

Scale Insects on Ornamental Plants

Introduction

Scale insects are sap-feeding insects that derive their name from the scale or shell-like waxy covering that conceals their bodies. In Iowa, most species of shade trees, fruit trees, and ornamental shrubs are subject to scale insect attacks.

Scale insects are generally divided into two categories:

- *Soft scales* produce a soft cottony, powdery or waxy substance that cannot be separated from the insect body.
- *Armored scales* have a hard shield-like cover composed of shed skins and wax that is not attached to the body of the insect.

Depending on the species, scale insects may be found on plant stems, twigs, foliage, or fruit.

Damage

Scale insects feed by sucking sap from trees and shrubs through piercing-sucking mouth parts. Sap feeding by scale insects may cause yellowing or wilting of leaves, stunting or unthrifty appearance of the plants, and eventually death of all or part of the plant when infestations are heavy. Weakened plants may lose vigor and become more susceptible to injury caused by drought, severe winters, attack by other insects (such as borers), or infection by diseases.

While feeding, soft scale insects excrete a sweet, sticky substance called honeydew. Honeydew on leaves and stems may make the plant appear shiny and wet which serves to attract flies, ants, bees, and other insect scavengers. The honeydew may encourage a fungus called *sooty mold* that gives the plants a characteristic black, “sooty” appearance. Honeydew can foul sidewalk, cars, and houses beneath scale-infested trees.

Life Cycle

Scale insects have a simple life. Eggs are laid underneath the scale covering of the adult female. When the eggs hatch, tiny immatures, known as nymphs, emerge. Nymphs have legs and antennae and are called “crawlers” because they walk away from the maternal

scale to settle at new feeding sites. For most common scales, this is the only stage that crawls about on the plant. When the crawlers arrive at a suitable location, they insert their mouthparts into the plant, and begin to feed on the plant’s sap. The shell or scale characteristic of the species develops soon after feeding begins. The legs and antennae of most species are lost as the nymphs grow. Nymphs and adult females for most species remain at the same location for the rest of their lives. Adult males are tiny, flying, gnat-like insects that fly to new females for mating. Scales may go through one or more generations each year.

Pest Management

Scale insects are difficult to control because the waxy or cottony covering serves as a protective barrier to traditional contact insecticides. However, a pest management program that incorporates natural, mechanical, and/or chemical controls (as described below) should provide satisfactory control of most scales on most ornamental plants.

Natural Control

Parasitoids (such as small parasitic wasps) and predators (such as lady beetles) can attack and significantly reduce scale insect populations. Other natural mortality factors (such as adverse weather) may influence populations, causing year-to-year variations. The presence of biological and natural controls can keep scale populations low, so insecticide treatments are not needed. Observe closely the progress of scale infestations. If scale numbers decrease (or continue at a low level), do not treat. Rapidly increasing scale populations and/or heavy infestations should be treated as outlined below. Plants produced for sale must be treated so they remain pest free.

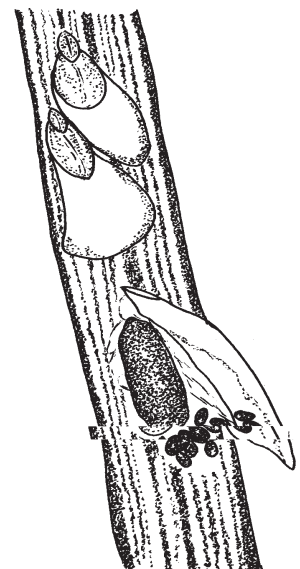


Table 1: Scale insects commonly found on ornamental plants in Iowa.

Soft Scales	Description
Cottony Maple Scale	The large, flat, brown female scales on twigs swell to a conspicuous 1/2-inch, white, cottony egg sac in late spring. The young crawlers disperse to the leaves where they feed and spend the summer. Adult females return to stems and twigs in late summer.
Lecanium Scale	Newly formed adult females on tree stems are flattened and brown with a mottled appearance. As they mature, they become hemispherical to 3-4 millimeters in diameter and uniform brown.
Fletcher Scale	Indistinguishable from lecanium scale in appearance. Hemispherical, brown scale on stems at base of needles.
Spruce Bud Scale	Round, reddish-brown scale on twigs at base of needles.
Pine Tortoise Scale	Dark brown to black, wrinkled, hemispherical scales in clusters on twigs. Up to 6 mm in diameter.
European Elm Scale	Oval, very soft-bodied scales 1-2 mm in length on stems and twigs. Color starts brown but turns gray. A white, waxy fringe covers the bottoms and sides of the insect but the top surface of the insect is exposed. Crawlers feed on leaves before moving to stems to settle.
Armored Scales	
Oystershell Scale - Brown Form	Elongate, curved 2 to 3 mm long shiny scales found on stems, resembling miniature oyster shells
Oystershell Scale - Gray or Banded Form	Slightly larger than the brown race. The shiny gray scale is covered with cross ridges of alternating brown and gray. One generation per year that develops slightly later than the brown oystershell scale.
Pine Needle Scale	White scales 3 mm in length on needles; elongate oval
Euonymus Scale	Female scale is elongated oval and dark brown with a yellow or brown tip. Found on stems and leaf veins, occasionally on leaf undersides. The conspicuous male scales are elongate and white with three longitudinal ridges. Male scales are found on the leaves and stems.
San Jose Scale	Flat, round, gray scale 1-2 mm in diameter with a slightly raised dark or yellow nipple-shaped bump in the middle on stems and fruits.
Scurfy Scale	Flat, grayish-white, pear-shaped female scales are about 3 mm in length. The smaller parallel-sided male scales are brilliant white. May completely cover branches and twigs.

Plants Infested**Normal
Crawler Time****Phenological Indicator Plants**

Prefers maples, particularly silver maple, but found on numerous other hardwood hosts	Early July	Hydrangea 'Grandiflora' is in full bloom, and <i>Yucca filamentosa</i> is blooming.
Wide variety of deciduous trees	Mid to late June	Hydrangea 'Grandiflora' is in full bloom, and <i>Yucca filamentosa</i> is blooming.
Yew, arborvitae and juniper	Mid to late June	Overwintering nymphs move when saucer magnolia is in bloom. New nymph crawlers move when Hydrangea 'Grandiflora' is in full bloom, and <i>Yucca filamentosa</i> is blooming.
Spruce, particularly Norway spruce	Late June	European Mountain ash fruits ripening, Hydrangea 'Grandiflora' changing from white to green, and Canada thistle seed is ripe.
Pines, especially Scots and mugho pine, but also Austrian and red pine.	Late June	Mock orange and beautybush are blooming.
Elms	Overwintering nymphs controlled in early April. New nymphs are present in late June	Overwintering nymphs: when first elm leaves appear.
Apple, dogwood and numerous others.	Mid to late May	Lilac has finished bloom and Vanhoutte spirea is in full to late bloom.
Lilac, ash, willow, poplar, maple and others	Late May to early June	Vanhoutte spirea has finished blooming.
Pines, spruces, firs and Douglas fir	Two generations per year: mid-May and early August	First generation: Vanhoutte spirea in early bloom. Second generation: Hydrangea 'Grandiflora' blooms change from white to green.
Euonymus, especially stressed plants, pachysandra, holly, and bittersweet	Late May	Japanese tree lilac and catalpa in early bloom.
Almost all ornamental, shade, and fruit trees and shrubs	Mid-June	Japanese tree lilac and catalpa in early bloom.
Apples and crabapples, Prunus species, and many others	Two generations per year: mid-May and mid-July	First generation: Vanhoutte spirea in early bloom. Second generation: Hydrangea 'Grandiflora' blooms change from white to green.

Mechanical Control

Mechanically removing scale insects may be practical in certain situations such as small infestations on houseplants or on small trees and shrubs. Heavily infested stems can be pruned out and discarded to reduce scale populations.

Chemical Control

Insecticide applications may be warranted when natural enemies and mechanical controls are not sufficient to prevent plant injury. There are three chemical control strategies for treating infested trees and shrubs: spray dormant oil prior to bud break, apply a contact insecticide in summer when the crawlers are active, or use a systemic insecticide.

Dormant Oil: A thorough application of horticultural oil according to label instructions just prior to bud break in late March or early April (while the plant is dormant) may control scale insects on trees and shrubs. However, recent research suggests that dormant oil sprays do not affect those scales that overwinter in the egg stage such as oystershell scale and pine needle scale. Horticultural oils are typically applied as a 2 percent mixture of oil in water. Effective control requires a thorough treatment of all aboveground plant parts.

Summer Sprays: Contact insecticide sprays do not penetrate the protective covering of the most scales. Therefore insecticide treatments are most effective when applied during crawler emergence, immediately after egg hatch.

There are three methods for determining when eggs are hatching and when crawlers will be vulnerable.

1. Spray at the “normal” crawler times listed in Table 1.
2. Time crawler sprays by relying on phenological indicators such as those listed in Table 1. See definition of phenology below.
3. Spray when crawler activity is observed using one of the following methods. Carefully examine the infested plant to see if crawlers are present or shake a branch of the infested plant above a sheet of white paper and examine the paper for crawlers. Alternatively, place double-sided tape around the twigs or branches in affected areas of the plant when crawlers are expected. The tiny insect’s bodies get stuck in the adhesive. A magnifying glass can help with identification.

... and justice for all

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Most home lawn and garden insecticides found in garden stores (including insecticidal soap and horticultural oil) are appropriate for use on ornamental trees and shrubs in Iowa. Check the pesticide label of each product to make sure that the type of scale and the name of the host plant are listed for that product.

Always read and follow label instructions on mixing, usage and application safety.

Old scales may remain harmlessly on the plant for some time after the death of the insect. To evaluate the effectiveness of treatments, slide your thumb across a group of scales. If scales are dead, they will be hollow and the coverings will flake off easily. Living scales will leave a colored, wet residue on your thumbnail.

Systemic Treatment

Systemic insecticides are injected into the plant or are applied as a foliar spray, drench or soil injection under an infested tree or shrub. Systemic insecticides circulate through the plant and can control both crawlers and adult scales with less impact on natural enemies and less risk of pesticide drift.

However, systemic insecticides can be time consuming and expensive and they may be effective only on those scales infesting the leaves or those that are actively producing honeydew.

Phenology is the study of plant or animal rhythms as influenced by variations in the weather. Years of careful observations by several researchers in the Midwest have produced tables of phenological coincidence — blooming of certain plants coincides with specific insect activity in the same area. By watching the phenological indicator plants (even though they are not infested with the scale in question) you can predict when a particular scale’s egg hatch will occur in your area.

The phenological information found in Table 1 was adapted from *Coincide: The Orton System of Pest Management* by Donald A Orton. Plantsmen’s Publications, Flossmore, Illinois, 1989.

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Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture. Stanley R. Johnson, director, Cooperative Extension Service, Iowa State University of Science and Technology, Ames, Iowa.