GROWERTALKS

Pest Management

11/30/2016

Spying for Scales

Steven Frank

Greenhouses are home to all kinds of pests that fly, run, crawl, squirm and dig. With all this going on, it's easy to overlook pests that hardly do anything at all. You won't find them on sticky cards or flitting about the plant canopy, but scale insects can be major pests of greenhouse crops.

In this article, I'll give you a scale primer so you can decide if your crops are at risk and how to approach scale insect management.

Identifying which scales you have

There are hundreds of scale insect species in North America and many potential greenhouse pests. However, for management purposes, you primarily need to distinguish between the two most common families of scale insects: armored scales (*Diaspididae*) and soft scales (*Coccidae*). Most greenhouse pests belong to one of these families (of course, it's always good to get a solid identification from your extension agent). Proper identification, at least to family, is critical because some insecticides kill soft scales, but not armored scales.



All scale insects are small and cryptic, but there are a couple of tricks to help you determine which family of scale insect is on your crop. Armored scales are protected by a cover, called a "test," made from wax they secrete and cast skins of previous growth stages. If you remove the test with a probe or the tip of your pocket knife, you'll see the insect's body, which is usually yellow, orange, pink or purple. Their body is really just a sack since females don't have legs or antennae under their test.

Pictured: Hemispherical scale infestation showing hemispherical adult females full of eggs and tiny orange crawlers.

Soft scales also generally have a waxy cover, but it's softer and attached to their body. Female soft scales can be flat or hemi-spherical, depending on species and life stage. Some soft scales also retain their legs

and antennae as adults.

• **Identification tip #1:** Try to remove a scale's test. If the test comes off, but the scale's body stays on the plant, you have an armored scale. If the whole insect comes off the plant, cover and all, you have a soft scale.

Armored and soft scales also differ in how they feed, which could help you determine the type of scales on your plants. How can you possibly tell what a scale insect is eating? By what comes out the other end. All scale insects suck fluids from plants with flexible straw-like mouth parts. Armored scales feed in parenchyma cells or other cells their stylet encounters. They excrete very little and no excretions leave the test.

In contrast, soft scales feed in plant phloem, which is rich in sugar, so they excrete lots of honeydew. Honeydew is the shiny, sticky fluid that accumulates on leaves beneath phloem feeders like aphids, whiteflies and mealybugs. Honeydew is also a substrate for black sooty mold
fungus.

• **Identification tip #2:** Look around your suspect scale insects for honeydew or black sooty mold. If leaves beneath the scales are dry, you probably have armored scales. If they're shiny or sticky, you have soft scales.

A bit more biology is necessary here before we move on to some specific scale insect pests. Armored scales lay eggs beneath their tests; soft scales generally lay eggs beneath the female's body, which often becomes dome-shaped to accommodate the eggs. Newly hatched scales are called crawlers. This is because they have legs and crawl around to find a place to feed. After armored scales molt from the crawler stage, they start building their test and never move again. The same is true for many soft scales, though others will move a little even as adults.

Scale crawlers are the only stage that can disperse to other plants and the only stage not protected by a waxy (water-proof) test or exoskeleton. Thus, management targeting crawlers is the most effective because it reduces spread throughout the greenhouse and crawlers are more susceptible to insecticides. Unfortunately, scale insects can reproduce continuously in greenhouses, so all life stages are often overlapping. This makes management more difficult and often necessitates multiple insecticide applications. Since most scale insects have relatively long generations, infestations are most likely on plants with long production cycles or plants in conservatories.

Types of scales

Armored scale tests vary from circular to elongate or oyster shell-shaped. Boisduval scale and fern scale are common armored scale insects attacking flowering and foliage plants. Adult female boisduval scales (*Diaspis boisduvalii*) have circular white tests 1 to 3 mm in diameter. They're flat rather than hemispherical and, in some cases, translucent. Nymphs are pale orange. They can be found throughout the world in greenhouses. Boisduval scales feed on dozens of plant genera, but are most frequently pests of palms and orchids. They feed on leaves and new growth, particularly along midribs, causing chlorotic spots.

Female fern scale (*Pinnaspis aspidistrae*) tests are oyster shell or pear-shaped and light brown. These will be interspersed with smaller white felted males. Fern scale crawlers are yellow with red eyes. Fern scales are found in greenhouses throughout the U.S. They feed on many foliage plants, but are primarily pests of ferns.

Infestation is apparent on ferns because the white male tests are easy to see and because female feeding causes chlorotic leaf spots.

Common soft scales found in greenhouses include the brown soft scale and hemispherical scale. These and other species can have multiple overlapping generations throughout the year in greenhouses. Again, plants with soft scales can become unmarketable due to the presence of sticky honeydew or sooty mold. Ants will visit and protect soft scales to gather their honeydew, so reducing ants can improve management and reduce population growth.

Adult female brown soft scales (*Coccus hesperidum*) are pale yellow to green or brown. Their body is usually oval, 2.5 to 4 mm long and slightly convex. Crawlers and young nymphs are yellow and almost flat. Parasitized nymphs are dark brown to black and convex. Brown soft scale is found in greenhouses throughout the world. Brown soft scale has been reported feeding on hundreds of plant species, but ferns are a common host. They can complete seven generations per year depending on temperature.

Hemispherical scale (*Saissetia coffeae*) adults vary in size from 4.5 mm to as small as 2.0 mm depending on the host plant. Adults are hemispherical, brown, smooth and shiny. Nymphs are light yellow or pink. Nymphs and young adults may exhibit a characteristic “H” pattern. Hemispherical scales are found in greenhouses and interiorscapes throughout the world where they feed on many plant species, including many foliage plants, ferns and orchids.

Scale insect management, like all pest management, begins with clean plants. Inspect plants and cuttings when they arrive for signs of scales, exoskeletons, tests or honeydew. Unfortunately, scales cannot be monitored with sticky cards or other techniques like tapping foliage against a clipboard. Therefore, inspection of the most susceptible plants and watching for the sheen of honeydew can help identify small populations. Susceptible plants include most foliage plants and ferns, but especially plants that require several months of production.

If you find scales in your greenhouse, deal with them quickly. In some cases, it may be best to cull isolated infested plants. If insecticide is necessary, there are many options—just remember that scales are waterproof, so contact insecticides, like pyrethroids, are unlikely to provide full control.

Some insect growth regulators, neonicotinoids, horticultural oils and other products can be effective. Check with your local extension service to see what’s effective and labeled for your crop. However, you cannot treat scales you don’t know you have. Thus, the key is finding scales before they get out of control and tip the scale in your favor. **GT**

Steven Frank is Associate Professor and Extension Specialist at North Carolina State University. He conducts extension and research related to greenhouse, nursery and landscape pest management. You can reach him at sdfrank@ncsu.edu, @OrnaPests on Twitter or visit his website http://ecoipm.org.