



University of California  
Agriculture and Natural Resources

Retail Nursery and Garden Center

# IPM News

Vol. 2 • No. 1 • March 2012

## Managing Powdery Mildew on Ornamentals

**P**owdery mildew is a common disease on many types of plants. It is easily recognized by the white, powdery mycelial and spore growth that appears on leaves and shoots. Different powdery mildew fungi cause disease on different plants.

The best method for managing powdery mildew is prevention. Avoiding the most susceptible cultivars, placing plants in full sun, and following good cultural practices will adequately control powdery mildew in many situations. Some ornamentals do require protection with fungicide sprays if mildew conditions are more favorable, especially susceptible varieties of rose and crape myrtle. Let your customers know about the mildew-resistant varieties you carry in your store.

### Cultural Practices

Shade and moderate temperatures favor most powdery mildews. Locate plants in sunny areas as much as possible, provide good air circulation, and avoid excess fertilizing or use a slow-release fertilizer. Overhead sprinkling may actually reduce the spread of powdery mildew, because it washes spores off the plant. Also, if spores land in water, they die. The best time to irrigate is mid-morning so plants dry rapidly, reducing the likelihood of infections



J. K. Clark, UC

Figure 1. Powdery mildew on euonymus.



J. K. Clark, UC

Figure 2. Powdery mildew on rose.

by other fungi such as ones that cause rust or black spot on roses. As new shoots begin to develop on perennial plants, watch closely for signs of powdery mildew.

### Fungicide Applications

In some situations, especially when growing roses, you may need to use fungicides, which function as protectants, eradicants, or both. A protectant fungicide prevents new infections from occurring, whereas an eradicant can kill an existing infection. Apply protectant fungicides to highly susceptible plants before the disease appears. Use eradicants at the earliest signs of the disease. Once mildew growth is extensive, controlling the situation with any fungicide becomes more difficult.

**Fungicides.** Several least-toxic fungicides are available, including horticultural oils, neem oil, jojoba oil, sulfur, and the biological fungicide Serenade.

With the exception of the oils, these materials are primarily preventive. Oils work best as an eradicant but also have some protectant activity.

**Oils.** To eradicate mild to heavy powdery mildew infections, use a horticultural oil such as JMS Stylet Oil, Saf-T-Side Spray Oil, Sunspray Ultra-Fine Spray Oil, or one of the plant-based oils such as neem oil (e.g., Powdery Mildew Killer). Be careful, however, never to apply an oil spray within two weeks of a sulfur spray, or it may injure plants. Also, you should never apply oils when temperatures are higher than 90°F or to water-stressed plants. Some plants may be more sensitive than others, and the interval required between sulfur and oil sprays may need to be even longer. Always consult the fungicide label for any special precautions. Of the horticultural

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# Asian Citrus Psyllid Update

**Y**ou may have heard about the Asian citrus psyllid (Figure 1) or ACP for short, an insect that has invaded Southern California. It's been found on citrus trees and relatives such as kumquats and *Citropsis* species. Other preferred host plants that aren't as commonly found in home gardens or landscapes in California include orange jasmine (*Murraya paniculata*), Indian curry leaf (*Bergera koenigii*), and Chinese box orange (*Severinia buxifolia*).

For additional photos of the insect and its damage, see the UC IPM Pest Note at <http://ipm.ucdavis.edu/PMG/PESTNOTES/pn74155.html> or visit <http://www.californiacitrusthreat.org/>.

While this insect can damage a plant just by feeding on it, a bigger problem, which threatens the citrus industry as well as home garden trees, is that the ACP can transmit the most devastating disease of citrus in the world, huanglongbing (HLB). Luckily, so far no ACP carrying the HLB disease have been found in California.

Symptoms of HLB include yellow shoots; leaf mottle; small upright leaves; and, worst of all, small, lop-sided, inedible fruit with a bitter flavor. Infected trees decline in health and eventually die. There is no cure for HLB, and infected trees must be removed and destroyed. The disease is working its way from Mexico toward California in the bodies of infected ACP. The best way to keep HLB disease out of California is to keep the ACP in very low numbers.

## Management

When the ACP was first found in 2008 in backyard citrus in San Diego, the California Department of Food and Agriculture (CDFA) treated all infested host plants. These treatments have been very effective in most areas where the ACP been found—San Diego, Imperial, Orange, Los Angeles, Ventura, Riverside, and San Bernardino counties.

However, in some parts of Los Angeles County, there are too many ACP finds for CDFA to treat them all. Landscapers and homeowners can play a very important role in protecting California citrus by keeping the psyllid, and potentially HLB, from spreading. One way is to remind customers not to move trees that are blue-tagged out of the ACP-infested area. Another is to call the hotline if you or your customer suspects you have seen the pest or disease. People who have ACP-infested trees in the

“A bigger problem, which threatens the citrus industry as well as home garden trees, is the ACP can transmit the most devastating disease of citrus in the world.”

areas of Los Angeles that aren't treated by CDFA can assist greatly in the fight against the psyllid by treating their own citrus trees.

There are currently no effective natural controls for the ACP in California. Some predators feed on it, and recently an insect parasite, a mini wasp, that attacks the ACP was released in parts of Riverside and Los Angeles counties. However, biological control is unlikely



M. E. Rogers, University of Florida

Figure 1: Asian citrus psyllid adult (left) and nymphs with waxy tubules.

to reduce the psyllid populations enough to prevent spread of HLB.

## What Consumers Should Do

If the ACP is found, homeowners are asked to call the CDFA pest hotline, 1-800-491-1899. CDFA personnel will let the homeowner know if CDFA will treat their trees or if the homeowner should treat. Recommended insecticides for your customers who must treat trees themselves are listed in Table 1. Best choices will depend on the life stage of the insect and time of year.

Educational handouts and posters in many languages are available at [www.CaliforniaCitrusThreat.org](http://www.CaliforniaCitrusThreat.org) and [www.PeligranCitrusenCalifornia.com](http://www.PeligranCitrusenCalifornia.com).

—Cheryl Wilen, Area IPM Advisor, UC IPM, South Coast, [cawilen@ucdavis.edu](mailto:cawilen@ucdavis.edu); and Beth Grafton-Cardwell, Entomology, UC Riverside/Kearney Agricultural Center, Parlier, [bethgc@uckac.edu](mailto:bethgc@uckac.edu).

Table 1. Los Angeles County only: Home use insecticides for use against ACP in areas CDFA isn't treating.

Insecticide	How applied	Growth stage controlled	Comments
carbaryl (Sevin)	foliar (leaf) spray	adult	Very toxic to honey bees and to natural enemies of other citrus pests. Do not apply unless you are certain you have the ACP. Never apply to blooming trees.
imidacloprid (Bayer Advanced Fruit, Citrus, and Vegetable Insect Control)	systemic (moves through plant); apply to the ground at the base of trees.	nymphs and adults	Effective for one to three months. Use only once a year. Best when applied in late summer (August through September). Takes about two weeks to move up the plant, so apply before or as soon as tiny new flush appears. Applying it in early fall, just before leaf flush, minimizes hazards to honey bees.

\*Remind customers to follow all label directions.

# Mushrooms and Other Nuisance Fungi in Lawns

**M**ushrooms, sometimes called toadstools, are the visible reproductive (fruiting) structures of some types of fungi. Although the umbrella-shaped fruiting body is the most common and well known, mushrooms display a great variety of shapes, sizes, and colors.

Some other fruiting bodies encountered in lawns include puffballs, stinkhorns, and bird's nests, descriptive names that reveal the diversity of forms among mushrooms. But regardless of shape, the purpose of all fruiting bodies is to house and then disseminate spores, the reproductive units of fungi.

Many people become concerned when mushrooms appear in their lawns; however, most mushroom-producing fungi in lawns are merely nuisance problems and don't cause lawn diseases. An exception are fairy-ring mushrooms, which can sometimes cause dead areas of grass by limiting water penetration to turf roots.

Because mushrooms are merely the fruiting bodies of fungi, removing them doesn't kill the underground mycelia

from which they are growing. Picking mushrooms, puffballs, stinkhorns, or other reproductive structures soon after they appear might prevent their spores from spreading to new sites. However, because most spores are windblown long distances, they can easily come into a lawn from neighboring areas. The primary reasons for removing mushrooms from lawns are to keep them away from children and pets and to improve a lawn's appearance.

A newly revised Pest Note, *Mushrooms and Other Nuisance Fungi in Lawns*, provides information on managing and identifying many types of lawn mushrooms and is illustrated with photographs of 13 common species. It is available at <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74100.html>.

—Excerpted with modifications from the Pest Note by Michelle LeStrange, UC Cooperative Extension, Tulare Co., [mlestrange@ucdavis.edu](mailto:mlestrange@ucdavis.edu); Carol A. Frate, UC Cooperative Extension, Tulare Co., [cafrate@ucdavis.edu](mailto:cafrate@ucdavis.edu); and R. Michael Davis, Plant Pathology, UC Davis, [rmdavis@ucdavis.edu](mailto:rmdavis@ucdavis.edu).



R. M. Davis, UC

Newly emerged inky cap mushrooms, *Coprinus comatus*.



R. M. Davis, UC

Mushrooms of the common lawn fungus haymaker's *Panaeolus foeniseccii*.



R. M. Davis, UC

Stinkhorn mushroom, *Phallus impudicus*.

## Powdery Mildew ... continued

oils, JMS Stylet Oil is the most highly refined and therefore the least likely to damage plants, but it may be more difficult to obtain than the others.

**Sulfur.** Sulfur products have been used to manage powdery mildew for centuries but are effective only when applied before the disease appears. The best sulfur products to use for powdery mildew control in gardens are wettable sulfurs that are specially formulated with surfactants similar to those in dishwashing detergent (e.g., Safer Garden Fungicide). Sulfur can damage some ornamental cultivars. To avoid injuring any plant, don't apply sulfur when the temperature is near or higher than 90°F, and don't apply it within two weeks of an oil spray.

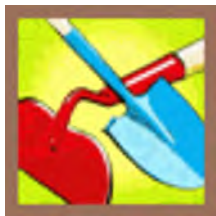
**Biological Fungicides.** Biological fungicides (e.g., Serenade) are commercially available beneficial microorganisms formulated into a product that, when sprayed on the plant, destroy fungal pathogens. The active ingredient in Serenade is a bacterium, *Bacillus subtilis*, which helps prevent the powdery mildew from infecting the plant. These products have some effect in killing the powdery mildew organism but aren't as effective as the oils or sulfur.

**Synthetic Fungicides.** Myclobutanil (Immunox) is also available to the home gardener and functions as an eradicant and protectant against both powdery mildew and rust.

**How to Use.** Apply protectant fungicides to susceptible plants before or in the ear-

liest stages of disease development. Once mildew growth is mild to moderate, it generally is too late for effective control with protectant fungicides. These are effective only on contact, so applications must thoroughly cover all susceptible plant parts. However, eradicant fungicides can reduce existing infections. As plants grow and produce new tissue, additional applications may be necessary at seven- to 10-day intervals as long as conditions favor disease growth.

—Excerpted with modifications from Pest Notes: Powdery Mildew on Ornamentals by Doug Gubler, Plant Pathology, UC Davis, [wdgubler@ucdavis.edu](mailto:wdgubler@ucdavis.edu); and Steven Koike, UC Cooperative Extension, Monterey Co., [stkoike@ucdavis.edu](mailto:stkoike@ucdavis.edu).



# From the Field

## Preliminary Report on Iron HEDTA: A Natural Selective Herbicide

**A**fter writing an article about natural herbicides in the December issue of this newsletter, I was asked what I thought about the iron HEDTA (FeHEDTA) herbicides that recently came on the market. These are organically acceptable products believed to have minimal human health or environmental effects.

My first finding was it's difficult to obtain herbicides with FeHEDTA in Southern California where I am based, but apparently products are easier to find in Northern California. Of the four nurseries I went to, I found only one that carried even a single product that contained FeHEDTA. The product I found was Whitney Farms Lawn Weed Killer (Scotts), although according to the California Department of Pesticide Regulation's pesticide product database, there are four other registered products with the same active ingredient (Table 1).

Various sources of information about FeHEDTA state it provides control or suppression of a number of common broadleaf lawn weeds (e.g., dandelion, English daisy, white clover, black medic, common chickweed, and broad-leaved plantain) but won't injure grasses, making this a selective herbicide for use on lawns.

I did some of my own testing, although not a controlled study, on broadleaf plantain, dandelion, oxalis (creeping woodsorrel) (Figure 1a), and black medic in a tall fescue lawn and on weeds in concrete cracks. It took about one week for broadleaf plantain to die, and there was only foliar damage to black medic (Figure 2). However, both the oxalis and dandelion were showing injury within one day and were controlled in about three days. There was no turf injury.

**Table 1. California Registered Herbicides containing FeHEDTA.**

Formulation	Company	Name	Percent of active ingredient
concentrate	Bayer	Bayer Advanced Natria Lawn Weed Control Concentrate	26.5%
concentrate	Engage Agro	Fiesta Turf Weed Killer	26.5%
concentrate	Gardens Alive	Iron-X Selective Weed Killer for Lawns	26.5%
ready to use	Scotts	Ortho Elementals Lawn Weed Killer	1.5%
ready to use	Scotts	Whitney Farms Lawn Weed Killer	1.5%



C.A. Wilen, UC

**Figure 1. Oxalis in tall fescue lawn treated with FeHEDTA, one week after treatment (a) and four weeks after treatment (b).**

The product also provided good control of oxalis growing in cracks in concrete sidewalks and didn't stain the sidewalk.

I found that there was no observable difference if the herbicide was applied in the sun or the shade. However, on some weed species, especially black medic, the herbicide didn't adhere well to the leaf and beaded up, which could explain the lack of good control (Figure 3). More testing is needed to see if use of a surfactant could improve activity.

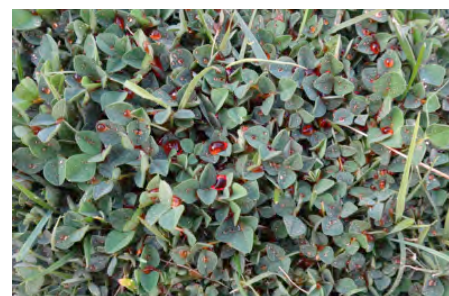
I do want to caution that there is no soil residual. The area I sprayed for oxalis had new plants, although not as many as the untreated section, within about a month after I did the treatment (Figure 1b).

—Cheryl Wilen, Area IPM Advisor, UC IPM, South Coast, [cawilen@ucdavis.edu](mailto:cawilen@ucdavis.edu).



C.A. Wilen, UC

**Figure 2. Foliar injury to black medic five days after spraying.**



C.A. Wilen, UC

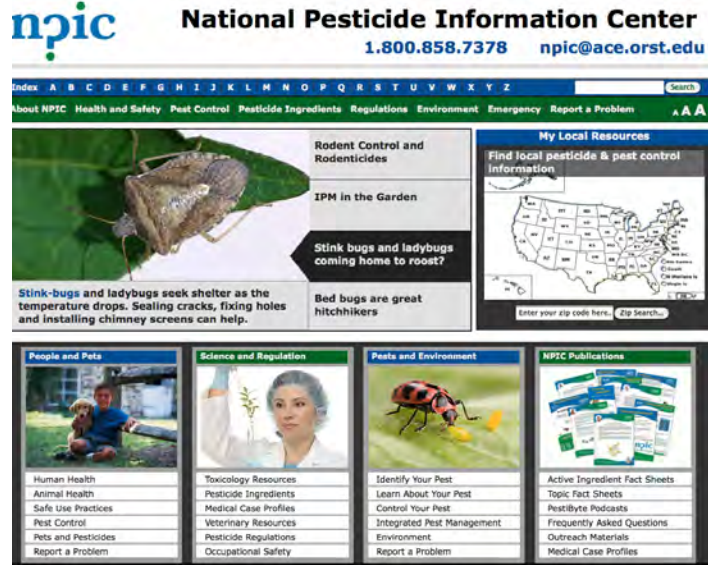
**Figure 3. FeHEDTA sprayed on black medic. Note poor spray coverage due to beading of the solution.**

# NPIC: A Good Source of Pesticide Information for Your Customers



system. For managing common home and garden pests, the site relies primarily on links to state resources including the University of California Statewide IPM Program, [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu).

Probably the most useful and unique documents on the site are the Active Ingredient Fact Sheets. These fact sheets cover 38 common home-use pesticide ingredients, including a few no longer registered. General fact sheets are written in simple language for the general public. Technical fact sheets provide similar information in a little more depth for people who want to know more about the ingredient's chemistry. All sheets explain what the chemical is, how it controls target pests, and its toxicity to people (including acute and chronic toxicity), pets, and wildlife, as well as how long the pesticide is likely to persist in the environment. Each sheet has a list of



references for more information. These are excellent documents to print out and provide to your customers or employees.

Take a look at this useful Web site and bookmark it on your computer for quick reference. It is frequently updated with new information and resources that can help you stay up to date.

—Mary Louise Flint, UC IPM and Entomology, UC Davis, [mlflint@ucdavis.edu](mailto:mlflint@ucdavis.edu), from *Green Bulletin*, Vol. 2, No. 1, Nov. 2011, <http://www.ipm.ucdavis.edu/greenbulletin/index.html>.

**D**o employees or customers ask you questions about the toxicity of the pesticides sold in your store? Questions about pesticide toxicity are difficult to answer, and often the information available isn't easy for nonscientists to understand and interpret.

The National Pesticide Information Center (NPIC), a cooperative project of the U.S. EPA and Oregon State University, is dedicated to providing science-based information about pesticides and pesticide-related topics to the general public. Its Web page, <http://npic.orst.edu>, is the most comprehensive and reliable source of pesticide information for consumers in the United States.

In addition to its Web site, NPIC operates a toll-free telephone number, 1-800-858-7378, from 7:30 a.m. to 3:30 p.m. PST Monday through Friday that is staffed by experts who can answer pesticide-related questions in 170 different languages.

The NPIC Web site has a wealth of information on many topics including general topics of pesticides and their impact on humans, pets, and the environment as well as procedures for safely using pesticides. There is a section on handling emergencies, and NPIC also asks users to report injuries or problems with pesticides directly through their toll-free phone

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Produced by the University of California Statewide IPM Program with partial funding from the USDA NIFA EIPM Coordination Program. To simplify information, trade names of products have been used. No endorsement of named products is intended, nor is criticism implied of similar products not mentioned.

For more information about managing pests, contact your University of California Cooperative Extension office listed under the county government pages of your phone book, or visit the UC IPM Web site at [www.ipm.ucdavis.edu](http://www.ipm.ucdavis.edu).

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**WHAT IS IPM?** Integrated Pest Management (IPM) programs focus on long-term prevention of pests or their damage through a combination of techniques including resistant plant varieties, biological control, physical or mechanical control, and modification of gardening and home maintenance practices to reduce conditions favorable for pests. Pesticides are part of IPM programs but are used only when needed. Products are selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment.