

Taming the woolly adelgid

by DEBORAH SMITH-FIOLA

The Hemlock Woolly Adelgid (HWA) is an aphidlike insect that is a serious pest of Eastern hemlock and Carolina hemlock. It was introduced into the United States (Oregon) from Asia in 1924 and discovered in Virginia 40 years ago. It's since spread throughout Pennsylvania (1960s), Connecticut and Massachusetts (1980s), killing forests and landscapes from New England to North Carolina.

Symptoms

The HWA prefers to feed on new twig growth of hemlocks, feeding on sap, and, theoretically, injecting a toxic saliva. HWA usually attacks lower branches first. Feeding damage first appears as needle discoloration, from deep green to grayish green to yellowing; followed by premature needle drop/defoliation, branch dessication and loss of vigor. Eventual death of the tree occurs after four to eight years, depending on the size, stress level and site of the tree. Even seemingly healthy, mature trees in good growing sites may succumb to this pest. Trees of all sizes and ages are attacked. Mature trees in native settings or landscapes that are large and tightly packed together may be severely attacked.

Monitoring and life cycle

HWAs reach maturity between late winter and early spring at the base of individual needles, covering themselves with white, cottony wax, resembling the tips of cotton swabs, for protection. All HWAs are female. Brownish orange eggs are laid under the cottony wax and hatch during an extended period from February through June. Wind, birds and animals spread the eggs from tree to tree during the spring.



Mature trees tightly packed together in large, native settings may be hit hard by the woolly adelgid. Wind, birds and small animals can disperse their eggs.

Newly hatched woolly adelgids (immature crawlers) are black, oval and flat. They emerge from the cottony egg mass with new hemlock growth in May and June. Use a hand lens to look for crawlers; they are barely visible to the naked eye. Crawlers migrate to new growth, molt, lose their legs, and settle down at the base of needles and begin to feed. These immature nymphs remain where needles attach to twigs until maturity. In the summer, nymphs enter a hibernation stage (aestivate) before resuming feeding in early fall. By October, nymphs begin covering themselves with white, cottony wax, initially secreting it along the outer edge of their bodies like white fringe. This wax often remains firmly attached to hemlock branches long after the insect dies. There is

one spring generation a year plus a partial fall generation.

(Black nymphs are exposed on new growth for a long period, from June to October, before beginning to secrete their white protective wax. They are susceptible to pesticides at this time.)

Cultural controls

There are ways to reduce HWA populations on hemlocks by managing trees properly.

► Do not place birdfeeders in hemlocks as birds pick up eggs/nymphs in their feathers and transport them to other trees and other areas.

► Do not fertilize HWA-infested hemlocks. Nitrogen fertilization enhances the survival and reproduction of HWAs. Research shows that twice as many HWAs

survived on fertilized hemlocks as on unfertilized ones. This was true whether the fertilizer was soil broadcast, micro injected, or implanted. (McClure, 1991)

► No effective natural enemies are known for reliable biological control. Several native predators may help to lower HWA populations.

► A winged population of HWAs is produced each spring which leave hemlock and lay eggs on spruce. It has yet to be determined what type of spruce may act as an alternate host.

► Western hemlock species (*T. heterophylla*, *T. metersiana*) tend to tolerate or be more resistant to HWA. However, these species may not be adapted to Northeast conditions.

Biorational pesticide control

The settled nymph stage is extremely sensitive to control treatment for a long time period, June-October.

► Sprays timed between September-October have less potential impact on beneficial insects, and landscapers/nurserymen tend to be less busy this time of year.

► Research in Connecticut and New Jersey has shown excellent control using either insecticidal soap or horticultural oil. Read the label directions. Do not spray oil if temperatures are over 90 F. and hemlocks are under drought stress. Thorough

Tree injections look promising

Tree injections and implants give good control of adelgids, say researchers in Connecticut. Fertilizer and insecticide treatments were applied using the Mauget system; a combination of both was applied using the CSI Medicap system in late May.

Pesticides injected or implanted in May in a forested site significantly reduced HWA levels within four weeks: Metasystox-R by 98.6 percent; Bidrin by 94.3 percent, and Orthene by 93.4 percent.

Intermediate control occurred on trees treated with combinations of insecticide and fertilizer (acephate/Orthene and 12-4-4). After four weeks the average control was over 88 percent even with the fertilizer. Applications of fertilizer alone (Stemix Hi Volume 0.5-0.7-0.6) significantly improved HWA survival.

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coverage is necessary, using a high-pressure sprayer. Use of insecticidal soap will remove most of the white wax, which is an eyesore. Target sprays to the underside of new growth.

► The developing females in early spring are also vulnerable to dormant oil (2%) applied in March or April.

Chemical controls

► The exposed, settled nymph in June and July is vulnerable to most sprays. Diazinon and malathion have shown excellent control during this period. (McClure, 1991)

► Fluvalinate (Mavrik) is also labeled, using the same timing. However, preference is given to the less toxic soaps and oils for control of this pest. Spray coverage must be thorough.

► A recent study at Longwood Gardens, Pa., looked at the effect of Morestan (Joust) on HWA survival. A September spray targeting nymphs provided excellent control with thorough foliar coverage. This treatment (and timing) could also control hemlock rust mites and spruce spider mites.

► Also, many landscapers and nurserymen are awaiting research results using imidacloprid (Merit) for control of HWA as both a foliar spray as well as a soil injection.

Merit is used at a very low rate, has a long residual and may take weeks to months to translocate and control pests in large trees. Research by the product's manufacturer, Bayer Corp., determined that soil injections gave 96 percent control—after 153 days.

► There is also a new product on the market, called the Wedge, which essentially is a large hypodermic needle injector system. The manufacturer, ArborSystems, Inc., (402/571-9786) claims that Merit can be injected at waist height in a simple process with minimal tree wounding. Additionally, the pesticide will be uptaken within the tree in a matter of hours versus weeks. Research trials on this new product are underway.

Injecting insecticides is most effective in dense stands of trees that are inaccessible by spray equipment, or when thorough drenching by sprays is impossible or undesirable.

(Mention of any product in this article does not constitute an endorsement by Rutgers Cooperative Extension, and does not imply approval to the exclusion of other suitable products.) **LM**

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Egg masses of overwintering adelgid adults

