 and 2013. In the spring of 2013 in the central growing areas of the state, however, serious outbreaks of a new disease of developing fruit that is characterized by lesions penetrating into the mesocarp and profuse gumming was identified as bacterial spot caused by *Xanthomonas arboricola* pv. *pruni*.

**Project Cooperators and Personnel:** Helga Förster, David Thompson, and D. Cary, University of California Riverside; Tom Gradziel, University of California, Davis; Joe Connell, UCCE - Butte County; Roger Duncan, UCCE - Stanislaus County; Brent Holtz, UCCE - San Joaquin County; L. Wade, Arysta LifeScience

### For More Details, Visit

- Poster location 24, Exhibit Hall A and B during conference; or on the web (after January 2014) at [www.almondboard.com/researchreports](http://www.almondboard.com/researchreports)
- 2012.2013 Annual Report CD (12-PATH4-Adaskaveg); or on the web (after January 2014) at [www.almondboard.com/researchreports](http://www.almondboard.com/researchreports)

[Type text]

[Type text]

[Type text]

[Type text]

[Type text]

[Type text]