

HEALTHY SCHOOLS ACT REQUIREMENTS

FOR SCHOOLS AND CHILD CARE CENTERS

Identify school designee

- choose a person (at the center, school, or district level) to make sure the requirements of the Healthy Schools Act (HSA) are met
 - also known as the Integrated Pest Management (IPM) Coordinator
-

NEW as of January 1, 2015:

- create an IPM plan using the template for an IPM plan provided by the Department of Pesticide Regulation (DPR); or get your IPM plan approved by DPR
 - post the IPM plan on the center, school, or district Web site; if you do not have a Web site send the IPM plan to all parents, guardians, and staff with the annual written notification
 - the IPM plan must be available to view in the center or school office
 - the Web site for the IPM plan must be included in the annual written notification
 - the template for an IPM plan will be available on the DPR School IPM Web site¹ by January 2015
-

NEW

Develop an IPM plan*

Provide annual written notification*

- send all parents, guardians, and staff a written notification of pesticide products expected to be applied at schools and child care centers (schoolsites) during the year
 - provide product name, active ingredient, Web site for the IPM plan, and the DPR School IPM Web site
 - the notification must also inform parents, guardians, and staff that the IPM plan is available to view in the center or school office
 - if you hire a pest control business, include any pesticides they may use
 - if a product not included in the annual notification is used, give written notification to all parents, guardians, and staff at least 72 hours before application
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Establish individual notification registry*

- allow all parents, guardians, and staff the opportunity to register to be notified before each pesticide application
 - notify everyone on the registry about individual pesticide applications at least 72 hours before each application
 - provide product name, active ingredient, and intended date of application
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Post warning signs*

- post warning signs at each area where pesticides will be applied so that they are visible to anyone entering the area
 - post signs at least 24 hours before and leave up at least 72 hours after an application
 - signs must read "*Warning-Pesticide Treated Area*" and include product name, manufacturer's name, U.S. EPA registration number, scheduled date and areas of application, and reason for application
-

¹Visit DPR's School IPM Web site: www.cdpr.ca.gov/schoolipm/ for more detailed information about the Healthy Schools Act (HSA), as well as sample forms for meeting the requirements of the HSA.

Keep records*

- keep records of all pesticide applications for four years at each schoolsite
 - records must include product name, manufacturer's name, U.S. EPA registration number, date and areas of application, reason for application, and amount used
 - make records available to the public when requested
-

NEW

Send pesticide use reports to DPR*

NEW as of January 1, 2015:

- send pesticide use reports for pesticide applications made by schoolsite employees
 - to DPR annually or more frequently
 - submit reports no later than January 30 for the previous year (for example, submit your 2015 reports no later than January 30, 2016)
 - use the DPR form HSA-118 (Pesticide Use Reporting For School And Child Care Employees) which will be available on the DPR School IPM Web site in January 2015
 - **DO NOT** submit pesticide use reports for pesticides applied by contractors; they will submit their reports to DPR
-

Don't use prohibited pesticides

- pesticides with inactive registrations or that are on the *List of Pesticide Products Prohibited from Use in Schools and Child Care Facilities* cannot be used on schoolsites
 - this list is posted on the DPR School IPM Web site
 - always check this list prior to using a new pesticide product
 - check the DPR product database at www.cdpr.ca.gov/docs/label/labelque.htm before using old products to verify that the registration is still active
-

NEW

Complete IPM training

NEW as of July 1, 2016:

- take a DPR-approved training course before applying pesticides, and renew annually
 - the list of DPR-approved courses meeting this requirement will be available on the DPR School IPM Web site in spring 2016
 - this training is required for the IPM coordinator and anyone who will apply pesticides (including disinfectants) at the schoolsite
 - the training must focus on schoolsite IPM and the safe use of pesticides in relation to the unique nature of schoolsites and children's health, and is in addition to the required annual pesticide safety training
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*The HSA exempts certain types of reduced-risk pesticides from the IPM plan, notification, posting, recordkeeping, and reporting requirements. These reduced-risk pesticides include self-contained baits or traps, gels or pastes used for crack-and-crevice treatments, antimicrobials, and pesticides exempt from registration under the Federal Insecticide, Fungicide, and Rodenticide Act (Education Code Section 17610.5)). To determine whether a product is exempt, or not, read the label carefully, and consult DPR's *Exempt Pesticides Worksheet* on the DPR School IPM Web site.

Pesticide

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WHAT YOU SHOULD KNOW ABOUT PESTICIDES



California Department of Pesticide Regulation

1001 I Street
P.O. Box 4015
Sacramento, CA 95812-4015
916-445-4300
www.cdpr.ca.gov

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What is a pesticide?

Pesticides are unique among toxic substances. Most environmental toxins are an unwanted by-product of another process (for example, outflow from a manufacturing plant or emissions from an automobile engine). Pesticides are chemicals designed to be harmful to a target pest and purposely introduced into the environment to do their job of managing insects, bacteria, weeds, rodents, or other pests.

Farmers use pesticides to control the pests that can destroy or damage food and other crops. Health agencies use pesticides to combat insects and other organisms known to carry disease (like West Nile virus). Hospitals use disinfecting pesticides to destroy viruses and other "germs" on floors and equipment. Many of us use pesticides to control pests in our homes and gardens.

Because most pesticides are designed to be toxic to their target pest—and because any substance can be harmful if used improperly—pesticide use is strictly controlled. The Department of Pesticide Regulation (DPR) protects human health and the environment by regulating pesticide sales and use and by fostering reduced-risk pest management. Pesticides must be registered

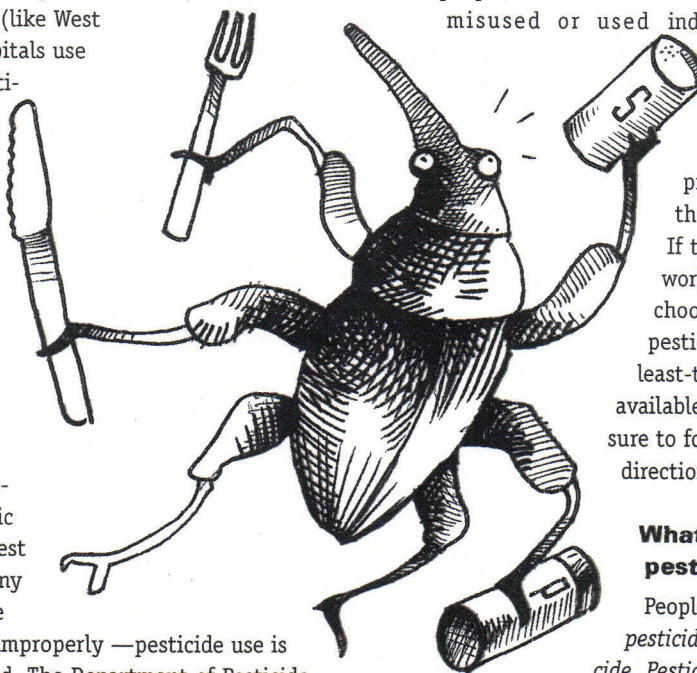
with both the U.S. Environmental Protection Agency and DPR before they can be sold or used in California. DPR will not allow any pesticide to be registered unless it determines it can be used safely. DPR's strict oversight also includes environmental monitoring, residue testing of fresh produce, licensing of pesticide professionals, strict rules to protect workers and consumers, and local use enforcement administered by the county agricultural commissioners.

While pesticides can be useful, they can also harm people, animals or the environment if misused or used indiscriminately.

That is why the most desirable pest control is to prevent pests in the first place. If that doesn't work and you choose to use pesticides, use the least-toxic product available and make sure to follow the label directions carefully.

What is a pesticide?

People often think pesticide means insecticide. Pesticide refers to not only insecticides but many other kinds of chemicals. Under state and federal law, a pesticide is any substance intended to control, destroy, repel, or attract a pest.



California also regulates adjuvants as pesticides. This class of chemicals is exempt from federal licensing but must be registered in California. Adjuvants are emulsifiers, spreaders, and other compounds added to improve the effectiveness of a pesticide.

What is a pest?

Any living organism that causes damage or economic loss or transmits or produces disease may be the target pest. Pests can be animals (like insects or mice), unwanted plants (weeds), or microorganisms (like plant diseases, bacteria and viruses).

Do household products contain pesticides?

Many household products are pesticides, including cockroach sprays, mosquito repellents, rat baits, kitchen and bath disinfectants, products that kill mold and mildew and many lawn-and-garden and swimming pool chemicals.

What about pest control devices?

State law requires specific types of pest control devices to be registered by DPR. The devices that require registration are those that control wood-destroying insects including termites, carpenter ants and powder post beetles. Devices are defined as "any method, instrument, or contrivance intended to be used to prevent, eliminate, destroy, repel, attract, or mitigate any wood-destroying pest."

Exempt from registration are devices that claim to control wood-decaying fungi, general household pests such as cockroaches, and vertebrate pests such as rats and mice.

Pesticides, equipment used to apply pesticides, and firearms are not considered devices.

Are consumer products treated with pesticides regulated?

Many products, ranging from toothbrushes to children's toys, are treated with antimicrobial pesticides to get rid of bacteria. The pesticides are usually added to the product during manufacture (for example, plastic shower curtains), but may be added afterwards (for example, mixing a mold-preventing pesticide into paint).

If a treated product makes public health claims—that is, it claims to "fight germs," or "control fungus"—the article must be

registered as a pesticide. If no public health claims are made, the product is exempt from federal or state regulation.

In either instance, the product label must make clear that the benefits of pesticide treatment do not extend beyond the article itself. Products like sponges or cutting boards, used in the kitchen or other areas where disease-causing organisms may be present, can give the false impression that the treated article provides extended protection against food-borne and disease-causing bacteria. Therefore, the law requires that the label make clear the treatment is to protect the article, not to prevent infection of people or animals with bacteria or other microbes.

What substances are not regulated as pesticides?

California's definition of pesticides is broad, but does have some exclusions:

- Over-the-counter and prescription treatments for head lice, which are regulated by the U.S. Food and Drug Administration.
- Cosmetics and similar products (including antibacterial soaps and lotions, and antifungal creams) intended to be applied to the human body.
- Fertilizers, nutrients and other substances used to promote plant survival and health.
- Biological control agents, except for certain microorganisms. (Biological control agents include beneficial predators such as birds or ladybugs that eat insect pests.)
- Certain products which contain low-risk ingredients, such as garlic and cedar. (California exemptions differ from those at the federal level. For more information, go to www.cdpr.ca.gov, click on "A-Z Index," then, "Section 25b - Exempted pesticide products.")

Want more information?

Go to DPR's Web site, www.cdpr.ca.gov.

Some common pesticides include

- Insecticides
- Herbicides
- Rodenticides
- Repellents
- Disinfectants
- Fungicides
- Wood preservatives
- Pheromones
- Attractants
- Plant growth regulators



Single copies of this handout are available by calling your County Agricultural Commissioner's office, from DPR at 916-445-3974, or can be downloaded from DPR's Web site, www.cdpr.ca.gov, "Consumer Fact Sheets."

Pesticide Complaint?

1-87PestLine
INFORMATION LINE

1-877-378-5463



Pesticide

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WHAT YOU SHOULD KNOW ABOUT PESTICIDES

Read the label first!

The most valuable time spent in pest control is the time you take to read the pesticide label. Labels tell you:

- How to *use* a product so it works like it should and doesn't hurt you, anyone else, or the environment.
- How to *store* the product safely.
- How to give first aid.
- Where to call for help or more information.

Label information helps you get maximum benefits from the pesticide at minimum risk. Reading the label saves money! It helps you buy the right product, buy the right amount for your needs, and use the right amount for the job.

Before you buy, read the label. Is the pest problem you have on it? Is the plant or place you want to use it on the label? Read the label again before using the pesticide, and every time you use it. How do you mix it? How is it applied? What do you need to do to protect yourself and others?

Take time to look at the whole label. Don't trust your memory. Label instructions can change. Using pesticides contrary to the label is illegal, may make the

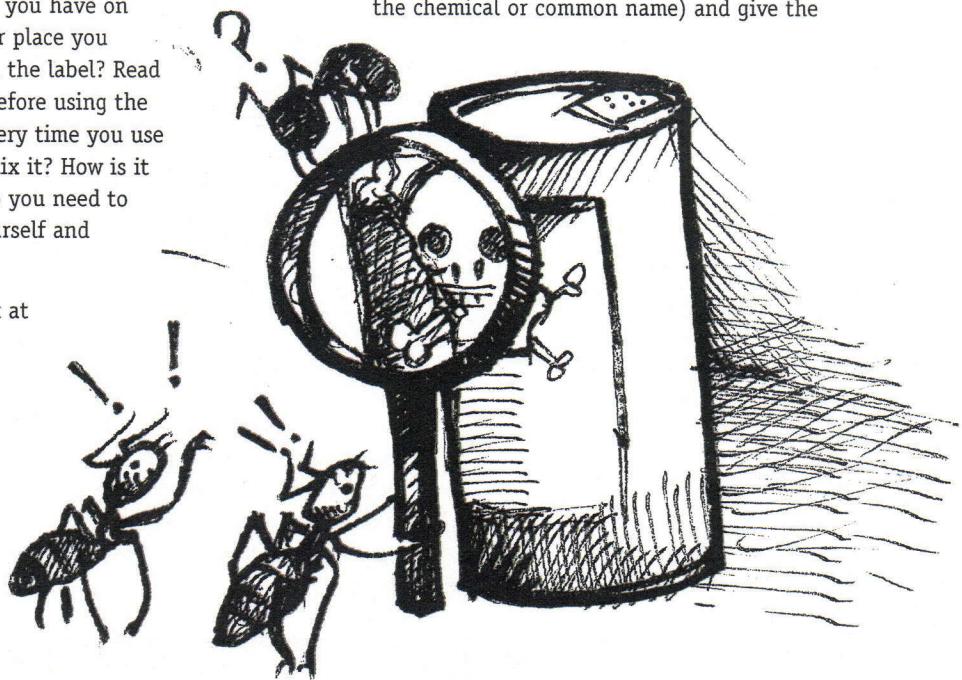
product ineffective and, even worse, dangerous. A pesticide product label includes:

Common name and brand name

Some pesticides have "**common names**" that are easier to recognize than chemical names. For instance, carbaryl is the common name for the compound whose chemical name is 1-naphthyl N-methylcarbamate. Common names are generic and non-proprietary. Several companies may sell products with the same active ingredient using different "**brand names**"; the labels will have the same chemical or common name.

Ingredients

The "**active ingredient**" is the part of the product that kills or inhibits the target pest. The label must list the active ingredient (either the chemical or common name) and give the



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LABELS TELL YOU:

How to use a product safely and effectively.



How to store the product safely.



First aid instructions.



Phone numbers to call for help or more information.

percentage by weight. "Inert ingredients," also called "other ingredients," are intentionally included in the product but not for their effect on the pest. They include solvents, emulsifiers, wetting agents and diluting substances. They are not necessarily chemically inert, and may have toxic properties. Inert ingredients do not need to be specified but their percentage must be listed.

EPA registration number

This number tells you that U.S. EPA has reviewed the product and found it can be used without risk if you follow the directions on the label properly. Don't buy or use any pesticide product that doesn't have an EPA registration number.

Signal words

Labels use three signal words, **Danger**, **Warning**, or **Caution**, to show a product's potential for making you sick if it isn't used correctly.

"Caution" appears on products that are least harmful to you.

"Warning" means a product is more harmful than one with a "Caution" label.

"Danger" means a product is poisonous or corrosive and should be used with extreme care.

Whatever the signal word, always follow the label instructions. Any substance—whether a pesticide, household cleaner, or over-the-counter medication—can be dangerous if not used correctly.

Precautionary statements

Besides the signal word, pay close attention to any warnings in the "Precautionary statements." This section tells you about special precautions you should take. For example, you may need to wear long sleeves and pants, gloves, goggles, or other protective clothing and equipment. This is where you also find any extra protections needed for children or pets.

Pesticides can be useful but wrong or careless use can cause environmental damage. The label lists several ways to protect the environment. Follow these instructions to avoid harming beneficial insects (for example, bees), damaging nearby desirable plants, or polluting ground or surface water (with irrigation runoff or drift from treated areas).

First aid

If swallowing or inhaling the product or getting it in your eyes or on your skin could be harmful, the label will give you first aid instructions. The instructions are not a substitute for medical advice or treatment. **ALWAYS** call a doctor or a Poison Control Center (1-800-222-1222) for advice if you think pesticides made someone sick. When you call, try to have the pesticide container with you.

Most labels do say what the symptoms of pesticide illness are. To get this information, call the National Pesticide Information Center (1-800-858-7378) or your regional Poison Control Center (1-800-222-1222).

Directions for use

This section tells you how to use the pesticide. You should make sure the pest you are trying to control is listed. This is your assurance that you are not wasting time and money on something that won't work. This section also tells you how much to use, and where, how and when you should apply the product. Always read and follow label directions. Be sure the pesticide is the right one for your pest problem—then use only the amount needed and no more.

Storage and disposal

Look here to find out how to store and dispose of leftover pesticide and empty containers safely. State or local laws may be stricter than federal requirements on the label. If you can't finish using a pesticide, check with your local solid waste management authority, environmental health department or county agricultural commissioner to find out if your community has a household hazardous waste collection program. You can also call 1-800-CLEANUP or go to www.cleanup.org for this information. Get the county agricultural commissioner's phone number in your local white pages under county government headings, or by calling 1-877-378-5463 (1-87PestLine). You can also get the commissioner's number on DPR's Web site, www.cdpr.ca.gov, and find more tips and information on safe pesticide use.



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WHAT YOU SHOULD KNOW ABOUT PESTICIDES

Buy less, lock it away, and dispose with care



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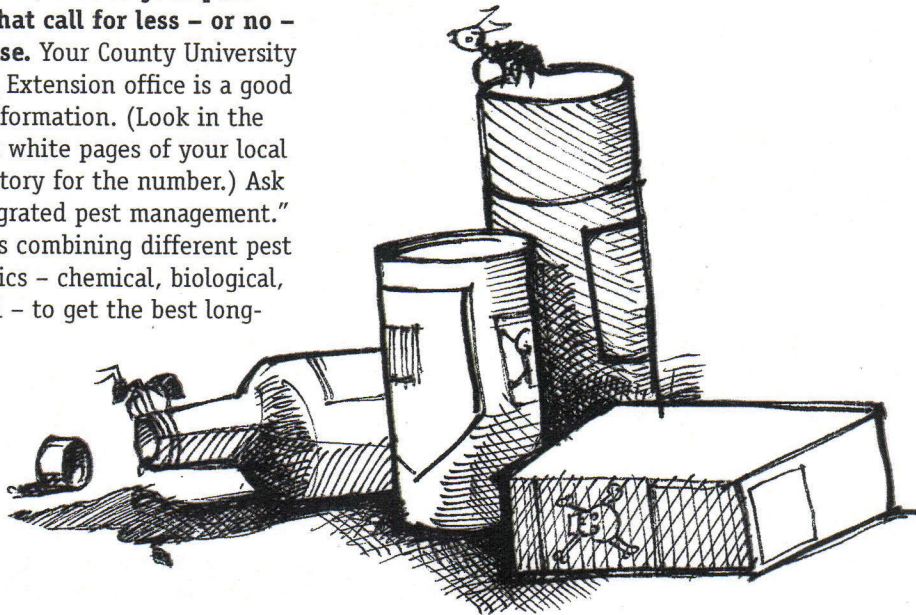
Storing pesticides safely

Improper pesticide storage and disposal can be dangerous to the health of you, your family and pets, and can harm the environment. To be safe, follow these recommendations:

- **Don't stockpile.** Buy only enough pesticide to carry you through the use season. Consider ready-to-use products rather than concentrated solutions. Although they are more expensive per use, these products may be more practical if all you need is a limited amount of pesticide. Pesticides lose effectiveness over time. And you reduce storage problems.
- **Look into solutions to your pest problems that call for less – or no – pesticide use.** Your County University Cooperative Extension office is a good source of information. (Look in the government white pages of your local phone directory for the number.) Ask about "integrated pest management." IPM involves combining different pest control tactics – chemical, biological, and cultural – to get the best long-

term results with the least disruption to the environment. It focuses on preventing pest problems in the first place so you don't need to use pesticides.

- **Follow all storage instructions** on the pesticide label.
- **Always store pesticides in their original containers.** The label has important information, including ingredients, directions for use, and first aid in case of accidental poisoning. Never transfer pesticides to soft drink bottles or other containers. Children or others can mistake them for something to eat or drink.



A pesticide label has important information, including ingredients, directions for use, and first aid in case of accidental poisoning.

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Never transfer pesticides to soft drink bottles or other food containers. Children or others can mistake them for something to eat or drink.

- **Transparent tape applied over labels helps keep them legible.** If you can't tell how old a container is or identify its contents, follow the advice on safe disposal in this handout.
- **Store pesticides out of reach of children and pets.** The best place is in a locked cabinet in a well-ventilated utility area or garden shed. Never store pesticides in cabinets near food, animal feed or medical supplies. Cap and put away pesticides immediately after each use.
- **"Child-resistant" packaging does not mean "child-proof."** You still must store pesticides properly, out of children's reach. Be sure to close containers tightly.
- **Store flammable liquids outside your living area** and away from ignition sources such as a furnace, vehicle, outdoor grill or gas-powered tools. Do not store containers where flooding is possible or in places where they might spill or leak into wells, drains, ground water, or surface water.

Safe disposal

- **The best way to dispose of a small amount of excess pesticide is to use it.** Apply according to directions on the product label. If you cannot use it, ask your neighbors if they can.
- **Do not throw unused pesticides in the trash.** If you can't finish using a pesticide, check with your local solid waste management authority, environmental health department or county agricultural commissioner to find out whether your community has a household hazardous waste collection program for getting rid of

unwanted pesticides. You can also call 1-800-CLEANUP or go to www.cleanup.org to get this information. Look for the number of your county agricultural commissioner (who enforces pesticides laws locally) in your white pages, under county government headings, or call 1-877-378-5463 (1-87-PestLine) for the number. You can also go to DPR's Web site, www.cdpr.ca.gov, for the contact information and more pesticide safety tips.

- **Never pour any leftover pesticides product down the sink, into the toilet, down a sewer or street drain or on the ground.** Many municipal water systems are not equipped to remove all pesticide residues from wastewater. If pesticides reach waterways, they can harm fish, plants, and other living things.
- **When empty, you should rinse the container carefully three times, draining the rinsewater each time back into the sprayer or the container used to mix the pesticide.** Then use the rinsewater as a pesticide, following label directions. Replace the cap securely. (Do not puncture or burn a pressurized container like an aerosol - it could explode.) Once you have followed these steps, dispose of the container according to label instructions or according to state and local laws, whichever is stricter. **Never reuse a pesticide container.**

Pesticide Complaint?

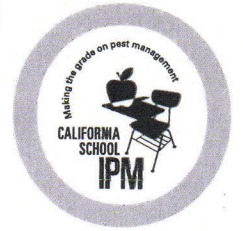
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PestInfo



INTEGRATED PEST MANAGEMENT FOR SCHOOLS

SAFELY MANAGING AN ARGENTINE ANT INFESTATION

CORRECTLY IDENTIFY THE SPECIES Argentine ants, *Linepithema humile*, are brown, slender, and about one-eighth inch long. They usually nest under boards, stones, tree stumps, and potted plants. Consult University of California Pest Note #7411 (www.ucipm.ucdavis.edu) or take specimens to your UC Cooperative Extension office (see county pages of your local phone directory).



BIOLOGY AND BEHAVIOR

- Argentine ants are the most common ants in California, and their nests are believed to cover much of the state as one huge supercolony, making eradication impossible.

CHECKLIST FOR MANAGING ANT INFESTATIONS

- ✓ Identify the ant species to maximize the effectiveness of your management strategy.
- ✓ Monitor by inspecting perimeters of buildings. Examine plants that support honeydew-producing insects.
- ✓ Include sanitation as your main preventive strategy. Clean up food debris in classrooms, empty classroom garbage daily, rinse recyclables before storing, place outdoor garbage cans and dumpsters away from doorways. Use soapy water to clean up ant trails.
- ✓ Exclude ants by caulking cracks and holes around foundations, and around pipes and wires. Seal indoor cracks and crevices. Band the trunks of honeydew-covered trees and shrubs with sticky materials such as Tanglefoot® so ants cannot reach their favorite food source.
- ✓ Communicate! Keep teachers and other staff informed of pest management actions.
- ✓ Educate staff and students so they can help prevent re-infestation and encourage successful treatment.
- ✓ Use least-hazardous chemical practices if necessary such as bait stations and bait gels. Sprays kill only the few ants you see – you'll miss the millions living safely in inaccessible nests. It's important to use slow-acting baits that reach the queens and think about ant management as an area-wide project.

- Argentine ants obtain protein from eating insects, including many pests, but they usually prefer honeydew, which is a sweet excretion produced by aphids, scales, mealybugs and whiteflies. You'll often find these ants in trees and shrubs that are infested with honeydew-producing insects.
- Ants often come indoors to find food during summer and fall when honeydew production declines.
- Ants feed each other by transferring food mouth to mouth, so slow-acting baits are more effective than sprays because foraging ants survive long enough to transfer the poison to other workers and the queens.
- Colonies begin to shrink soon after the bait kills the queens.
- Both sugary and protein-containing baits may be necessary to manage Argentine ants.

INSPECTION AND MONITORING

- Examine plants for aphid, scale, mealybug, and whitefly infestations, especially during the spring.
- Look for outdoor nests next to buildings, along sidewalks, around trees and shrubs, and under boards, stones, tree stumps, and potted plants. Nests consist of thousands of worker ants and several larger queens, plus microscopic eggs, tiny white larvae, and pupae that resemble grains of rice.

WHAT IF YOU SEE ONLY A FEW ANTS?

You may not mind seeing ants outdoors, but even a few can be objectionable in classrooms, teachers' lounges or food service areas. Often a few stragglers are scouting new feeding or nesting sites, and within hours you may have a steady trail of ants streaming in. Vacuum or use soapy water to clean up trails – in a labeled spray bottle combine 1 tablespoon dish soap and 1 quart water.

WHAT YOU CAN DO TO MANAGE ANTS

TEACHERS

- Keep classrooms clean by allowing food and beverages only in designated areas, then cleaning thoroughly.
- Ask students to remove food from lockers, cubbies, and desks daily.
- Keep any food, including pet food, stored in sealed containers.
- Take classroom pets home during severe ant infestations.
- Clean up the teachers' lounge before heading home every day.
- Communicate with custodial staff about special needs or ant sightings.

FOOD SERVICE STAFF

- Store food in containers with tight lids made of plastic, glass, or metal.
- Keep indoor garbage in lined, covered containers and empty daily.
- Clean food spills promptly.
- Clean food-soiled dishes, utensils, and surfaces by the end of each day.
- Maintain clean shelves in storage areas.
- Communicate with maintenance staff about repairing leaks, and custodial staff about emptying garbage daily and vacuuming up ant trails.

CUSTODIAL STAFF

- Vacuum up ant trails using a strong vacuum or wipe up with soapy water.
- Empty garbage daily from classrooms and food service areas.
- Place outdoor garbage containers on hard, cleanable surfaces and at least 50 feet away from building entrances.
- Wash all garbage containers regularly – wash those outdoors at least monthly and keep area around them clean.
- Collect litter from school grounds at least once weekly.
- Have recyclables collected at least once weekly.
- Communicate pest management roles to staff and students, including removing food or food wrappers from lockers, cubbies, and desks on a daily basis.
- Clean floors and vacuum carpets daily in areas where food is served, and at least weekly in other areas.
- Eliminate spills in storage and receiving areas and maintain clean shelves.

MAINTENANCE STAFF

- Caulk cracks and crevices.
- Weatherstrip doors and windows.
- Fix leaky pipes under sinks.
- Apply a sticky substance such as Tanglefoot® around trunks of trees and large shrubs infested with honeydew producers. Trim any branches that contact buildings.



WHAT IS INTEGRATED PEST MANAGEMENT (IPM)?

Integrated pest management is a widely accepted approach toward pest management that results in effective suppression of pest populations while minimizing hazards to human health and the environment.

FOR MORE INFORMATION

Visit DPR's school IPM Web site at www.schoolipm.info. For additional information about ants see the link to UC IPM's Pest Note #7411.

CHEMICAL CONTROL OPTIONS *(Least-hazardous)*

DUSTS – Injected into wall voids and cracks and crevices. Active ingredients include boric acid, diatomaceous earth, and silica aerogel. The ants die by drying out.

BAITS – Exempt from notification and posting requirements if bait is confined in a self-contained trap (bait station), or formulated as gel or paste applied to cracks and crevices. Active ingredients include abamectin, boric acid, fipronil, and hydramethylnon. Using aerosols or other sprays often reduces the effectiveness of baits. The ants you see foraging are only the tip of the iceberg – if you kill these with a fast-acting spray, thousands more will soon replace them. This is why it's important to use slow-acting baits that reach the queens via mouth-to-mouth feeding of the workers. Think about management as an area-wide project.

NOTE: Dusts and liquid insecticides are not exempt from Healthy Schools Act (HSA) requirements.



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INTEGRATED PEST MANAGEMENT FOR SCHOOLS

SAFELY MANAGING A COCKROACH INFESTATION

German cockroaches, *Blattella germanica*, commonly infest classrooms and food service areas. The less common brownbanded cockroach, *Supella longipalpa*, also lives indoors, but prefers warm environments and often lives near electrical appliances. You'll often find the Turkestan cockroach, *Blatta lateralis*, and the oriental cockroach, *Blatta orientalis*, living underneath cracked and raised asphalt and concrete. The American cockroach, *Periplaneta americana*, usually lives in sewers and basements. The smokybrown cockroach, *Periplaneta fuliginosa*, and field cockroach, *Blattella vaga*, live outdoors, but occasionally come inside.



CHECKLIST FOR MANAGING A COCKROACH INFESTATION

- ✓ Identify the roach species to maximize the effectiveness of your management strategy.
- ✓ Monitor thoroughly with sticky traps (such as roach motels). Continue to monitor hotspots even after roaches are gone.
- ✓ Include sanitation as your main preventive strategy. Clean up food debris in classrooms, offices, and lounges; empty classroom garbage daily; rinse recyclables before storing; place outdoor garbage cans and receptacles away from doorways.
- ✓ Exclude roaches by caulking cracks and holes, and sealing spaces around permanent fixtures such as bulletin boards and cabinets.
- ✓ Use mechanical devices such as a strong vacuum to force roaches out of their hiding places.
- ✓ Use least-hazardous chemical practices, if necessary, such as bait stations and bait gels. Sprays tend to scatter roaches. You may kill a few, but most will survive and return.
- ✓ Communicate! Keep teachers and other staff informed of pest management actions.
- ✓ Educate staff and students how they can help prevent reinfestation and encourage successful treatment.

WHAT DO ROACHES WANT MOST?

Food, shelter, and water! Eliminate these as much as possible and you'll drastically reduce infestations.

BIOLOGY AND BEHAVIOR

- Active at night – if you see them during the day, you have a heavy infestation!
- Live in cracks and crevices near food sources
- Prefer to crawl along edges of counters or floors – rarely venture into the middle of rooms
- Scatter when they sense vibration such as the sound of pesticide sprays

INSPECTION AND MONITORING

- Locate hiding places by putting sticky traps (such as a roach motel) on the floor next to walls and under refrigerators, dishwashers, sinks, and ranges.
- Monitor on a regular basis and note how many per trap and the age range. Lots of young roaches – they're smaller and wingless – indicate you have an active infestation.
- Use a flashlight and small mirror to check behind or under cabinets and appliances.
- Flush out roaches with a hair dryer, not aerosol pesticides.
- Once you locate the source of roaches, you can restrict management to those specific areas.

HOW MANY ROACHES ARE TOO MANY?

You may be able to tolerate a few roaches in garbage areas, but zero in kitchens or the teachers' lounge. Keep the threshold in mind when you monitor. Remember that even one female German cockroach can produce thousands of offspring.

WHAT YOU CAN DO TO MANAGE ROACHES

TEACHERS

- Keep classrooms clean by allowing food and beverages only in designated areas, then cleaning thoroughly.
- Take classroom pets home during roach infestations – their food and water support visiting roaches.
- Ask students to remove food from lockers, cubbies, and desks on a daily basis.
- Eliminate cockroach hiding places by removing out-of-date notices from walls and reducing clutter.
- Clean up the teachers' lounge before heading home every day.
- Communicate with custodial staff about special needs or roach sightings.

FOOD SERVICE STAFF

- Store food in containers with tight lids made of plastic, glass, or metal.
- Store and seal food waste (from prep and serving areas) in plastic bags before removal.
- Remove waste at the end of each day.
- Keep indoor garbage in lined, covered containers.
- Clean food spills promptly.
- Clean soiled dishes, utensils, and surfaces by the end of each day.
- Keep shelves in storage areas clean.
- Take supplies out of boxes and store on pallets or open metal shelving – keep pallets away from walls.
- Communicate with custodial staff about emptying garbage daily, cleaning behind appliances – including refrigerators, ice-makers, and vending machines – and washing floors and vacuuming carpets daily in areas where food is served.

CUSTODIAL STAFF

- Vacuum roach hiding places using a strong vacuum with a crevice attachment. Vacuum twice, about five minutes apart. During the first pass, the roaches will scatter because of the air current. They'll resetttle by the time you vacuum again.
- Empty garbage daily.
- Place outdoor garbage containers on hard, cleanable surfaces at least 50 feet away from building entrances.
- Wash all garbage containers regularly – wash those outdoors at least monthly and keep area around them clean.
- Collect litter from school ground areas at least once weekly.
- Have recyclables collected at least once weekly.
- Keep drains clean – this also prevents infestations of drain flies.
- Empty and thoroughly clean lockers and desks at least twice per year (e.g., winter break and at the end of each school year).
- Annually clean under and around rarely moved furniture (e.g., staff desks, bookcases, filing cabinets).

MAINTENANCE STAFF

- Repair cracks and crevices in walls, floors and pavement.
- Seal openings around potential cockroach runways (electrical conduits, heating ducts, plumbing).
- Caulk permanent bulletin boards, mirrors and other wall fixtures.
- Cover floor drains with screens.
- Seal all permanently installed furniture and cabinets at points of attachment, under counter tops, and inside to prevent harborage of pests in the gaps.

CHEMICAL CONTROL OPTIONS *(Least-hazardous)*

INSECTICIDAL DUSTS – Injected into wall voids and cracks and crevices. Active ingredients include boric acid, diatomaceous earth, and silica aerogel. The roaches die by drying out.

IGRs – These prevent immature roaches from reproducing and stimulate mature roaches to feed (good idea to place near bait). Available products contain the active ingredients hydroxypropylurea or pyriproxifen.

BAITS – Exempt from notification and posting requirements if bait is confined in a self-contained trap (bait station), or formulated as gel or paste applied to cracks and crevices. Good sanitation encourages roaches to be more interested in baits. Active ingredients include abamectin, boric acid, fipronil, hydramethylnon, and imidacloprid.

NOTE: Dusts and insect growth regulators (IGRs) are not exempt from Healthy Schools Act requirements, although the ones described here are considered least hazardous when used according to label directions. **Don't be tempted to spray roaches – they'll scatter and then return with a vengeance.**



WHAT IS INTEGRATED PEST MANAGEMENT (IPM)?

Integrated pest management is a widely accepted approach toward pest management that results in effective suppression of pest populations while minimizing hazards to human health and the environment.

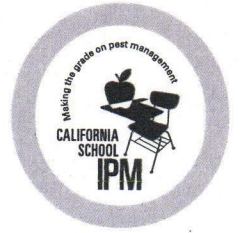
FOR MORE INFORMATION

Visit DPR's school IPM Web site at www.schoolipm.info. For additional information about cockroaches see the link to UC IPM's Pest Note #7467.



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INTEGRATED PEST MANAGEMENT FOR SCHOOLS

PREVENTING MICE AND RATS FROM INVADING YOUR SCHOOL

When mice or rats invade a school, they chew on anything that resembles food or nesting material, including cardboard boxes, books, art projects, plastic bags and their contents, and electrical wires. Mice and rats also make a mess by urinating and defecating wherever they feed, and leaving smelly trails of urine and droppings. Both mice and rats can transmit parasites, diseases, and aggravate allergies.



Roof Rat

BIOLOGY AND BEHAVIOR A MISCHIEF OF MICE

The house mouse, *Mus musculus*, lives throughout the United States in open fields as well as in structures. Indoors, mice live in wall voids, above drop ceilings, in drawers and cupboards, on high shelves, and in clutter. They prefer to feed on grains, but will nibble on anything. They can fit through 1/4-inch spaces – that is, under most doors.

A PACK OF RATS

The Norway rat, *Rattus norvegicus*, also known as the sewer rat, lives throughout California. Its burrows are found along building foundations, beneath trash piles, around gardens, and in unused sewers and storm drains. Indoors, Norway rats prefer living close to the ground floor in basements and wall voids. The roof rat, *Rattus rattus*, lives in the Western half of California in trees, woodpiles, and debris. Roof rats are good climbers and indoors like to live in attics and ceiling voids. Both rat species are omnivorous – they'll eat almost anything.

CHECKLIST FOR MANAGING MICE AND RATS

MECHANICAL CONTROL

RATS

- ✓ **When setting traps**, be aware that rats are cautious, so prebaiting will get them used to feeding from the trap. Snap traps work well when prebaited – keep them out of the reach of children. Sticky traps (or glue traps) are not as effective as snap traps. Rats will usually sense and avoid them.

MICE

- ✓ **Place snap traps** in corners with the trigger facing out. Traps can be placed along walls with the trigger end toward the wall. Be aware that at many schools and offices, staff or students who have discovered a live or dead rodent affixed to a glue trap have raised a ruckus. (It's the issue of a quick death with a snap trap or a slow, tortuous death with a glue trap.)
- ✓ **Ultrasonic devices**. Don't waste your money. There is no evidence that these devices consistently repel rodents.

CHEMICAL OPTIONS

- ✓ **Prevention through exclusion and sanitation** is the most important way to avoid rodent visitors inside school buildings and on school grounds. If a rodenticide is necessary because of high populations, enclose the poisoned bait in a tamper-resistant bait station. See UC IPM's Pest Notes #7483 (house mice) and #74106 (rats) for guidance.
- ✓ **If mice suddenly invade** an inaccessible place such as a ceiling void, don't scatter pellet bait. Mice sometimes move the bait from well-hidden to public places.

WHAT YOU CAN DO TO HELP MANAGE RODENTS

TEACHERS

- Allow food and beverages only in designated areas.
- Minimize clutter in the classroom. Mice love to nest in fabric, stacks of construction paper, and other art supplies. Store these in large plastic boxes with tightly fitting lids.
- Store food in tightly sealed containers, including chow for students, classroom pets, and your own consumption. Remove edible art projects from walls. Ask students to remove food from lockers, cubbies, and desks daily.
- Communicate with custodial staff about evidence of rodents such as gnaw marks, destroyed material, or droppings.

FOOD SERVICE STAFF

Food-serving areas

- Clean floors, counters, cabinets, and tables, and vacuum carpets daily in areas where food is served.
- Remove garbage at the end of each day.

Kitchen

- Store and seal food waste (from prep and serving areas) in plastic bags before removal.
- Clean food-soiled dishes, utensils, appliances, cabinets, shelving, and surfaces by the end of each day.

Food-receiving and storage areas

- Maintain an inspection procedure for all received goods, and establish procedures for rejecting anything that's infested, leaking, or contaminated.
- Store nonperishable food in pest-proof containers, not in cardboard boxes.

- Place received goods on clean shelves or mobile storage carts.

CUSTODIAL/MAINTENANCE STAFF

Indoors

- Seal all electrical conduits, heating ducts, pipes, and pipe chases. Don't seal potential rodent entry points with gnawable material such as rubber, plastic, or wood.
- Weatherstrip doors and windows. Repair all broken panes in windows or skylights. Keep indoor garbage in lined, covered containers and empty daily.

Outdoors

- Clean all garbage containers regularly. Make sure all outdoor garbage containers have plastic liners and tight-fitting, spring-loaded lids. Don't let garbage spill over the container.
- Empty garbage cans in outdoor lunch areas immediately after lunch and remove any food debris on the ground.
- Collect and move recyclables and stored waste off site at least once weekly.

GROUNDS STAFF

- Avoid planting fruit-bearing trees – the fruit attracts roof rats. Harvest fruit, including citrus, before you start a rat feeding frenzy.
- Don't plant vegetation directly against buildings because this provides shelter and runways for rodents.
- Thin out or eliminate dense ground covers such as ivy – it creates a perfect rodent habitat.

THINK OF PREVENTION BEFORE RODENTS INVADE

Before the rodents invade, let's consider the main preventive strategies and how we can avoid rodent invasions in the first place.

EXCLUSION

Rodent-proof the School

Build in pest-proofing strategies that prevent rodent access, make the school easier to clean, and minimize tempting food and nesting material.

SANITATION

Deny Food

Keep the school clean of food scraps. Keep food and beverages only in designated areas.

HORTICULTURAL FIXES

Deny Access

Trim trees and shrubs 3 to 6 feet away from buildings and keep vines off building walls.

Written by Nita Davidson with assistance from Sewell Simmons, Tom Babb, Lisa Ross, Nan Gorder, and Veda Federighi (DPR); Tanya Drlak (Marin County Model IPM Plan for Schools); Sherry Bryan (Ecology Action); Ingrid Carmean (Carmean Consulting). Image courtesy of Orkin, Inc.



WHAT IS INTEGRATED PEST MANAGEMENT (IPM)?

Integrated pest management is a widely accepted approach toward pest management that results in effective suppression of pest populations while minimizing hazards to human health and the environment.

FOR MORE INFORMATION

Visit DPR's school IPM Web site at www.schoolipm.info. For additional information about mice and rats see the link to UC IPM's Pest Notes #7483 and #74106. For help identifying rodents, see www.ipm.ucdavis.edu and click on "Homes, structures, people, and pets."



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INTEGRATED PEST MANAGEMENT FOR CHILD CARE CENTERS

BED BUGS ARE BACK!

Common before the 1950s, bed bugs are back, showing up in homes, apartment buildings, dorm rooms, hotels, and child care centers. How do these blood-sucking insects get around? They usually arrive with a child who has an infestation at home by attaching to clothing, blankets, backpacks, or soft toys. Bed bugs will infest spotlessly clean rooms as well as messy or filthy ones. Since bed bugs are so good at hiding, the more clutter you have, the harder it is to find them—and the more likely their numbers will increase.



BED BUGOLOGY

Bed bugs are flattened brownish-red insects, about ¼-inch long, that look like apple seeds. They're fast movers, but they don't fly or jump. They feed only on blood and can survive several months without a meal.

- ✓ **Young bed bugs**, called nymphs, look like small versions of adults. The youngest nymphs are the size of a poppy seed and turn dark red after they feed.
- ✓ **As a nymph grows** to the next stage, it sheds its skin. The skins accumulate where the bugs hide.
- ✓ **Bed bugs live in groups.** Once females mate, they often wander away to lay their eggs somewhere else. This is usually how the bugs end up in other rooms.
- ✓ **Eggs are tiny**, pale, see-through, and hard to find.
- ✓ **Eggs are glued to surfaces**, especially wood, cardboard, and fabric, which is why you should check furniture, cardboard boxes, and clothing for bugs, their droppings, shed skins, and eggs.
- ✓ **You'll find bed bugs year-round.**
- ✓ **Bed bugs usually move around and feed at night**, but visit daytime nappers.

BED BUG BITES

Thankfully, bed bugs don't spread disease. But, when people think they have bed bugs, they may sleep poorly and worry about being bitten.

- Bites can cause swelling, redness, and itching, although many people don't react at all
- Found singly or in groups, often arranged in a semi-circle or line on the face, neck, arms, and legs
- Resemble rashes, hives, or bites from other insects such as mosquitoes or fleas
- Can get infected from frequent scratching.

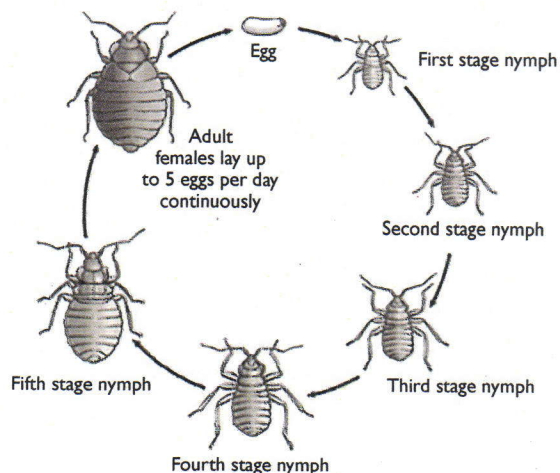
BE A BED BUG DETECTIVE

Prepare an inspection kit that includes a good flashlight and magnifying glass to look for bed bugs, bloodstains, or shed skins.

Inspect the nap area regularly. Use a flashlight to examine nap mats, mattresses (especially seams), bedding, cribs, and other furniture in the area.

- Check under buttons of vinyl nap mats.
- Roll cribs on their side to check the lower portions.
- Scan the walls and ceiling and look behind baseboards and electrical outlet plates for bugs, bloodstains, and shed skins. The bloodstains may look like dark-brown ink spots and splatters.
- Examine upholstered furniture and wall-mounted items such as clocks, pictures, and mirrors.

Collect any suspicious insects or shed skins for an expert to identify. Use a small vial or clear packing tape for this purpose.



Illustrations courtesy of Orkin (bed bug drawing) and UC IPM (bed bug life cycle), used with permission. Written by Nita A. Davidson (DPR) and coordinated by Belinda Messenger (DPR). Reviewed by Gail M. Getty (Gail M. Getty Consulting).

PREVENTION CHECKLIST

Use the following approaches to discourage other pests, too:

- ✓ **Reduce clutter!** Store toys, stuffed animals, and dress-up clothes in plastic boxes with tight-fitting lids.
- ✓ **Seal cracks and crevices** to eliminate hiding places for bed bugs and other pests. Caulk and paint wooden baseboards or molding around ceilings.
- ✓ **Vacuum the nap area frequently** using a crevice tool around molding and the area between wall and ceiling. Vacuuming is the most important thing you can do to catch stray bed bugs.
- ✓ **Wash bedding frequently.** Every few days, toss pillows and blankets into a hot dryer for 20 minutes.
- ✓ **Enclose crib mattresses** in high-quality mattress encasements.

WHAT TO DO IF YOU FIND BED BUGS

Collect any suspicious insects or shed skins—or photograph evidence of bed bugs you've found, such as bloodstains on mattresses.

Call your pest management professional and mention what you've seen, collected, or photographed.

Don't throw anything away, even nap mats and mattresses! You can easily clean these, especially if you've caught the infestation early.

- **Mattresses.** Vacuum thoroughly, especially around seams and anywhere a small, flat bug could hide. Enclose the mattress in a high-quality mattress encasement (See Got Cribs? box on right).
- **Nap mats.** For vinyl mats, vacuum and then wash with soapy water, especially along seams and under buttons. For soft, washable mats, machine-wash and then place in a hot dryer for at least 20 minutes.
- **Soft items** such as pillows, linens, blankets, stuffed animals. Machine-wash and then place in a hot dryer for at least 20 minutes. If the item isn't washable, tumble in a hot dryer for 20 minutes.

Use traps such as ClimbUp® Interceptors under crib legs. Pull cribs away from the wall so bugs don't have a natural bridge from wall to mattress.

JUST SAY NO TO SPRAYS

If you're worried that your center has bed bugs, your first impulse might be to spray. Resist this impulse! **Spraying will not prevent infestations.** Never try to tackle bed bugs yourself. This is a job for an expert.

- **Don't set off foggers or bug bombs.** The pesticide mist won't reach places where the bugs are hiding.
- **Never spray pesticides** on bed linens, pillows, stuffed animals, clothing, or people.
- **Don't use pesticide-containing mattress covers.** Use a mattress encasement instead.

GOT CRIBS? USE MATTRESS ENCASEMENTS

Encasements are machine-washable covers that snugly wrap around mattresses. Good encasements have bug-tight zippers and are made of strong-but-flexible fabric that won't easily tear.

- If bed bugs already live in a mattress the encasement will trap them inside so they won't bite the sleeper.
- Bed bugs can live on top of an encasement, but they'll be easier to find. (They can still live elsewhere in the room and bite sleepers.)

The following encasements have bed bug-proof fabric and zippers: Allergy Luxe®, National Allergy® BedCare Elegance, and Mattress Safe®. All come in crib mattress size.

PUT TOGETHER AN ACTION PLAN

If you ever find a bed bug, have a simple action plan ready for staff members so no one panics. Include the phone number of your pest management professional or PMP (see HIRE A PROFESSIONAL below).

HIRE A PROFESSIONAL

Chances are you already have a pest management professional or PMP (also known as a pest control operator or PCO) who services your child care center.

If your center doesn't use a PMP and you're concerned about bed bugs, hire a PMP who's licensed, insured, and has experience working with bed bugs. (See www.pcoc.org to find qualified PMPs in your area.) Many PMPs prefer treating bed bugs with heat rather than spraying pesticides because heat reaches places where bed bugs hide.

- Make sure you actually have bed bugs before any treatment starts.
- Be prepared to work closely with your PMP, who will explain how you can prepare for treatment by reducing clutter, vacuuming, cleaning, and laundering.
- Expect 2–4 visits to be sure the bed bugs are gone.



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FOR MORE INFORMATION

UC IPM Pest Notes (UC IPM Program)
www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7454.html

EPA's Bed Bug Resources
www.epa.gov/pesticides/bedbugs

National Pest Management Association
www.pestworld.org/all-things-bed-bugs

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What is green cleaning, sanitizing, and disinfecting?



The word *green* is often used to market products and services. There are no government definitions of the word green. There are no laws for how the word can be used. This makes it hard for the consumer to decide on the best product.

When we use the phrase green cleaning, sanitizing, and disinfecting, we mean:

1 Using cleaning, sanitizing, and disinfecting products with less risk of harm to human health, especially the health of children, or the environment.

- One way to find lower risk products is to use those that have been certified by a third party group such as:
 - ◊ Green Seal
 - ◊ EcoLogo
 - ◊ US EPA's Safer Choice

These organizations look at effects on human health, wildlife, and the environment when they test products. These organizations have websites where you can find lists of lower risk products (see the Resources on the reverse side).

- No products used to clean, sanitize, or disinfect are completely safe. In the child care setting, use lower risk products and always follow the instructions on the product label.
- Remember that when you see words like green, all natural, organic, ecofriendly, and environmentally friendly on a cleaning product label, they have no legal meaning.

- Manufacturers of cleaning products don't have to test their products to make sure they are safe for people and the environment. They don't have to list the ingredients they use on the label of a product so it can be hard to find lower risk cleaning products.

2 Using sanitizers and disinfectants only when and where necessary. Unlike cleaners, these products contain chemicals that *kill* germs. They are all hazardous to people and the environment to some degree.

- The only group that tests sanitizers and disinfectants to find those that are lower risk is the EPA's Design for the Environment Antimicrobial Pesticide Pilot Project.
- Some products with the active ingredients citric acid, accelerated hydrogen peroxide, and lactic acid have been found to be lower risk.
- Always clean the surface, then disinfect. Allow a disinfectant to remain visibly wet for the amount of "contact" time stated on the label. This is how long it takes to kill germs with the product. If you don't keep the surface visibly wet for the entire contact time, you could be breeding superbugs that are resistant to sanitizer and disinfectants.
- Remember, sanitizing and disinfecting are temporary. As soon as someone touches a disinfected surface, germs start to grow again.
- Cleaning vigorously with an all-purpose cleaner and a microfiber cloth can remove most germs on a surface and poses less risk of harm for people and the environment. Be sure to check if state or local regulations require the use of disinfectants.

3 Changing behavior to reduce the spread of infectious disease

No chemicals are needed! We can reduce the risk of getting an infectious disease by:

- **Hand washing.** It is the most important way to reduce the spread of infectious disease. It also reduces exposure to toxic chemicals that collect in dust and get on our hands and into our mouths, especially for young children.
- **Getting vaccinated!** Vaccinations are the only way to prevent many diseases that are spread in the air. Vaccinations also protect other people, especially those who are vulnerable such as infants who aren't old enough to be vaccinated and elderly people, and people getting chemotherapy, who don't have good immune systems.
- **Sneezing into your sleeve.** This keeps germs trapped in fabric where they don't live very long and are less likely to be passed on to other people.
- **Keeping 3 to 6 feet away from others when you sneeze or cough.**
- **Not touching the inside of your mouth, nose, and eyes.** The skin that lines these parts of your body is called a mucous membrane. When you touch your mucous membranes with germy hands, the germs can get into your body and make you sick.
- **Staying home when you are sick.**



RESOURCES

EcoLogo www.ecologo.org/en/

US EPA Design for the Environment (for antimicrobials)
www.epa.gov/pesticides/regulating/labels/design-dfe-pilot.html

US EPA Safer Choice (for cleaners)
www2.epa.gov/saferchoice

Green Seal www.greenseal.org/

Dahl, R. "Greenwashing: Do you know what you are buying?" *Environ Health Perspectives*, 2010 June; 118(6): A246–A252. Available online at: www.ncbi.nlm.nih.gov/pmc/articles/PMC2898878/pdf/ehp-118-a246.pdf

What's so great about microfiber?



Microfiber cleaning cloths and mops work well for removing organic matter (dirt, oils, and grease) as well as germs from surfaces. Microfiber's cleaning ability is the result of two simple things: more surface area and a positive charge.

What is microfiber?

- Microfiber is a synthetic material.
- Microfiber used for cleaning is called split microfiber. When microfibers are split, they are 200 times thinner than a single human hair. These split microfibers become much more absorbent. They can remove large quantities of microbes, including hard-to-kill spores.
- Split microfiber quality varies. Microfiber that catches slightly on the surface of your hand is better quality. Another way to tell is to push a water spill with it. If the microfiber pushes the water instead of absorbing it, then it's not split.
- A microfiber cloth has the same surface area as a cotton cloth four times as large! And it is very absorbent. It can absorb seven times its weight in water!
- Microfiber products are also positively charged, meaning they attract negatively charged dirt and grease. These characteristics of microfiber allow you to clean surfaces without using cleaning products.

- A recent study of microfiber mop usage in hospitals showed that a microfiber mop head used with a detergent cleaner removed bacteria as effectively as a cotton mop head used with a disinfectant.
- Another advantage of microfiber is that, unlike cotton, it dries fast. This can make it harder for bacteria to grow in it.
- A laundering program is necessary if microfiber is used. This can include washing mops and cloths by hand, by machine, or using a laundering service. Laundering will help prevent the spread of germs from one surface to another (called cross-contamination).
- Microfiber cloths and mops are available in grocery stores, hardware stores, big box stores, and online. Prices range from cheap (\$1.00 or less, especially when bought in bulk) to mid-range (\$3.00 – \$5.00). There are differences in quality and durability. Higher priced cloths usually have smaller fibers and pick up more dirt and dust, but even the cheap ones get good results.

Why use microfiber tools for cleaning?

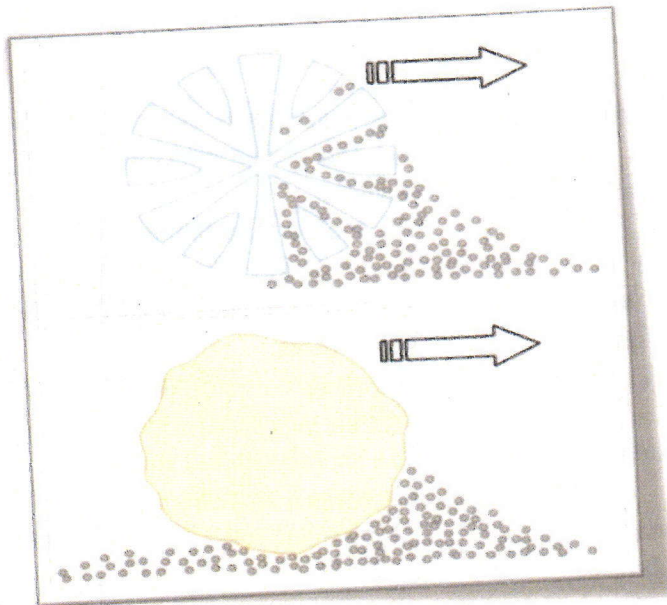
- They reduce exposure to chemicals in the ECE environment and reduce pollution from cleaning products.
- Microfiber is durable and reusable.
- Microfiber lasts longer than cotton; it can be washed a thousand times before losing its effectiveness.
- Microfiber saves the ECE provider up to \$100 per year in cleaning costs because they are reusable and durable.
- Microfiber is made from synthetic fibers, usually polyester and nylon, which are not treated with chemicals.
- Microfiber mops are far lighter than their cotton counterparts, helping to save the user from neck and back injuries from using heavy, water-soaked cotton mops.

How to clean using microfiber

- **Surfaces:** Use microfiber for cleaning counters and stovetops. The tiny fibers pick up more dirt and food residue than most cloths. They can be used with a third-party certified all-purpose cleaner, or a sanitizer to remove most germs. Check if state or local regulations require the use of disinfectants.
- **Floors** can be washed with microfiber mops. These mops are flat-surfaced and have easy-to-remove microfiber heads. Microfiber mop heads are lightweight and much easier to wring out, which results in a cleaner floor with much less water left on the floor.
- **Windows:** With microfiber, only water is necessary to clean and de-streak windows. No toxic window cleaners are needed. Use one cloth and water to wash, and another to dry.
- **Dusting:** Microfiber cloths and mops trap much more dust than cotton rags making the job faster and easier.

Cleaning and maintenance

- Wash and dry microfiber separately from all other laundry. Because microfiber has a charge, it will attract dirt, hair and lint from other laundry. This will reduce the effectiveness of the microfiber.
- Wash heavily soiled microfiber cloths and mop heads in warm or hot water with detergent.
- Do not use fabric softener! Fabric softeners contain oils that clog up microfibers. This makes them less effective during your next use.
- Bleach will shorten the life of the microfiber.
- Microfiber dries very fast, so plan on a short laundry cycle. You can also hang items up to dry.
- Be sure to clean microfiber cleaning cloths after every use. Use color-coded cloths for different areas of your facility, so you don't transfer germs from one area to another.



Microfiber (top image) picks up much more dirt and bacteria than a cotton cloth (bottom image).

RESOURCES

Explainthatstuff: Microfiber cleaning cloths <http://www.explainthatstuff.com/microfibercloths.html>

About microfiber <http://starfibers.com/microfiber.php>

The Department of Pesticide Regulation (DPR) provided partial or full funding for this project but does not necessarily recommend or endorse any opinion, commercial product, or trade name used.

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Pesticides - What's my Risk?

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Topic Fact Sheet

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Introduction

Many times, non-chemical controls can be used to deal with pests. If you decide to use a pesticide, it is important to understand the risks associated with a specific product or treatment. No matter the treatment method, there is always some degree of risk associated with using a pesticide. Understanding the risk from specific pesticides can help you decide whether or not you want to use them, or help you choose between two different products.



Understanding pesticide risks

Many people believe that some pesticides are "safe," while others are "dangerous." Actually, all chemicals, including all pesticides, have the potential to be hazardous. Even products that are considered low in toxicity, natural, or organic can be hazardous if someone or something comes in contact with enough of the substance.

The toxicity of a pesticide, its **formulation**, and how much you touch, eat, or breathe in, are all important considerations. The likelihood of experiencing some health effect as a result of using a product is referred to as the **pesticide risk**. The risk of any pesticide use depends on which pesticide is used, how much pesticide is applied, how often the pesticide is applied, and who or what has contact with the pesticide.

Pesticide Risk:

Your risk from the use of pesticides depends on two things: the toxicity of the pesticide, and the amount of exposure. In other words,

$$\text{Risk} = \text{Toxicity} \times \text{Exposure}$$

Toxicity can range from low to high, and can vary depending on the route of exposure. The pesticide Signal Word is a way to determine a pesticide's general level of toxicity.

Exposure takes place when a pesticide is breathed in, touches the skin, or gets eaten.

Pesticide exposure

The chance of developing a health problem from a pesticide depends on two things: the toxicity of the pesticide and the amount of **exposure**. In order for a pesticide to affect you, you must be exposed to the pesticide by some route such as eating it (ingestion), breathing it (inhalation), or getting it on your skin or in your eyes (dermal exposure).

Even if a very toxic pesticide is used near your home, the risk may still be low. If you are not exposed to the pesticide, it can't harm you. In

some cases, a pesticide can be used without people coming into contact with it at all.

Pesticide toxicity

To help people understand the toxicity of products, pesticides are classified in groups from low to high toxicity. Because the risk or chance of a problem depends on both the toxicity **and** the amount of exposure, even pesticides that are low in toxicity can be hazardous if the exposure is high. The **signal word** describes the toxicity of the pesticide.

How toxic is the pesticide I am using?

Pesticides may contain more than one ingredient, and each may have a different toxicity level. There are several ways to estimate to the toxicity of a pesticide. One easy



way is to look at the **signal word**, which is an indicator of the toxicity of the product. Every registered pesticide will have the words CAUTION, WARNING, or DANGER on the label, and that word reflects the level of toxicity of the product. Products that say CAUTION are the lowest in toxicity, WARNING indicates medium toxicity products, and DANGER is found on the most toxic products. If you want to know the toxicity of a specific pesticide, call NPIC. We can help.



Some groups of people, such as the elderly, people with health conditions, those who are pregnant, and infants and children, could be more sensitive to a pesticide than other people. Sensitive populations can minimize their risks by reducing their exposure to pesticides, and by selecting less toxic pesticides or pest control measures that do not involve pesticides.

Putting it together: What's my risk?

Toxicity and exposure are the basis for the statement, "the dose makes the poison." Just as one aspirin is beneficial for occasional pain or to manage certain medical conditions, too much aspirin (taking a whole bottle in one sitting) would be very hazardous. As the amount of exposure or the toxicity of pesticide increases, so does the risk of a problem. The higher the toxicity of the pesticide and the more exposure occurs, the greater the chance that some hazardous effect will result.

If pesticides are being applied near you, try to find out some details about the application, such as where it is happening, how much area is being treated, and what is being applied. This will help you determine your risk. If you smell, taste or feel a pesticide, then you may have been exposed to it. In some cases, exposure can happen even if you do not smell or taste the pesticide. Try to determine the route by which you might be exposed. It is important to consider the route of exposure, or how the pesticide may contact your body. The amount that actually enters the body may vary depending on pesticide and the route of exposure. Some pesticides may move into the body very easily after an exposure, whereas others will not.

If you have been exposed to a pesticide, take note of the situation in which it happened. The length of time the exposure occurred and how much of the substance actually gets on or in the body are important details in understanding the risk. If the pesticide is low in toxicity and you had a very limited exposure, the risk is low. If the pesticide is very toxic and you had a large exposure to it, then the risk is higher.

Minimizing the chance of a problem

To minimize your chance of having a problem from using a pesticide product, look for **ways to reduce your exposure** or choose a product with lower toxicity. Always read the entire **product label** and follow any instructions for using personal protective equipment, like gloves or goggles, which help reduce your exposure. Labels may also contain instruction such as how to ventilate or the length of time to avoid a treated area. For more information on how to lower your risk, call and talk to one of our pesticide specialists.

NPIC fact sheets are designed to answer questions that are commonly asked by the general public about pesticides that are regulated by the U.S. Environmental Protection Agency (U.S. EPA). This document is intended to be educational in nature and helpful to consumers for making decisions about pesticide use.



We are open from 8:00am to 12:00pm Pacific time Mon. — Fri.
Please read our [disclaimer](#) | [Contact us](#)

粵語 Français 普通话 Русский 日本語 tiếng Việt فارسی Español

NPIC provides objective, science-based information about pesticides and pesticide-related topics to enable people to make informed decisions. NPIC is a cooperative agreement between **Oregon State University** and the **U.S. Environmental Protection Agency** (cooperative agreement #X8-83458501). The information in this publication does not in any way replace or supersede the restrictions, precautions, directions, or other information on the pesticide label or any other regulatory requirements, nor does it necessarily reflect the position of the U.S. EPA.



SIGNAL WORDS

TOPIC FACT SHEET

NPIC fact sheets are designed to answer questions that are commonly asked by the general public about pesticides that are regulated by the U.S. Environmental Protection Agency (US EPA). This document is intended to be educational in nature and helpful to consumers for making decisions about pesticide use.

What are Signal Words?

Signal words are found on pesticide product labels, and they describe the acute (short-term) toxicity of the formulated pesticide product. The signal word can be either: DANGER, WARNING or CAUTION. Products with the DANGER signal word are the most toxic. Products with the signal word CAUTION are lower in toxicity.¹ The U.S. Environmental Protection Agency (EPA) requires a signal word on most pesticide product labels. They also require it to be printed on the front panel, in all capital letters, to make it easy for users to find. The only pesticide products that are not required to display a signal word are those that fall into the lowest toxicity category by all routes of exposure (oral, dermal, inhalation, and other effects like eye and skin irritation).^{2,3} See the table below titled "Toxicity Category."

CAUTION means the pesticide product is slightly toxic if eaten, absorbed through the skin, inhaled, or it causes slight eye or skin irritation.^{2,4}

WARNING indicates the pesticide product is moderately toxic if eaten, absorbed through the skin, inhaled, or it causes moderate eye or skin irritation.^{2,4}

DANGER means that the pesticide product is highly toxic by at least one route of exposure. It may be corrosive, causing irreversible damage to the skin or eyes. Alternatively, it may be highly toxic if eaten, absorbed through the skin, or inhaled. If this is the case, then the word "POISON" must also be included in red letters on the front panel of the product label.^{2,4}



TOXICITY CATEGORY (Signal Word)³

	High Toxicity (DANGER/Danger-Poison) Category I	Moderate Toxicity (WARNING) Category II	Low Toxicity (CAUTION) Category III	Very Low Toxicity (Optional Signal Word = CAUTION) Category IV
Acute Oral LD ₅₀	Up to and including 50 mg/kg (≤ 50 mg/kg)	Greater than 50 through 500 mg/kg (> 50 - 500 mg/kg)	Greater than 500 through 5000 mg/kg (> 500 - 5000 mg/kg)	Greater than 5000 mg/kg (> 5000 mg/kg)
Inhalation LC ₅₀	Up to and including 0.05 mg/L (≤ 0.05 mg/L)	Greater than 0.05 through 0.5 mg/L (> 0.05 - 0.5 mg/L)	Greater than 0.5 through 2.0 mg/L (> 0.5 - 2.0 mg/L)	Greater than 2.0 mg/L (> 2.0 mg/L)
Dermal LD ₅₀	Up to and including 200 mg/kg (≤ 200 mg/kg)	Greater than 200 through 2000 mg/kg (> 200 - 2000 mg/kg)	Greater than 2000 through 5000 mg/kg (> 2000 - 5000 mg/kg)	Greater than 5000 mg/kg (> 5000 mg/kg)
Primary Eye Irritation	Corrosive (irreversible destruction of ocular tissue) or corneal involvement or irritation persisting for more than 21 days	Corneal involvement or other eye irritation clearing in 8 - 21 days	Corneal involvement or other eye irritation clearing in 7 days or less	Minimal effects clearing in less than 24 hours
Primary Skin Irritation	Corrosive (tissue destruction into the dermis and/or scarring)	Severe irritation at 72 hours (severe erythema or edema)	Moderate irritation at 72 hours (moderate erythema)	Mild or slight irritation at 72 hours (no irritation or erythema)

SIGNAL WORDS

TOPIC FACT SHEET

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How are Signal Words Chosen?

Before the EPA can determine the appropriate signal word for a pesticide product, the manufacturer performs research on laboratory animals to determine the toxicity of the formulation. Required studies include oral exposure (eating the product), inhalation exposure (breathing in the product), dermal exposure (spreading the product on the skin) and exposures to the skin and eyes to check for irritation. The study that shows the highest toxicity is used to determine the signal word.³ For example, if a product demonstrated low toxicity when eaten, moderate toxicity when inhaled, and high toxicity when applied to skin, the EPA would assign the signal word DANGER, based on the most sensitive route of entry. In this example it was the skin.¹

See the text box on **LD₅₀/LC₅₀** for more details about the required toxicity tests.

How are Signal Words Useful?

Signal words help alert users to special hazards of a pesticide product. The signal word can be used by shoppers to select the least toxic product(s) of those that are sufficiently effective.⁴

Regardless of the signal word on the pesticide product, it is important to remember that every product still has the potential to poison (i.e., is harmful at high doses). Special care should be taken to carefully follow all of the directions on the label, each time a pesticide product is used.

LD₅₀/LC₅₀: A common measure of acute toxicity is the lethal dose (LD₅₀) or lethal concentration (LC₅₀) that causes death (resulting from a single or limited exposure) in 50 percent of the treated animals. LD₅₀ is generally expressed as the dose in milligrams (mg) of chemical per kilogram (kg) of body weight. LC₅₀ is often expressed as mg of chemical per volume (e.g., liter (L)) of medium (i.e., air or water) the organism is exposed to. Chemicals are considered highly toxic when the LD₅₀/LC₅₀ is small and practically non-toxic when the value is large. However, the LD₅₀/LC₅₀ does not reflect any effects from long-term exposure (i.e., cancer, birth defects or reproductive toxicity) that may occur at levels below those that cause death.

Date Reviewed: July 2008

References:

1. Whitford, F. *The Complete Book of Pesticide Management: Science, Regulation, Stewardship, and Communication*; Wiley & Sons: New York, 2002; pp 450-452.
2. *National Pesticide Applicator Certification Core Manual*; Randall, C., Hock, W., Crow, E., Hudak-Wise, C., Kasai, J., Eds.; National Association of State Departments of Agriculture Research Foundation: Washington, DC, 2006.
3. *Label Review Manual*; U.S. Environmental Protection Agency, Office of Prevention, Pesticides, and Toxic Substances, Office of Pesticide Programs, U. S. Government Printing Office: Washington, DC, 2007. <http://www.epa.gov/oppfead1/labeling/lrm/chap-07.pdf> (accessed June 2008), updated Aug 2007.
4. Labeling Requirements for Pesticides and Devices. *Code of Federal Regulations*, Part 156.64, Title 40, 2007.

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ANTS

Integrated Pest Management in and around the Home

Ants are among the most prevalent pests in households. Ants also invade restaurants, hospitals, offices, warehouses, and other buildings where they can find food and water. On outdoor and sometimes indoor plants, ants protect and care for honeydew-producing insects such as aphids, soft scales, whiteflies, and mealybugs, increasing damage from these pests. Ants also perform many useful functions in the environment, such as feeding on other pests (e.g., fleas, caterpillars, and termites), dead insects, and decomposing tissue from dead animals.

There are more than 12,400 species of ants throughout the world. In California, there are about 270 species, but fewer than a dozen are important pests (Table 1). The most common ant in and around the house and garden in California is the Argentine ant, *Linepithema humile* (formerly *Iridomyrmex humilis*). Other common ant pests include the Pharaoh ant (*Monomorium pharaonis*), odorous house ant (*Tapinoma sessile*), thief ant (*Solenopsis molesta*), southern fire ant (*S. xyloni*), and pavement ant (*Tetramorium caespitum*). The velvety tree ants *Liometopum occidentale* and *L. luctuosum* nest in trees and are common outdoor species in landscapes.

Less common, but of great importance, is the red imported fire ant, *S. invicta*, which gained a foothold in Southern California in 1998. In some areas, competition from the Argentine ant has slowed the spread of the fire ant. Carpenter ants, *Camponotus* species, and velvety tree ants also invade buildings in California. Although they don't eat wood as termites do, they hollow it out to nest and may cause considerable damage. For more information about red imported fire ants or carpenter ants, see *Pest Notes: Carpenter Ants* and *Pest Notes: Red Imported Fire Ant* listed in References.

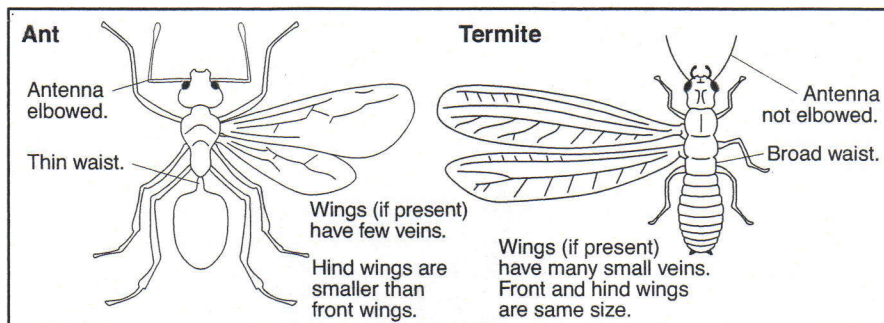


Figure 1. Distinguishing features of ants and termites.

IDENTIFICATION

Ants belong to the insect order Hymenoptera and are close relatives of bees and wasps. Ants are familiar insects that are easily recognized, especially in their common wingless adult forms, known as workers. However, winged forms of ants, which leave the nest in large numbers in warm weather to mate and establish new colonies, are often mistaken for winged termites, which also leave their nests to mate. Ants and termites can be distinguished from one another by three main characteristics (Figure 1):

- The ant's body is constricted, giving it the appearance of having a thin waist, while the termite has a broad waist.
- The ant's hind wings are smaller than its front wings, while the termite's front and hind wings are about the same size. However, shortly after their flights, both ants and termites lose their wings, so wings usually aren't present.
- Winged female and worker ants have elbowed antennae, while the termites' antennae aren't elbowed.

Ants undergo complete metamorphosis, passing through egg, larval, pupal, and adult stages (Figure 2). Larvae

are immobile, wormlike, and don't resemble adults. Ants, like many other hymenopterans such as bees and wasps, are social insects with duties divided among different types, or castes, of adults. Queens conduct the reproductive functions of a colony and are larger than other ants; they lay eggs and sometimes participate in feeding and grooming larvae. The sterile female workers gather food, feed and care for larvae, build tunnels, and defend the colony; these workers make up the bulk of the colony. Males don't participate in colony activities; their sole purpose is to mate with the queens. Workers feed and care for males, which are few in number.

For additional information about how to identify different ant species, see the *Key to Identifying Common Household Ants* at <http://www.ipm.ucdavis.edu/TOOLS/ANTKEY>.

LIFE CYCLE AND HABITS

Ants usually nest in soil; nest sites vary with species but are often found next to buildings, along sidewalks, or in close proximity to food sources such as trees or plants that harbor honeydew-producing insects. Ants also construct nests under boards, stones, tree stumps, or plants and sometimes

PEST NOTES

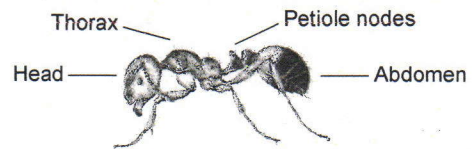
University of California
Agriculture and Natural Resources
Statewide Integrated Pest Management Program












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Table 1. Identifying Features of Common Household Ants.¹

Effective management approaches vary with ant species. Use behavioral characteristics such as food and nesting preferences along with physical characteristics to identify ants. A first step in identifying ants is to use a magnifier to determine if they have one or two nodes at the petiole, the first portion of the abdomen.



<p>One-node ant</p> 	<p>Two-node ant</p> 		
<p>Argentine ant (<i>Linepithema humile</i>) Food: sweets, sometimes proteins Nest: outdoors in shallow mounds Physical description: 1/8 inch, dull brown</p>	 <p>J. K. Clark</p>	<p>Pavement ant (<i>Tetramorium caespitum</i>) Food: sweets, proteins, grease Nest: in lawns or under stones or boards; builds mounds along sidewalks and foundations or near water Physical description: 3/16 inch, dark brown to black</p>	 <p>J. K. Clark</p>
<p>Carpenter ant (<i>Camponotus</i> species) Food: sweets Nest: in tree stumps, firewood, fence posts, hollow doors or window frames; deposits sawdustlike frass outside nests Physical description: large, workers vary from 1/4 to 1/2 inch, black or bicolored red and black</p>	 <p>J. K. Clark</p>	<p>Pharaoh ant (<i>Monomorium pharaonis</i>) Food: fats, proteins, sweets Nest: in wall or cabinet voids, behind baseboards or insulation, or outdoors in debris Physical description: 1/16 inch, yellow or honey-colored to orange</p>	 <p>J. K. Clark</p>
<p>Odorous house ant (<i>Tapinoma sessile</i>) Food: sweets, sometimes proteins Nest: in shallow mounds in soil or debris or indoors in wall voids or around water pipes or heaters Physical description: 1/8 inch, dark brown to shiny black, very strong odor when crushed</p>	 <p>D.-H. Choe</p>	<p>Red imported fire ant (<i>Solenopsis invicta</i>) Food: sweets, proteins Nest: in mounds with multiple openings in soil or lawns and sometimes in buildings behind wall voids Physical description: workers vary from 1/16 to 1/5 inch, reddish with dark brown abdomen</p>	 <p>J. K. Clark</p>
<p>Velvety tree ant (<i>Liometopum occidentale</i>) Food: sweets and insects Nest: in dead wood such as old tree limbs, stumps, and logs Physical description: workers vary from 1/8 to 1/4 inch, brownish-black head, red thorax, velvety black abdomen, very distinct odor when crushed</p>	 <p>D. Rosen</p>	<p>Southern fire ant (<i>Solenopsis xyloni</i>) Food: proteins and sweets Nest: in small mounds with flattened, irregular craters in wood or under rocks Physical description: workers vary from 1/8 to 1/4 inch, amber head and thorax, black abdomen, golden hairs cover body</p>	 <p>J. K. Clark</p>
		<p>Thief ant (<i>Solenopsis molesta</i>) Food: greasy and fatty, sometimes sweets. Steals food and ant larvae from other ant nests. Nest: outdoors in soil or under rocks or decaying wood, indoors behind wallboards or baseboards Physical description: 1/32 inch, yellow to light brown</p>	 <p>J. K. Clark</p>

¹ See the Key to Identifying Common Household Ants at <http://www.ipm.ucdavis.edu/TOOLS/ANTKEY> for more information and line drawings on identifying species.

under buildings or other protected places. The primary ant that nests indoors in California is the Pharaoh ant. In temperate climates, this species nests in warm, moist locations such as inside wall voids, under flooring, or near hot water pipes or heating systems, but is also found nesting outdoors in warmer parts of California. See Table 1 for nesting sites of other species. Food preferences vary among ant species but may include fruits, seeds, nuts, fatty substances, dead or live insects, dead animals, and sweets.

Ants often enter buildings seeking food and water, warmth and shelter, or refuge from dry, hot weather or flooded conditions. They may appear suddenly in buildings if other food sources become unavailable or weather conditions change.

Although there is some variation among species, a single newly mated queen typically establishes a new colony. After weeks or months of confinement underground, she lays her first eggs. After the eggs hatch, she feeds the white, legless larvae with her own metabolized wing muscles and fat bodies until the larvae pupate. Several weeks later, the pupae transform into sterile female adult workers, and the first workers dig their way out of the nest to collect food for themselves, the queen (who continues to lay eggs), and subsequent broods of larvae. As numbers increase, workers add new chambers and galleries to the nest. After a few years, the colony begins to produce winged male and female ants, which leave the nest to mate and form new colonies.

Argentine ants differ from most other ant species in California in that their nests are often shallow, extending just below the soil surface. However, under dry conditions they will nest deeper in the soil. In addition, Argentine ant colonies aren't separate but linked to form one large "supercolony" with multiple queens. When newly mated queens disperse to found new colonies, they are accompanied by workers rather than going out on their own as most other species do.

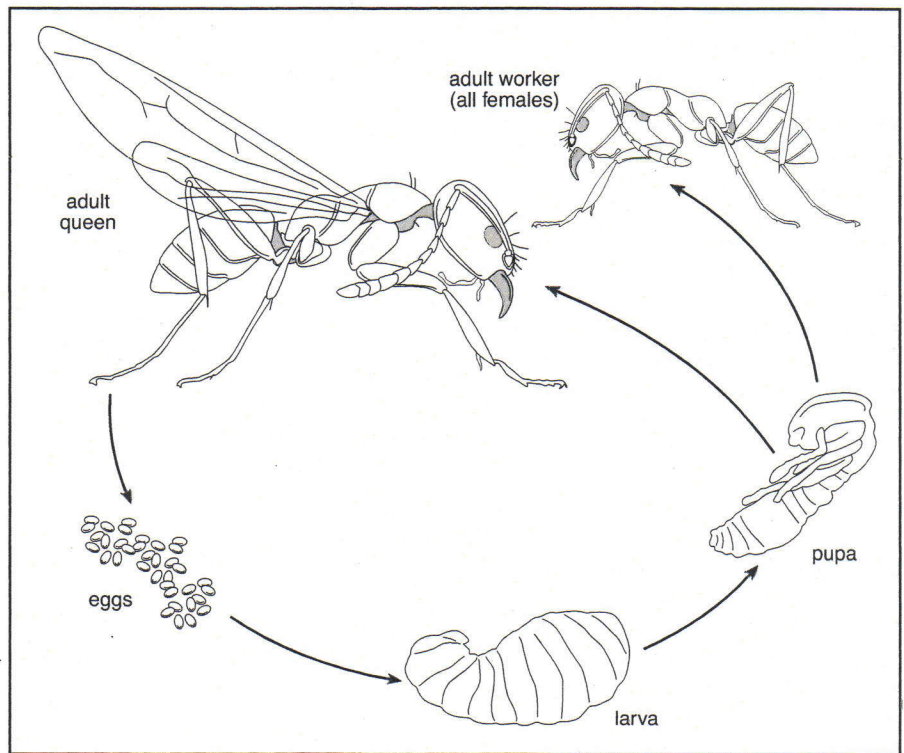


Figure 2. Life cycle of the Argentine ant.



Figure 3. Argentine ants tending aphids on ceanothus.



Figure 4. Velvety tree ants.

DAMAGE

Inside buildings, household ants feed on sugar, syrup, honey, fruit juice, fats, and meat. Long trails of thousands of ants may lead from nests to food sources, causing considerable concern among building occupants. Outdoors ants are attracted to honeydew that soft scales, mealybugs, and aphids produce. This liquid excrement contains sugars and other nutrients. Frequently outbreaks of scales and aphids occur when ants tend them for honeydew, because the ants protect scales and aphids from their natural enemies (Figure 3).

Ants can bite with their pincerlike jaws, although most species rarely do. However, the velvety tree ant (Figure 4) is an aggressive biter. A few ants sting, including native fire ants and harvester ants, which are primarily outdoor species and are the most common stinging ants in California. An aggressive stinging ant, the red imported fire ant has been found in various Southern California counties. If you suspect a fire ant infestation, report it to your county agricultural commissioner. For more information about red imported fire ants, see *Pest Notes: Red Imported Fire Ant* listed in References.

MANAGEMENT

Ant management requires diligent efforts and the combined use of mechanical, cultural, sanitation, and often chemical control methods. It is unrealistic and impractical to attempt to totally eliminate ants from an outdoor area. Focus your management efforts on excluding ants from buildings or valuable plants and eliminating their food and water sources. Reducing outdoor sources of ants near buildings will reduce the likelihood of ants coming indoors.

Remember that ants often play a beneficial role in the garden. Become aware of the seasonal cycle of ants in your area and be prepared for annual invasions by caulking and baiting before the influx. Different species of ants respond to management practices differently. For management information specific to a particular species, see the *Key to Identifying Common Household Ants* at <http://www.ipm.ucdavis.edu/TOOLS/ANTKEY>. For videos related to ant management in the home, go to <http://www.ipm.ucdavis.edu/ants>.

Monitoring and Inspecting

Regularly inspecting your home for ants or ant entry points is an important part of an IPM program. Monitor for ants near attractive food sources or moist areas. Ants may invade kitchens, bathrooms, offices, or bedrooms. Inspect under sinks, in cupboards, and along pipes and electrical wires. Look for large trails of ants or for just a few stragglers. Stragglers are scouts randomly searching for food or nesting sites. When you spot ant trails, try to follow the ants to where they are entering the building and to the nest if possible. Look indoors and outdoors for holes or cracks in foundations or walls that provide entry points to buildings.

Exclusion and Sanitation

To keep ants out of buildings, caulk cracks and crevices around foundations and other sites that provide entry from outside (Figure 5). Ants prefer to make trails along structural elements, such as wires and pipes, and frequently use them to enter and travel within a

structure to their destination, so look for entry points in these locations. Prior to caulking, some pest management professionals may apply products containing silica aerogel (sometimes combined with pyrethrins in professional products such as EverGreen Pyrethrum Dust) into wall voids before sealing them up.

Indoors, eliminate cracks and crevices wherever possible, especially in kitchens and other food-preparation and storage areas. Store attractive food items such as sugar, syrup, honey, and pet food in closed containers that have been washed to remove residues from outer surfaces. Rinse out empty soft drink containers or remove them from the building. Thoroughly clean up grease and spills. Remove garbage from buildings daily and change liners frequently.

Look for indoor nesting sites, such as potted plants. If ants are found in potted plants, remove the containers from the building, then place the pots for 20 or more minutes in a solution of insecticidal soap and water at a rate of 1 to 2 tablespoons of insecticidal soap per quart of water. Submerge so the surface of the soil is just covered by the water-soap solution.

Outdoor ant nests may be associated with plants that support large populations of honeydew-producing insects such as aphids, soft scales, mealybugs, or whiteflies. Avoid planting such trees and shrubs next to buildings, or manage honeydew-producing insects. Keep plants, grass, and mulch several inches away from the foundation of buildings, because these items provide nesting sites for ants. Fix leaky faucets and sprinkler heads; these attract thirsty ants.

Trees and Shrubs

When numerous ants are found on plants, they are probably attracted to the sweet honeydew deposited on the plants by honeydew-producing insects such as aphids or soft scales. Ants may also be attracted up into trees or shrubs by floral nectar or ripening or rotten sweet fruit. These ants can be kept out by banding tree trunks with sticky substances such as Tanglefoot. Trim



Figure 5. Caulking ant entryways is a key element of an ant IPM program.

WHAT TO DO IF YOU HAVE AN ANT EMERGENCY

- Determine what the ants are attracted to and remove the food source.
- Vacuum trails, wipe them with soapy water, or spray with window cleaner.
- Locate entry points then caulk openings or plug with petroleum jelly.
- Put out bait stations or apply gel bait at entry points.
- Baits take time to work, so continue to clean up trails.
- Indoor sprays aren't usually necessary.

branches to keep them from touching structures or plants so that ants are forced to try to climb up the trunk to reach the foliage.

When using Tanglefoot on young or sensitive trees, protect them from possible injury by wrapping the trunk with a collar of heavy paper, duct tape, or fabric tree wrap and coating this with the sticky material. Check the coating every one or two weeks and stir it with a stick to prevent the material from getting clogged with debris and dead ants, which will allow ants to cross. Ant stakes with bait can also be used around trees.

Baits

Ant baits contain insecticides mixed with materials that attract worker ants looking for food. Baits are a key tool for managing ants and the only type of insecticide recommended in most situations. Ants are attracted to the bait and recruit other workers to it. Workers carry small portions of the bait back to the nest where it is transferred mouth to mouth to other workers, larvae, and

queens to kill the entire colony. Bait products must be slow-acting so that the foraging ants have time to make their way back to the nest and feed other members of the colony before they are killed. When properly used, baits are more effective and safer than sprays.

Baits are available in several different forms. For residential users, the most readily available forms are solids or liquids that are prepackaged into ant stakes or small plastic bait station containers. These products are easy to use and are quite safe if kept away from children and pets. Some products dry up rapidly and must be frequently replaced to manage a large population. A few boric acid products are liquids that are poured into refillable containers or applied as drops on cards.

Reusable bait stations or dispensers are more useful than prepackaged baits for difficult ant problems. Reusable stations can be opened, checked, and refilled as needed. This is particularly important for liquid baits, which may be rapidly consumed or dry out. Some stations have removable cups that can be filled with two or more types of baits to offer ants a choice. Bait stations protect baits from photodegradation and disturbance by children. Some types of bait stations can be permanently installed into the ground or attached to outside walls or pavement in areas around schools or other buildings where ants are a frequent problem. The bait stations may be hidden in mulch so they aren't immediately visible to children or pets.

Gel formulations of pesticide baits are packaged in small tubes. They are applied in small cracks and crevices where ants are entering. Gel products are now available to home users as well as professionals and can be a useful tool in an IPM program.

Ant baits contain carbohydrates (e.g., sugars), proteins, oils, or a combination of these as attractants along with an active ingredient (toxicant). Different attractants are more effective against different species of ants and

Table 2. Common Ant Bait Products.¹

Active ingredient	Example product names	Formulation: application/bait
avermectin B (abamectin)	Enforcer AntMax Bait Stations Raid Ant Baits III	solid: bait station/protein solid: bait station/protein
borate-based products ²	Drax SF Ant Gel ³ Grants Kills Ants Liquid Ant Bait Terro Ant Killer II Liquid Ant Baits Gourmet Liquid Ant Bait	gel: cracks/sugar liquid: bait station/sugar liquid: bait containers/sugar liquid: refillable dispensers/ sucrose solution
fipronil	Combat Ant Killing Gel Combat Quick Kill Formula 3 Maxforce FC Ant Killer Bait Gel ³	gel: cracks/protein solid: bait discs/protein gel: cracks/sugar
hydramethylnon	Combat Source Kill Amdro Kills Ants Killing Bait	solid: bait discs/protein dry: ant stake bait stations/protein

¹ Effectiveness varies according to ant species and product

² Borate products may include the following active ingredients: borax (sodium tetraborate decahydrate), disodium octaborate tetrahydrate, or orthoboric acid.

³ May be available for professional use only.

at different times of the year. In the case of Argentine ants, sweet baits are attractive year-round. Protein baits are attractive to Argentine ants primarily in the spring. However, other ant species such as thief ants and Pharaoh ants prefer protein or greasy baits year-round. Fire ants prefer baits containing oils. See Table 1 for information on food preferences. Offering a small quantity of each kind of bait and observing which one the ants prefer is a good way to determine what to use.

Look for the active ingredient listed on the label of bait products. Some examples of active ingredients include hydramethylnon, fipronil, boric acid (borate or various forms of sodium borate), and avermectin B (abamectin). Table 2 lists some common ant bait products organized by active ingredient. Bait products are constantly being improved. Look for new active ingredients and improvements to current products. Avoid products packaged as granules that contain the active ingredients cyfluthrin or permethrin. Although these products may be mistaken for baits, they are actually contact insecticides that rapidly kill foragers and don't control the colony. Likewise, bait stations with propoxur or indoxacarb aren't very effective, because the active ingredient is too fast-acting.

To improve bait effectiveness, be sure to remove any particles of food, residues of sweet liquids, or other attractive material from cracks around sinks, pantries, and other ant-infested areas. For the most effective and economical control, use baits only when there is an ant problem. Treatments made in late winter and early spring when ant populations are just beginning to grow will be most effective. Ant preferences can change throughout the year; to increase your success rate, set out different formulations of various bait products in a single baiting station, giving ants a choice. Don't use any insecticide sprays while you are using baits, and check and refresh bait stations regularly. Baits can dry up or become rancid and unattractive over time.

Use baits primarily outdoors. Use indoors only if there is a serious infestation and you can't find the spot where ants are entering the building; otherwise you could attract ants indoors. Outdoor baits draw ants out of buildings. Place bait stations where ants can easily find them, but avoid placing them in areas that are accessible to pets and small children. Place baits near nests, on ant trails beneath plants, or along edges where ants travel. Space them every 10 to 20 feet outside around the foundation and at nest openings,

if they can be found. Effectiveness of baits will vary with ant species, bait material, and availability of alternative food. To achieve wide distribution of the bait so the entire colony will be killed, the bait toxicant must be slow-acting. Control with baits isn't immediate and may take several weeks or more to be complete.

Refillable Bait Stations for Argentine Ant Management. Currently the most effective baits available to consumers for Argentine ants are the borate-based baits. Prepackaged bait stations usually contain 5.4% borate. They can be effective at killing foragers in the home but are less effective at managing major infestations, because foragers are killed before they can bring the bait back to the colony.

Liquid borate products with a lower percentage of active ingredient (0.5 to 1.0% concentration in a sugar-water solution) will have more impact on the colony, although it may take several days to a week to see results and they need to be used in larger, refillable bait stations. Products with the lower concentration of borates (e.g., Gourmet Liquid Ant Bait) are registered for home use but are difficult to find in stores and may have to be ordered online.

Several refillable bait stations are available including the Ant Café, Antopia, Ant-No-More, and KM AntPro. University of California research with the KM AntPro dispenser has shown that it can be effective when properly installed and maintained outside the home (Figure 6). Usually at least one dispenser is installed around each side of a house and placed in shady areas where ants trail. Stations must be checked regularly and refilled as necessary. For more information about installation and maintenance, see the video on refillable bait stations at <http://www.ipm.ucdavis.edu/PMG/menu.ants.html>.

Indoor Insecticide Treatments

If ants can be thoroughly washed away and excluded from an area, indoor insecticide sprays aren't necessary. Vacuuming up ant trails or sponging or mopping them with soapy water may

be as effective as an insecticide spray in temporarily removing foraging ants in a building. Soapy water removes the ant's scent trail, especially if thorough cleaning is done at the entry points. Some soap products such as window cleaners can kill ants on contact but leave no residual toxicity. Certain plant-based oils (e.g., peppermint, rosemary, clove, orange, and thyme) are formulated in pesticide-type products to be applied for this purpose, although as food-based products they aren't required to be registered as pesticides. These types of products typically provide excellent contact activity but have limited residual activity against ants.

Outdoor Insecticide Treatments

A common practice used to prevent ants from coming indoors is to apply a perimeter treatment of residual sprays around the foundation. Commonly used insecticides include the pyrethroids bifenthrin, cypermethrin, and lambda-cyhalothrin. All are available in retail products, but products available to professionals provide longer residual control than home-use products.

Spraying around the foundation won't provide permanent control, because it kills only foraging ants without killing the colony and the queens. Typically the foragers represent only a small proportion of the colony. On occasion, barrier sprays make the situation worse by trapping ants indoors. Perimeter treatments may appear to knock down the population, but ants will quickly build back up and invade again.

To try to achieve long-term control, some pest control companies offer every-other-month perimeter spray programs. Perimeter treatments pose more risk of environmental upset than baits in bait stations and are less effective than a bait-based IPM program. Because of water quality concerns, the California Department of Pesticide Regulation has recently adopted regulations limiting the use of perimeter treatments with pyrethroid insecticides.

Baits in refillable bait stations provide the safest effective treatment for do-



Figure 6. Place bait stations or dispensers, such as this KM AntPro dispenser, outside the house in shady areas where ant trails are seen.

it-yourself ant management outdoors. Combined with the exclusion and sanitation practices discussed above, this approach should manage most home ant invasions. If a problem persists, the best option is to hire a pest management professional trained in IPM or IPM-certified by a reputable organization. These professionals have access to more effective materials (such as fipronil) and application equipment that can prevent contamination of the environment. For more tips on hiring a professional, see *Pest Notes: Hiring a Pest Control Company* listed in References.

REFERENCES

- Greenberg, L., J. H. Klotz, and J. N. Kabashima. Aug. 2007. *Pest Notes: Red Imported Fire Ant*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7487. Also available online, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7487.html>.
- Klotz, J. H., L. Hansen, H. Field, M. K. Rust, D. Oi, and K. Kupfer. 2010. *Urban Pest Management of Ants in California*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3524.
- Klotz, J. H., L. Hansen, R. Pospischil, and M. K. Rust. 2008. *Urban Ants of North America and Europe: identification, biology, and management*. Ithaca, N.Y.: Cornell Press.
- Klotz, J. H., M. K. Rust, and L. D. Hansen. Aug. 2009. *Pest Notes: Carpenter Ants*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7416. Also available online, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7416.html>.

Mallis, A. 2011. *Handbook of Pest Control*. 10th ed. Richfield, Ohio: GIE Media Inc.

Reynolds, C. A., M. L. Flint, M. K. Rust, P. S. Ward, R. L. Coviello, and J. H. Klotz. 2001. *Key to Identifying Common Household Ants*. UC Statewide IPM Program. Also available online at <http://www.ipm.ucdavis.edu/TOOLS/ANTKEY/>.

Wilens, C. A., D. L. Haver, M. L. Flint, P. M. Geisel, and C. L. Unruh. March 2006. *Pest Notes: Hiring a Pest Control Company*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 74125. Also available online, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn74125.html>. ❖

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YELLOWJACKETS AND OTHER SOCIAL WASPS

Integrated Pest Management for Home Gardeners and Landscape Professionals

Only a few of the very large number of wasp species in California live a social life. These species are referred to as social wasps. Some social wasps are predators for most or all of the year and provide a great benefit by killing large numbers of plant-feeding insects and nuisance flies; others are exclusively scavengers. Wasps become a problem only when they threaten to sting humans. In California, yellowjackets are the primary pests among the social wasps.

IDENTIFICATION AND LIFE CYCLE

In Western states there are two distinct types of social wasps—yellowjackets and paper wasps. Yellowjackets are by far the most troublesome group, especially ground- and cavity-nesting ones such as the western yellowjacket (Figure 1), which tend to defend their nests vigorously when disturbed. Defensive behavior increases as the season progresses and colony populations become larger while food becomes scarcer. In fall, foraging yellowjackets are primarily scavengers, and they start to show up at picnics and barbecues, around garbage cans, at dishes of dog or cat food placed outside, and where ripe or overripe fruit are accessible. At certain times and places, the number of scavenger wasps can be quite large.

Paper wasps are much less defensive and rarely sting humans. They tend to shy away from human activity except when their nests are located near doors, windows, or other high-traffic areas.

Typically, previously mated, overwintering yellowjacket and paper wasp queens begin their nests in spring when the weather becomes warm. The queen emerges in late winter to early spring to feed and start a new nest. From spring to midsummer, nests are in the growth phase, and larvae require large amounts of protein. Workers forage mainly for protein at this time—usually other insects—and for some sug-



Figure 1. Western yellowjacket.

ars. By late summer, however, the colonies grow more slowly or cease growth and require large amounts of sugar to maintain the queen and workers; foraging wasps are particularly interested in sweet things at this time. Normally, yellowjacket and paper wasp colonies live only one season. In very mild winters or in coastal California south of San Francisco, however, some yellowjacket colonies survive for several years and become quite large.

Yellowjackets

The term “yellowjacket” refers to a number of different species of wasps in the genera *Vespula* and *Dolichovespula* (family Vespidae). Included in this group of ground-nesting species are the western yellowjacket, *V. pennsylvanica*, which is the most commonly encountered species and is sometimes called the “meat bee,” and seven other species of *Vespula*. *V. vulgaris* is common in rotted tree stumps at higher elevations, and *V. germanica*, the German yellowjacket, is becoming more common in many urban areas of California, where it frequently nests in houses.

These wasps tend to be medium sized and black with jagged bands of bright yellow—or white in the case of the aerial-nesting *D. (formerly known as V.) maculata*—on the abdomen and have a very short, narrow “waist,” the area where the thorax attaches to the abdomen.

Yellowjackets commonly build nests in rodent burrows (Figure 2), but they some-

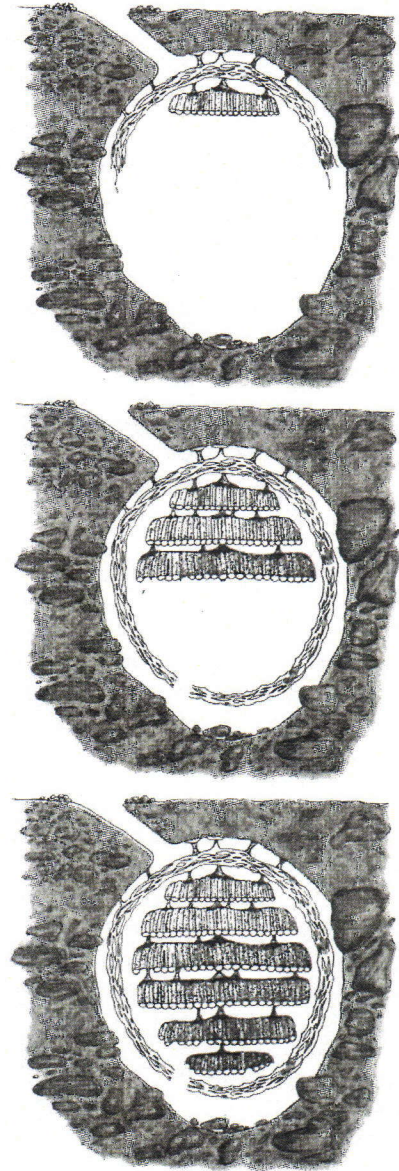


Figure 2. Yellowjacket nest in an underground rodent burrow in spring (top), summer (center), and early fall (bottom). The nest becomes larger during the summer as yellowjackets add new comb layers, each containing developing larvae. The colony declines in late fall when workers die off.

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times select other protected cavities, such as voids in walls and ceilings of houses, as nesting sites. Colonies, which are begun each spring by a single reproductive female, can reach populations of between 1,500 and 15,000 individuals, depending on the species.

The wasps build a nest of paper made from fibers scraped from wood mixed with saliva. It is built as multiple tiers of vertical cells, similar to nests of paper wasps, but enclosed by a paper envelope around the outside that usually contains a single entrance hole. If the rodent hole isn't spacious enough, yellowjackets will increase the size by moistening the soil and digging. Similar behavior inside a house sometimes leads to a wet patch that develops into a hole in a wall or ceiling.

Immature yellowjackets are white grublike larvae that become white pupae. The pupae develop adult coloring just before they emerge as adult wasps. Immatures normally aren't seen unless the nest is torn open or a sudden loss of adult caretakers leads to an exodus of starving larvae.

Aerial-nesting yellowjackets, *D. arenaria* and *D. maculata*, build paper nests that they attach to the eaves of a building or that hang from the limb of a tree. The entrance normally is a hole at the bottom of the nest. These aerial nesters don't become scavengers at the end of the season, but they are extremely defensive when their nests are disturbed. Defending *D. arenaria* sometimes bite and sting simultaneously. Wasp stingers have no barbs and can be used repeatedly, especially when the wasp gets inside clothing. As with any stinging incident, it is best to leave the area of the nest site as quickly as possible if wasps start stinging.

Paper Wasps

Paper wasps such as *Polistes fuscatus aurifer*, *P. apachus*, and *P. dominulus* are 1-inch-long slender wasps with long legs and a distinct slender waist (Figure 3). Background colors vary, but most Western species tend to be golden brown or darker with large patches of yellow or red.

Preferring to live in or near orchards or vineyards, they hang their paper nests in protected areas, such as under eaves, in attics, or under tree branches or vines. Each nest hangs like an open umbrella from a pedicel (stalk) and has open cells that can be seen from beneath the nest (Figure 4). Sometimes white, legless, grublike larvae can be seen from below. Paper wasp nests rarely exceed the size of an outstretched hand, and populations vary between 15 to 200 individuals. Most species are relatively unaggressive, but they can be a problem when they nest over doorways or in other areas of human activity such as fruit trees.

Mud Daubers

Mud daubers (Figure 5) are black and yellow thread-waisted solitary wasps that build a hard mud nest, usually on ceilings and walls, attended by a single female wasp. They belong to the family Sphecidae and aren't social wasps but might be confused with them. They don't defend their nests and rarely sting. During winter, you can safely remove the nests without spraying.

INJURY AND DAMAGE

Concern about yellowjackets is based on their persistent, pugnacious behavior around food sources and their aggressive defense of their colony. Usually stinging behavior is encountered at nesting sites, but sometimes scavenging yellowjackets will sting if someone tries to swat them away from a potential food source. When scavenging at picnics or other outdoor meals, wasps will crawl into soda cans and can sting your lips or the inside of your mouth or throat.

Reactions to wasp stings vary from only short-term, intense sensations to substantial swelling and tenderness, some itching, or life-threatening allergic responses. These reactions are discussed in detail in *Pest Notes: Bee and Wasp Stings*. (See References.) Of specific concern is a condition that results from multiple-sting encounters, sometimes unfamiliar to attending health professionals, that is induced



Figure 3. Paper wasp.



Figure 4. Paper wasp nest.



Figure 5. Mud dauber.

by the volume of foreign protein injected and the tissue damage caused by destructive enzymes in wasp venom. Red blood cells and other tissues in the body become damaged, and tissue debris and other breakdown products are carried to the kidneys, to be eliminated from the body. Too much debris and waste products can cause blockages in the kidneys, resulting in renal insufficiency or renal failure. Patients in this condition require medical intervention, which can include dialysis.

MANAGEMENT

Most social wasps provide an extremely beneficial service by eliminating large numbers of other pest insects through predation and should be protected and encouraged to nest in areas of little human or animal activity. Although many animals prey on social wasps—including birds, reptiles, amphibians, skunks,

bears, raccoons, spiders, praying mantids, and bald-faced hornets—none provides satisfactory biological control in home situations.

The best way to prevent unpleasant encounters with social wasps is to avoid them. If you know where they are, try not to go near their nesting places. Wasps can become very defensive when their nest is disturbed. Be on the lookout for nests when outdoors. Wasps that are flying directly in and out of a single location are probably flying to and from their nest.

Usually, scavenging wasps won't become a problem if there is no food around to attract them. When nuisance wasps are present outdoors, keep foods including pet food and drinks covered or inside the house, and keep garbage in tightly sealed garbage cans. Once wasps discover food, they will continue to hunt around that location long after the source has been removed.

If wasp nests must be eliminated, it is easiest and safest to call for professional help. In some areas of California, personnel from a local mosquito and vector control district may be available to remove nests. To determine if this service is available in your area, call the Mosquito & Vector Control Association of California at (916) 440-0826. If a rapid solution to a severe yellowjacket problem is essential, seek the assistance of a professional pest control operator or consider installing bait stations.

Trapping Wasps

Trapping is one method that can be employed to try to reduce yellowjacket problems. Trapping isn't suggested for other social wasp species.

Lure traps. The easiest to use are lure traps (Figure 6), which are available for purchase at many retail stores that sell pest control supplies. Lure traps can help reduce the number of localized foraging workers, but they don't eliminate large populations. Lure traps contain a chemical that attracts yellowjackets into the traps, but the common lure in traps, heptyl butyrate, attracts

primarily the western yellowjacket and not other species. Meat such as chicken can be added as an attractant and is believed to improve catches of the German yellowjacket and *V. vulgaris*. Replace meat frequently, because yellowjackets aren't attracted to rotting meat. Also, periodically check the trap to remove trapped yellowjackets and make sure workers are still attracted to the trap. Lures need to be replaced periodically; follow trap directions regarding replacement.

To reduce the number of yellowjackets foraging in specific areas such as patios, picnic tables, concession stands, and Dumpsters, place lure traps with heptyl butyrate around the periphery. In large areas such as parks, place traps about 200 feet from the area to be protected and about every 150 feet along the circumference. In backyards, place them along the edge of the property line as far away from the patio or other protected area as possible. To intercept foraging yellowjackets, it is important to place the traps between the area to



Figure 6. Yellowjacket lure trap.

be protected and the native landscapes serving as nesting sites. Typically yellowjackets will forage about 1/4 mile. See Figure 7 for a suggested placement for traps.

Water traps. Water traps generally are homemade and consist of a 5-gallon bucket, string, and protein bait such as turkey, ham, fish, or liver. Fill the bucket with soapy water, and suspend the pro-

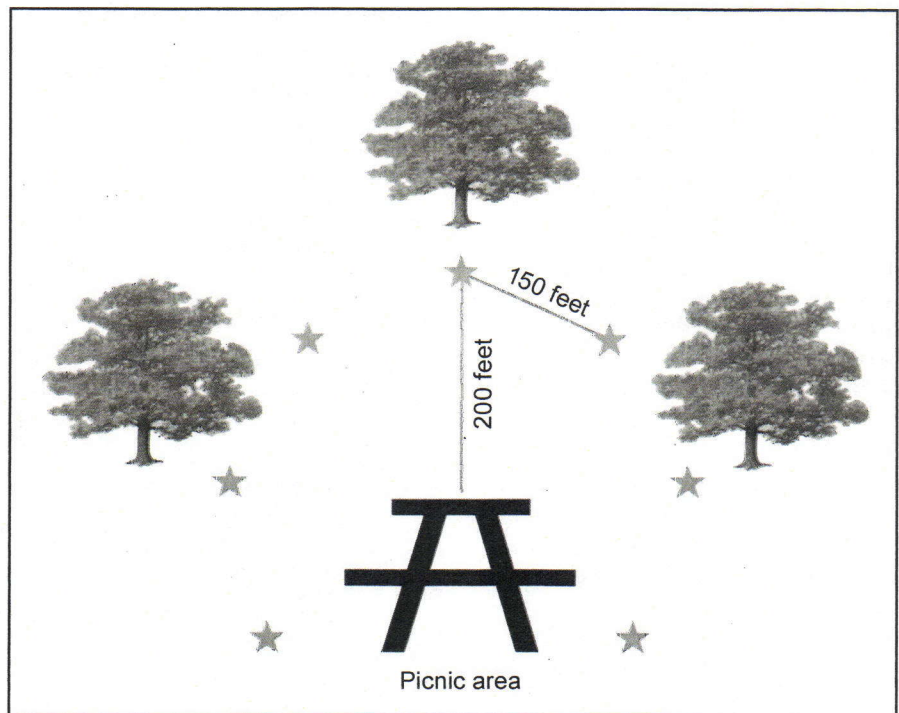


Figure 7. Placement of lure traps (represented by stars) to protect a picnic area in a park. Place the traps about 200 feet from the protected area and about 150 feet apart. In a backyard situation, place the traps around the periphery of the property as far away from the patio or other protected area as possible.

tein bait 1 to 2 inches above the water. A wide mesh screen over the bucket will help prevent other animals from reaching and consuming the bait. After the yellowjacket removes the protein, the yellowjacket flies down and becomes trapped in the water and drowns. Like the lure trap, these traps also work best as queen traps in late winter to early spring. In summer and fall they might assist in reducing localized foraging workers but usually not to acceptable levels. Place water traps away from patio or picnic areas, so wasps aren't attracted to your food as well.

Bait Stations

In the past, poison bait products were available to reduce yellowjacket populations later in the season when their prey is no longer available and some species turn to scavenging. However, reliable products were taken off the market in the early 2000s. Esfenvalerate products that recently became available haven't been shown to be effective in research trials.

Discouraging or Eliminating Nests

Early in the season, simply knocking down newly started paper wasp nests will cause the founding female to go elsewhere to start again or to join a neighboring nest as a worker. As there is little activity around newly started wasp nests, they are very difficult to find. Wasps are more likely to be noticed after nests and populations grow. Nest removal for controlling subterranean or cavity-dwelling yellowjackets isn't practical, because the nests are underground or otherwise inaccessible.

Nest Sprays

Aerosol formulations of insecticides labeled for use on wasp and hornet nests can be effective against yellowjackets and paper wasps, but the products must be used with extreme caution. Wasps will attack if they sense a poison being applied to their nests, and even the freeze-type products aren't guaranteed to stop all wasps that come flying out. It is prudent to wear protective clothing that covers the entire body, including a veil over your face and gloves. In addition, you need to wear protective

eyewear and other clothing to protect yourself from pesticide hazards.

Wasps are most likely to be in the nest at night, but even after dark and using formulations that shoot an insecticide stream up to 20 feet, stinging incidents are likely. Underground nests can be quite a distance from the visible entrance, and the spray might not get back far enough to hit the wasps. Partially intoxicated, agitated wasps are likely to be encountered at some distance from the nest entrance, even the day after an insecticidal treatment. Hiring a pest control professional will reduce risks to you and your family; in some areas of California, this service might be available through your local mosquito and vector control district.

REFERENCES

Akre, R. D., A. Green, J. F. MacDonald, P. J. Landolt, and H. G. Davis. 1981. *The Yellowjackets of America North of Mexico*. USDA Agric. Handbook No. 552.

Ebeling, W. 1975. *Urban Entomology*. Oakland: Univ. Calif. Agric. Nat. Res.

Mussen, E. C. Sept. 2011. *Pest Notes: Bee and Wasp Stings*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7449. Also available online, www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7449.html.

SUGGESTED READING

Sacramento-Yolo Mosquito & Vector Control District, www.fightthebite.net. ❖

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Head Start Staff: What You Need to Know About Pesticide Poisoning

They buzz, they burrow, they crawl, they sting, they bite, they munch, and they torment. From insects to rodents, they can make our lives difficult. Pests, such as ants, cockroaches, mice, rats, and termites, can be particularly troublesome to families if left unchecked. However, many families are unaware of the serious health risks associated with the improper storage or use of household pesticides, the products we use to control or kill pest populations in and around a home.

We encourage Head Start staff to teach families about the possible health effects pesticides can have on young children as well as the simple pesticide poisoning prevention efforts that they can incorporate into their regular household activities. In this way, families are armed with important safety knowledge that lets them make smart choices that effectively protect their children.

One of the simplest and most effective methods of preventing pesticide poisoning is storing household pesticides out of reach of small children in high, locked cabinets.

Pesticides. What are they?

Pesticides are products used in and around the home to control insects (insecticides), termites (termiticides), rodents (rodenticides), fungi (fungicides), weeds (herbicides), and

microbes (disinfectants). They can be sold in the form of sprays, powders, crystals, or balls. Since most pesticides are specifically created to be poisonous to pest populations, there are many potential risks associated with their improper use.

How do children come in contact with pesticides?

Children can come into contact with pesticides stored or applied in their homes, yards, day-care facilities, schools, parks, or on pets.

Children often touch things (that may be contaminated with a pesticide) and put their hands in their mouths. They also crawl and play on floors, grass, or in spaces that might be contaminated with pesticides. These activities may put them at higher risks for poisoning. Exposure to pesticides may cause serious damage to a child's health.

What are the symptoms of pesticide poisoning?

Pesticide poisoning symptoms may appear similar to the flu. If a child is experiencing any of the following symptoms listed below, contact your Poison Control Center immediately.

IMPORTANT FACTS YOU SHOULD KNOW

- The American Association of Poison Control Centers (AAPCC) data show that more than 50 percent of the two million poisoning incidents each year involve children younger than six years old.
- Each year, poison centers receive thousands of calls from the public with concerns about potential exposure to common household pesticides.
- Over 90 percent of calls to the poison control centers concern poisonings that occur in the home.
- Among households with children under the age of five, close to half stored at least one pesticide product within reach of a child.
- Nearly 75 percent of households with no children under the age of five stored pesticides in an unlocked cabinet within a child's reach—a significant figure since 13 percent of all pesticide poisonings occur in homes other than that of the child.

P **I** **d** **y** **I** **t** **S** **a** **f** **e**

Immediate short-term effects include:

- Headaches,
- Dizziness,
- Muscle twitching,
- Weakness,
- Tingling sensations, and
- Nausea.

How can pesticide poisoning affect a child's health?

Pesticide poisoning is especially harmful to children since their brain and nervous systems are at the early, critical stages of development. The effects are not always immediate, and may show up years later as unknown illnesses. Because their bodies are still growing, children have less natural defenses and can develop serious health effects if overexposed to pesticides.

Long-term exposure to pesticides may cause serious health effects such as:

- Birth defects;
- Learning disabilities;
- Behavioral changes;
- Organ damage;
- Forms of cancer, including leukemia, breast cancer, and brain tumors; or
- Asthma symptoms.

Where are pesticides commonly found?

Bathrooms and kitchens are the most likely areas of the home to contain improperly stored pesticides.

Common household pesticides in these areas are:

- Roach sprays and baits;
- Bath and kitchen disinfectants and sanitizers, including bleach;
- Rat and other rodent poisons;
- Insect repellents;
- Products used to kill mold or mildew; and
- Flea and tick shampoos, powders, and dips for pets.

Other household pesticides include:

- Swimming pool chemicals and
- Weed killers.

How can pesticide poisoning be prevented?

Curiosity is a normal stage of a child's developmental process. These explorers are at greater risk for accidental poisoning.

By practicing the following pesticide poisoning prevention guidelines, innocent mistakes don't have to turn into tragedies:

- Always store pesticides away from children's reach, in a locked cabinet.
- Install safety latches on cabinets.
- Read the label first. Follow the directions exactly as they are written on the label.
- Remove children, pets, and their toys before applying pesticides (inside or outside).
- Re-close a pesticide product if ever interrupted during application (e.g., phone call, doorbell, etc.).
- Store pesticides in their original containers since a child can mistake another container for food or drink.
- Use child-resistant packaging correctly by tightly sealing the container after every use.
- Teach children that "pesticides are poisons" and not to be touched.
- Program or post the Poison Control Centers' national hotline number, 1-800-222-1222, in or near your phone.





Pesticides and Their Impact on Children: Key Facts and Talking Points

While pesticides have benefits for society and can be powerful tools for controlling pests, they are also inherently toxic and can severely harm children's health if stored or used improperly.

The following data-driven talking points can be useful when talking with Head Start staff, families and others about the risks associated with pesticides and the importance of pesticide poisoning prevention.

Why are we talking about pesticides?

- 50 percent of the 2 million poisoning incidents each year involve children younger than six years old, and 90 percent of these incidents occur in the home.
- The American Association of Poison Control Centers data reports more than 70,000 calls made to poison centers with concerns about potential exposure to common household pesticides.
- Among households with children under the age of five, close to half stored at least one pesticide product within reach of a child.
- Nearly 75 percent of households with no children under the age of five stored pesticides in an unlocked cabinet within a child's reach — a significant figure since 13 percent of all pesticide poisonings occur in homes other than that of a child.

Why are children especially vulnerable?

Due to key differences in physiology and behavior, children are more susceptible to environmental hazards than adults.

Differences in Physiology

- Children's nervous, immune, digestive and other systems are still developing. Developing systems are less able to detoxify and excrete these pollutants compared to adults.
- Children's systems provide less natural protection than adults.
- Children breathe in more air than adults, inhaling almost 2 times as many pollutants.

Differences in Behavior

- Children spend more time outdoors on grass, playing fields, and play equipment where pesticides may be present.
- Children crawl on the floor and therefore have full body contact with carpets.
- Children's hand-to-mouth contact is more frequent, exposing them to toxins through ingestion.

Decaying cockroaches and mouse dander are among the top triggers in asthmatic children. People with roaches in their homes are 1.5 times more likely to have asthma. People with rodents in their homes are 2 times more likely to have asthma.

Play It Safe

How can pesticide poisoning affect a child's health?

Pesticide poisoning is especially harmful to children since their brain and nervous systems are at early critical stages of development. Because their bodies are still growing, children have fewer natural defenses and can develop serious health effects if overexposed to pesticides. There are two categories of health effects of pesticide exposure. **Acute exposure** refers to an intense exposure over a short period of time; for instance, a child sitting in the room during a spraying. Low-dose and **long-term exposure** is exposure that occurs over a period of time.

Acute exposure to pesticides may cause short-term effects such as:

- Headaches;
- Dizziness;
- Muscle twitching;
- Weakness;
- Tingling Sensations; and
- Nausea.

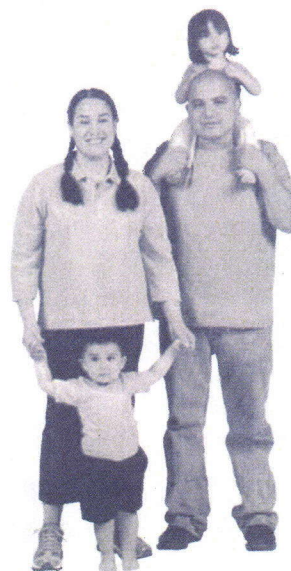
Long-term exposure to pesticides may cause serious health effects such as:

- Birth defects;
- Learning disabilities;
- Behavioral changes;
- Organ damage;
- Forms of cancer, including leukemia, breast cancer, and brain tumors; or
- Asthma symptoms.

What can we do?

One of the most effective ways you can help prevent pesticide poisonings is by adopting Integrated Pest Management (IPM) practices to reduce children's exposure to pesticides. IPM is a safer method of pest management that makes use of a variety of control techniques and focuses on eliminating the causes of pest infestations instead of merely treating the symptoms. Since children spend so much of their day at home and in school, IPM provides an opportunity to create a safer learning environment—to reduce children's exposure to pesticides as well as eliminate pests. IPM involves the following six steps.

- **Keep Pests Out** — If pests can't get inside, then you won't need to use any pesticides to kill them.
- **Starve and Dry Pests Out** — Every creature needs food and water to survive. Eliminate your pests' access to these things and they won't hang around for long.
- **Eliminate Safe Havens for Pests** — Roaches can live in any nook and cranny. Anywhere you see a small crack leading to a spot that people can't access, make sure to seal it up.
- **Monitor for Pests** — Monitoring is key to successful IPM. It lets us know when there is a problem so we can address it early.
- **Create an IPM Plan and Keep Proper Records** — An IPM plan is a document that indicates how you plan to monitor for pests and what you will do if pests suddenly arrive. Having this tool will help you avoid the urge to use dangerous pesticides.
- **Treat Existing Pest Problems** —To get rid of existing pests, use traps, vacuums, gels and baits. If pesticides are necessary, use spot treatments rather than area-wide applications.



BASIC PEST MANAGEMENT IN THE SCHOOL AND CHILD CARE SETTINGS

Course Instructions and Components

Instructions for administering this course

This course package will allow you to train a group of people without your prior knowledge in integrated pest management or safe use of pesticides around children. Watching the enclosed video and taking the quiz will fulfill the annual Healthy Schools Act training requirement.

- The video is titled "HSA Basic course video." It is approximately one hour long.
- After playing the video to your group, have them take the enclosed ten-question quiz. The answer key is also included so you can discuss the correct answers with the group.
- Distribute certificates of completion to all attendees for their records.
- Everyone needs to sign the enclosed sign in sheet.
- Return sign-in sheets to:

School and Child Care IPM Program
California Department of Pesticide
Regulation
1001 I Street P.O. Box 4015
Sacramento, CA. 95812-4015

- The resources included are for your information.

If you have any questions, please contact us at school-ipm@cdpr.ca.gov

Contents

- Course video
- Course objectives
- Sign in sheet
- Basic course quiz and answer key
- Blank certificate of completion
- Resources
 - DPR fact sheet on the Healthy Schools Act requirements for schools and child care centers
 - DPR Pesticide Info sheets
 - What is a pesticide?
 - How to read a pesticide label
 - Buy less, lock it away, and dispose with care
 - DPR school pest fact sheets
 - IPM for ants
 - IPM for cockroaches
 - IPM for mice and rats
 - DPR child care fact sheets
 - IPM for bed bugs
 - What is IPM?
 - DPR green cleaning documents
 - What is green cleaning?
 - What's so great about microfiber?
 - NPIC topic fact sheets
 - Pesticides—what's my risk?
 - Signal words
 - Disinfectants in schools
 - UCIPM Pest Notes
 - Ants
 - Yellowjackets
 - US EPA fact sheets
 - What you need to know about pesticide poisoning
 - Pesticides and their impact on children

BASIC PEST MANAGEMENT IN THE SCHOOL AND CHILD CARE SETTINGS

Course Objectives

1. Students will be able to describe the most common pests in school settings and ways to manage them without pesticides.
2. Students will be able to describe the components of integrated pest management and relate them to real-world maintenance practices.
3. Students will be able to explain why the safe use of pesticides around children is so important.
4. Students will understand how to comply with the Healthy Schools Act requirements.

BASIC PEST MANAGEMENT IN THE SCHOOL AND CHILD CARE SETTINGS QUIZ

Q1. What does IPM stand for?

- A: Integrated Pesticide Management
- B: Integrated Pest Management
- C: Innovative Pest Management
- D: Innovative Pesticide Management

Q2: You can keep pests out by getting rid of space under and around doors. How do you do this?

- A: New doors
- B: Bigger doors
- C: Screens
- D: Weather stripping and door sweeps

Q3. How do you keep pests from coming into your school or center?

- A: Seal up cracks and crevices.
- B: Spray pesticides around the perimeter.
- C: Eliminate food and water around the buildings.
- D: Monitor using sticky traps.

Q4: How does the presence of cockroaches trigger asthma?

- A: The bacteria on their bodies can get on surfaces.
- B: They stir up dust.
- C: They contaminate food.
- D: They leave droppings and body parts.

Q5: If a chemical kills weeds, what is that chemical?

- A: A fertilizer
- B: A medicine
- C: A pesticide
- D: An adjuvant

BASIC PEST MANAGEMENT IN THE SCHOOL AND CHILD CARE SETTINGS QUIZ

Q6: You just purchased a new disinfectant. If you want to know how to safely store this pesticide product, where would you look?

- A: Ask your supervisor
- B: On the DPR Web site
- C: On the Safety Data Sheet for the old product
- D: On the pesticide label

Q7: When is it okay to use a drink container to store pesticides?

- A: After triple-rinsing the container
- B: Never
- C: If it properly labeled
- D: Only when used out of reach of children

Q8: Why should you clean first before sanitizing or disinfecting?

- A: Because dirt reduces the effectiveness of the disinfectant/sanitizer
- B: Because one-step cleaning-disinfectants are too expensive
- C: Because it's safer
- D: Because it's easier

Q9: How often do you need to mix up a fresh bleach solution?

- A: Every other day
- B: Every day
- C: Weekly
- D: When the solution runs out

Q10: What is the Healthy Schools Act?

- A: A federal health and safety law
- B: An environmental safety law regulating all toxins in California schools
- C: A pesticide law prohibiting the use of pesticides in all California schools
- D: A right-to-know law regulating pesticide use in California schools

Disinfectants in Schools

~a conversation~

Disinfectants make things cleaner and healthier. What's the big deal? They aren't harmful.

Are you sure? Did you know disinfectants are pesticides regulated by the EPA? They can harm people if they spill, splash, or are improperly mixed.

OK, so what IS a disinfectant?

Great question! A disinfectant is a pesticide used to destroy fungi, bacteria, and some viruses found on non-living surfaces.



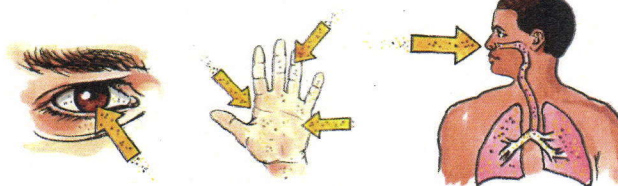
Disinfectant Examples

- Pine Oil
- Some surface wipes
- Germ-killing sprays
- Bleach (Sodium Hypochlorite)



When not used properly, disinfectants can damage the eyes, skin, and lungs. Children can be particularly sensitive to the chemicals in disinfectant products.

Is there anything I should know about using disinfectants safely?



DOs

- ✓ Read the label and follow the directions every time you use a product, even if familiar with it.
- ✓ Wash your hands right after using disinfectants.
- ✓ Point containers away when opening, pouring, or pulling wipes from canisters.
- ✓ Note the amount of time a surface must remain wet in order for the product to work.

DON'Ts

- ✗ Never let young children use or have access to disinfectant products.
- ✗ Never put disinfectants in food or drink containers. Store in original containers and clearly label anything that contains a pesticide.
- ✗ Never mix disinfectants with other cleaning products. Mixing bleach and ammonia will produce a toxic gas.

Got it! Where can I get more information?

npic
NATIONAL PESTICIDE INFORMATION CENTER
1.800.858.7378

Call NPIC for general questions about pesticides, including the potential risk to humans, pets, or the environment.

POISON Help
1-800-222-1222

Call poison control if someone breathes in, swallows, or gets pesticide in the eyes or on the skin.



