

SYCAMORE SCALE

Integrated Pest Management for Home Gardeners and Landscape Professionals

Sycamore scale (*Stomacoccus platani*), which occurs only on sycamore, is the most damaging insect pest of these trees in California. Its hosts include the native California sycamore (*Platanus racemosa*); Oriental sycamore (*P. orientalis*), which was introduced from Eurasia; and the London plane tree (*Platanus x acerifolia*), a commonly planted hybrid. Sycamore scale reportedly is not a pest on American sycamore (*P. occidentalis*), which is native to the Eastern United States.

IDENTIFICATION

Sycamore scale (Margarodidae or Steingeliidae family) looks so different in comparison with other scale species and is so tiny—only about $\frac{1}{16}$ inch long—many people fail to see it or recognize it as a scale insect. Sycamore scale is recognized primarily by its feeding damage, which might be mistaken for disease symptoms (Fig. 1).

Because the scales are so small, you'll need a high-powered hand lens—or preferably a binocular dissecting microscope—to see them. Look for yellow or orange scales on the undersides of leaves in the center of yellow to whitish spots (Fig. 2). Another sign of scales is the waxy masses they secrete on bark or leaves (Fig. 3); these can contain numerous eggs or nymphs. Another reason sycamore scales are difficult to identify is they vary in appearance not only by age and gender but sometimes by feeding location on the tree and time of year.

Each sycamore scale develops through an adult, egg, and several immature stages. Immatures develop through 5 nymphal instars in males and at least 3 instars in females (Fig. 4).

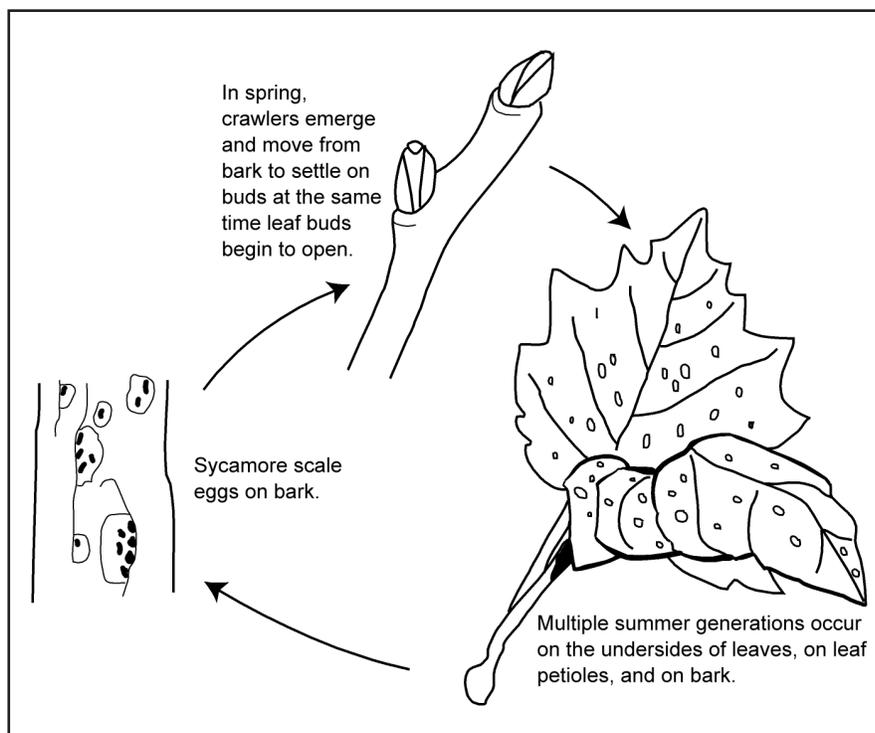


Figure 1. Sycamore scale life cycle and leaf damage.



Figure 2. Leaf spotting from sycamore scale infestation.



Figure 3. Sycamore scale nymphs and eggs beneath a sycamore bark plate.

Eggs are yellow to whitish and occur in a mass beneath cottony, white wax on bark and leaves. The dry, dark body of the dead female often is next to the egg mass she laid.

First instars, called crawlers during their mobile stage, are tiny and yellowish. Crawlers have legs, antennae, and a somewhat flattened, oblong body. After they settle and begin

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feeding, the first instars' legs and antennae shrivel, and their body swells to resemble an insect egg or a tiny football.

Nymphs secrete wax from the edges of their bodies. When the wax is abundant, it causes scales to sometimes be mistaken for whitefly nymphs such as those of the woolly whitefly (*Aleurothrixus floccosus*). Whitish wax can occur around the edges or on top of all immature stages, except for the mobile stage of late-instar males and early first instars that have moved away from their waxy egg mass.

Wax can be especially abundant when second instars feed on tender bark and often is not obvious if they are feeding on leaves. When wax is not covering them, the legless, yellow to orangish, oval to oblong bodies of immobile nymphs appear swollen; these nymphs sometimes are called "cysts."

After the second instar, immature females produce little or no wax, but their body might retain the second instar's wax fringe. Female scales remain swollen and legless until the adult emerges. Late-instar males also initially lack visible appendages, but then during the second to the last immature stage, a nymph with legs and antennae emerges. This male nymph is briefly mobile before settling and exuding a cottony cover that resembles a tiny, oblong, white cocoon.

Adults resemble immature, or wingless, thrips (Fig. 4). Adults are elongated and pale yellowish to orange. They have distinct body segments, legs, and—especially in males—long antennae. In comparison with females, males are more active and slender and about half as long. The sluggish females sometimes are wider toward their rear.

LIFE CYCLE

Sycamore scale can be found on foliage from leaf flush through fall and on tender bark throughout the year.

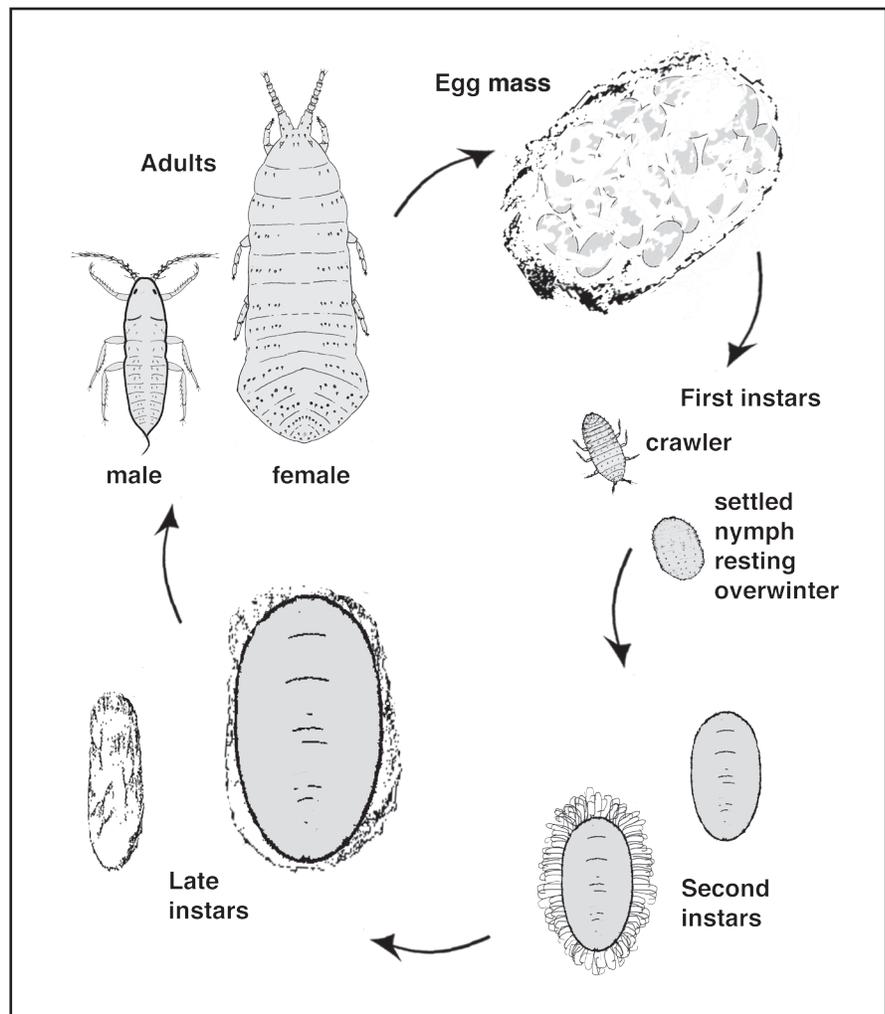


Figure 4. Life stages of the sycamore scale. Pale wax covers or surrounds eggs and some nymphal stages.

Tender bark includes the under-surface of outer bark and the outer surface of inner bark. Inner bark becomes exposed when older bark flakes off the tree and in the fissures between outer (older) bark that cracks but remains attached to the tree as old, thin bark "scales" or plates.

In mid-winter (about January), most scales are first or second instars. During late winter (about February), scales mature and mate, and females lay eggs. Egg hatch coincides with sycamore bud break and early leaf flush. The crawlers move from bark to leaf buds, leaf petioles, and to the undersurface of leaf blades where

they settle, inserting their strawlike mouthparts to feed.

Each female scale lays a single mass of 50 to 100 eggs. Females that developed from immatures feeding on leaves often move and lay their eggs on bark. Other females lay eggs on leaves. When eggs hatch, if they were laid on bark and leaves are present, many of the crawlers might move from bark to settle and feed on foliage.

As fall approaches, scale densities on leaves decline, and an increasing proportion of the scale population occurs on bark. Sycamore scale has several generations each year (Fig. 1).

DAMAGE

Leaves that become infested before they have developed to their full size often are distorted and remain smaller than healthy ones (Fig. 5). Where each scale feeds, brown spots form on the leaf petiole, and yellow or white spots develop on the leaf blade. The pale leaf spots gradually turn brown as the affected tissue dies. Infested leaves can drop prematurely.

When sycamore scale feeds on tender bark, it causes the surface of infested twigs and branches to develop a rough texture. Heavy populations exude abundant white wax from bark fissures and cover bark with pale outer skins, which molting scales have shed. When large numbers of scale feed on young tree bark in nurseries or landscapes, it can cause abnormal separation and flaking off of smooth bark from trunks and limbs, resembling the shedding of older, outer bark that is normal in older sycamores.

Rough bark on sycamore trees is more commonly caused by the sycamore borer (*Synanthedon resplendens*). Larvae of this clearwing moth feed under bark, and the granular excrement pellets they push out of tunnels often are obvious in bark crevices and around the basal trunk. No pellets are associated with sycamore scale infestations. See *Pest Notes: Clearwing Moths* in References.

The impact of scale feeding on a tree's overall health has not been studied quantitatively. Prolonged feeding by high populations of sycamore scale on either bark or leaves that results in extensive, abnormal bark loss on young trees or in severe, repeated premature leaf drop from trees of any age could stunt tree growth and can cause die-back of twigs and small branches.

Other causes of premature leaf drop include sycamore anthracnose and powdery mildew, and these trees can suffer from both sycamore scale and other conditions at the same time. Sycamore anthracnose, however, is a fungal disease that *Apiognomonia veneta* causes; it leads to browning on all or large por-

tions of leaves, often beginning along leaf veins (Fig. 6), as opposed to the small spots characteristic of sycamore scale feeding. Powdery mildew, which the fungus *Microsphaera alni* causes on sycamore, usually can be recognized by examining affected leaves for the pale fungal growth—the spores and spore-forming structures—characteristic of this disease (Fig. 7). See *Pest Notes: Anthracnose* and *Pest Notes: Powdery Mildew on Ornamentals* in References.

Premature leaf drop also can be due to other pathogenic diseases, abiotic disorders, and other invertebrates. Spider mites such as *Oligonychus platani* and the western sycamore lace bug (*Corythucha confraternata*), can cause leaf drop beginning midsummer or later. Look for the tiny, dark green to reddish-brown mites on the upper leaf surface.

If lace bugs are the cause, leaves will have specks of black excrement (Fig. 8). Lace bugs, found on the underside of leaves, as adults are less than $\frac{3}{16}$ inch long and mostly white with translucent and black areas. Nymphs are black with white or yellowish areas.

When examining affected leaves, choose ones that are still on the tree. Fresh, partially damaged foliage usually exhibits the most characteristic symptoms and is more likely to harbor live pests.

MANAGEMENT

No treatment thresholds for sycamore scale are available. Trees in landscapes probably can tolerate low to moderate levels of infestation without lasting negative impact. Management is complex, because treatment is most effective at bud break before damage is visible. By the time sycamore scale damage is obvious—during spring when leaves distort, in summer when leaves become severely spotted, and anytime leaves drop prematurely—it's too late to spray effectively. See *Monitoring* and *Chemical Control* below.



Figure 5. Sycamore scale feeding can distort, curl, and spot leaves.



Figure 6. Unlike sycamore scale, anthracnose causes large areas of browning, not leaf spots.



Figure 7. Whitish fungal growth is visible on these sycamore leaves, which powdery mildew has distorted.



Figure 8. Sycamore lace bugs (shown here) and spider mites can bleach leaves and cause leaf drop.

Cultural Control

Provide the appropriate growing conditions and cultural requirements for your species of sycamore, and protect trees from injuries. Healthy trees are better able to tolerate pest damage, such as premature leaf drop.

Choose pest-resistant cultivars when planting sycamores, such as those resistant to anthracnose or powdery mildew. The best choice varies according to the growing location and how trees will be managed. Although sycamore scale reportedly does not damage *P. occidentalis*, this species, which is native to the Eastern United States, might not be a good choice for most urban California landscapes.

Biological Control

Several species of lady beetles feed on sycamore scales. These include the twicestabbed lady beetle (*Chilocorus orbis* [formerly known as *C. stigma*]), the pine ladybird (*Exochomus quadripustulatus*), and *Axion plagiatum* (Fig. 9).

Adults and last-instar, or oldest, larvae are about 1/5 inch long. Adults are mostly black with two red to orangish spots on the wing covers of *Axion plagiatum* and the twicestabbed lady beetle and four yellow to orangish spots on the pine ladybird's back. Larvae are a mixture of black, brown, gray, and white that varies with the instar's age and species. Larvae of *Axion plagiatum* and the twicestabbed lady beetle are distinctly spiny.

Monitoring

If sycamore scales were a problem the previous spring or summer and you plan to spray, check weekly, beginning in late December, for bud break, which is the best time to make an application. Bud break varies from year to year and among locations.

If the pest history from the previous spring and summer is unknown and you are deciding whether to treat, look to see if sycamore scale eggs and nymphs are abundant. Examine the woody areas of the tree, looking for

white, cottony "wax" in the cracks of bark and beneath bark plates. Examine waxy bark using a hand lens (20X), or collect waxy bark flakes and examine them under a dissecting binocular microscope. Eggs and nymphs will be oval to oblong or look like yellow to whitish spots within the white, cottony material.

Chemical Control

Bud break through early leafing out is the most effective time to spray for sycamore scale, because first instars, the stage most susceptible to insecticides, emerge from eggs at the same time as bud break. If scales are abundant and damage cannot be tolerated, apply 1% horticultural oil (narrow-range or supreme) or insecticidal soap.

Thoroughly spray branch tips, large limbs, and the trunk using a commercial, high-pressure sprayer. Because of the equipment and experience needed to effectively treat large trees, spraying sycamores usually requires hiring a professional applicator.

Other insecticides such as malathion are available for application at bud break; however, these are not recommended, because they can cause secondary outbreaks of other pests in the landscape. Also, pesticide drift or runoff can be more of a concern when spraying trees with this organophosphate insecticide.

Once leaves expand spraying is less effective, because it is difficult to thoroughly spray leaf petioles and the undersides of leaves where scales feed. The interfering foliage results in poorer coverage, while leaf hairs protect scales from spray contact. The presence of leaves also increase the amount of material you must apply to achieve coverage. Additionally, many scales will have developed into life stages that are less susceptible to the spray.

Combination sprays for disease and scale control. Oil sprayed at bud break or early leaf flush helps control



Figure 9. Several lady beetles, including *Axion plagiatum* shown here, are predators of sycamore scale.

powdery mildew disease in addition to sycamore scale. A combination of oil and copper spray (e.g., Bordeaux mixture) or oil combined with chlorothalonil (e.g., Ortho Max Garden Disease Control) can help to control anthracnose disease and scales. Other fungicides also are available for mixing with oil. For more information, consult product labels, and also see *Pest Notes: Bordeaux Mixture*, *Pest Notes: Anthracnose*, and *Pest Notes: Powdery Mildew on Ornamentals* in References.

Systemic insecticides. Although soil application of the systemic insecticide imidacloprid has been suggested for managing sycamore scale, there is little research data on its efficacy. In contrast to oil, which must be sprayed to cover the whole tree, home-use systemic products (e.g., Bayer Advanced Garden 12-Month Tree & Shrub Insect Control) are relatively easy to mix in a bucket and apply as a soil drench. Professional applicators can apply imidacloprid (Merit and other products) with soil injection equipment. Trees take the pesticide up through their roots.

Soil application of imidacloprid is more likely to be effective if applied in late winter or early spring. Application later in the summer, especially where trees are not well irrigated, is unlikely to be effective. Follow all label directions. Trunk injections or implants are not recommended, because they physically injure trees and can mechanically spread pathogens such as the sycamore canker stain fungus that kills sycamore trees.

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