

## Least-toxic Control of Hemlock Woolly Adelgid

The Hemlock Woolly Adelgid (HWA) is an important pest of eastern and Carolina hemlock trees, which are extensively planted in urban landscapes. The pest was first reported in the eastern United States in the late 1960s – its origin unknown.

It is a small, aphid-like insect with piercing-sucking mouthparts, which are used to suck sap from plants. For most of its life, it is covered by a white woolly substance that it secretes all over its body. They feed primarily on young branches, causing cessation of tree growth, discoloration and premature drop of needles, the dieback of branches and possible death of the tree in as little as one year.

Eastern hemlock ranges stretch south from Nova Scotia to Northern Alabama and west to northeastern Minnesota and eastern Kentucky. Carolina hemlock ranges extend from southern West Virginia down the east coast to Georgia.

The females are oval, blackish-grey, about 2mm in length and serve as the overwintering stage. The brownish-orange, very small, oblong eggs are laid in cottony white egg sacs (about 50 eggs per sac) on young twigs from late March to May. The presence of the egg sacs offers the most visible diagnostic evidence of infestation. The eggs hatch into reddish-brown crawlers (nymphs) from early April through early June and begin feeding on the sap of young twigs, maturing into adults in a few weeks. Some of the adults are wingless and remain on hemlock for a second generation, while the winged forms may fly to nearby hemlocks or spruces.

### Prevention

- Do not disturb shallow roots with heavy equipment or by digging or tilling;
- Keep hemlocks well-watered (apply about 1 inch / week around drip line) during droughts;
- Do not place a bird feeder amongst your hemlock trees in infested areas of the state. Birds can transport HWA crawlers to your trees.
- Remove large, heavily infested trees that can act as reservoirs for uninfested trees. Clip and burn heavily infested hemlock branches. If you can catch the infestation early enough, this may significantly slow the insect's spread and build-up.
- **DO NOT** fertilize trees infested with HWA with nitrogen. Researchers have found five times as many HWAs on nitrogen-fertilized trees, regardless of whether fertilization occurred at infestation or six months later.

## Monitoring

Infestations can be detected early by periodically examining young twigs for the presence of the egg sacs and the presence of a white cottony scale on the hemlock branches. Egg sacs are readily observed in the spring before the eggs have hatched. Keep in mind that remnants of old egg sacs may remain on twigs long after the eggs have hatched and the insect has been controlled. Early detection is very important because injury to hemlock may develop quickly.

## Physical Control

Replant affected areas with native species, such as eastern white pine, that are similar ecologically but are not affected by HWA.

## Biological Control

Proper timing is key for control of the HWA.

- *Pseudoscymnus tsugae* (PT) is a pinhead-sized, specialized, black lady beetle discovered feeding on HWA in Japan in 1992. Having completed several years of successful tests in cooperation with the U. S. Forest Service, in 1999 the Pennsylvania Department of Conservation and Natural Resources' (DCNR) Bureau of Forestry started a statewide PT release project in Pennsylvania.
- *Laricobius nigrinus* (LN) is a beetle that is native to the western North America where it preys on HWA on western hemlock. *Laricobius* beetles only feed on woolly adelgids. LN adults lay eggs in early spring on overwintering HWA nymphs. Larvae emerge and feed on HWA until they mature in spring, when they enter the soil to pupate.
- In a field study conducted in Massachusetts during 2002 and 2003 HWA populations were significantly reduced by a single fall application of fungi, *V. lecanii*. A second fungi, *B. bassiana*, was also efficient when applied using an ultra-low volume (ULV) sprayer. Spring applications were not as effective. Fungus applications also had did not cause any significant decrease in survival rate of beneficial insects<sup>1</sup>.

## Chemical Control

Horticultural oils and insecticidal soaps have shown to be very effective when sprayed during susceptible life stages. 100% mortality was obtained by both materials when

sprayed in mid-July (when all individuals were present as dormant nymphs) and in late October (after the nymphs had resumed development). Both of these materials are of relatively low toxicity, but will kill a wide variety of insects and mites, including those that are beneficial. They should only be used when the adelgid is present in damaging numbers.

## References

Beyond Pesticides/NCAMP. "Least Toxic Control of Pests In the Home & Garden: A series of pest control & chemical factsheets." Washington, DC.

Lifton, Bernice. Bug Busters. Garden City Park: Avery Publishing, Inc., 1991.

Olkowski, Helga, Daar, Shiela, and Olkowski, William, Common-Sense Pest Control, Newtown: The Taunton Press, Inc., 1991.

Pennsylvania Department of Conservation and Natural Resources. Forest Health Fact Sheet Hemlock Woolly Adelgid.  
[http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr\\_007179.pdf](http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_007179.pdf)

USDA. 2005. Pest Alert.  
[http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr\\_005542.pdf](http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_005542.pdf)



**BEYOND PESTICIDES**

701 E Street, SE ■ Washington DC 20003  
202-543-5450 phone ■ 202-543-4791 fax  
info@beyondpesticides.org ■ www.beyondpesticides.org