

HEMLOCK WOOLLY ADELGID

Adelges trugae by Lorraine VanSlooten

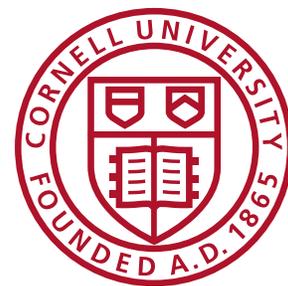
The hemlock woolly adelgid (HWA), native to Asia and western North America, was first discovered in the eastern U.S. in Virginia in the 1950s. It was thought to have been introduced on nursery stock imported from Japan. It infested two species of hemlock native to the eastern U.S. – eastern hemlock (*Tsuga canadensis*) and Carolina hemlock (*T. caroliniana*). By the 1980s it had begun to spread rapidly and eventually cause the loss of native hemlocks from New Brunswick to Alabama, permanently changing the composition of eastern forests. Feeding by HWA causes needles on infested branches to turn gray-green, dry and drop off. Very little new growth is produced since most buds are killed. Major limbs die from the bottom of the tree upward within two years and the entire tree may die within only four years.

HWA is a tiny insect closely related to aphids. It has a piercing/sucking mouth that works well for feeding on plant sap. When the nymphs hatch from their egg sacs that look like little puffs of cotton, they are only a millimeter in size and look like tiny specks of pepper. Called crawlers, they start feeding on sap at the base of a hemlock needle. This injures the hemlock host, but it's also believed that HWA injects a toxin that will eventually damage the hemlock's vascular system. The crawlers become dormant in mid-July and neither feed or develop until they come out of dormancy in mid-October and begin feeding again. They develop into adults by early March and begin to produce eggs. Being active during the winter and dormant during the growing season makes them somewhat cold tolerant and able to infest hemlocks in the northeastern U.S. All HWA are female and most are wingless.

Controlling options for HWA include insecticides, maintaining the condition of trees and forests or bio-control. Horticultural oil sprays work well when applied before the buds open. But the oil has to be applied all through the tree to be effective, which is easier in an urban setting than in a large forest stand of hemlocks. Finding an appropriate bio-control is a complicated process. Bringing a non-native predator of HWA to a new environment involves a careful assessment in a quarantined setting to make sure that the predator eats only HWA and that it can reproduce and maintain a suitable population before it can be approved to be released.

Beetles (*Laricobius nigrinus*) collected in British Columbia were successfully established on HWA infested hemlock branches in quarantine at Virginia Tech and subsequently released. Additional

collections of the beetle in Washington and Oregon were tested, released and have been widely established in hardiness zones 6a and 6b from the Appalachians to New England. A related species (*Laricobius osakensis*) was collected in Japan. It occurs in a broad range of climates in Japan and is well adapted to southern as well as northern climates in the U.S. A bio-control program integrated into management programs with early detection surveys, monitoring of pest density and a combination of control methods is necessary in the ongoing effort to preserve these hemlock species in forests of the eastern U.S. ■



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