Adapting and Applying the Central Tenets of IPM to Urban Landscapes



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University of California

Agriculture and Natural Resources

Statewide Integrated Pest Management Program

Making a Difference for California

Outline of presentation

- The what, why, where and who of IPM
 Central tenets of IPM
- Pest-specific IPM program outlines:
 - -Yellowjackets
 - White grubs in turf (and their vertebrate predators)
- UCCE and UC IPM resources



What's an Urban IPM Advisor?!

- Andrew Sutherland: Bay Area Urban IPM Advisor
 - Alameda, Contra Costa, San Francisco, San Mateo, Santa Clara counties
 - Structural / industrial IPM
 - Professional / commercial landscape IPM
 - Urban agricultural IPM
- amsutherland@ucanr.edu
- http://ucanr.edu/sites/urbanIPM/



Problems with pesticide use in urban areas

- Surface water, soil, groundwater contamination
- Human health concerns
- Disruption of ecosystem
- Economic costs
- Public perception



Major users of pesticides in urban areas

- General (residential) public
 - Homeowners / tenants
 - Property owners / managers
- Pest management professionals (PMPs)
- Government agencies
- Agriculture
 - Non-crop systems: ornamental nurseries
 - Urban ag systems



Central tenets of IPM

- Education
- Prevention
- Monitoring
- Treatment Thresholds
- Multiple Tactics
- Integration
- Evaluation





- Education: ID
 - Western: Vespula pennsylvanica
 - German: Vespula germanica
 - May nest in structural voids, may be more cold tolerant, may be increasing in urban areas
 - Know how to distinguish yellowjackets, paper wasps, honeybees, etc.

http://wasps.ucr.edu/waspid.html



- if yes, it is the western yellowjacket, V. pensylvanica. (There will also be a yellow blotch of pigment on the first antennal segment.)
- > if no, continue to the next step

When looking straight down on the wasp's head, is the yellow ring broken up around the eyes?

- if yes, it is the German yellowjacket, V. germanica. (Also, the first antennal segment will be completely black).
- if no, either you don't have a yellowjacket, you have a male yellowjacket, or you have a species not considered here.





• Education: life cycle



Fall: Colony declines, workers begin to die off, nest decomposes



Heavy reproduction phase

Late summer: Peak of worker population, workers become nuisance scavengers



Beginning of cycle: Fertilized queen overwinters in sheltered location



Spring: Queen establishes nest, lays eggs and begins colony

> Rodent burrow or ground hole

First workers emerge



Summer: Colony development phase, workers expand nest, queen specializes in egg production





Queens fly early during some years!

- Photo sent by Walnut Creek client
- March 10, 2014
- Queen flight usually during April





- Education
- Prevention
 - -Eliminate nesting sites
 - Rodent burrows, dense vegetation, structural voids
 - -Ensure proper sanitation
 - Use trash bags, tightly-covered trash cans
 - -Prevent stings
 - Lids on sugary drinks, don't go barefoot



- Education
- Prevention
- Monitoring
 - Spring and summer
 - Traps for queens in spring, foragers in summer
 - Active nests

Protein baits will be most effective during spring and summer; a piece of meat works great...





- Treatment Thresholds
 - Yellowjackets are important predators...
 - How many represent a problem?
 - Usually situation-specific (public areas, schools vs. natural / remote areas)
 - Nest proximity to people: threshold may be distance rather than density...
 - Nests are much easier to control early in the season



- Treatment Thresholds
- Multiple Tactics
 - Cultural tactics (see 'Prevention')
 - Physical tactics
 - Traps: proteins during spring and summer, sweets (commercial lures) during autumn
 - Nest removal (ensure proper PPE)



Trap Placement for Sting Prevention



- Treatment Thresholds
- Multiple Tactics
 - Cultural tactics
 - Physical tactics
 - Chemical tactics



- Some vector control service districts offer services (call state association at 916-440-0826)
- Direct nest treatments (ensure proper PPE!)
 - Pyrethroids
 - Oils (some may be EPA-exempt materials)



- Education
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 Thresholds
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Did anyone get stung on the property this year?

Was I able to find nests early enough?



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IPM is a problemsolving, decisionmaking process!



Problem

 Vertebrates destroying urban turf and / or landscape beds (usually late summer, autumn)









Fat, juicy grubs!

Most common and largest species is fully grown and ripe for the picking in autumn and winter



Idea: manage grubs to prevent damage due to vertebrates

No grubs = no digging = no problem



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- Education
 - Masked chafer larvae?
 - Black Ataenius larvae?
 - Billbug larvae?





- Education
 - Masked chafer larvae?
 - Black Ataenius larvae?
 - Billbug larvae?





Look Ma, no legs!



Masked chafer vs. black ataenius

- Both scarab beetles (Coleoptera: Scarabeidae)
- Size difference: MC: ~1"; BA: ~1/5" (5mm)
- BA: multiple generations / year
- MC: more common and more damaging



Masked chafer vs. black ataenius

Grubs up to <u>1</u> inch long, all same size, adults only in mid-spring



Bristles on abdomen





Grubs up to <u>1/5</u> inch long, varying sizes, adults may be present



Masked chafer biology and ecology

- Adults active May July (can be monitored via UV light traps)
- Larvae feed on roots of all turf species in CA (damage more serious on ryegrass, bluegrass)
- Overwinters as mature larva in earthen cells
- Pupates in early spring



- Education
- Prevention
 - Warm season grasses more tolerant
 - Proper irrigation
 - Thatch removal





- Education
- Prevention

Monitoring

Infestations tend to reoccur in same area / region

- Adult beetles attracted to lights (May-July)
- Cut / roll turf to expose grubs (June-...)











- Education
- Prevention
- Monitoring
- Thresholds
 - \geq 6 grubs / sq.ft. in most turf situations
 - \geq 1 grub / sq. ft. in golf course greens
 - Vertebrate predation / turf damage?



- Education
- Prevention
- Monitoring
- Thresholds
- Multiple tactics
 - Cultural
 - Biological
 - Chemical

Proper turf species selection, installation, and maintenance...



- Entomopathogenic nematodes
 - Heterorhabditis bacteriophora
 - Steinernema spp. not effective





- Entomopathogenic nematodes
 - Heterorhabditis bacteriophora
 - Steinernema spp. not effective
 - Can be used at any time during grub stage
 - May not prevent vertebrate predation
 - Check product viability (shelf life exists)
 - Ensure proper environmental conditions
 - Higher efficacy in sandier soils

- Entomopathogenic nematodes
- Tiphiid wasps
 - Common naturally-occurring larval parasitoids
 - May not reduce grubs below threshold





- Entomopathogenic nematodes
- Tiphiid wasps
- Milky spore disease (Paenibacillus spp.)
 - May offer natural control
 - Not commercially available
- Bacillus thuringiensis galleriae
 - grubGONE![™] (CA registration 2015)
 - Phyllom Bioproducts

Chemical control for white grubs

- Neonicotinoids
 - Imidacloprid
 - Thiamethoxam
 - Clothianidin



application site for specific use restrictions and instructions to protect bees and other insect pollinators.

This product can kill bees and other insect pollinators.

- Must be applied when grubs are small
- Most only work when applied just prior to egg hatch
- New EPA regs on landscape uses



Chemical control for white grubs

- Neonicotinoids
- Chlorantraniliprole (Acelepryn)
 - 'preventive and early curative'
 - Label: early April early September
- Carbaryl (Sevin)
 - Can be used against large grubs
 - Disrupts soil biota
 - May be prohibited / regulated in cases
 - Should be considered last option

| EXPERIMENTAL TREATMENTS: | | | | | | |
|--------------------------|----------------|------------------------------|--|--|--|--|
| treatment | rate applied | application dates | | | | |
| untreated control | N/A | N/A | | | | |
| grubGONE! G | 100 lbs / acre | June 28, 2016 (San Jose) and | | | | |
| based on monitoring | | June 30, 2016 (Walnut Creek) | | | | |
| grubGONE! G | 100 lbs / acre | July 11, 2016 (Walnut Creek) | | | | |
| based on calendar | | and July 15, 2016 (San Jose) | | | | |
| Acelepryn | 100 lbs / acre | June 28, 2016 (San Jose) and | | | | |
| based on monitoring | | June 30, 2016 (Walnut Creek) | | | | |
| Acelepryn | 100 lbs / acre | July 11, 2016 (Walnut Creek) | | | | |
| based on calendar | | and July 15, 2016 (San Jose) | | | | |







Error bars produced with standard error of the mean

Curative field site- well-established turf, site with chronic incidence of western masked chafer infestations and damage.

Preventative field site- newly planted turf, site with some previous incidence of western masked chafer infestation and damage.

- Education
- Prevention
- Monitoring
- Thresholds
- Multiple tactics
- Integration
 - Broad spectrum insecticides may interfere with biological control agents



- Education
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- Evaluation



Continue monitoring program





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UC&IPM Online



Statewide Integrated Pest Management Program

| What is IPM? Identify & Mar | nage Pests Research | Publications | Training & Events | Links | About Us | Contact Us | Subscribe 🔊 |
|-------------------------------|--|-------------------------------|---|-----------------------|-----------------------------|----------------------------|-------------|
| HOME | Homes, Gardens, Lan | dscapes, and | l Turf | | | | |
| ON THIS SITE | Trees, shru | bs, & w | oody orna | mer | tals | | |
| What is IPM? | | | | | | 15.00 miles | |
| Home & landscape pests | The table below list shrubs included in t | ts common, s his Web site. | cientific, and family Click on a name to | names f link to ii | or ornament nformation a | al trees and bout pests | |
| Agricultural pests | commonly found on | that plant. (| See also cultural tip | 5) | int) | | |
| Natural environment pests | ▲ = Ascending ▼ | = Descendin | g = Unsorted | Javasu | φς. | | |
| Exotic & invasive pests | Common name | ▲ Scienti | fic name | ♦ Fi | amily | | \$ |
| Weed gallery | Abelia | Abelia | spp. | С | aprifoliaceae (| Honeysuckle far | nily) |
| NT . 1 . 1 II | Abutilon | Abutilo | on spp. | N | lalvaceae (Hibi | scus family) | |
| Natural enemies gallery | Acacia | Acacia | spp. | F | abaceae (Pea | family) | |
| Weather, models & degree-days | African fern pine | Podoci | arpus spp. | P | odocarpaceae | (Podocarpus fa | mily) |
| Destal de Information | Agave | Agave | spp. | A | gavaceae (Aga | ave family) | |
| Pesticide information | Albizia | Albizia | spp. | F | abaceae (Pea | family) | |
| Research | Alder | Alnus | spp. | В | etulaceae (Bir | ch family) | |
| Publications | Algerian ivy | Hedera | a spp. | А | raliaceae (Gin | seng family) | |
| | Andromeda | Pieris | spp. | E | ricaceae (Heat | th family) | |
| Events & workshops | Angelica | Fatsia | japonica = Aralia siebo | ldii A | raliaceae (Gin | seng family) | |
| Online training | Aralia | Fatsia | japonica = Aralia siebo | ldii A | raliaceae (Gin | seng family) | |

http://www.ipm.ucdavis.edu/PMG/GARDEN/plantmenu.html

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Detailed information about certain pests can be found in the Pest Notes Library.

http://www.ipm.ucdavis.edu/PMG/menu.invertebrate.html

Q Search

UC VIPM

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UC IPM / Home, garden, turf and landscape / Plant pest diagnostic tool

Plant pest diagnostic tool



Select plant types for list of results

Reset All



Flowers



Fruit trees, nuts, berries, and grapevines



Trees and shrubs



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Plant pest diagnostic tool



Q

Leaves / Drop, cling to branches

+ Add to my list



Leaves / Ragged, tattered, crinkled, leathery UC↓IPM

0

Q Search

Plant pest diagnostic tool

Results for: trees and shrubs, india hawthorn, leaves, discolored, necrosis, chlorosis

Aphids

Collar, foot, root, and crown rot

Verticillium wilt

+ Back to diagnostics

Collar, foot, root, and crown rots-Phytophthora spp.

Several species of the *Phytophthora* fungi infect the roots or crowns of landscape plants. Plants wilt and leaves become discolored, stunted, and drop prematurely. Often a vertical streak, stain, or canker becomes visible on infected trunks. A cinnamon brown or dark gray discoloration may be seen beneath the bark. Black or reddish sap may ooze from darkened areas of infected bark. Infected mature plants grow slowly and may gradually decline. Twigs and branches die back and the entire plant can be killed.

Identification | Life cycle

Solutions

Prepare the site well before planting and provide proper irrigation. In soils that are compacted, drain poorly, or are usually damp, and where Phytophthora root rot is a problem, improve drainage and plant only species believed to be resistant.

For more information, see the Phytophthora Root and Crown Rot Pest Note.



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Branch dieback on plant with root rot



Bark cut away reveals dark discoloration

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Bee precaution pesticide rating*

UC IPM / Bee precaution pesticide rating

Guidance on how to reduce bee poisoning, based on reported pesticide effects on adults and brood of honey bees and other bee species. Ratings are for the pesticide active ingredient, the common name.**

Do not apply or allow to drift to plants that are flowering.

II Do not apply or allow to drift to plants that are flowering, except when the application is made between sunset and midnight if allowed by the pesticide label and regulations.



$\downarrow^{\scriptscriptstyle A}_z$ Common name

| X | (Example trade name) | Туре | Mode of action | Rating | Other effects | Apis brood toxicity reported | NonApis bees toxicity reported |
|---|--|-------------|----------------|--------|---------------|------------------------------|--------------------------------|
| x | 2,4-D (Clean-crop, Orchard Master) | Herbicide | 0.4 | Π | - | 4 | _ |
| x | IMIDACLOPRID (Admire, Provado) | Insecticide | 4A | Ι | FRAC3 | 4 | * |
| X | IMIDACLOPRID bait (Vitus Liquid Ant Bait) | Insecticide | 4A | III | FRAC3 | _ | _ |

| *Footnotes | ootnotes | | | | | |
|------------|---------------------------------|--|--|--|--|--|
| × Rem | nove current row from list. | | | | | |
| Į≜ Sort | ted column. | | | | | |
| ¢ Colu | umn available for sorting. | | | | | |
| - Infor | ormation not available. | | | | | |
| 🛛 Exte | ernal link. Open in new window. | | | | | |

RE

for Home and Landscape from the University of California

Birds, Mammals, and Reptiles

Bats Birds on Tree Fruits and Vines Cliff Swallows Coyote Deer Deer Mouse **Ground Squirrel** House Mouse Lizards Moles Opossum Pocket Gophers Rabbits Raccoons Rats Rattlesnakes

Carpenter Bees Carpenterworm Carpet Beetles Citrus Leafminer Clearwing Moths Clothes Moths Cockroaches Codling Moth Conenose Bugs Cottony Cushion Scale Drywood Termites Earwigs Elm Leaf Beetle Eucalyptus Longhorned Borers Eucalyptus Redgum Lerp Psyllid Eucalyptus Tortoise Beetles False Chinch Bug



Millipedes and Centipedes Mosquitoes Nematodes Oak Pit Scales Olive Fruit Fly Pantry Pests Psyllids Red Imported Fire Ant Redhumped Caterpillar Removing Honey Bee Swarms and Established Hives Roses: Insect and Mite Pests and Beneficials Scales Scorpions Sequoia Pitch Moth Silverfish and Firebrats

http://www.ipm.ucdavis.edu/PDF/PESTNOTES/index.html

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|-----------|-------|-------|-----------|---------|------|--------|----|
| Statewide | Integ | rated | Pest | Manager | nent | Progra | an |

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Exotic & invasive pests

Natural enemies gallery

Pesticide information

Weather, models & degree-days

| | UC IPM Home > Homes, Gardens, Landscape | s, and Turf > Lawn Insect | |
|---------------------------|---|---|--|
| HOME | How to Manage Pests - Pests in Gardens and Landscap | Des | |
| SEARCH | - Lawn Insects | Download PDF | |
| ON THIS SITE | Published 3/03 | Quick Tip) Nota Breve | |
| What is IPM? | In this Guideline: | | |
| Home & landscape pests | Identifying features of various lawn pests Managing lawn insects | See also UC Guide to Healthy Lawns About Pest Notes | |
| Agricultural pests | Treatment | Publication | |
| Natural environment pests | | Glossary | |

Insects are not a common cause of residential lawn damage in California, but certain species occasionally damage or kill turfgrass. Insect feeding can cause grass to turn yellow or brown, or die, especially if the grass is already stressed. Damage usually begins in small, scattered patches, which may merge into large dead areas. However, lack of proper cultural care and use of inappropriate grass species in a particular location are more likely responsible for unhealthy or dving lawns than insects. Disease-causing pathogens, excessive or inappropriate use of chemicals such as fertilizers and herbicides, and dog urine also produce damage resembling that of insects. Before taking any insect control action, be sure that it is insects causing the problem and not something else.



Brown patches of turfgrass killed by Phoenix or Phoenician billbug.

Insects that may cause damage in California lawns include various root-, crown-, and leaf-feeding caterpillars; white grubs, which are the larvae of scarab beetles such as the black turfgrass ataenius and masked chafers; billbugs, which are weevils with white, grublike larvae; and chinch bugs, which are true bugs in the order Hemiptera, Each species produces somewhat different damage symptoms and must be managed differently. Study identifying characteristics and Table 1 for damage symptoms associated with each species. In addition to the pests in Table 1, leafhoppers may occur in lawns, sometimes causing yellowing of leaf blades, but rarely occur in numbers justifying treatment. Many other insects may be observed while examining grass.

However, control is rarely or never needed for most types of insects because they are harmless or beneficial. Common beneficial insects include predatory ants, ground beetles, rove beetles, and blister beetles. Other common arthropods that are primarily decomposers and do no significant injury to turfgrass include springtails and millipedes.

IDENTIFYING FEATURES OF VARIOUS LAWN PESTS

Table 1. Some Lawn Pests, Appearance of Their Damage, and Cultural Control Methods.

| Pest (Scientific name) | Hosts | Damage appearance | Cultural control |
|---|------------------------|---|---|
| armyworms, cutworms (Mythimna (= Pseudaletia) unipuncta, Peridroma saucia, Agrotis spp.) | all grasses, dichondra | leaves and base of leaves chewed and cut beginning in small, irregular spots that can spread to patches extending many feet in width | reduce thatch; eliminate soggy areas; overseed lawn |
| billbugs (Sphenophorus spp.) | All grasses | brown, thin, dying grass, beginning in small, irregular spots that can spread to patches extending many feet in width | irrigate and fertilize adequately; increase mowing height |
| black turfgrass ataenius | annual bluegrass, | brown, dying grass, few roots; lawn is | increase mowing height; aerate to improve root |

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UC IPM Home > Homes, Gardens, Landscapes, and Turf > Notas Breves > Insectos del césped - Print HOME Notas Breves en español Insectos del césped Publicado 5/02 SEARCH Descargar PDF | English ON THIS SITE Leer más sobre esta tema What is IPM? Contrario a lo que se cree, los insectos comúnmente no causan daños al césped en California. Lo más probable que Home & landscape pests cause enfermedad y muerte es el césped mal cuidado, especialmente cuando se riega indebidamente o se usan especies de césped inadecuados. El uso indebido o excesivo de productos químicos como fertilizantes y herbicidas, la orina de perro y Agricultural pests agentes causantes de enfermedades producen daño al césped parecido al que causan los insectos. Muchos insectos que habitan Natural environment pests en el césped son benéficos. Nunca aplique un insecticida a menos que hava confirmado la presencia de una plaga en números dañinos. Los insecticidas son efectivos únicamente si se aplican de la manera y en el momento adecuados. Algunos insecticidas Exotic & invasive pests también pueden matar insectos benéficos. Weed gallery ¿Cómo saber si el daño es causado por insectos? Las larvas del gusano blanco Natural enemies gallery Las manchas pardas en el césped pueden ser el resultado de insectos, pero también pueden ser debido a riego insuficiente o (enmascarado abejorro). Weather, models & degree-days excesivo, enfermedad, uso inadecuado de productos químicos o la orina de perro. Antes de aplicar un insecticida, confirme la presencia de insectos en el césped. Para encontrar larvas de escarabajos, Pesticide information escarbe alrededor de las raíces; para otros insectos, realice la prueba de sumersión. Research Para mantener el césped en buen estado: Publications Plante especies de césped que crecen bien en su zona. **Events & training** Rieque abundantemente y con poca frecuencia. Links Mantenga en buen estado los grifos del sistema de riego. · Al fertilizar, aplique anualmente no más de 3 a 6 libras total de nitrógeno por cada mil pies cuadrados. Glossarv Cavar alrededor de las raíces para buscar larvas. Anualmente oxigene el césped y quite la paja (tallos, hojas y raíces de césped viejo) si ésta sobrepasa 1/2 pulgada de About us grosor. Contact us Al podar el césped, corte no más de 1/3 a 1/2 de su altura y mantenga afiladas las cuchillas de la podadora. Si confirma que hay suficientes insectos para causar daño: • Escoja el insecticida de acuerdo al insecto a controlar. Averigüe cuáles son los ingredientes de los insecticidas que controlan específicamente cada insecto del césped:

 El Bacillus thuringiensis (Bt) mata únicamente a orugas, incluyendo el gusano cortador o rosca, la polilla del césped y ciertas mariposas.

Larva del gusano cortador.

- Los nemátodos que atacan insectos controlan orugas y las larvas de los escarabajos.
- · El "Azadirachtin" controla gusanos cortadores, gusanos militares y larvas de la polilla del césped.

REMOVING HONEY BEE SWARMS AND ESTABLISHED HIVES

Integrated Pest Management for Home Gardeners and Landscape Professionals

Large numbers of bees swarming in a tree in your garden or around your home can be unnerving, especially if they establish a hive within your house. However, bee swarms and nests can be safely managed if you follow careful procedures and get proper help.

WHAT IS A BEE SWARM?

Swarming is the honey bee's (Figure 1) method of colony reproduction. The old queen and about half of the worker bees leave their former nest and seek a new home, usually in the spring but sometimes at other times of the year when local conditions permit. To start the process, certain worker bees, called "scouts," begin to canvas the surrounding territory for a potential new nesting site even before the swarm leaves its original colony. bees—the common honey bees in central and Northern California—are extremely docile. It takes quite a bit of stimulation, such as being hit by sticks and stones or squirted with a hose, to induce defensive behavior. The same may not be true for Africanized honey bees or for any swarm of honey bees that has run out of food, as these aren't nearly as predictable and can be very touchy, even as swarm clusters.

Honey bees will nest in cavities having a volume of at least 4 gallons but prefer cavities around 9 gallons. Honey bees also prefer dark cavities with an easily defended entrance that is at least 9 feet from the ground. Hollowed-out trees are ideal sites. However, honey bees may nest in all sorts of cavities such as inside walls of houses; in or around



Figure 1. Honey bee.



Figure 2. Bee swarm cluster on tree branch.

http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74159.html

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How to Manage Pests

Key to Identifying Common Household Ants

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This key includes the ant species that are most likely to be a nuisance around California homes and structures. Many other ant species occur in California, but most are not home invaders. References | Acknowledgment

🛛 Begin key

 Click through the key until you get to a summary screen of the ant that the key identified

Supplementary information

- · An introduction to ants
- Quick tips for identifying ants
- PDF version to print (PDF)

Already know your species? Click on an illustration below to go directly to a summary screen

| Didorous house ant | Argentine ant | Pharaoh ant | Carpenter ant |
|--------------------|-----------------------|------------------------------|---------------|
| | 1/8" long | 1/10" long | 14- 172" long |
| Pavement ant | Red imported tile ant | Southern fire ant | Thief ant |
| 3/10" long | 1/15 - 1/5" long | 1/8 - 1/4 th long | 1/32" long |

Related information

Ants Pest Note

PDF: To display a PDF document, you may need to use a PDF reader.

http://www.ipm.ucdavis.edu/TOOLS/ANTKEY/

Lawn Insects

Contrary to popular belief, insects do not commonly cause damage in California lawns. Poor lawn care, especially ill-timed watering and planting grass not suited to your yard, are more likely causes of unhealthy or dying lawns. Plant disease, excess or inappropriate use of chemicals such as fertilizer and herbicides, or dog urine also produce similar damage. Never apply an insecticide unless a damaging level of a known insect is confirmed. Insecticides are effective only if applied at the right time and in the right manner. Many insecticides also kill good bugs—use them only as a last resort.

Keep your lawn healthy

- Plant grass species that will do well in your area.
- · Over-seed thin areas in the spring and fall.
- Water deeply and infrequently.
- Perform routine maintenance on sprinkler heads.
- Apply fertilizer appropriately.
- Aerate your lawn annually; remove thatch if it exceeds ½ inch.
- Cut only ½ of grass height at each mowing and keep lawnmower blades sharp.

How do you know if insects are causing damage?

- Brown spots in lawns also can be caused by over- or under-watering, plant disease, a fertilizer/herbicide spill or over-application, or dog urine.
- Confirm that insects are present at numbers high enough to cause damage before applying an insecticide.
- For grubs, dig around roots. A few grubs will not do serious damage, but 6 or more per square foot can.
- For other insects, perform a drench test as described on reverse.
- If you do not find live pest insects at high levels. do not treat with chemicals.

insectos del césped

Contrario a lo que se cree, los insectos comúnmente no causan daños al césped en California. Lo más probable que cause enfermedad y muerte es el césped mal cuidado, especialmente cuando se riega indebidamente o se usan especies de césped inadecuados. El uso indebido o excesivo de productos guímicos como fertilizantes y herbicidas, la orina de perro y agentes causantes de enfermedades producen daño al césped parecido al que causan los insectos. Muchos insectos que habitan en el césped son benéficos. Nunca aplique un insecticida a menos que haya confirmado la presencia de una plaga en números dañinos. Los insecticidas son efectivos únicamente si se aplican de la manera y en el momento adecuados. Algunos insecticidas también pueden matar Insectos benéficos

¿Cómo saber si el daño es causado por insectos?

- Las manchas pardas en el césped pueden ser el resultado de insectos, pero también pueden ser debido a riego insuficiente o excesivo, enfermedad, uso inadecuado de productos químicos o la orina de perro.
- Antes de aplicar un insecticida, confirme la presencia de insectos en el césped. Para encontrar larvas de escarabajos, escarbe alrededor de las raices, para otros insectos, realice la prueba de sumersión.

Para mantener el cesped en buen estado:

- Plante especies de césped que crecen bien en su zona.
- Riegue abundantemente y con poca frecuencia.
- Mantenga en buen estado los grifos del sistema de riego.
- Al fertilizar, aplique anualmente no más de 3 a 6 libras total de nitrógeno por cada mil ples cuadrados.
- Anualmente oxigene el césped y quite la paja (tallos, hojas y raices de césped viejo) si ésta sobrepasa 1/2 pulgada de grosor.
- Al podar el césped, corte no más de 1/3 a 1/2 de su altura y mantenga alitadas las cuchillas de la podadora.

If there is a damaging number of insects:

- First see if you can alter your lawn environment to discourage the pest.
- If an insecticide is required, select the least toxic product available for the pest you are targeting.
- Find out which insecticide targets your specific lawn insect:
 - Bacillus thuringiensis (Bt) and spinosad are least toxic pesticides that kill caterpillars.
 - Insect-attacking nematodes reduce caterpillars or grubs.
 - Azadirachtin controls cutworms, armyworms, and larvae of lawn moths.
 - Imidacloprid is effective against young lawn grubs.
 Avoid products containing carbaryl and
 - pyrethroids (e.g. bifenthrin). These are broadly toxic insecticides that kill chinch bugs, grubs, lawn moths, and cutworms, but also kill beneficial insects and impair water quality.

How to Perform a Drench Test

- Mix 3-4 tblsp of dishwashing liquid to 2 gal of water.
 Evenly apply the 2 gal to 1 sq yrd of your lawn.
- . Watch the area for 10 min and count the number of
- enterpillars that rise to the surface.
- Treat the area only if insect numbers exceed 5 army-
- worms or cutworms or 15 lawn moths per sq yrd.



Minimize the use of pesticides that pollute our waterways. Use nonchemical alternatives or less toxic pesticide products whenever possible. Read product labels carefully and follow instructions on proper use, storage, and disposal.

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 the UC IPM Web site at www.ipm.ucdavis.edu.



University of California Cooperative Extension

What you use in your garden affects our creeks, rivers, and oceans!

HOME

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What is IPM?

Home & landscape pests

Agricultural pests

Natural environment pests

Exotic & invasive pests

Weed gallery

Natural enemies gallery

Weather, models & degree-days

Pesticide information

Research

Publications

Events & training

Links

Glossary

About us

Contact us

Pesticide active ingredients database

Search home and garden:

Pesticides should be used only as a last resort to manage home, garden and landscape pest problems. If you must use a pesticide, choose the least toxic yet most effective product that targets the pest but does not also kill natural enemies or other animals.

Go

For the best information on what pesticides or other pest management methods are most appropriate for a specific pest, type the pest name in the "Search home and garden" box and read the appropriate Pest Notes or other informational screens.

Below is a partial list of pesticides available for home, garden, and landscape use that are included in one or more UC IPM Pest Notes. Each links to a screen providing information on pesticide type, hazards to people, water quality, honey bees and natural enemies, as well as other precautions and tips. These screens also include example home and garden products containing each active ingredient.

For more detailed information on pesticide safety and safety of individual products, go to the National Pesticide Information Center web site at http://npic.orst.edu/gen.htm.

LANDSCAPE AND GARDEN PESTICIDES

View pesticides by category | View pesticides by name

| Insectides & Miticides | Herbicides | Fungicides & Bactericides | Molluscicides |
|---------------------------|------------------------------|----------------------------|----------------|
| abamectin | 2,4-D | Bacillus subtilis | iron phosphate |
| acephate | benefin | Bordeaux mixture | metaldehyde |
| allethrin | bensulide | chlorothalonil | |
| arsenic trioxide | bentazon | copper ammonium complex | |
| azadirachtin | bromoxynil | copper hydroxide | |
| Bacillus thuringiensis | cacodylic acid | copper octanoate | |
| Beauveria bassiana | calcium acid methanearsonate | copper oxychloride sulfate | |
| bifenthrin | carfentrazone | cupric hydroxide | |
| borate | chlorsulfuron | fosetyl-al | |
| canola oil | clethodim | horticultural oil | |
| carbaryl | DCPA | jojoba oil | |
| clothianidin | dicamba | mancozeb | |
| cryolite | dichlobenil | myclobutanil | |
| cyfluthrin | dimethenamid-P | neem oil | |
| diflubenzuron | diquat | phosphorous acid | |
| dinotefuran | dithiopyr | potassium bicarbonate | |
| disulfoton | EPTC | resmethrin | |
| emamectin benzoate | fluazifop | soap | |
| fipronil | fluroxypyr | sulfur | |
| fluvalinate | foramsulfuron | thiophanate methyl | |
| horticultural oil | glufosinate | tribasic copper sulfate | |
| hydramethylnon | glyphosate | triforine | |
| imidacloprid | halosulfuron | | |





About the pesticide database

OF CALIFORNIA ADDICULTORS & HATVERS SEADLINES

UC IPM Online

Contact us

| Statewide Integrated Pest M | anagement Program | | | | | | | | | | |
|-------------------------------|---|---|-------------------------|--------------------|------------------------|---|--|--|--|--|--|
| HOME | How to Manage Pesticide Info | Pests ormation | | | | | | | | | |
| n. Altera | About Pesticide Information | | | | | | | | | | |
| SEARCH | Active ingree | Active ingredient: Azadirachtin | | | | | | | | | |
| ON THIS SITE | Pesticide type: insecticide (botanical) | | | | | | | | | | |
| What is IPM? | See example prod | ucts below. | | | | | | | | | |
| Home & landscape pests | Potential Hazard ¹ to | | | | | | | | | | |
| Agricultural pests | 2 | | | People a | nd Other Mamma | Is | | | | | |
| Natural environment pests | (aquatic wildlife) | (beneficials) | Honey bees ³ | Acute ⁴ | Long Term ⁵ | | | | | | |
| Exotic & invasive pests | M | LM | M | VL | Not listed | 3 | | | | | |
| Weed gallery | and Contactor | | and the second | | | | | | | | |
| Natural enemies gallery | Acute Toxicity | Acute Toxicity to People and Other Mammals ⁴ | | | | | | | | | |
| Weather, models & degree-days | Toxicity rating | : Not Acutely Too | kic | | | | | | | | |
| Pesticide information | Long-Term Top | Long-Term Toxicity to People and Other Mammals ⁵ | | | | | | | | | |
| Research | • On US EPA lis | On US EPA list: Not listed; | | | | | | | | | |
| Publications | On CA Proposition 65 list: Not listed | | | | | | | | | | |
| Events & training | Water Quality Rating ² | | | | | | | | | | |
| Links | Overall runoff risk rating: Moderate | | | | | | | | | | |
| Glossary | Source: Pestic | ide Choice: Best Ma | anagement Prac | tice for Pro | tecting Surface Wat | er Quality in Agriculture, UC ANR Publication 8161. | | | | | |
| About us | Impact on Nat | ural Enemies | | | | | | | | | |

- Overall toxicity rating: Low To Moderate
- Specific impacts: predatory mites (Moderate), parasitoids (Low To Moderate), general predators (Low To Moderate)

Impact on Honey Bees³

• Toxicity category: III - Apply only during late evening, night, or early morning

Pests for which it is mentioned in Pest Notes

Biological Control and Natural Enemies . Elm Leaf Beetle . Lace Bugs . Lawn insects . Psyllids

Precautions and Safety Equipment

| AGRICULIUKE & NATURAL RESOURCES | |
|--|---|
| PM | |
| Pest Management Program | |
| ge Pests Research Publications Training & Events Links About Us | Contact Us Subscribe & |
| Homes, Gardens, Landscapes, and Turf | PRINT |
| Resources for landscape professional | ls |
| | |
| Newsletters | |
| Green Bulletin, a quarterly newsletter for landscape and structural pest management professionals | A A A A A A A A A A A A A A A A A A A |
| Online training | |
| These programs for pesticide applicators offer DPR continuing | 1/19 |
| education credit. | |
| Orban Pesticide Runoff and Mitigation for Pest Management Professionals | |
| Pesticide Application Equipment and Calibration | |
| Exam preparation | |
| Maintenance Gardener Pesticide Applicator Exam Preparation (includes online training program and study guides) | |
| Study Guide for Landscape Pest Control Pesticide Applicator | A Startes |
| exam | |
| Other publications and tools | |
| Seasonal Landscape IPM Checklist (A regional decision-making | and metter |
| tool to help guide landscape professionals through the activities needed to implement an IPM program throughout the year.) | UC Statewide IPM Program |
| | © 2003 Regents, University of California |
| | Performance Performance Performance Research Publication Training & Events Links About Us Performance Research Publications Training & Events Links About Us Performance Gardens, Landscapes, and Turf Homes, Gardens, Landscapes, and Turf Descources for landscape professionals Newsletters • Green Bulletin, a quarterly newsletter for landscape and structural pest management professionals Ohine training • Besprograms for pesticide applicators offer DPR continuing education credit. • Urban Pesticide Runoff and Mitigation for Pest Management professionals • Pesticide Application Equipment and Calibration • Pesticide Application Equipment and Calibration • Pesticide Application Equipment and study guides) • Study Guide for Landscape Pest Control Pesticide Applicator exam • Study Guide for Landscape Pest Control Pesticide Applicator • Study Guide for Landscape and gardens • Study Guide for Landscape and gardens • Study Guide for Landscape and gardens • Study Calibrations and Loops • Seasonal Landscape IPM Checklist (A regional decision-making tool to help guide landscape professionals through the activities needed to implement an IPM progra |

Information for pest management professionals and pesticide applicators

University of California Agriculture and Natural Resources Vol. 3 • No. 4 • August 2013

Neonicotinoid Insecticide Use Under Increasing Scrutiny

Creen Bulletin

Tight new regulations being imposed by European Union authorities and a widely publicized mass die-off of native pollinators in Oregon (see page 3) have recently brought neonicotinoids to the public's attention. Neonicotinoid insecticides are increasingly being scrutinized by regulators and the public alike throughout the world.

First developed in the late 1980s, neonicotinoids represented the first new class of insecticides in over 50 years. They are nervous-system toxins widely used in agricultural, horticultural, veterinary, and structural settings for broad-spectrum management of pest insects. Desirable qualities such as reduced toxicity to humans and pets (as compared to some organophosphates and carbamates) and systemic activity in plants led to rapid and widespread use. Imidacloprid, the first neonicotinoid developed, is now the most widely-used insecticide in the world. (See Table 1 for other active ingredients and common product names.)

From the beginning, it was recognized that foliar applications of neonicotinoids were quite broad in activity and would have negative impacts on beneficial insects. However, the high water-solubility and antirent mental persistance of perpiseting ide ment that applications



S.H. DREISTADT, UCIPM

UC IPM / Home, garden, turf and landscape / Seasonal Landscape IPM Checklist

Seasonal Landscape IPM Checklist

A monthly guide to help landscape professionals, gardeners, and others use integrated pest management (IPM) to avoid and manage common pests of landscape trees, shrubs, and vines.

Select your region or county. Then select the elevation of interest (low elevation is less than 2,000 feet/high elevation is greater than 2,000 feet) to view a monthly list of actions to keep landscapes healthy, common pest problems to look out for, and links to more information.

Get an automated monthly email by subscribing.

View by county View by region S Α Κ Amador (low elevation / high elevation) Kern (low elevation / high elevation) Sacramento В Kings San Joaquin Butte (low elevation / high elevation) Shasta (low elevation / high elevation) Μ Madera (low elevation / high elevation) С Solano Calaveras (low elevation / high elevation) Mariposa (low elevation / high elevation) Stanislaus Colusa Merced Sutter E Ν Т Nevada (low elevation / high elevation) El Dorado (low elevation / high elevation) Tehama (low elevation / high elevation) р Tulare (low elevation / high elevation) Fresno (low elevation / high elevation) Placer (low elevation / high elevation) Tuolumne (low elevation / high elevation) G Υ Glenn (low elevation / high elevation) Yolo Yuba (low elevation / high elevation)

UC IPM / Home, garden, turf and landscape / Seasonal Landscape IPM Checklist

Seasonal Landscape IPM Checklist

A regional decision-making tool to help guide landscape professionals, gardeners, and others through the activities needed to implement an IPM program throughout the year.

| <u>Central Sierra</u> | <u>Northern San Joa</u> | quin Valley | Sacramento Valle | sout | hern <mark>S</mark> an Joac | <u>uin Valley</u> | | | | |
|--|---|-----------------------|----------------------|----------------|-----------------------------|-------------------|-------------------|-----------------|--------------------|------------------|
| Amador (low elevation) / Butte (low elevation) / Colusa / El Dorado (low elevation) / Glenn (low elevation) / Nevada (low elevation) / Placer (low elevation) / Sacramento / Shasta (low elevation) / Solano / Sutter / Tehama (low elevation) / Yolo / Yuba (low elevation) | | | | | | | | | | |
| — — — | | | | | | | | | | — – |
| 🗆 Jan 🗹 | Feb 🗌 Mar | □ Apr | 🗆 May | 🗆 Jun | L Jul | 🗆 Aug | 🗆 Ѕер | □ Oct | □ Nov | □ Dec |
| Subscribe to month | y email checklist: your- | email@organizat | ic Subscribe | | | | | | | Print friendly |
| 🖬 February | | | | | | | | | | |
| Abiotic Disorder | rs - Prevent or manage | damage, such a | s that caused by aer | ration deficit | , frost, hail, he | rbicides, wind, | and too much or | little water. | | |
| Ants - Manage around landscape and building foundations, such as using insecticide baits and trunk barriers. | | | | | | | | | | |
| Asian citrus psyllid - Look for it and if found where not known to occur report it and other new or exotic pests to your local county agricultural commissioner. | | | | | | | | | | |
| Carpenter bees - Paint or varnish and seal wood in which they nest. If intolerable, treat tunnels during fall or early spring. | | | | | | | | | | |
| Compost - Turn and keep it moist. Cover during rainy weather if needed to avoid sogginess. | | | | | | | | | | |
| Continue rainy-season prevention of diseases, earwigs, snails and slugs, and weeds. | | | | | | | | | | |
| Deter borers in fruit and nut trees e.g., paint trunk and scaffolds with white interior latex paint diluted with an equal amount of water. | | | | | | | | | | |
| Fire blight - Look for oozing and dead limbs on pome plants such as apple, crabapple, pear, and pyracantha. If a problem in the past, apply blossom sprays to prevent new infections. | | | | | | | | | | |
| Frost - Protect sensitive plants from cold injury when freezing or frost are predicted. | | | | | | | | | | |
| Grape diseases - Monitor for powdery mildew, Eutypa dieback, Phomopsis cane and leaf spot, and others. Prune, remove, or treat as appropriate. | | | | | | | | | | |
| Implement disease and insect control for apple, pear, stone fruits, nut trees, and deciduous landscape trees and shrubs such as roses. | | | | | | | | | | |
| <u>Irrigation</u> - Adju deeply but infre | ust watering schedules equently if the winter is | according to the dry. | weather and plants | changing n | eed for water. | Reduce irrigation | on frequency or t | urn off systems | if rainfall is ade | equate. Irrigate |



www.youtube.com/channel/UCDsO-0Vo5zpJk575nKXgMVA

http://www.youtube.com/user/UCIPM



http://www.youtube.com/watch?v=PJHKA-Fre0k

Landscape Pest ID Cards from the University of California



Provide a quick field reference

✤ 80 common insects and mites
 ✤ 40 diseases
 ✤ 20 beneficial insects
 ✤ least toxic management
 options
 ✤ 46 pocket-size cards
 � 211 color photos









Professional Landscape Managers Calendar

San Bruno CAPCA ED Seminar Date: February 21, 2013

Date: 1 60/08/ 21, 2015

CAPCA ED is the premier provider of continuing education (CE) training for California PCAs, QALs, QACs, Private Applicators, Arborists, and other Licensed & Certificate Holders. Andrew will deliver an educational presentation entitled 'What does IPM look like in urban settings?'

Thanks!...Questions?

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