



# PLANT DISEASE AND INSECT ADVISORY

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## Euonymus Scale in the Ornamental Landscape

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The Plant Disease and Insect Diagnostic Lab at OSU was recently bombarded with plant samples infested with euonymus scale, *Unaspis euonymi*. Native to Asia, euonymus scale is a serious pest of ornamental plants throughout the temperate regions of the world, and our Oklahoma landscapes certainly harbor their fair share of the pest. This insect favors feeding on plants belonging to the bittersweet family (Celastraceae), which includes American bittersweet, *Celastrus scandens*, and various species of *Euonymus*. I frequently encounter euonymus scales on creeping varieties of euonymus, but the insect can also feed on camellia, ivy, hibiscus, holly, and ligustrum.

Scales are small, plant-sucking insects closely related to aphids. All scales have piercing-sucking mouthparts, comprised of four stylets that are inserted into plant tissues that enable the insect to extract plant sap. There are four main scale families that feed on ornamental plants: soft scales, pit scales, mealybugs, and armored scales (which includes euonymus scale). Diagnosing scale problems is difficult because scales don't resemble

insects during most of their life cycle. The actual scale body is concealed beneath a waxy cover that ranges from a soft, white 'flocking' to a hard, shell-like carapace. Their often drab coloration and gall-like appearance makes them look like "bumps on a log" to the untrained observer.

From above, adult female euonymus scales are brown to dark gray and somewhat teardrop shaped (Figure 1a), while males are elongate, white, and strongly tricarinate (having three raised lines on the scale cover) (Figure 1b). Females are yellowish orange, legless and wingless, and are saclike, having no discernible head, thorax, or abdomen. Adult males are usually winged, gnat-like, and seek out females to mate. Mated females overwinter and begin laying eggs beneath the protective, waxy cover from mid April to mid June in Oklahoma. First-instar

nymphs, or crawlers, hatch and emerge from beneath the waxy cover (Figure 2). Crawlers are mobile and disperse to un-colonized portions of the plant or new host plants altogether. New infestations are typically the result of contaminated plants being established in a landscape, but the dispersal of tiny crawlers to new hosts is often aided by wind. Once crawlers settle down to feed, they begin secreting their own waxy layer and become sessile (immobile). In Oklahoma, there are three additional generations in July, August, and September.



**Fig 1.** Euonymus scale adult female surrounded by orange crawlers (*left*); and adult males (*right*). Photo credits: Cliff Sadof, Purdue University (*l*); and Lisa Ames, University of Georgia



**Fig 2.** Eggs and crawler (circled) beneath cover of female euonymus scale. Photo credit: Eric Rebek, Oklahoma State University.

Feeding damage can be extensive. Euonymus scales burst plant cells with their long, needle-like mouthparts and feed on the cell contents. This feeding strategy results in the formation of chlorotic halos, small yellow blotches on the leaves (Figure 3), which results in reduced photosynthetic leaf area. Heavy infestations usually result in a cascade of physiological problems for the plant including reduced photosynthesis, stunted growth, and leaf drop or

dieback. *Euonymus* scale infestations can eventually cause high mortality of host plants, which translates into economic loss for both homeowners and nurseries.



**Fig 3.** Chlorosis (yellow spots) on purple winter creeper, *Euonymus fortunei*, caused by euonymus scale. Photo credit: Cliff Sadof, Purdue University.

*Euonymus* scale can be controlled through a variety of methods, including biological, cultural, and chemical options. Biological control relies on euonymus scale natural enemies, predators and parasitoids (parasitic insects), that reside in the landscape. A lady beetle related to the native twice-stabbed lady beetle, *Chilocorus stigma* (Figure 4), and the scale picnic beetle, *Cybocephalus nipponicus* (Figure 5), both feed on euonymus scale. An important predatory mite in the genus, *HemisarcOPTES*, hitches a ride under the wing covers of *Chilocorus* beetles and attacks euonymus scales. A tiny, parasitic wasp, *Encarsia citrina* (Figure 6), attacks many armored scales and is found with high frequency where euonymus scale occurs. However, euonymus scale populations can grow rapidly and large scale populations are rarely, if ever, kept in check by natural enemies. However, flowering plants rich in nectar and pollen, food resources required by adult natural enemies, can attract resident predators and parasitoids to ornamental landscapes. Importantly, this approach and other conservation biological control strategies can result in control of euonymus scale and other insect pests of ornamental plants.



**Fig 4.** Twice-stabbed lady beetle, *Chilocorus stigma* (left), and related species, *C. kuwanae* (right). Photo credit: J. Davidson, University of Maryland.



**Fig 5.** Scale picnic beetle, *Cybocephalus nipponicus*, predator of euonymus scale. Photo credit: Pennsylvania Department of Conservation and Natural Resources - Forestry Archive, Bugwood.org.



**Fig 6.** *Encarsia citrina* (left), parasitoid of euonymus scale; and scale with exit hole where adult wasp emerged from its host (right). Photo credits: Eric Rebek, Oklahoma State University.

Cultural control of euonymus scale includes selecting insect-resistant plant species or cultivars. For example, research shows that euonymus scale favors *Euonymus japonicus* 'Albo-marginatus' and *E. japonicus* 'Microphyllus' over other species and cultivars of euonymus. Leaf variegation can also lead to feeding preferences. Research at the University of Maryland demonstrated that variegated *E. japonica* var. *aureus* is more susceptible to euonymus scale than non-variegated plants. Finally, scales and other plant-feeding insects tend to prefer stressed or damaged host plants. Therefore, select planting sites that reduce environmental stress (e.g., drought) and minimize mechanical damage.

Insecticides can provide effective control of euonymus scale if applications are correctly timed and coverage is adequate. Applications of foliar insecticides must coincide with emergence of susceptible crawlers because the waxy scale cover produced by settled scales protects them from most insecticides. Pyriproxyfen (Distance), an insect growth regulator, does an outstanding job controlling euonymus scale and other pests. However, this product is only available to commercial pesticide applicators and cannot be purchased by homeowners. Both dormant horticultural oil applied in late winter and summer horticultural oil (e.g., Sunspray Ultra-Fine Oil) can be used successfully against euonymus scale. Unlike many other foliar insecticides, horticultural oils are effective without harming natural enemies. Soil-applied systemic insecticides such as imidacloprid (e.g., Merit, Bayer Tree and Shrub Insect Control) generally work well for sucking insect pests but do not provide adequate control of euonymus scale. Acephate (Orthene) applied as a soil drench works well against euonymus scale, but read

the label closely because this product does cause phytotoxicity in some plants such as euonymus. Be aware that because adult parasitoids are most abundant at or near peak crawler production, use of broad-spectrum insecticide sprays can result in reduced natural control. As always, follow all label directions before applying any insecticide. Contact your county extension office for specific recommendations on euonymus scale control.

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