



## Soft scales in Utah landscapes

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### What You Should Know

- There are more than 1,000 different species of soft scales found throughout the world. Less than 5% are considered serious pests.
- Soft scales feed on a wide range of woody ornamental plants and often go unnoticed until they stunt growth or cause severe plant stress.
- Scales can be controlled with a combination of cultural control, scouting and reduced risk insecticides.

Soft scales are insects in the family Coccidae and are closely related to armored and felt scales and mealybugs. Scales are fluid feeders with piercing-sucking mouthparts that remove plant phloem or sap. Most life stages are immobile because they anchor their mouthparts into host tissue. They are difficult to control because of their waxy covering, seasonal abundance, and high fecundity. A soft scale infestation, whether in a landscape, greenhouse, or nursery setting, can cause severe damage. Several hundred species of woody plants are susceptible to soft scales. Examples in Utah include beech, elm, linden, maple, conifers, oak, pine, and yew. Some soft scales attack a wide host range (European fruit lecanium; Fig. 1) while others are host specific (spruce bud scale; Fig. 2).



Fig. 11. Spruce bud scale.<sup>2</sup>



Fig. 1. European fruit lecanium on littleleaf linden.<sup>1</sup>

### Life Cycle

Life cycles vary among soft scales. Most outdoor species have one generation per year, but several life stages can be present at one time. In Utah, immature or unmated females overwinter on bark or twigs, and males overwinter in a pupal case. In spring, they resume their growth, feeding and mating. In some species where males do not exist, female scales reproduce asexually through parthenogenesis. Females produce about 200-1,000 eggs. The female will either swell with eggs, or form an egg sac at the hind end of her body that is covered with a thick, fluffy wax. Some soft scale species give birth to live young, similar to aphids (i.e., viviparous birth). The female dies shortly afterward, but her body can harden to protect the nymphs.

Eggs hatch into mobile 1<sup>st</sup> instars, or "crawlers," that are hardly visible to the naked eye, and may appear as specks of dust. Crawlers can be blown or splashed to nearby hosts, serving as the means of dispersal. Some species that feed on deciduous hosts will have crawlers move to and feed on actively growing foliage for the majority of the summer (e.g., cottony maple and lecanium scales). Eventually they will move back to woody tissue to settle and complete development. Other species have crawlers move only a short distance from the mother (e.g., Fletcher scale). The 2<sup>nd</sup> instars anchor their mouthparts into the host plant and form a waxy covering. Females go through three instars, and males go through five before becoming adults.

## Description

**Female Adults:** Scales are unique insects in that the female adults' bodies are not visibly segmented and their legs and antennae are absent or highly reduced, but their size, shape and color depend on the host and their position on the host. The European fruit lecanium, for example, may be large and rounded on one host, and completely flattened on another. In comparison to armored scales, adult soft scales are larger, more rounded, and do not have a hard, removable covering. In general, adult females range in size from 2-6 mm, and are hemispherical, with either a glistening-smooth, waxy body, or white cottony surface (Figs. 1-4, 6, 9-11).

**Immatures:** The crawlers (1<sup>st</sup> instars) are 1-2 mm in size, mobile, almost flat, and very pale (Fig. 3). The older nymphs (2<sup>nd</sup>-3<sup>rd</sup> instars) are wingless but have well-developed legs and antennae; they are elliptical, flattened, and several shades lighter than the adult.

**Male Adults:** Although rarely seen, male soft scales resemble small wasps or flies (Fig. 4). They have distinct body regions and a pair of antennae. Some males have one pair of wings and are highly mobile during late spring or summer. Males often have reduced or absent mouthparts and do not have a waxy covering. Adult male scales are short-lived and are rarely seen; their only purpose is to mate.



Fig. 3 Crawlers, older nymphs and adults.<sup>1</sup>



Fig. 4. Example of male and female adult scales.<sup>3</sup>

## Plant Damage

Unlike armored scales that feed on cell contents, soft scales feed on phloem by inserting a straw-like stylet into the host tissue. Most plants are able to tolerate light feeding. However, plants with a large soft scale infestation will show a marked reduction of vigor, yellowing of leaves, premature leaf drop, and death of twigs and limbs (Fig. 5). Soft scales generally consume more sap than needed, and are adapted to excrete copious amounts of nutrient-poor/sugar-rich honeydew. Honeydew serves as a substrate for fungi that cause sooty mold, which grows as a grey or black film on leaves and limbs (Figs. 6, 7). Honeydew is also a sticky nuisance as it drips and covers nearby objects.



Fig. 5. European elm scale damage.<sup>4</sup>



Fig. 6. Honeydew droplets from scale feeding.<sup>1</sup>



Fig. 7. Sooty mold growing on scale honeydew.<sup>4</sup>

## Management Options

**Cultural Control:** A heavy soft scale infestation is usually a sign that the tree or shrub is under some kind of stress. Therefore, keeping plants healthy will minimize the negative effects caused by feeding from scales and other fluid feeding insects. There are many things homeowners can do to reduce soft scales. The following cultural steps can help minimize infestations:

- Keep trees in a healthy condition with optimal watering, fertilization and mulching. Make sure trees are planted in appropriate sites and soil depth.
- Monitor soft scale crawler activity by attaching and examining double-sided sticky tape to limbs where scales occur.
- Spray crawlers off limbs and foliage with a high pressure water hose; regular washings will also remove honeydew and dust from plants.
- Scrub infested limbs with a mesh dish sponge to remove adults and old waxy caps.
- For local scale infestations, prune small limbs and branches to protect new growth and prevent spreading. Rake, bag and discard infested debris.

**Biological Control:** Soft scales have many natural enemies, such as predators and parasitic wasps. In most cases, natural enemies will help regulate soft scale populations on many woody ornamental trees. Lady beetle larvae and adults will eat crawlers and nymphs (Fig. 8). Ants will often "tend" or protect scale colonies from predators in return for honeydew. Controlling ants by putting a sticky barrier at the base of woody ornamentals will encourage beneficial insects. The use of broad spectrum insecticides will nullify attempts at biological control.



Fig. 8. Lady beetles are effective beneficial insects.<sup>5</sup>

**Reduced Risk Insecticides:** Consider using reduced risk insecticides to target soft scales. Reduced risk products will conserve more natural enemies than conventional insecticides, but still have the potential to kill beneficial and pollinating insects.

- Horticultural oils may provide the most effective soft scale control. During plant dormancy, oils can be used at higher rates to suffocate dormant, immobile stages. During active plant growth in the summer, lower rates will suffocate immobile scales and crawlers. Apply oils between 40-90°F to prevent plant damage.
- Insecticidal soaps disrupt the cell membranes of insects and also remove the waxy cuticle, causing dehydration. Soaps are most effective on crawlers, and must be well-timed for suppression. As with oils, soaps are only effective when wet, so multiple applications may be necessary for adequate control.
- Systemic insecticidal soil drenches, like imidacloprid (Merit®), and others are an option for persistent scale problems. Soil drenches applied in the spring are absorbed by the roots of the plant and primarily target fluid feeding insects like scales and aphids. Systemic products will kill all feeding stages, including adults.
- Insect growth regulators, such as pyriproxyfen (Esteem®), will help reduce crawlers on tree nuts, pome fruits, stone fruits, pear, or bushberries.

**Other Foliar Insecticides:** As a last resort for soft scale control, conventional insecticides may be applied to infested trees. Crawlers are the targeted life stage, and treatments must be well-timed for effective control. Examples of products registered for scale control in Utah include: carbaryl (Sevin®), chlorpyrifos, dimethoate, malathion, permethrin (Pounce®). Conventional insecticides are generally broad spectrum and will kill beneficial insects, so use these products with discretion.



Fig. 9. Brown soft scale nymphs and adults.<sup>3</sup>

## Examples of Soft Scales in Utah

### Brown soft scale, *Coccus hesperidum*

Hosts: avocado, citrus, cottonwood, holly, manzanita, palm, poplar, stone fruit, willow. Found worldwide, this sub-tropical scale occurs outdoors only in southern Utah, but can be a pest of indoor and greenhouse plants throughout Utah. The brown soft scale may have up to five generations per year in warmer climates. Adults are oval, 1.5-4.5 mm long, yellowish green, and often mottled with brown spots (Fig. 4).

### Cottony maple scale, *Pulvinaria innumerabilis*

Hosts: linden, maple, basswood, ash, elm, hawthorn, locust, fruit trees, and others. These scales become most visible when they produce their cottony white egg sac in early summer (Fig. 10). Adults are 4-7 mm long, with body color depending on host. Large outbreaks are generally only seen on stressed or weakened trees. The crawler stage occurs from mid-June to early August in northern Utah.

### European elm scale, *Gossyparia spuria*

Hosts: native and introduced elms. The European elm scale is a felt scale in the family Eriococcidae and closely related to soft scales. The adult female has a distinctive, white cottony fringe (Fig. 11) and can be up to 10 mm long. The crawler stage occurs from late June to late July in northern Utah.

### European fruit lecanium, *Parthenolecanium corni*

Hosts: maple, elm, beech, birch, ash, linden, fruit trees, and many more. This species varies in form depending on its host, making identification difficult (Fig. 1). It can build to a large population quickly, to the point where scales will settle on top of nearby scales. The crawler stage occurs from early July to mid-August in northern Utah.

### Fletcher scale, *Parthenolecanium fletcheri*

Hosts: yew (preferred), arborvitae, juniper, and pachysandra. Fletcher scale begins feeding early in spring, so signs of damage should be quite apparent. Crawlers are not very mobile, so there are often localized, dense populations. The crawler stage occurs from late June to late July in northern Utah.

### Spruce bud scale, *Physokermes piceae*

Hosts: Norway spruce and dwarf Alberta spruce. Spruce bud scale is somewhat rare in Utah, but has been reported on dwarf Alberta spruce. Females are 1 - 2 mm long and are often overlooked because they resemble buds on twigs. The appearance of black sooty mold on needles and bark, as well as death of lower limbs, aids diagnosis. These scales congregate at shoot tips and lower branches (Fig. 2). The crawler stage occurs from early to mid-June through mid-July.



Fig. 10. Cottony maple scale.<sup>6</sup>



Fig. 11. European elm scale.<sup>1</sup>

<sup>1</sup> Images courtesy of Marion Murray, Utah State University Extension.

<sup>2</sup> Image courtesy of Steve Katovich, USDA Forest Service ([www.ipmimages.org](http://www.ipmimages.org)).

<sup>3</sup> Images courtesy of U.S. National Collection of Scale Insects Photographs Archive, USDA-ARS ([www.ipmimages.org](http://www.ipmimages.org)).

<sup>4</sup> Images courtesy of Whitney Cranshaw, Colorado State University Extension ([www.ipmimages.org](http://www.ipmimages.org)).

<sup>5</sup> Image courtesy of Clemson University - USDA Cooperative Extension Slide Series ([www.ipmimages.org](http://www.ipmimages.org)).

<sup>6</sup> Image courtesy of Southern Forest Insect Work Conference ([www.ipmimages.org](http://www.ipmimages.org)).

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2. Dreistadt, S. H., et. al. 2007. Pest Notes: Scales. University of California Statewide Integrated Pest Management Program. Publication 7408.

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**Precautionary Statement:** All pesticides have benefits and risks, however following the label will maximize the benefits and reduce risks. Pay attention to the directions for use and follow precautionary statements. Pesticide labels are considered legal documents containing instructions and limitations. Inconsistent use of the product or disregarding the label is a violation of both federal and state laws. The pesticide applicator is legally responsible for proper use.

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