

Controlling Scale Insects and Mealybugs

► Scale insects and mealybugs can be difficult to detect. Learn how to identify and control these pests hiding on your plants and turfgrass.

Scale insects and mealybugs are plant-feeding pests considered by landscapers and nursery producers to be among the most difficult to control. Many scale insects are so small that they blend into the bark of woody plants, making them even more difficult to spot. But once you know what to look for, you can choose the best control method to protect your plants and lawn.

Distinguishing Characteristics

Scale insects are plant parasites. A few species can kill the host plant on which they feed. But most plants undergo a slow decline over several years. Unless you sample for scale insects, this loss of plant vigor is often thought to be a watering or fertilization issue. Scale insects and mealybugs are grouped together by entomologists because they have similar habits and life cycles.

Appearance

Scale insects derive their name from their barnacle-like appearance on host plants (figure 1). They are covered with a waxy coating or cover, which hides and protects the insect and its eggs underneath. Mealybugs have



Figure 1. Scale insects are like plant barnacles.



Figure 2. The long-tailed mealybug is recognizable by its long anal filaments.

a white cottony/waxy body with no hardened covering. They also can have waxy extensions (filaments) around the edges and backside (figure 2).

Nutrition

Scales and mealybugs do not consume leaf tissue, as do beetles or caterpillars. They have sucking mouthparts made up of threadlike stylets that act like a straw. This enables them to draw out liquids from the plant's vascular tissue or cells.

Species that consume phloem (tissues that conduct food) produce sugary liquid excrement called honeydew. Honeydew drops from the plant and accumulates on anything located below the infested tree or shrub. This covering of honeydew can lead to the growth of sooty mold fungi. The appearance of honeydew is not necessarily an indication of scales or mealybugs, since many insects, such as aphids and whiteflies, also produce the liquid.

Life Stages

Development of these insects progresses from egg, to nymph, to adult. Mealybugs produce an ovisac to hold and protect the eggs, whereas scales lay eggs underneath their scale covering.

Newly hatched nymphs are called crawlers (figure 3), because this is typically a mobile, dispersing stage for most species. Crawlers may stay on the same plant or be dispersed by animals, other insects, or wind to adjacent plants. They do not have a waxy coating at this point and are more susceptible to natural enemies and insecticides.

Once crawlers settle to feed, they typically develop until their first molt, or shedding of the exoskeleton. Scale insects, except for some species of soft scales, lose their legs or the use of them during their first molt. Mealybugs, on the other hand, retain functional legs as they develop.

The majority of scale insects and mealybugs have a synchronized crawler hatch, meaning the eggs in an area hatch at the same time. Timing of crawler hatch often is known for more common varieties. You may need a professional to confirm the exact species you are dealing with. Most state land grant universities have a plant pest diagnostic lab and can provide an accurate identification, usually for a small fee (see <http://offices.aces.edu/plantlabauburn/>). This information can help you to determine the best method and timing of treatment.



Figure 3. Crawlers are scale insects or mealybugs just hatched from eggs. This life stage can disperse to different areas of the plant or can spread to other plants.

Species of Scales and Mealies

Soft Scales

Soft scale insects (family Coccidae) have a soft waxy outer coating that cannot be removed or separated from the insect body. They range in size from 1/10 to 1/4 inch, making them larger than other scale insects. Their coloring contrasts with their host plant. The waxy coverings of adult females are raised on the leaf or stem and may have a rounded or elongated appearance.

Most soft scales that you find on plants are female. Each female produces hundreds to thousands of offspring, commonly without mating. Females are always wingless; males have wings.

Soft scales are among the most problematic. Most species produce one or two generations per year when infesting outdoor ornamental plants. Inside a home or greenhouse, however, these same species can produce multiple generations during winter months due to the warmer temperatures inside. Under these conditions, many different life stages may be present at one time. Nymphs may remain mobile, moving freely between stems and foliage to feed on phloem. They produce honeydew, which can lead to sooty mold.



Figure 4. Calico scale adults



Figure 5. Tuliptree scale adults



Figure 6. Wax scale and sooty mold on Indian hawthorn



Figure 7. Brown soft scale (photo by Chazz Hesselein, Bugwood.org)

Common species of soft scales include calico (figure 4), tuliptree (figure 5), wax (figure 6), and brown soft (figure 7).

Armored Scales

Armored scales (family Diaspididae) are the smallest scales, measuring 1/25 to 11/100 inch (a few millimeters). They have a hardened waxy coating that covers the insect like armor. This covering can be removed or lifted, exposing the insect underneath (figure 8). Males and females often have different scale coverings (figure 11), which can lead a person to think that two different species of armored scales are present.

Armored scales have three basic cover shapes: rounded (figure 9), pupillarial (figure 10), and oystershell (figure 11). As the insect molts, the covering for each consecutive instar (life stage) is added to the previous covering (figure 9). This can help you to estimate the age of the armored scales on the plant.

Besides their hardened coating, armored scales differ from soft scales in several ways:

- They typically reproduce sexually.
- Females generally produce only one generation per year, consisting of a small number of eggs (a dozen or fewer).
- They feed directly on plant cells and xylem (tissues that conduct water), so there is no sugary honeydew or sooty mold produced.
- They cause plants to decline slowly. Symptoms of infested plants include canopy thinning. Thinning is often mistaken for plant stress, since the scale insects are smaller and blend into the bark. Most are found on woody trees and shrubs, but a few are known to attack grasses.

The most common species of armored scales in urban landscapes are tea scale on camellias and hollies (figure 12), false oleander scale on southern magnolia (figure 13), obscure scale on oak trees (figure 14), and gloomy scale on maples (figure 15).



Figure 8. The covering of armored scales can be removed, exposing the insect underneath.

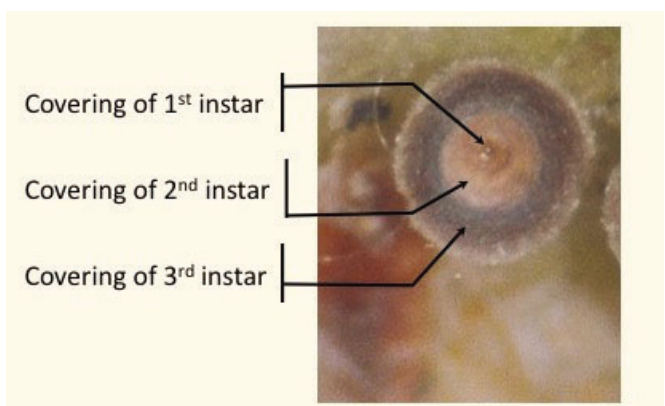


Figure 9. This armored scale has completed all three of the nymphal instars. The wax covering of armored scales leaves a record of insect development.



Figure 10. Euonymus scale has a pupillial scale form. Males in this scale are white and females are brown.

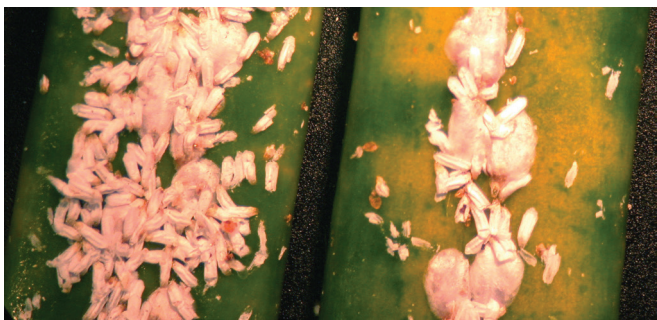


Figure 11. Male armored scales often outnumber female scales. In this species, males are elongated and smaller, where females are oystershell shaped.



Figure 12. Tea scale on camellia

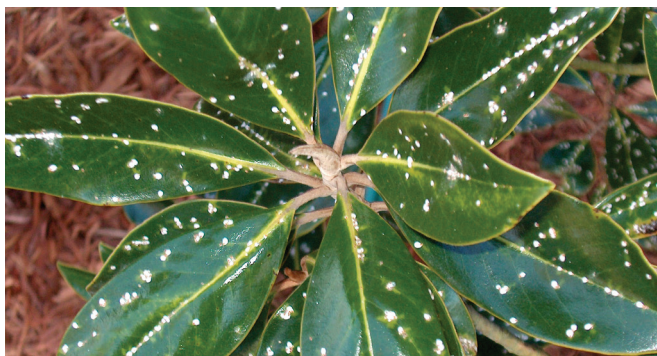


Figure 13. False oleander scale on southern magnolia



Figure 14. Obscure scale on oak trees (photo by William Fountain, Bugwood.org)



Figure 15. Gloomy scale (photo by Lorraine Graney, Bugwood.org)

Mealybugs

Mealybugs (family Pseudococcidae) have no hardened covering and are distinctive for their flocculent (wool-like) bodies. In Alabama, only a few mealybug species exist outdoors, and they produce just one generation per year. Those that live on house plants or infest ornamentals in greenhouses, however, can produce more generations per year.

Mealybugs feed on the phloem and produce honeydew that can cause sooty mold. Sugar-loving ants tend to protect mealybugs from enemies, and they may even move them to new plants for the benefit of their honeydew (figure 16).

Common species of mealybugs include rhodesgrass (figure 17), pink hibiscus (figure 18), and Madeira (figure 19).

Giant Scales

Giant scales (family Monophlebidae) are among the largest scale insects. They are commonly misidentified as mealybugs, because they have an

exterior ovisac and retain well-developed legs (figure 20). Honeydew and sooty mold are common when giant scales are present. Cottony cushion scale is commonly encountered on ornamental bamboo (Nandina) and the shrub pittosporum. It has the potential to kill these host plants if populations are left uncontrolled.

Ground Pearls

Ground pearls (family Margarodidae) are primitive scale insects 1/8 inch or less in size. They live underground and feed on the roots of turfgrass—most commonly centipedegrass and varieties of bermudagrass. In Alabama, there are two species: *Margarodes meridionalis* and *Eumargarodes laingi*. Both are associated with damage to centipedegrass lawns.

Symptoms of ground pearls can be mistaken for many abiotic problems, such as drought or winter kill. Areas infested may not green up. Lawns with ground pearls typically have one spot where grass refuses to grow. These areas may be tilled and replanted, yet the grass does not survive.

Ground pearls have a life stage called a cyst that is round and looks similar in size and shape to a prill of fertilizer (figure 21). They overwinter in this stage and can persist this way for many years if environmental conditions are not good for development. Reddish-pink females emerge from the cyst from June to July and move around in soil looking for sites to lay eggs. Crawlers that emerge from those eggs attach to roots and secrete the coating that becomes the ground pearl. Ground pearls produce one generation per year.

To confirm ground pearls, you must sample the soil below the grass. Your county Extension office can assist with proper identification of ground pearls.

Felt or Bark Scales

Felt or bark scales (family Eriococcidae) are not common except for a new species recently found on crapemyrtle trees. Crapemyrtle bark scale occurs only on the trunk, small branches, and twigs. It can infest the branches all the way to the top of the canopy.

The external covering on the adult insects is white. Nymphs lack this coating and may resemble a mealybug (figure 22). This insect coats the trunk and stems with white masses. It also produces a lot of honeydew, so infested trees are often black with sooty mold.



Figure 16. Ants tending mealybugs for their honeydew (photo by Alton N. Sparks Jr., Bugwood.org)



Figure 17. The rhodesgrass mealybug can attack all grasses used in lawns.



Figure 18. Pink hibiscus mealybug (photo by Florida Dept. of Agriculture and Consumer Services, Bugwood.org)



Figure 19. Madeira mealybug (photo by Sally Tucker, Bugwood.org)



Figure 20. Cottony cushion scale is the most common species of giant scale insect in landscapes.



Figure 21. The cyst and pink adult female stages of ground pearls



Figure 22. Azalea bark scale is a species very similar in appearance to crapemyrtle bark scale. In fact, crapemyrtle bark scale was initially thought to be this insect. (Photo by United States National Collection of Scale Insects, USDA Agricultural Research Service, Bugwood.org)

Crapemyrtle bark scale has been confirmed in Alabama and Mississippi, in addition to the original locations in Texas and Louisiana. In Alabama, populations are most common in north Alabama (Huntsville and surrounding areas) and south Alabama (Mobile and Baldwin Counties), but they can exist anywhere crapemyrtle is grown. They even have been reported to attack native American beautyberry, figs, waxmyrtles, and boxwoods.

If you find this insect, contact your county Extension office so that additional records of this insect can be recorded.

Control Methods

Before introducing any control measures, it is best to check the viability of scale insects on a plant. Scales will hang on the branch for many seasons, even when dead. It is not uncommon for 75 percent or more to be dead, yet still stuck to the tree or shrub. There is no need to invest pesticides and money in treating a plant where the insects are already dead. Plus, applying an insecticide to a dying population of scale insects may kill mostly the natural enemies. It has been shown that if the natural enemies are removed, scales and mealybugs rebound and even exceed previous levels.

Assessing whether or not a scale insect is alive can be tricky, since the dead often look the same as the living. The best way to find out is to use a small sewing needle and a hand lens to flip over the waxy coating. Living scale insects will look full and rounded under the waxy coating, and others will bleed when you try to uncover them.

To estimate the total percentage of live scales, count at least 25 insects then multiply the number of live ones by 4. If the number of dead scales is high, you may be able to rely on a dormant oil or insect growth regulator spray to reduce populations further over time and protect natural enemies.

Natural Enemies and Biological Control

Populations of scale insects and mealybugs are often kept in check by natural enemies. Parasitoids are wasps or flies that use scale insects as food and a place to develop (figure 23). They are only obvious when they emerge from the host insect, usually leaving one or more small holes in the waxy scale cover (figure 24). Predatory insects, mites, spiders, and pathogenic fungi also commonly attack scale insects. For these reasons, it may not be necessary or feasible to use chemical controls.

Cultural Control

There are a few options available to reduce scale insects and mealybugs without using pesticides. You can replace herbaceous annuals or perennials as well as small shrubs with plants that are not susceptible to the scale insect that is present. For this to work, you need professional identification of the scale you're dealing with. Some scales can attack more than one plant type; identification helps to ensure that you make a good choice.

Another option is to use a consumer-grade pressure washer to remove some of the scale insects. Pressure washers can dislodge as many as 70 percent of these insects from plants. Keep in mind, however, that certain tips on consumer pressure washers can do more damage than good. The trick is to use a tip that is broad and not pinpoint. A pinpoint tip will severely or fatally injure plants, trees, and large shrubs. If properly timed, this technique can be used once or twice a year and can help to reduce unsightly sooty mold.

Chemical Control

The use of chemical insecticides to control scale insects is often required to avoid loss of the plant or to prevent the plant from becoming unsightly. Different insecticides may be required at different stages in the life of these insects.

Insect Growth Regulators

Insect growth regulators (IGRs) generally work by targeting the molting process in insects. This action limits the negative impacts on beneficial insects. IGRs are especially effective against scales when applied at the crawler stage. Multiple applications often are needed.

When choosing a product, look for the active ingredient pyriproxyfen on the label (Distance is one example). Many products are labeled for application when crawlers are hatching. Knowing when to expect crawler hatch can improve results (table 1).

Systemic and Translaminar Insecticides

Insecticides that move into and within the whole plant are called 'systemic' (figure 25). Insecticides that move into and within the leaf on which they are applied are called 'translaminar' (figure 26).

The most widely used systemic insecticides contain the neonicotinoid class of insecticides.



Figure 23. A fully developed parasitoid wasp ready to emerge from inside a scale insect.



Figure 24. Emergence holes in the waxy covering of scale insects can only indicate the action of natural enemies. The small crawlers do not make holes in the covering.

Whole Plant Systemic



Figure 25. Whole-plant systemic insecticides are sometimes referenced simply as 'systemic'. These insecticides can be applied to the leaves or roots and then move through the vascular tissue. This is how a material applied only to the roots can move to the leaves and shoots at the top of a tree or shrub.

Translaminar Systemic



Figure 26. Translaminar activity in an insecticide means it can be sprayed on the upper side of the leaf. It then moves within the leaf to control insects on the underside.

Table 1. Crawler Hatch Times for Common Scale Insects

Scale Insect	Approximate Hatch Times
European fruit lecanium scale	late May to mid-June
Indian wax scale	late May to mid-June
Florida wax scale	first 2 weeks of May, September to October
obscure scale	April
euonymus scale	early March to early May
tea scale	late Feb. to early May
cottony maple leaf scale	mid-to-late May
cottony camellia scale	mid-to-late June
cottony maple scale	mid-to-late May
oak felt scale	first 2 weeks of April

Insecticides with translaminar activity include those with the active ingredients acephate or abamectin.

Nymphs and adults respond well to systemic insecticides. These products applied to the foliage or roots provide good to excellent control of soft scales (table 2). Performance of systemic insecticides against armored scales can be less consistent. Management therefore requires a combination of approaches to be successful.

Horticultural Oils

Prior to the availability of whole-plant systemic insects, horticultural oils commonly were used to control scale insects. Dormant oil (Damoil, Volk oil) applied to plants that are not actively growing controls or suppresses scale populations and certain plant-feeding mites. Some plant species or varieties may be injured by horticultural oils, so it is important to read the precautionary statements on the product label for warnings about sensitive plants. Oils can be very effective, but multiple applications are often needed. Eggs that are under the female may remain alive. Once the eggs hatch, the population can rebound.

Table 2. Chemical Control of Scales by Life Stage

Treatment Target	Soft Scales	Armored Scales
Crawlers (easiest stage to control)	Contact active insecticides, insecticidal soaps, azadirachtin products, oils, insect growth regulators (Distance)	
Nymphs or adults (spring to summer)	Systemic insecticides	Horticultural oils, systemic insecticides
Adults (late fall to winter)	Horticultural oils	



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