

Watch out for Putnam scale, *Diaspidiotus ancyclus*

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Putnam Scale

Putnam scale (*Diaspidiotus ancyclus* [Putnam]) is an armored scale (family Diaspididae). It is also known as maple leaf aspidiotus, maple bark louse, Howard scale, and rhododendron scale. This scale is classified under the tribe Aspidiotini, a group that contains numerous cosmopolitan pest species (Miller and Davidson 1990; García Morales et al. 2016). The infestation of this scale in kousa dogwoods was recently noticed in Tennessee.

Armored scale insects can be highly invasive and often become pests on trees,

shrubs, and other woody ornamentals (Miller and Davidson 1990; 2005; Normark et al. 2019). Their success is largely due to their small size and the hard waxy armor they secrete after settling in a feeding location (Figure 1c). The armor protects them from generalist predators, harsh environmental conditions, and pesticide applications.

Putnam scale is an occasional pest in the United States, particularly on blueberry. Large populations have been reported to reduce plant vigor. Infested fruits are

deformed by depressions formed under the aggregated females. Heavy infestation can also kill twigs and branches (Baker 1972). Infestations on the leaves and stems of hosts can cause red or black necrotic areas around the feeding site (Figure 1a, b).

Distribution

This scale is native to North America, but is also found in Argentina, Australia, Brazil, Canada, Chile, Egypt, France, Japan, Germany, Mexico, New Zealand, Portugal, South Africa, and Spain. In the US, it has been reported in the states except, New Hampshire, Vermont, Arkansas, Wisconsin, Minnesota, North Dakota, South Dakota, Nebraska, New Mexico, Nevada, Utah, Wyoming, Idaho and Washington. (Miller and Davidson, 2005; García Morales, 2016).

Lifecycle and Characteristics

Putnam scale is reported to have 1 or 2 generations per year (Figure 1f), depending on location. We expect 2

generations per year to occur in Tennessee, with adults appearing in May and July, but further observations are required to confirm the timing of life stages.

The scale body can be observed by removing the waxy armor (Figure 1c, d, e).

The adult female is approximately 1.5 mm long, and is immobile, yellow, and somewhat pear-shaped. The top portion of the female may be darker in color. Under this armor, the female feeds, mates, and produces eggs. The adult male is a tiny, winged insect, which emerges from its cover and mates with mature females. In the spring, females lay a mass of yellow eggs (averaging 49 eggs per female) under their armor (Tinker 1957; Figure 1f). The eggs hatch around mid-May; the hatchlings are known as crawlers. Crawlers are 0.5 mm long, yellow, with a flattened, oval appearance. They are highly mobile and can migrate to leaves, branches and fruit where they settle and feed. A crawler molts to a second instar, which are legless, flattened

yellow sacs attached to the bark. It then begins to secrete grey waxy armor.

Host Plants

Putnam scale is a polyphagous pest and has been reported from over 80 plant species belonging to 55 genera across 37 plant families (García Morales et al. 2016).

Putnam scale infestation has been observed on *Acer*, *Actinidia*, *Ailanthus*, *Asimina*, *Betula*, *Caragana*, *Carpinus*, *Carya*, *Castanea*, *Ceanothus*, *Celtis*, *Cladrastis*, *Cornus*, *Corylus*, *Cotoneaster*, *Diospyros*, *Euonymus*, *Fagus*, *Fraxinus*, *Gleditsia*, *Hedera*, *Hydrangea*, *Illex*, *Juglans*, *Machura*, *Magnolia*, *Malus*, *Plantanus*, *Populus*, *Prunus*, *Ptelea*, *Quercus*, *Rhamnus*, *Rhus*, *Rhododendron*, *Ribes*, *Rosa*, *Salix*, *Sorbus*, *Staphylea*, *Tamarix*, *Tilia*, *Tsuga*, *Ulmus*, *Vaccinium*, and *Ziziphus*. (Gill 1997; Miller and Davidson, 2005). Due to the breadth of the reported host range, Putnam scale is likely to infest other related genera of plants. We recently

collected Putnam scale from kousa dogwoods in Tennessee.

Scouting

Putnam scale identification is complicated by the presence of different morphological forms on different parts of the plants. Stannard (1965), described the differences between the bark form (ancyllus) and the leaf form (comstocki-howardi).

Putnam scale is extremely variable and may be a complex of several species. Expert identification will be required to confirm the species.

When scouting in the field, look for necrotic spots on foliage. Adult females appear as dark grey waxy dots, roughly circular in shape with scalloped edges. These scale encrustations can blend in with the color of the bark and untrained eyes may not be able to catch it. The aid of a 10x to 20x hand lens is needed to detect infestations on wood. However, detection is easier on leaves and fruits. The small, white

coverings stand out on the leaves. The male cover is similar to the female, except for being more oval. Considerable variation in scale cover is noted depending on the host. For example, the cover is very thin and delicate on maple leaves but thick and robust on rhododendron leaves. Necrotic spots adjacent to the scale on foliage can also be more noticeable than the scale itself (Figure 1a, b).

The morphology of the scales found on leaves varies from those found on bark (Miller and Davidson, 2005). Therefore, searching the scales on or under the bark, especially in the fall after leaves drop, could help confirm the species' identity.

Management Options

Cultural Control. In blueberry production, the best strategy for the management of scale insects is pruning old wood. Putnam scale is principally a stem feeder and does not thrive on strong, vigorous wood. In

general, removing infested limbs can limit scale population.

Chemical Control. Pruning should be followed by dormant oil application.

Thorough spray coverage of all stems and branches is essential. Large volumes of spray, 200 to 300 gallons per acre, are needed under heavy-scale infestations. Use high pressure so that the plant surface is completely covered. Do not apply oil sprays twenty-four hours before or after freezing. It is best to wait for temperatures above 50°F and calm wind to apply treatments.

Insecticides labeled for scale insects may assist in reducing heavy populations but could have negative effects on natural enemies.

Natural Enemies. Putnam scale is native to North America, and therefore, it has a large complex of native natural enemies. Reported outbreaks of Putnam scale often follow foliar applications of pesticides, which presumably reduced natural enemy

populations. Tinker (1957) reported 6 Eulophidae wasp parasitoids attacking the scale in Illinois. Gordh (1979) reported 3 Aphelinidae wasp parasitoids: *Coccobius* (= *Phycus*) *varicornis* (Howard); *Encarsia* (= *Prospaltella*) *aurantia* (Howard) *E.* (= *Aspidiotiphagus*) *citrinus* (Craw). Additionally, Polavarapu et al. (2000) found 9 wasp parasitoid species in New Jersey: *Ablerus clisiocampae* (Ashmead) of the family Azotidae; 6 belonging to the family Aphelinidae namely, *Coccobius varicornis* (Howard); *Coccophagoides* sp. 1, *Coccophagoides* sp. 2, *Encarsia* sp., *Encarsia aurantia* (Howard); *Marietta carnesi* (Howard), *Epitetracnemus intersectus* (Fonscolombe) of the family Encyrtidae, and *Signiphora* sp. of family Signiphoridae (most likely a hyperparasitoid). They also found 2 ladybird beetles, *Microwesia misella* (LeConte) and *Chilocorus* sp. as well as the predatory mite, *Hemisarcoptes malus* (Shimer), feeding on

this scale. They found a higher rate of parasitism in individuals that were exposed on the fruit, leaves or smooth bark than on those hidden under rough bark. Adult parasitoids seem to be most abundant when adult female scales and crawlers are prevalent. This situation is problematic because pesticide applications are most effective against scale crawlers during this same period. In addition to predators and parasitoids, the entomopathogenic fungus *Myriangium duriaei* was also found associated with the scale (Evans and Prior 1990).

Conclusion. Biological information available on this species is scant. Despite its wide host range, it has only been historically problematic on blueberries. To date, its appearance in Tennessee nursery production has been sporadic. If you believe you have a Putnam scale infestation contact Dr. Karla Adesso (kaddesso@tnstate.edu).

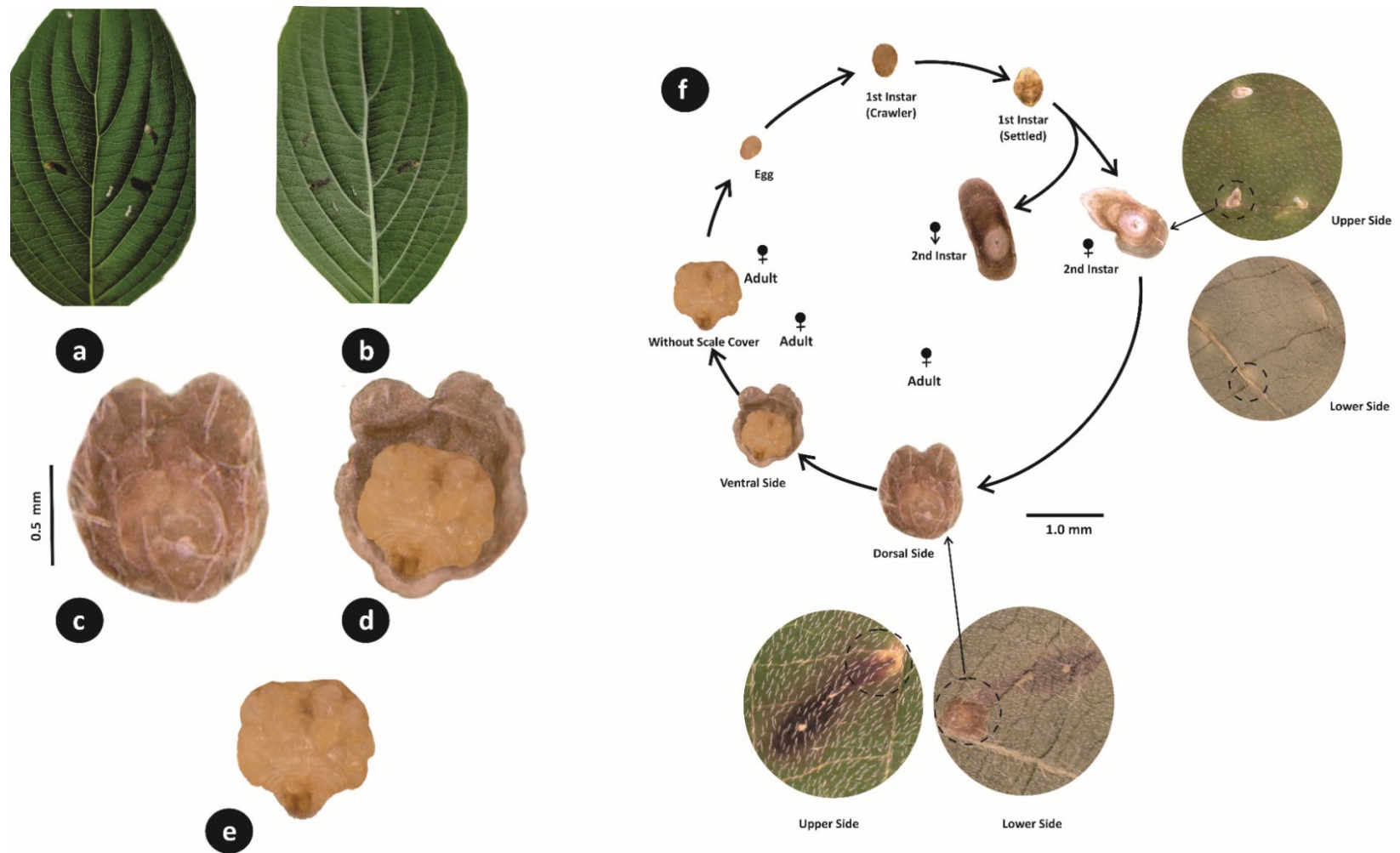


Figure 1. Necrotic spots projecting from the feeding site of the Putnam scale on (a) dorsal and (b) ventral view of dogwood leaves, (c) wax armor dorsal view, (d) wax armor ventral view and adult female ventral view, (e) female ventral view with armor removed, (f) lifecycle of Putnam scale.

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For additional information, contact your local nursery specialist at:

Tennessee State University, Otis L. Floyd Nursery Research Center

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