

COTTONY CUSHION SCALE

Integrated Pest Management for Home Gardeners and Landscape Professionals

Cottony cushion scale, *Icerya purchasi*, can infest a number of woody ornamentals and certain crops (Figure 1). Common hosts in California are citrus, coccolus, nandina, and pittosporum. Its cottony egg sac and profuse honeydew production make cottony cushion scale easy to spot in the landscape.

IDENTIFICATION AND LIFE CYCLE

The body of the female cottony cushion scale is orangish brown, but its most distinguishing feature is the elongated, fluted white cottony egg sac that is attached to its body. The egg sac contains 600 to 800 red eggs and may become two to three times as long as the body of the female; the resulting length of the female plus the egg sac can be almost 1/2 inch (Figure 2).

Eggs hatch into crawlers (Figure 3) in a few days during warm weather but take up to two months to hatch in winter. The crawlers are red with black legs and antennae. They settle along leaf veins and begin to produce the white cottony secretion they are known for. In order to increase in size, scales shed their outer skin (molt) and grow a new, larger covering. Each time the scale molts, it leaves behind its white, cottony molting skin (Figure 4). Immature scales look reddish for a short period of time before they begin producing more cottony secretions.

Second-instar nymphs settle on twigs and leaves, usually along leaf veins (Figure 5). Third-instar nymphs move to branches (Figure 6). Adults may be found on branches or on the trunk of trees. The minute red-winged male is



Figure 1. Colony of cottony cushion scale.



Figure 2. The actual size of female with egg sac can be about 1/2 inch long.



Figure 3. Cottony cushion scale crawlers.

rarely seen, and females don't need to mate to reproduce young.

Cottony cushion scale has two to three generations a year. Unlike most other scales, it retains its legs and its mobility throughout its life. Cottony cushion scale completes its life cycle in three months during warm weather conditions. For additional photographs of each life stage of cottony cushion



Figure 4. Each time a scale molts, it leaves behind its white, cottony molting skin.



Figure 5. Cottony cushion scale second-instar nymphs.



Figure 6. A third-instar nymph.

scale, consult *Stages of the Cottony Cushion Scale (Icerya purchasi) and its Natural Enemy, the Vedalia Beetle (Rodolia cardinalis)* listed in References.

DAMAGE

Like other scales, cottony cushion scale decreases the vitality of its host by sucking phloem sap from the leaves, twigs, branches, and trunk. Feeding can result in defoliation and

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dieback of twigs and small branches when infestations are extremely heavy (Figure 7). Heavy populations can severely reduce the yield of citrus trees. Like soft scales, cottony cushion scale excretes honeydew, which is usually accompanied by blackish sooty mold growth and ants (Figure 8).

MANAGEMENT

Unless disrupted by insecticides, dust, or ants, natural enemies provide excellent control of cottony cushion scale. An exception is on *Cocculus laurifolius* (laurel-leaf snailseed or laurel leaf cocculus); it is often highly infested with cottony cushion scale, especially when grown away from the coast, because scale-feeding vedalia beetles avoid this plant.

Biological Control

Cottony cushion scale is usually well controlled by two introduced natural enemies. The most famous one is the vedalia beetle, *Rodolia cardinalis*, (Figure 9). This red and black lady beetle was introduced from Australia in the 1890s and saved California's fledgling citrus industry from destruction by these prolific scales. Adult female beetles lay their oblong red eggs underneath the female scale or attached to her egg sac. The newly hatched reddish beetle larvae chew their way into the egg sac and feed on scale eggs and crawlers. Larvae molt two times and gradually increase in size.

Mature larvae (Figure 10) and adult beetles feed on all scale stages. The fourth, and last, larval instar stops feeding, crawls toward the outside of the tree, and attaches its posterior end to a leaf in preparation for pupation. Reddish beetle pupae develop within the grayish skin of the last larval instar (Figure 11). The entire life cycle of the vedalia beetle is five to six weeks in warm weather. For photographs of each life stage of vedalia, consult *Stages of the Cottony Cushion Scale* (Icerya purchasi) and its Natural Enemy, the Vedalia Beetle (*Rodolia cardinalis*) listed in References.



Figure 7. Mature cottony cushion scale females on bark.



Figure 8. Cottony cushion scale is usually accompanied by blackish sooty mold growth as show on these citrus leaves.



Figure 9. Adult cottony cushion scale female with an adult vedalia beetle in the foreground and vedalia beetle nymphs and eggs on its back. The adult female beetle lays eggs underneath the scale or attached to scale egg sacs. The larval and adult stages of the beetle feed on scale eggs and the adult scale.

The other important natural enemy, the parasitic fly *Cryptochaetum iceryae* (Figure 12), deposits one to four eggs inside each second-instar, third-instar, or adult female scale body. The eggs hatch into larvae that feed within the scale. After four molts, the larvae pupate inside the scale. When the adult fly emerges, it creates a round emergence hole, easily seen in the scale. The life cycle of the *Cryptochaetum* fly is about four weeks in warm weather.

Both the vedalia beetle and *Cryptochaetum* are active in coastal areas; the vedalia



Figure 10. Mature vedalia beetle larva feeding on cottony cushion scale.



Figure 11. Vedalia pupa.



Figure 12. Adult parasitic fly *Cryptochaetum iceryae* (left) and female cottony cushion scales with parasite emergence holes (right).

beetle is also abundant in Southern California desert regions and is the predominant species in interior areas of California. Both of these natural enemies can be extremely effective in controlling cottony cushion scale because of their short generation time (four to six weeks) and host specificity, attacking only cottony cushion scale.

Conserve natural enemies of cottony cushion scale by controlling ants and dust and by avoiding the use of persistent insecticides. If you find cottony cushion scale, look for the vedalia beetle and its red eggs and larvae on top of scale egg sacs or look for the beetle's pupal cases. Inspect female scales for *Cryptochaetum* emergence holes. If you find evidence of these natural enemies, then insecticide treatments aren't necessary.

Controlling Ants

Ants protect scale insects from predators and parasites in order to farm the honeydew the scales produce. To improve biological control, keep ants out of trees and shrubs by banding the trunks with sticky substances such as Tanglefoot or by using ant baits. Protect young or sensitive trunks, especially citrus, from possible injury by wrapping the trunk with a collar of duct tape or fabric tree wrap and coating this with the sticky material. Check the sticky material every week or two and stir it with a stick to prevent the material from becoming covered with debris that ants can cross. Alternatively, pesticide baits such as ant stakes may be placed near nests or on ant trails beneath plants.

For the most effective and economical control, treat in early spring when ant populations are active but before they become heavy. For more information, see *Pest Notes: Ants*, listed in References.

Chemical Control

Although adult females with their white, ridged egg sacs are the most obvious stage, insecticides don't control adults well. The females and their eggs are protected by both the cottony egg sac and their position inside the canopy of the tree, making this pest difficult to treat. If scales can't be tolerated, apply narrow range horticultural oil to deciduous hosts during the dormant season or spray foliage with insecticides when the females are dead and the tiny reddish scale crawlers and younger instars are infesting the leaves (spring or fall).

You can use traps made of double-sided sticky tape to determine when crawlers are hatching. Before crawlers begin to emerge in spring, tightly encircle several twigs or branches near adult female scale with transparent tape that is sticky on both sides, such as Scotch double-sided tape. Change the tape at regular intervals, about once a week, and examine it with a hand lens to identify the crawlers. Once eggs begin hatching, scale crawlers get stuck on the tape and appear as red or orange specks. Spray after you observe a sharp increase in crawler production.

Natural enemies are the best method for controlling cottony cushion scale, so look carefully for their presence and avoid insecticides if you find evidence of natural enemies attacking cottony cushion scale. If natural enemies are absent, the infestation is intolerable, and the population is in the treatable crawler stage, the organophosphates malathion or acephate can be effective. Both of these materials can be quite toxic to natural enemies, honey bees, and nontarget organisms; acephate is allowed only for use on ornamentals. Horticultural oil can also be applied to manage the crawler stage and is least disruptive of natural enemies or bees.

Do not apply imidacloprid (Merit or Bayer Advanced Citrus Fruit and Vegetables) for cottony cushion scale control. Although imidacloprid has scale insects listed on the label, it doesn't kill cottony cushion scale. To make matters worse, imidacloprid is very toxic to vedalia beetles. The beetles are poisoned when they feed on cottony cushion scale that have ingested imidacloprid. Cottony cushion scale outbreaks have been observed following use of this insecticide because the vedalia beetles were removed and the insecticide didn't control the pest.

REFERENCES

Dreistadt, S. H., J. K. Clark, and M. L. Flint. 2004. *Pests of Landscape Trees and Shrubs: An Integrated Pest Management Guide*, 2nd ed. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 3359.

Grafton-Cardwell, E. E. 2002. *Stages of the Cottony Cushion Scale (Icerya purchasi) and its Natural Enemy, the Vedalia Beetle (Rodolia cardinalis)*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 8051.

UC Statewide IPM Program. Feb. 2007. *Pest Notes: Ants*. Oakland: Univ. Calif. Agric. Nat. Res. Publ. 7411. Also available online, <http://www.ipm.ucdavis.edu/PMG/PESTNOTES/pn7411.html> ❖

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Pesticides applied in your home and landscape can move and contaminate creeks, rivers, and oceans. Confine chemicals to the property being treated. Avoid drift onto neighboring properties, especially gardens containing fruits or vegetables ready to be picked.

Do not place containers containing pesticide in the trash or pour pesticides down the sink or toilet. Either use the pesticide according to the label, or take unwanted pesticides to a Household Hazardous Waste Collection site. Contact your county agricultural commissioner for additional information on safe container disposal and for the location of the Household Hazardous Waste Collection site nearest you. Dispose of empty containers by following label directions. Never reuse or burn the containers or dispose of them in such a manner that they may contaminate water supplies or natural waterways.

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