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Scale insects on ornamental plants

HOUSE AND LANDSCAPE PESTS

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Many species of scale insects damage landscape plants, shrubs and trees. Scale insects insert their mouthparts into plant tissues and suck out the sap. When many of these insects attack a plant, its growth may be stunted; its leaves may develop yellow blotches; the branches may die; and some or all of the leaves may fall off.

Although scale insects are common, they are probably the most misidentified of all insect groups. Scale insects are generally small (1/4 inch long or less) and often mimic various plant parts, such as bark and buds. Other species appear as small, white, waxy blotches or small bits of cotton on leaves and stems. The one attribute of scale insects that probably leads to most misidentification is that they appear to be nonliving: Once the young settle on a plant, they generally don't move and are often overlooked.

To control scale insects most effectively, you need to know how to identify them, when in their life cycle to treat them, and what methods and chemicals work best for the various species. It's also good to be able to recognize their natural enemies, so you can use them to help you combat scale insects.

Knowing this can help you:

- Time your pesticide applications to control the most scale insects;
- Avoid wasting time and money applying chemicals that don't work at certain stages of the insect's life cycle; and
- Release fewer unnecessary chemicals into the environment.

The life cycles of scale insects vary considerably among species. Their life span may last from a few weeks to several months. The various species can have from one to several overlapping generations every summer. Females can give birth to live young or lay eggs.

Depending on the species, scale insects can spend the winter (overwinter) as eggs, young or adults. Under greenhouse conditions, they may not overwinter at all.

However, all scales have two life stages in common: a mobile stage, generally followed by a motionless development period.

The mobile stage is the first developmental stage, in which the nymphs move about. At this stage they are called "crawlers." Scale crawlers generally emerge in spring or early summer and at the beginning of each generation. This is the stage at which scale insects can be controlled most effectively.

Crawlers search for a suitable location on the plant on which to settle and feed. Once they settle, scale insects enter the motionless development period. Most species never move again in their lives.

Scale insects feed by inserting their hairlike mouthparts into plant tissue and siphoning the plant's sap. While feeding, many species excrete a sweet, sticky liquid referred to as "honeydew." If many of them infest a plant, the honeydew can accumulate on the stems and leaves, making them appear shiny.

In humid areas, a fungus can grow on the honeydew. Because this fungus makes the plant leaves and stems appear sooty, its common name is "sooty mold" (Fig. 1).

Figure 1. Black sooty mold growing on honeydew secreted by wax scale infesting burford holly.

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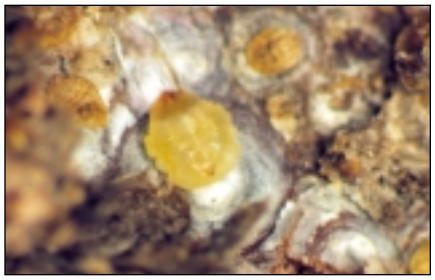

Figure 2. Hard scale with waxy covering removed.

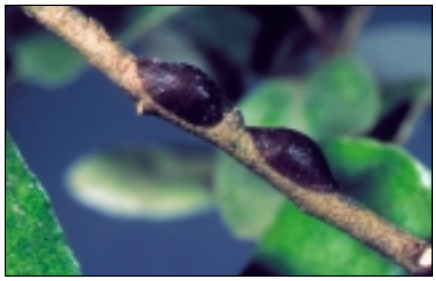

Figure 3. A soft scale.

Figure 4. A mealybug.

Honeydew also attracts ants, and some ant species actually "tend" scale insects for honeydew, while giving protection from predators and parasitoids (small wasps that lay eggs in hosts). Under these conditions, scale insect populations can skyrocket.

As scale insects grow, many species exude wax from pores on their bodies. This wax generally forms a protective covering that may or may not be attached their body. Scale insects with hardened wax coverings that detach easily from their soft bodies underneath are referred to as "hard" or "armored" scales (Fig. 2).

Two other groups of scales produce waxy coverings that are attached to their bodies:

- Soft scales, which are mottled light to dark brown; adults generally do not move.
- Mealy bugs, which are covered with soft, white wax that can be rubbed off easily (Fig. 3-4). All developmental stages of mealy bugs have legs and can crawl, but they move slowly and infrequently.

Some of the more common plant infesting scale insects and plant symptoms are shown in Table 1.

Sampling for scale crawlers

Because of their protective wax covering, most scale insects are very difficult to control with insecticides once they have settled. Scale insects are most vulnerable to spray formulations of contact insecticides during the crawler stage of development.

Generally, the crawler stage lasts from 2 to 4 weeks; however, scales that have multiple generations per year may have crawlers present at all times. To detect this stage of development, you need to inspect scale-infested plants often.

Scale crawlers are tiny ($^1/_{16}$ inch long or smaller), making them difficult to see. To see if scale crawlers are on a plant, use either of these two simple detection methods:

Method 1: In early spring before new plant growth occurs, wrap a small piece of double-sided sticky tape to a stem above a scale infestation (Fig. 5). Crawlers that are moving to new locations will become caught on the tape. Crawlers move toward light. Placing the tape above the scale infestation will increase your chances of finding the crawlers if they are present.

Figure 5. Double-sided sticky tape used to monitor scale crawler activity.

If crawlers are on the plant, the tape will become covered with tiny, cream to light-yellow specks. A magnifying glass can help you verify that crawlers are present.

Method 2: Gently tap a scale-infested stem or leaf over a sheet of white paper. If scale crawlers are present, they will fall onto the paper, where you can easily see them moving about.

Using natural enemies to control scales

Many natural enemies—small parasitic wasps, ladybird beetles and some fungi—can significantly reduce scale insect populations. Before using pesticides, check for natural enemies. Ladybird beetles (commonly known as ladybugs) are easy to spot, but parasitic wasps are more difficult to see because they are so small.

Parasitic wasps often emerge from scales by chewing small, round holes in them. Examine several scales to see if they have these exit holes (Fig. 6). Also, check to see if ants are tending the scales; if so, natural enemies may be ineffective.

If natural enemies are present and it appears that there are few scale insects or that no ants are attending them, wait a few days and check again. If natural enemies are controlling the scale infestations, you do not need to use pesticides.

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Table 1. General descriptions and host plants of some commonly encountered scale insects.

Soft scales

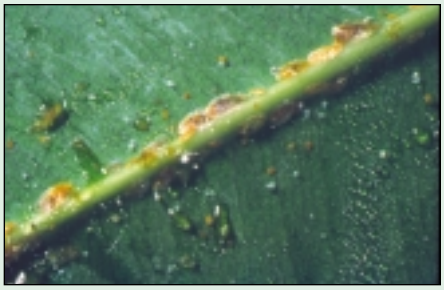

Figure 7. Brown soft scale on ficus tree.

Figure 8. Wax scale on Japanese barberry.

Figure 9. Wax scale on burford holly.

Calico, kermes, lecanium, tortoise and wax scales

These large (up to 3/8 inch), generally mottled patterns of light to dark brown appear as raised hemispherical bumps on leaves and twigs. Most species produce much honeydew, and sooty mold is common under humid conditions. Soft scale infestations can cause leaves to yellow, die and fall off prematurely, and limbs and entire plants to die. Host plants include oaks, conifers, elms, redbud, pyracantha, hollies, euonymus, camellia, citrus and many houseplants.

Figure 10. Lecanium scale on ornamental juniper.

Figure 11. Pit scale on Texas mountain laurel.

Pit scales

These small, round scales are found in the centers of depressed areas or pits on leaves and stems. They are most often found on sweetgum, Pittosporum, mock orange, ligustrum, ilex and Texas mountain laurel.

Hard or armored scales

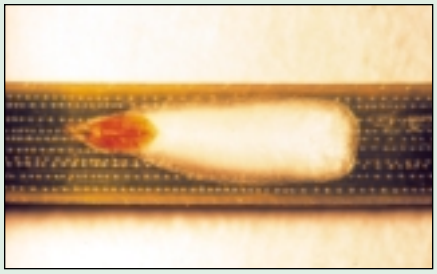

Figure 12. Pine needle scale on pine needle.

Figure 13. Florida red scale on desert rose.

Figure 14. Euonymous scale on evergreen euonymous.

These scales are small (1/8 inch), elongate to oval, and generally from dark gray to white. They infest all parts of exposed plant tissue and can cause leaves to turn yellow and fall off and the plant to be less healthy and even die. Hard scales do not produce honeydew. They infest many species of outdoor trees, shrubs, and grasses, and indoor ornamental plants. Some of the more commonly infested plants include oaks, fruit trees, conifers, euonymous, holly, privet and ferns.

Figure 15. Obscure scale on oak limb.

Table 1. General descriptions and host plants of some commonly encountered scale insects. (continued)

Mealybugs and cottony scales

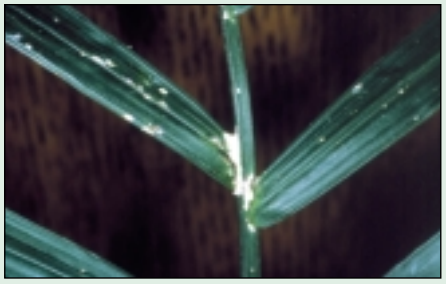

Figure 16. Mealybug infestation on ornamental palm.

Figure 17. Longtail mealybug.

Figure 18. Camellia scale egg mass on burford holly.

Mealybugs

Mealybugs derive their name from the whitish, waxy or mealy appearance of the wax they secrete. These waxy secretions in some species project into long strings or filaments, hence the common name "longtail mealybug." These filaments are easily broken.

Mealybugs can infest all parts of the plant and stunt its growth, discolor and deform the leaves, and eventually kill the plant. Mealybugs also produce honeydew, which can cause sooty mold to appear. Mealybugs more commonly infest indoor ornamental plants.

Cottony scales

Cottony scales derive their name from the cottony wax they produce in which to enclose their eggs. These scales generally go unnoticed until they produce these cottony egg masses. A more commonly encountered cottony scale is the cottony camellia scale, which often infests camellia, holly, yew, rhododendron, maples, euonymus, English ivy, mulberry and hydrangea.

(continued from page 2)

Some natural enemies are available for managers of interiorscapes and greenhouses to buy to control scale insects and mealybugs. These specific parasites are species of *Leptomastix*, *Pseudaphycus*, *Rhyzobius* and *Aphytis*. A small beetle called the mealybug destroyer (*Crytolaemus*) also is available. For a list of commercial suppliers, contact the Department of Pesticide Regulation, California Environmental Protection Agency,1020 North Street, Room 161, Sacramento, CA 95814-5604 or on the Web at *www.cdpr.ca.gov*.

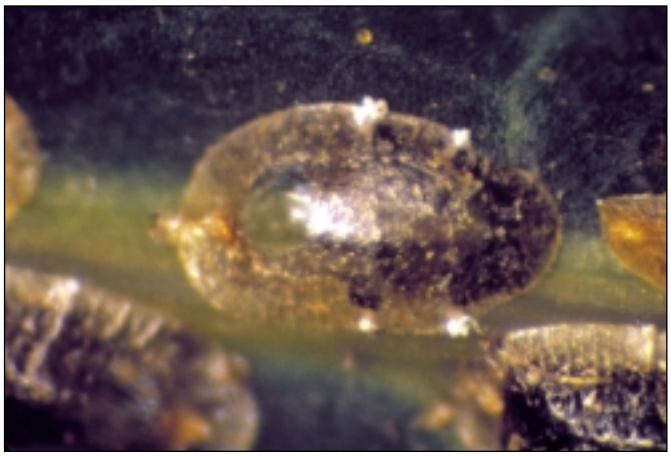

Figure 6. Dead brown soft scale with circular exit hole chewed by parasitic wasp.

Use pesticides on landscape plants only if the scales are injuring the plants significantly. Always consider removing, destroying and replacing heavily infested ornamental shrubs and trees. Insecticides labeled for control of scale insects may harm beneficial insects.

Pesticides for scale control

Many pesticides are available to consumers wanting to control scale insects (Table 2). These can be divided into three general groups based on how they control scales: Some poison the insects; others suffocate them or cause them to dry out and die; and still others, called insect growth regulators or "IGRs," disrupt molting.

Poisons: The most common group of poisons is the nerve poisons. These insecticides disrupt an insect's nervous system. They are absorbed through the insect's exoskeleton "skin" and are considered "contact insecticides." Common contact insecticides include carbaryl, diazinon, chlorpyrofos, pyrethrins, and permethrin.

Other poisons have "systemic" activity, meaning that when they are applied to the plant's leaves or roots, the plant absorbs the insecticide into its tissue, and the scale insect is poisoned when it feeds from the plant. Examples of systemic insecticides are imidacloprid, dimethoate and disulfoton.

Table 2. Insecticides registered for treatment of scales infesting outdoor-grown ornamental, greenhouse-grown and indoor ornamental plants and trees.

Scale insect	Insecticide
Hard (armored) scales	
Euonymous scale	*Bendiocarb, chlorpyrifos, fenoxycarb
Oystershell scale	Carbaryl, chlorpyrifos
Pine needle scale	Bifenthrin, chlorpyrifos, diazinon, *dimethyl phosphorothioate, *lamda-cyhalothrin
Soft scales	
Soft scale	*Bendiocarb, bifenthrin, carbaryl, chlorpyrifos, diazinon, fenoxycarb, horticultural oil, *lambda-cyhalothrin, paraffinic oil
Black scale	Carbaryl, chlorpyrifos, diazinon, paraffinic oil, pyriproxyfen
Hemispherical scale	*Bendiocarb, chlorpyrifos
Lecanium scales	Carbaryl, chlorpyrifos, diazinon, horticultural oil
Scales (unspecified)	
	Acephate, bifenthrin, chlorpyrifos, cyfluthrin, deltamethrin, diazinon, *dimethyl phosphorothioate, disulfoton, fenoxycarb, horticultural oil, imidacloprid, insecticidal soap (potassium salts of fatty acids),*lambda-cyhalothrin, malathion, permethrin, pyrethrins, pyriproxyfen
Mealy bugs (unspecified)	
	Acephate, azadirachtin, *bendiocarb, bifenthrin, carbaryl, chlorpyrifos, cyfluthrin, deltamethrin, diazinon, imidacloprid, insecticidal soap (potassium salts of fatty acids), *lambda-cyhalothrin, permethrin

NOTE: This is a compilation of information from many insecticide product labels. Any one product's label may not mention all of the specific pests, even when it contains the active ingredient mentioned in this table. The user is responsible for obtaining the product with label directions that list the pest problem and the proper use site to address the problem at hand. Refer to the product labels for information on how much and how often the pesticide should be applied and for which ornamental plants can be sprayed with products containing the insecticides listed above. Some insecticides listed can be used by a commercial operator only.

*Generally, restricted-use products that are available only to licensed pest-control operators.

Some products, such as acephate and dimethoate, are both contact and systemic insecticides.

Suffocating/drying pesticides: Scale insects are suffocated by oils and dried out by insecticidal soaps.

Consumers may buy two kinds of oils for treating scale insects: dormant oils; and summer horticultural or parafinnic oils. Both types affect immature and adult scale insects. Dormant oils may be applied only to deciduous plants (trees and shrubs that lose their leaves in the fall) when the plants are dormant. Be careful with evergreen plants: These oils may injure or discolor some species.

Summer oils are lighter than dormant oils and may be applied during the summer on deciduous plants and throughout the year on many evergreen trees and shrubs. Some horticultural oils may also be mixed with other insecticides to control scale insects more effectively.

Insecticidal soaps disrupt the waxy cuticle or "skin" of the insect, which eventually causes the insect to dry out (desiccate) and die.

IGRs: Insect growth regulators interfere with an immature scale insect's ability to molt (shed its outer skin to allow for growth); in some cases, IGRs suppress egg development. Although these insecticides often act more slowly than contact insecticides, they can effectively control many species of scales. Examples of IGRs include azadirachtin and pyriproxyfen.

Most insecticides are formulated as:

- Wettable or soluble powders (WP, S), which are mixed with water and sprayed onto an infested plant;
- Emulsifiable concentrates (EC), which also are mixed with water and sprayed onto infested plants;
- Granulars (G), which generally are applied around the base of a plant and watered into the soil;
- Dusts, which are applied directly onto infested plants;
- Aerosols, which also are applied directly onto plants.

Beware of phytotoxicity, which is the damage that pesticides cause to plants. Many plants are sensitive to various pesticides. If you're in doubt, treat a small part of the plant, then check a day or two later to see if the plant tissue is yellowed or burned. Many pesticide labels list the plants that are susceptible to phytotoxicity if those products are used on them.

Pesticide application to control scales

Pesticides work best on scale crawlers. Because crawlers can take from 2 to 4 weeks to emerge completely, check the scale-infested plant at least weekly until you see them. For effective control, you may need to apply pesticides two to four times at 5- to7-day intervals, because most pesticides work for less than a week, but crawlers from a single generation can hatch over several weeks.

Regardless of the number of applications needed, you must cover the plant thoroughly with insecticide each time, particularly when you're using contact insecticides. Cover both sides of the leaves and all the twigs and branches.

Dormant oils should be applied before spring growth begins, when temperatures are above 45 degrees F for 24 to 48 hours. Follow the instructions on the product label on how to dilute and apply the pesticide.

Apply summer sprays when temperatures are below 90 degrees for 24 to 48 hours. Spray two to four times at 7- to 10-day intervals when the crawlers are active. Emulsifiable concentrate (EC) sprays are preferred. Summer oils can be used alone or in combination with other insecticides.

When scales are on plants that are actively growing, apply systemic insecticides such as imidacloprid around the base of scale-infested trees, shrubs or potted plants. Follow the instructions on the product label on dilution and application rates.

To control scales infesting houseplants, you can use a commercially available insecticidal soap or make your own soap solution by diluting a mild dishwashing detergent. If possible, dip the entire plant into the soap solution, otherwise thoroughly cover all plant parts using a hand-held sprayer.

You may need to reapply the soap to control the scales effectively. You may also use systemic insecticides by applying the appropriate solution around the base of the plant. Check the product label for application and dilution rates.

To remove minor scale infestations on small houseplants, use cotton balls or swabs to brush rubbing alcohol onto the plant.

Contact insecticides, such as aerosol sprays containing pyrethrins and permethrin, may also be used on houseplants, but they don't work for long. Reapply them at 1- to 3-day intervals until the scales are controlled. Spray any aerosol from at least 12 inches from the plant.

Evaluate the effectiveness of treatments to determine if you need to make further applications. To see if you've controlled the scales successfully, slide your thumb across a group of scales. If scales are dead, they will be dry and hollow and will flake off easily.

Policy statement for chemical control suggestions

Regulations on insecticides change frequently, and changes may have occurred since this publication was printed. The pesticide **user** is always responsible for the pesticide residues' effects on plants or household goods, as well as for problems that arise when neighboring property or plants are contaminated. Always read and follow carefully the instructions on the container label.

Table 3. Approved common names and corresponding trade names of some of the more commonly encountered insecticides available to control scale insects. Specific insecticides can have only one approved common name, but can be distributed under several trade names. At times, this can make it difficult to select a pesticide. To help alleviate this problem, the list below gives examples of several commonly available trade names for some insecticides labeled for scale insect control.

Common name	Trade name
acephate	Orthene®, Orthenex®
azadirachtin	Azatin®XL
bendiocarb	Turcam®
bifenthrin	Attain®, Talstar®
carbaryl	Sevin®
chlorpyrifos	Dursban®, Duraguard®, Duraplex®,
cyfluthrin	Decathlon®
diazinon	Diazinon®
disulfoton	Di-Syston®
fenoxycarb	Precision®, Preclude®
imidacloprid	Merit®, Marathon®
lambda-cyhalothrin	Battle®®, Scimitar, Topcide®
permethrin	Astro®
refined petroleum distillate	Horticultural Oil
potassium salts of fatty acids	Olympic Insecticidal Soap
pyriproxyfen	Distance®

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