

# Maintaining the UC IPM Pest Management Guidelines for Almond

## What's New

- Responded to almond industry push for bee-safe products during bloom
- Added photos and information about an emerging disease: bacterial spot
- New year-round IPM program tutorial about managing pests in almonds
- General properties of fungicides, most effective treatment timing, and resistance management tables updated
- Herbicide mode-of-action numbers added to weed susceptibility tables
- Relative toxicities of insecticides and miticides table updated
- In 2014, look for our new tutorial on how to calculate degree-days using tools in the Pest Management Guidelines

## Introduction

The Pest Management Guidelines (PMGs) are the University of California's official guidelines for managing agricultural pests in California. They are UC's primary extension publication for growers. The Pest Management Guidelines are a well-established tool to extend the most current pest management science.

The Pest Management Guidelines series receives **2 millions web accesses** a year. The Almond Guidelines receives about **91,000 hits** a year.

[www.ipm.ucdavis.edu/PMG/selectnewpest.almonds.html](http://www.ipm.ucdavis.edu/PMG/selectnewpest.almonds.html)

View our new tutorial. The year-round IPM program packages monitoring and management activities for key pests throughout the season. It includes ways to minimize pesticide harm to the environment and pollinators.

**Almonds**

**New Disease in California**

- Bacterial Spot

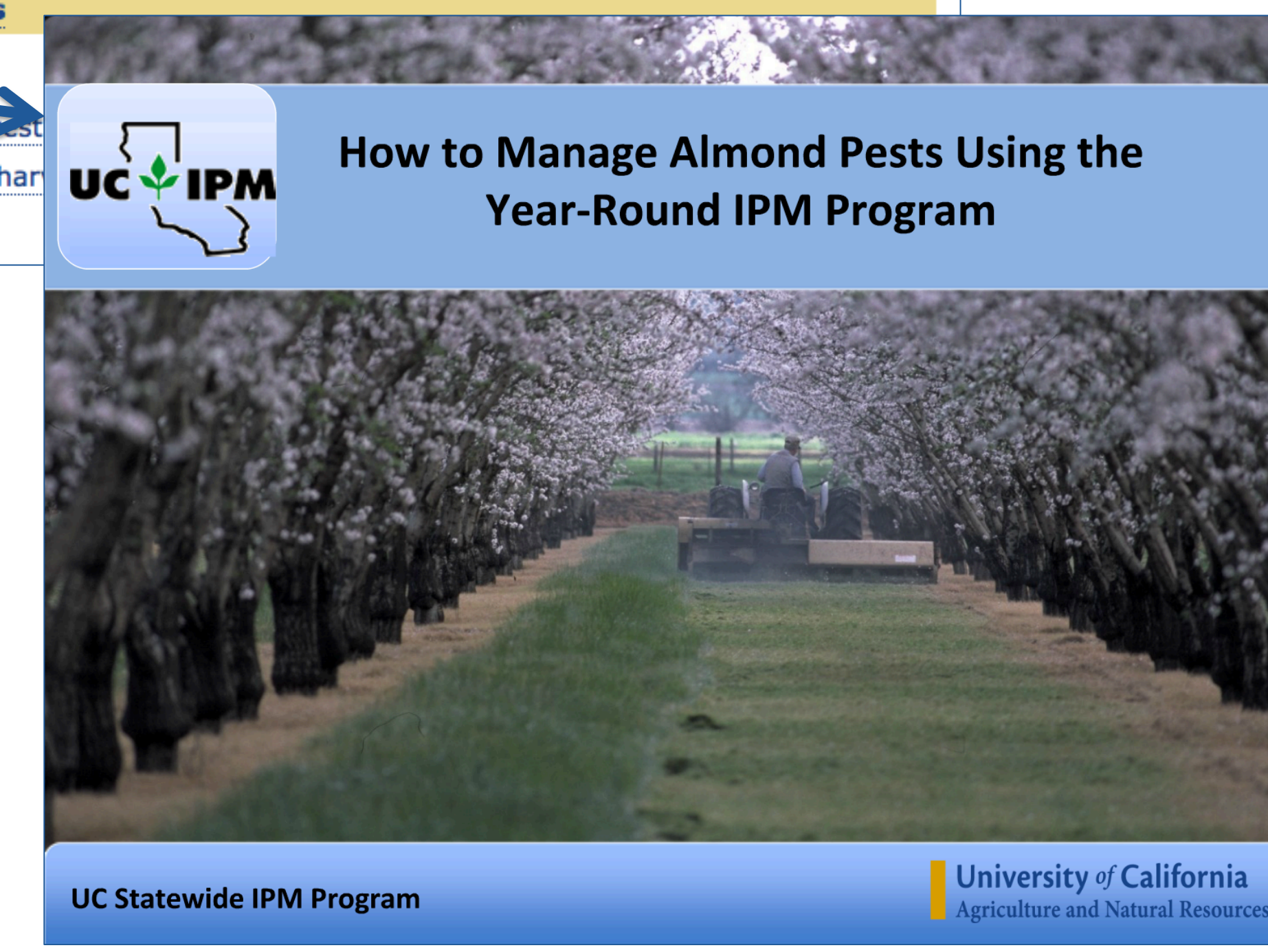
**Year-Round IPM Program**

Tells you what you should be doing throughout the year in an overall IPM program. Includes Year-Round IPM Program Annual Checklist.

[Using the almond year-round IPM program | Forms and supplemental pages](#)

**Year-Round IPM Program for Almonds (3/09)**

- Dormant to delayed-dormant
- Bloom to postbloom
- Fruit development
- Harvest
- Postharvest



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### Bacterial spot (*Xanthomonas arboricola* pv. *pruni*)

(Published 7/13)

Bacterial spot is a relatively new almond disease in California. It has currently been found predominantly on the cultivar Fritz in Colusa, Merced, Stanislaus, and San Joaquin counties. The disease has also been observed on sweet cherry and other stone fruit crops in San Joaquin and Stanislaus counties. Research is ongoing to determine management options.

2013 Bacterial Spot on Almond Field Day (PDF)



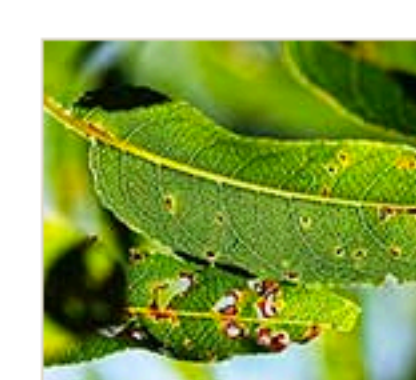
Bacterial spot on almond leaves and nuts. Photo by Roger Duncan. Used by permission.

**Symptoms**

Symptoms first appear in mid-April to early May. Amber-colored gum exudes from nuts with reddish lesions on the hull surface, similar to anthracnose and leafhopper plant bug feeding.

**Pest Management Guidelines**

- Almond
- Cherry



Closeup of bacterial spot on almond leaves. Photo by Brent Holtz. Used by permission.

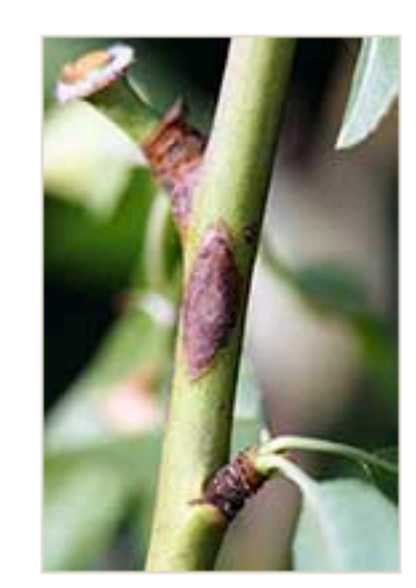
- Anthracnose = amber gum, sunken lesions, and pink or orange spores in the lesions
- Leafhopper bug feeding = clear gum and feeding puncture through hull and into shell

In bacterial spot, leaves become spotted, especially where water collects (e.g., along leaf margins), turn yellow, and drop prematurely. Green twigs (less than a year old) can have visible lesions or cankers.

### Biology

See also: [Bacterial Spot of Almond and other Prunus species](#). (PDF)

Bacterial Spot needs wetness to spread; bacteria are spread from cankers or mummies by dripping dew and splashing or wind-blown rain to newly emerged leaves. It overwinters on mummies and possibly in twig cankers.



Bacterial spot lesion on young almond twig. Photo by Brent Holtz. Used by permission.

### Preliminary Management Guidelines

Practice prevention measures as for other bacterial diseases. Research in other crops suggest the following preliminary management guidelines may reduce bacterial spot. Research is needed to determine the benefits of in-season bactericide treatments.

- During the season, blow fallen nuts into the center between rows and grind them up into small pieces that easily degrade.
- Practice sanitation when moving between orchards by brushing off shoes; sweep out all nuts from trailers or hoppers.
- If possible, harvest before fall rains.
- After harvest, defoliate trees to reduce inoculum and improve the visibility of mummies and coverage of dormant sprays.
- Remove and destroy mummy nuts; pole or shake and then disc or mow.
- Copper plus oil applications before winter rain may help prevent disease.
- A delayed-dormant copper plus oil application may help prevent disease.

UC continues to learn about bacterial spot. Biology, photos of symptoms, and management tips were added to the Almond Pest Management Guidelines.

New fungicides and bactericides are updated annually in the Almond Pest Management Guidelines using the *Fungicides, Bactericides, and Biologicals for Deciduous Tree Fruit, Nut, Strawberry, and Vine Crops*. Find the PDF at the bottom of Guidelines pages.

**Almond**

**2013 Fungicide Efficacy and Treatment Timing**

(Reviewed 3/10, updated 10/13)

In this Guideline:

- Fungicide efficacy
- Fungicide treatment timing
- Publication
- Glossary

Fungicide	Resistance risk (FRAC) <sup>1</sup>	Brown rot	Jacket rot	Anthracnose	Shot hole	Scab <sup>3</sup>	Rust <sup>3</sup>	Leaf blight	Alternaria leaf spot <sup>3</sup>	PM-like <sup>5</sup>	Hull rot <sup>16</sup>
Bumper/Tilt <sup>4</sup>	high (3)	++++	+/-	++++	++	++	+++	ND	++	+++	++
Indar	high (3)	++++	+/-	+++	++	++	NL	ND	+	ND	---
Inspire Super <sup>4</sup>	high (3/9)	++++	++++	ND	+++	+++	+++	ND	+++	ND	+++
Luna Sensation	medium (7/11) <sup>3,7</sup>	++++	++++	++++	++++	++++	++++	ND	++++	+++	+++
Pristine	medium (7/11) <sup>3,7</sup>	++++	++++	++++	++++	++++	+++	ND	+++	+++	+++
Merivon*	medium (7/11) <sup>3,7</sup>	++++	++++	++++	++++	++++	+++	ND	++++	++++	+++
Quash <sup>4</sup>	high (3)	++++	++	++++	+++	+++	++++	ND	++++	+++	+++
Luna Experience	medium (3/7) <sup>3</sup>	++++	+++	++++	+++	++++	++++	ND	++++	+++	+++
Quadris Top	medium (3/11) <sup>3</sup>	++++	+++	++++	+++	++++	++++	ND	+++	+++	+++
Quilt Xcel	medium (3/11) <sup>3</sup>	++++	+++	++++	+++	++++	++++	ND	+++	+++	+++
Rovral + oil <sup>8</sup>	low (2)	++++	++++	---	+++	+/-	++	ND	+++ <sup>9</sup>	ND	---
Scala <sup>3</sup>	high (9) <sup>3,7</sup>	++++	++++	ND	++	---	ND	ND	+	---	---
Tebuzol (Elite**)	high (3)	++++	+/-	+++	++	++	+++	ND	+	ND	++
Topsin-M/T-Methyl/Incognito <sup>2</sup>	high (1) <sup>2,7</sup>	++++	++++	---	---	+++ <sup>8</sup>	+	+++ <sup>6</sup>	---	++	---
Vanguard	high (9) <sup>3,7</sup>	++++	++++	ND	++	---	ND	ND	+ <sup>9</sup>	---	---
Fontelis	high (7) <sup>4</sup>	++++	++++	++	++++	+++	+++	ND	+++	ND	---
Abound <sup>4</sup>	high (11) <sup>3,7</sup>	+++	---	++++	+++	++++	++++	+++	+++ <sup>10</sup>	+++	+++
Elevate	high (7) <sup>7</sup>	+++	+++	---	+	ND	ND	ND	ND	ND	---

FUNGICIDES, BACTERICIDES, AND BIOLOGICALS FOR DECIDUOUS TREE FRUIT, NUT, STRAWBERRY, AND VINE CROPS 2013

ALMOND, APPLE, APRICOT, CHERRY, KIWIFRUIT, PEACH/NECTARINE, PEAR, PISTACHIO, PLUM, POMEGRANATE, PRUNE, STRAWBERRY, WALNUT

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Statewide IPM Program, www.ipm.ucdavis.edu  
UC Kearney Agricultural Center, www.ukac.ucdavis.edu

## Update Process

Every year Pest Management Guidelines Coordinator Romy Basler contacts the authors for updates.

1. The annual call went out in October 2013.
2. Romy will edit and incorporate updates received.
3. The authors will review the changes and approve or make additional changes/clarifications. Steps 2 and 3 are repeated until the authors approve the updated pest sections.
4. The UC ANR Office of Pesticide Information and Coordination reviews updated pesticide information for accuracy and compliance with regulations.
5. Romy will work with the Production Team to publish the PDF and online.



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Integrated Pest Management Program