

Understanding and Identifying Scale Insects on Woody Plants

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Now that spring is in full swing, we need to be alert for the very illusive and tricky scale insect pests. These insects can be hard to identify and because of their life cycle and life stages can be even harder to manage. In this article we want to discuss the scale insects including their habits, unique attributes, and life cycles. Information presented here will hopefully assist you in properly identifying these pesky critters and managing them in a safe and effective manner.

Scale insects are a diverse and interesting group of insects. They are primarily tropical in origin and may be found infesting a wide variety of woody landscape plants. The number of scale insect species in North America north of Mexico alone numbers 928 species in 16 different families. Most of the scales attacking woody landscape plants in the northern U.S. belong to either the **armored or soft scale** insect families.

Armored Scales

Armored scales make up the largest scale group with about 297 North American species of which about 100 species are considered to be of economic importance. Female armored scales are usually small (1 to 2 mm), soft, and reside under a waxy covering that is separate from the body. Their covers may appear circular, elongate, smooth or rough, and may vary greatly in color depending on the species. They are often hidden under bark flakes and in wounds.

In contrast, male scale covers are usually more elongate and smaller than the female scale. They may be the same color and texture as the female cover, or different in color and texture (i.e. euonymus scale). Female armored scales lack legs and eyes, and their antennae may be absent or quite reduced in size. In most armored scales, the adult male is a fragile winged creature resembling a gnat-like insect with well-developed legs and antennae. A few species have wingless males.

Reproduction of armored scales may occur in a variety of ways including sexual or asexual reproduction (no males produced), and females may produce eggs or living young. If eggs are laid, they are deposited under the female scale cover. Newly hatched eggs result in an oval, flat active stage called a crawler. Most crawlers are yellow or white at hatching and possess legs and antennae and are quite mobile. This mobility contributes greatly to the spread of the insect via rain, wind, or transport on the feet of birds. Each crawler can live 24-48 hours before it must begin feeding or die. After a period of time (i.e. days or weeks), the crawlers in a population settle down, lose their legs and antennae, insert their mouthparts into plant tissue, and begin feeding on plant sap. Their piercing-sucking type mouthpart or, food tube, may be six to eight times the length of their body. Female armored scales remain sessile the remainder of their lives.

Examples of armored scales include San Jose, oystershell, pine needle, obscure, juniper, elongate hemlock and euonymus scales.

Soft Scales

The other major family of scales, the soft scales, is characterized by the females being elongate to oval in shape, usually convex (helmet-shaped), and usually not covered with wax. A notable exception are the wax scales. Soft wax scales are different from armored scales in that the insect's body and the waxy cover are one unit.

Soft scale females maintain legs and antennae throughout their development, but the females usually become so large that the minute legs are useless. Soft scale males also resemble small gnats and may be winged or wingless.

Approximately 85 species of soft scales are known in North America with a number of species being considered economic or aesthetic pests. Soft scales have a life cycle similar to armored scales with the crawler being the most active stage. Eggs are laid under the body of the female. The female dies and her body hardens to protect the eggs. The crawler activity for a species may last a few weeks. They settle down by inserting their mouthparts into the plant tissue and begin withdrawing sap from the host. The crawlers of most soft scale species spend the summer feeding on the leaf veins. In the fall, they move to twigs where they overwinter. After a series of molts (shedding the "skin"), the immature scales differentiate into males and females, mating occurs, and eggs are laid completing the life cycle. Most species mature on the bark in the spring.

Examples of common soft scales include pine tortoise, magnolia, tuliptree, European fruit lecanium, terrapin, spruce bud, fletcher, and cottony maple leaf and cottony maple scales.

Diagnosing Scale Insect Infestations

Scale insect infestations can sometimes be hard to detect because they may blend in very closely with the bark or other plant features. When diagnosing for scales on bark and foliage, rub suspected scales off. Scales will leave a white ring behind when they are removed whereas foliar diseases and galls will not.

Certain scale species are found only on certain parts of the plant. For example, oystershell scale is found only on the twigs and branches while pine needle scale is located only on the needles (foliage) of pine and spruces. Euonymus scale may be found on the twigs, branches, and foliage of the plant. Euonymus scale males are most common on the foliage while the females are more likely on the twigs and branches.

Some scale species are host-specific while others have a broad host range. Knowing the preferred host of the scale can be helpful in identifying the scale species in question. Pine needle, magnolia, tuliptree, and euonymus scales are host specific to pines/spruces, magnolia, magnolia/tuliptree (*Liriodendron*), and euonymus, respectively. In contrast, oystershell is known to feed on over 100 different woody plant hosts.

Since armored and soft scales are sap feeders, they may cause plant injury by reducing vitality, vigor, and ability to fight off lethal secondary organisms such as borers and pathogens. In most cases, only extremely heavy scale populations may result in plant death.

The following are general (there are always exceptions) symptoms that may be helpful for diagnosing scale infestations in the landscape.

- Premature leaf drop
- Branch dieback or mortality
- Yellowing or discoloration of needles or leaves

- Sooty mold buildup (soft scales only)
- Plant mortality

Management of Scales

In general, practice good Plant Health Care. Keeping plants healthy with good vitality is an important first step in reducing the detrimental effects of scale populations. Avoid excessive fertilization as this may increase scale populations. Research has demonstrated that excess nitrogen may actually increase scale reproduction (i.e. females lay more eggs). In addition, knowing the life cycle of the scale is essential for proper timing of control measures.

In order to prevent scale populations from going undetected and increasing to levels that cause economic damage the following steps should be taken:

- Match the proper plant with the proper site
- Monitor susceptible plants regularly
- Prune out infestations
- Conserve natural enemies of the scale
- Use dormant sprays to control overwintering life stage
- Maintain appropriate plant health and vigor
- Properly identify the scale involved
- Use chemical insecticides when crawlers are present