



Hemlock Woolly Adelgid

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Distribution and Hosts

Native to Asia and western North America, the hemlock woolly adelgid (HWA) was first reported in eastern Virginia in the early 1950s. It feeds on both eastern hemlock and Carolina hemlock in Virginia. Since then, it has spread to most of the Appalachian region of the eastern United States and spans as far north as parts of Canada (Fig. 1).

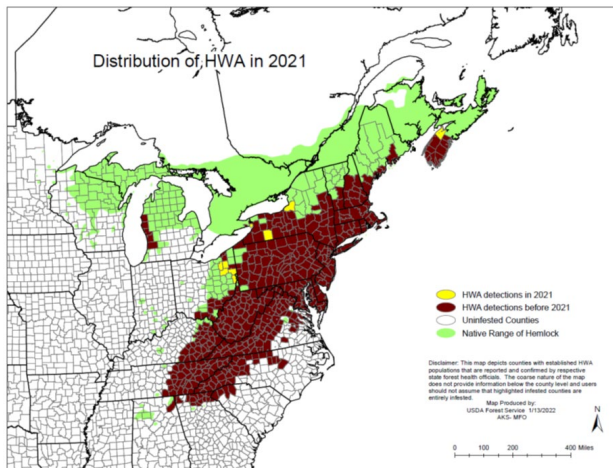


Figure 1. Current range of Hemlock woolly adelgid in the eastern United States (USDA Forest Service).

Description of Damage

Immature nymphs and adults damage trees by feeding on storage cells near the base of needles at their attachment point on the twigs (Fig. 2). The tree loses vigor and prematurely drops needles, to the point of defoliation, which often leads to death. If left uncontrolled, the adelgid can kill a tree in as quick as four years.



Figure 2. Nymphs settling into the base of needles (Olivia Andrews, Virginia Tech).

Identification

These small insects display several different forms during their life cycle, including winged and wingless forms. Generally, they are brownish-reddish in color, oval-in-shape, and about 0.8 mm in length. Crawler stage nymphs produce white cottony/waxy tufts after settling on the twig, which cover their bodies and remain in place throughout their lifetime. The white masses are 3 mm or more in diameter. The presence of these masses on the bark, foliage, and twigs of hemlock is a sure sign of HWA (Figure 3). The white cotton masses may stay on the twig long after the adelgid is gone. HWA, *Adelges tsugae*, is in the order Hemiptera and family Adelgidae.



Figure 3. Hemlock woolly adelgid covering a branch of Eastern hemlock (Olivia Andrews, Virginia Tech).

Life History

There are two generations called the sistens and the progrediens. Each goes through six life stages (egg, four nymphal instars, and adult). As a cool weather species, most development of these stages occurs between October and June. As temperature rises thereafter, the first instar nymphs of the sistens generation go into a dormant stage. These nymphs break dormancy in October when the temperatures begin to cool, and following winter development into adults, they will lay the progrediens eggs in February or March. Most eggs develop into wingless adults that remain on the hemlock tree where they will complete their life cycle again.

Control

See the [Virginia Pest Management Guide for Horticultural and Forest Crops](#) for current pesticide recommendations. See following for general comments on control.

Systemic Insecticides

Several systemic insecticides provide good long-term control of this pest. Use a systemic insecticide that can be applied as a soil drench at the base of the tree or can be directly injected into the trunk, especially when trees are located near bodies of

water. Make this application in late April when new growth starts on the tree.

Dormant Oil

Horticultural oils which are known as dormant oil or superior oil will smother the insect. A 1% solution is recommended from May through September and the 2% solution is recommended from October to April. Complete coverage of the tree is necessary if you hope to kill the majority of adelgids. Only one complete application of oil is necessary per year. Insecticidal soap can also be used but may cause some burn and should be tried on a few branches first. Following treatment monitor the situation and treat again if needed.

Fertilizer

Fertilizing trees can end up causing more damage, as the extra nitrogen will make for more tender growth that will in-turn support more adelgids. Only add fertilizer if it's suggested after a soil test.

Biological Control

Two *Laricobius* species (specialists of HWA), in the order Coleoptera: Derodontidae, have been released since the early 2000s and are now well established throughout the eastern United States. While they have been shown to significantly impact the winter generation of HWA, they are not present for the spring generation. Therefore, two additional adelgid-specific predator species, *Leucotaraxis* flies in the order Diptera and in the family Chamaemyiidae, that are active during this second generation of HWA, are being released with the goal of establishment and additional impact. Biological control agents are being released on public lands throughout the range of eastern hemlock where trees are infested but are still relatively healthy. In many of these areas, an integrated approach of insecticide treatment combined with release of predators is being recommended. Currently no biological control agents are available for purchase for the control of HWA.

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