



Irrigation Practices Affect Pest Problems

As a pest control applicator, you might be called in to deal with a pest problem that is really an irrigation problem. Mismanaged irrigation is one of the most common causes of problems seen in the landscape.

Overwatering

Symptoms of overwatering look similar to those of underwatering (Figure 1). In California, overwatering tends to occur in the summertime. This is because most plants are adapted to handling lots of water in the rainy season, but many Mediterranean and otherwise drought-tolerant species aren't adapted to getting much water in the summer months. When excess water is applied during the warm season, the most sensitive plants, such as *Leucophyllum* or lavender, simply drown.

Other more tolerant species don't drown directly but tend to develop root infections if their roots stay wet for too long or are irrigated too frequently (Figure 2). The resulting disease or death of the plant is often blamed on the disease organism that attacks the roots, but the disease would have a harder time getting established if the plants were watered correctly in the first place. Once the root systems begin to die, they can't absorb all of the water the plant requires, and the plant begins to



L. Beasley, Distinctive Gardens

Figure 1. *Buxus decline due to overwatering.*

appear drought stressed. This may lead some homeowners and landscapers to add even more water as the plant begins to wilt.

Edema is another clue a plant is receiving too much water. It looks like a fungal disease on the leaves, with leaf spots that often occur in groups (Figure 3). However, close inspection will reveal tiny blisters on the leaves, and no clear signs of fungal activity such as fruiting bodies. Edema is most common in plants that are drought adapted and that have very stiff woody leaves, such as blue gum eucalyptus. The exact causes aren't completely understood, but in situations where susceptible plants get both lots of sun and too much water, it's thought that the water pressure in the leaves causes cell walls to burst, resulting in blistering followed by pockets of dead cells.

Underwatering

Not all problems in the landscape are caused by overwatering. The relationship between drought and wilting is relatively straightforward.



S. Swain, UCCE

Figure 2. Scraping bark away from the declining *Buxus* plant shown on the right in Figure 1 reveals a discolored area due to *Phytophthora* infections. The plant shown on the left in Figure 1 is healthy, while the plant in the center is dead.



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Figure 3. Edema on eucalyptus leaves.

However, most plants are water stressed before they actually wilt. Wilting occurs at the point where the plant can no longer compensate for water loss, and the plant begins to droop due to insufficient turgor. Not all plants wilt, though. Sunburn may also be an indicator that some plants—such as rhododendrons, camellias, pines, madrones, and citrus trees—are not getting enough water.

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Be Careful When Moving Infested Wood

When you trim or remove a tree infested with insects or disease, what do you do with the wood? Do you sometimes leave it on site for the homeowner or others to use for firewood? Do you move it to another location for distribution as firewood? If you move wood to another location, you may be inadvertently spreading insect or tree pathogen pests.

Movement of infested wood is a primary way invasive pests are spread to new areas. Three important invasive pests, already in some parts of California, that can spread in this way are the sudden oak death (SOD) pathogen, *Phytophthora ramorum* (Figure 1); goldspotted oak borer (GSOB), *Agrilus auroguttatus* (Figures 2 and 3); and pitch canker (Figure 4) caused by the fungus *Fusarium circinatum*.

SOD has been killing coast live oak, black oak, tanoak, and canyon live oak in coastal California from Monterey County northward and could spread southward in the state. Although not killed by SOD, many other shrubs and trees such as bay laurel, rhododendron, and camellia can also harbor the disease and may spread it when infested leaves or live plants are moved.

GSOB has been killing several native oak species in parks and forests of San Diego County east of El Cajon, has spread to one site in La Jolla, and poses a threat to certain oak species throughout California. GSOB larvae within wood may remain viable in cut wood for at least a year.

Pitch canker has infested Monterey pines in most coastal California counties, but there are still many areas that aren't infested. Although many pine trees are killed, some recover from the disease.

Many other pests not yet established in California threaten our landscape and forest trees. Some of the most serious likely to be brought here in or on wood include the gypsy moth, *Lymantria dispar* (Figure 5); emerald ash borer, *Agrilus planipennis*; Asian longhorned beetle, *Anoplophora glabripennis*; and the redbay ambrosia beetle, *Xyleborus glabratus*, which spreads the fungus causing laurel wilt disease.



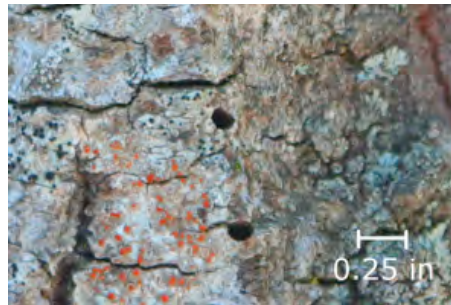
P. Svihra, UCCE

Figure 1. Viscous sap oozing from a coast live oak can be a sign of sudden oak death disease, but the identity of the pathogen must be confirmed by an expert. Goldspotted oak borer also causes oozing on bark.



T. W. Coleman, USDA-FS

Figure 2. Goldspotted oak borer larvae leave meandering galleries filled with dark frass beneath bark of infested trees. Live larvae may remain in cut wood for up to a year.



T. W. Coleman, USDA-FS

Figure 3. D-shaped exit holes are also a sign of goldspotted oak borer infestation.

To prevent the spread of tree pests, chip or grind small branches and use them as mulch on site or locally. Larger wood can be used locally for firewood, but never transport it more than about 25 to 50 miles. Where invasive pests are a known problem, such as with oaks or other hosts of SOD in central and northern coastal areas and oaks in San Diego County, wood shouldn't be transported beyond the zone of infestation. Check the Web sites listed below for help.



J. K. Clark, UC

Figure 4. Pitch canker can cause dieback of branches on Monterey pine.



R. Zerillo, USDA-FS

Figure 5. Gypsy moth is a foliage feeder that hasn't established in California. However, it may be transported into California as pupae on wood.

When storing cut wood for firewood on site, you can kill many pests by tightly covering the wood with high quality UV-resistant clear plastic for a season. In addition to reducing the number of emerging GSOB, this treatment will also kill other wood boring insects such as bark beetles that could emerge to attack nearby healthy trees.

Also, don't bring firewood from home on camping trips. Purchase firewood near the campground and leave any unused wood on site rather than bringing it home. More tips can be found at the California Firewood Task Force Web site at <http://firewood.ca.gov/>. Find more information about SOD at <http://www.suddenoakdeath.org/>, GSOB at www.gsob.org, and pitch canker at <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74107.html>.

—Mary Louise Flint, Ph.D.,
Associate Director for Urban and
Community IPM and Extension
Entomologist, mlflint@ucdavis.edu

Handling Invasions of Homes by Nuisance Pests

As weather patterns change from season to season, a host of “nuisance” pests may invade homes. Although these pests do little or no damage inside the home, their presence in large numbers is annoying to residents, many of whom will call for professional help.

Most of these invaders are associated with landscape plants but are driven indoors to seek overwintering sites or protection from cold, heat, drought or moisture; some move inside when food sources become scarce. They generally don’t reproduce inside homes and except for overwintering species, such as boxelder bugs, often remain or survive only for a few days or weeks.

Among the most common home invaders in California are various “true” bugs including boxelder bugs (Figure 1), false chinch bugs (Figure 2), and leaf-footed plant bugs such as the western conifer seed bug (Figure 3). Boxelder bugs prefer to overwinter—the term for an insect’s winter period of inactivity—in basements, attics, wall voids, and other structures or in debris near boxelder trees. False chinch bugs and seed bugs tend to move into homes in large numbers when food sources such as wild grasses, weeds, or crops disappear in late spring.

A number of other true bugs may invade homes at various times of the year. Two invading true bug species that have recently been reported moving into homes in the Pacific northwest—the tuxedo bug, *Raglius alboacuminatus*, and the brown marmorated stink bug, *Halyomorpha halys*, (Figure 4)—may become prominent nuisance pests in the future.

Crickets, earwigs, millipedes, and sowbugs also enter homes in substantial numbers, especially where there is vegetation, moist mulch, or debris around the foundation of the home. These conditions also favor spiders, ants, and several other invaders. Other insects tend to invade homes when attracted by outdoor lights; these include ground beetles, earwigs, certain roaches, and



J. K. Clark, UC

Figure 1. A Western boxelder bug, *Boisea rubrolineata*, adult, a newly hatch nymph, and eggs.



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Figure 2. False chinch bug, *Nysius raphanus*.



J. K. Clark, UC

Figure 3. Leaf-footed bug, *Leptoglossus* sp.

noctuid moths. Switch to yellow lights, which are much less attractive to insects.

A beneficial insect that sometimes invades homes in large numbers is the multicolored Asian lady beetle, *Harmonia axyridis* (Figure 5). This lady beetle is predator of aphids and related insects and often overwinters indoors in aggregations. While complaints about home invasions by *Harmonia* are more common in the cooler areas of the Midwest, it has also been reported as a nuisance in California.

The best way to handle problems with nuisance pests is to seal up entryways



D. Shetlar, The Ohio State University

Figure 4. The brown marmorated stink bug isn’t established in California but could become an important home invader if it does.



J. K. Clark, UC

Figure 5. The Asian multicolored lady beetle is a beneficial insect that sometimes overwinters indoors in aggregations. There are several color forms of this species.

into buildings and remove conditions that favor invaders such as lights, mulches, heavy vegetation, hiding places around foundations, and specific plants (e.g., female boxelder trees) that favor some pests. Use caulk, fine mesh screen, steel wool, or expandable foam to seal up cracks around doors, windows, attic and basement vents, and other entry points. Accumulations of pests inside can be vacuumed up. Assure customers that these pests won’t establish in the home or cause significant damage.

Although homeowners or pest control companies sometimes spray around foundations to prevent entry of nuisance pests, these applications often have little impact on the problem. In many cases, the invasion lasts for only a week or so and will be over by the time the treatment is applied. Also, the common pyrethroid products used against these pests have been associated with water quality problems, and their use is being discouraged.

—Mary Louise Flint, Ph.D.,
Associate Director for Urban and
Community IPM and Extension
Entomologist, mlflint@ucdavis.edu

Mushrooms and Other Nuisance Fungi in Lawns

Mushrooms, 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.



R. M. Davis, UC

Newly emerged inky cap mushrooms, *Coprinus comatus*.



R. M. Davis, UC

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



R. M. Davis, UC

Stinkhorn mushroom, *Phallus impudicus*.

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 is the fairy-ring mushroom, 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*, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74100.html>, provides information on managing and identifying many types of lawn mushrooms and is illustrated with photographs of 13 common species.

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

Ask the Expert!

Q Where can I find more information about exotic and invasive pest species?

A UC IPM (<http://www.ipm.ucdavis.edu/EXOTIC/index.html>), the UC Riverside Center for Invasive Species Research (<http://cisir.ucr.edu/>), and the California Department of Food and Agriculture (<http://www.cdffa.ca.gov/plant/>) provide resources about exotic and invasive pests and diseases that are posing a problem for California. This information includes pest identification, management options, and quarantine locations—when necessary—for each pest or disease problem. Additionally, you can contact a farm advisor at your local UC Cooperative Extension office. A list of local offices can be found at http://ucanr.edu/County_Offices/.

Q What light bulbs help keep nuisance insect pests away from homes?

A Insects are attracted mostly to UV light and blue light, so replace mercury vapor lights with sodium vapor ones. Low wattage yellow “bug light” bulbs are less attractive to insects than regular white bulbs. And although they don't produce much UV light, many LED lights produce blue light that attracts insects. Also don't forget about the light that might be leaking outside from your indoor lighting, which can be remedied by pulling down shades over windows at night.

Have a question? E-mail it to ucipm@ucdavis.edu.



New and Revised Pest Notes

One new Pest Note, *Indian Walking Stick*, has been released on the UC IPM Web Site, <http://www.ipm.ucdavis.edu/PDF/>

[PESTNOTES/index.html](http://www.ipm.ucdavis.edu/PDF/PESTNOTES/index.html). From this index you also can access the following 16 revised titles:

Vertebrates—House Mouse and Rats

Invertebrates—Bee and Wasp Stings, Codling Moth, Scorpions, Spider Mites, Spotted Wing Drosophila, and Yellowjackets and Other Social Wasps

Plant Diseases—Fire Blight, Lawn Diseases: Prevention and Management, Sooty Mold, and Wood Decay Fungi in Landscape Trees

Weeds—Field Bindweed, Green Kyllinga, and Kikuyugrass

Miscellaneous—Delusory Parasitosis

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Some landscape plants suffer from underwatering due to the owner's zeal to save water and money or because irrigation systems sometimes break, especially if not maintained and checked at least annually. While in severe cases this may produce wilting, sunburn, or dieback, in mild cases it simply causes a shift toward other pests and weeds.

Spider mites are fond of dry, dusty conditions, as are some diseases, such as verticillium wilt. Weeds such as black medic, prostrate spurge, birdsfoot trefoil, and prostrate knotweed may be able to establish where plants die back or gaps occur in the lawn or shrub cover. If you find you're routinely battling these pests, it is a sign that you might be able to solve your problems with just a little more water.

Poorly Adapted Species

Sometimes diagnosing improper irrigation isn't so simple. Some plants sold in the horticultural trade today are poorly adapted to most sites in California but continue to be offered by nurseries because of strong demand by the public. Birch trees are a good example of this. Birches are riparian species, that is they are adapted to streamside or boggy conditions where they have access to lots of water.

For example, birches were planted extensively in the Marin County area in the 1960's, '70s, and '80s. At first they grew in the area without a problem, in spite of the fact they were getting less water than they required and were therefore growing under continual mild drought stress.

This was a perfect situation for the bronze birch borer, *Agrilus anxius*, a beetle that's attracted to drought-stressed birches (Figure 4). It arrived in the area in the mid 1980s, and by the early '90s had killed several hundred birch trees, destroying them from the top

down and leaving telltale D-shaped exit holes in the bark. Well-irrigated trees were mostly spared, but as water rates climbed in Marin County, homeowners cut back on irrigation, and more birch trees continued to die. Landscapers were often called in at this point and asked what to do. Once the trees are damaged, additional water may help but will do little to guarantee recovery.

Group Plants with Similar Water Needs

It is possible to plant exotic high-water-use plants in California in a responsible manner, if done correctly and on a limited scale. Some sites, such as creek drainages, are naturally wet and will support water-hungry plants. However, these sites are also typically prone to flooding and aren't normally ideal building sites for a home. For homeowners wishing to incorporate high-water-use plants on a limited scale, hydrozoning may help.

Hydrozoning, or the practice of grouping plants with similar water needs into areas where they can all be watered appropriately, has been understood and employed by quality landscape designers for years. A small area hydrozoned for water-loving plants can be fire-safe, attractive, and still reasonably water efficient.

Yet these areas can and do attract their own pests. High-water-use areas typically have more problems with snails, slugs, mosquitoes, and gnats than drier areas. Some weeds such as plantain and annual bluegrass thrive in heavy water-use areas. If a landscape is experiencing problems with slugs and plantains are popping up frequently, it may be a sign that excess water is being applied—especially if that portion of the landscape isn't hydrozoned for high-water use.

Finding a balance between too much and too little water can be challenging,



B. Deller

Figure 4. Birch tree infested with bronze birch borer showing beetle emerge holes in trunk.

especially when the balance can change from one part of the garden to another depending upon soil texture, sun exposure, the plant palette, and many other factors. Nonetheless, properly managing water in the landscape is an important first step in managing pests, protecting water quality, and saving you both time and money.

—Steven Swain, UC Cooperative Extension, Marin and Sonoma Co., svswain@ucdavis.edu

University of California
Statewide IPM Program
One Shields Avenue
Davis, CA 95616-8621
Phone: (530) 752-8350
E-mail: ucipm@ucdavis.edu
Online: www.ipm.ucdavis.edu



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