- Hemlock Woolly Adelgid

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Hemlock Woolly Adelgid

The Hemlock Woolly Adelgid, a tiny aphid-like insect from Asia, was first discovered in the Pacific Northwest in the 1920's. By the early 1950's it was discovered in Virginia and has since been found as far north as Rhode Island. Its preferred host tree is hemlock, but it may also attack spruce.

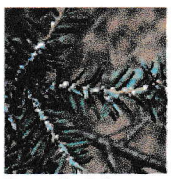
Tree Effects
The Hemlock Woolly Adelgid nymphs and adults feed on sap from the tree's twigs. The tree drops its needles and, if left uncontrolled, the adelgid can kill a tree within a year.

Monitoring
A tree infested with Hemlock Woolly Adelgid will exhibit gray-green needles and cotton-like wool tufts under the needles. By frequently inspecting trees for signs of Hemlock Woolly Adelgid, a homeowner can intervene in a timely manner and possibly prevent the tree from dying.

Management
A homeowner can mechanically remove both eggs and adults by spraying the twigs with water or pruning the most heavily infested branches from the tree. An infested tree can be successfully treated any time except when needles emerge. Spray the affected tree thoroughly with horticultural oil. Horticultural oils are highly effective in killing adelgids, yet relatively safe to the applicator, beneficial insects, and the environment.

Prevention
To prevent infestation, homeowners should place all bird feeders away from hemlock trees because birds, as well as squirrels and deer, can spread the adelgid from tree to tree. Since the adelgid affects stressed trees more quickly, homeowners should water their hemlocks in drought.

Hemlock Woolly Adelgid


Cotton-like tufts


Forester sprays hemlock

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The Hemlock Woolly Adelgid:

Life Cycle, Monitoring, and Pest Management in New Jersey

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The Hemlock Woolly Adelgid is an aphid-like insect that is a serious pest of Eastern hemlock and Carolina hemlock. Although originally introduced into the United States (Oregon) from Asia, it has since spread throughout the East from Virginia (1950s), Pennsylvania (1960s), Connecticut, and Massachusetts (1980s), killing forests and landscapes from New England to North Carolina. The first infestation in New Jersey was found in 1978 in Medford, Burlington County.

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.

Damage Symptoms: The Hemlock Woolly Adelgid prefers the new twig growth of hemlocks, feeding on sap and, theoretically, injecting toxic saliva. Feeding damage first appears as needle discoloration (from deep green to greyish green to yellowing), followed by premature needle drop/defoliation, branch desiccation, and loss of vigor. Gradual limb dieback, beginning at the bottom of the tree, occurs within 2 years. Eventual death of the tree occurs after 4 to 8 years, depending on size, environmental stress level, and site of the tree.

Monitoring and life cycle: The Hemlock Woolly Adelgid reaches maturity between late winter and early spring. They can be observed at the base of individual needles, covering themselves with fluffy white, cottony wax. Hemlock Woolly Adelgids covered with wax resemble the tips of cotton swabs. This wax often remains firmly attached to hemlock branches long after the insect dies.

All Hemlock Woolly Adelgid are female. Brownish orange eggs are laid under the cottony wax and hatch during an extended period from February through June. Eggs are dispersed from tree to tree throughout the spring, via wind, birds, and other animals.

Photos Courtesy of James Lashomb and Jianxin Zhang

Figure 1. Settled woolly adelgids at the base of each needle. (See "Note:" below.)

Newly hatched woolly adelgids (immature crawlers) are black, oval, and flat. They emerge from the cottony egg mass as the new hemlock growth expands in May and June. The tiny immature crawlers can only be seen with a hand lens because they are barely visible to the naked eye. Crawlers migrate to new growth, molt, lose their legs, and settle down at the base of a needle and begin to feed. These immature nymphs remain at this site (where needles attach to twigs) until maturity.

In New Jersey, nymphs enter a hibernation stage (aestivate) in late summer before resuming feeding in the fall. By October, nymphs begin covering themselves with white cottony wax, initially secreting it along the outer edge of their bodies like white fringe. There is one spring generation a year plus a partial fall generation.

(**Note:** The 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 very susceptible to control tactics at this time.)

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Cultural Notes and Alternative Controls

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

2. Do not fertilize Hemlock Woolly Adelgid—infested hemlocks. Nitrogen fertilization actually enhances the survival and increased reproduction of Hemlock Woolly Adelgids. Research shows that twice as many Hemlock Woolly Adelgids survived on fertilized hemlocks as on unfertilized trees—and the survivors laid twice as many eggs each. This pattern applied whether fertilizer was soil-broadcast, microinjected, or implanted (McClure, 1991).

3. The cottony masses produced by mature Hemlock Woolly Adelgid may persist for months, even after the insect is dead. A strong spray of insecticidal soap or water may wash away this eyesore.

4. A winged population of adult Hemlock Woolly Adelgids is produced each year in the spring, which leaves hemlock and lays eggs on spruce. Research has yet to determine what type of exotic spruce may act as an alternate host.

5. Western hemlock species (*T. heterophylla, T. mertensiana*) tend to be tolerant or resistant to Hemlock Woolly Adelgid. However, these species may not be adaptable to New Jersey conditions.

Biological Control

No effective native predators offer reliable control of Hemlock Woolly Adelgid. In New Jersey, researchers have released an exotic ladybeetle, *Pseudocymnus tsugae*, into infested hemlock stands. Preliminary results report high levels of control.

Pesticide Controls

The newly settled nymph is unprotected and exposed on the underside of new growth. Between June and October, it begins to secrete their white protective wax, and is extremely susceptible to sprays during this time. Time the treatments between late August through September because of less potential impact on beneficial insects.

1. Research in Connecticut and New Jersey has shown excellent control at this time using either insecticidal soap or horticultural oil (see Fig. 2). These products must contact the insect on the underside of the branch tips, so high spray pressure is necessary. Thorough coverage is imperative. If infested parts of the tree are missed, the infestation will likely survive and spread. Do not spray these products if temperatures exceed 90° F.

2. Commercial pesticide applicators can successfully manage Hemlock Woolly Adelgids with imidacloprid (Merit®). Merit controls Hemlock Woolly Adelgid by contact (foliar application) and ingestion (soil application). Foliar applications are made between mid-May and mid-June, and again between late-July and mid-October. Thorough coverage is necessary.

Soil applications are made by drenching or by soil injection, using a hand held (Kioritz™) injector or a power injector. Apply soil applications between late August and early December (before the soil is frozen) or from mid-March to mid-June. A 2- to 3- month lead time is required for Merit to move within a medium size plant. Soils should be moist prior to treatment and 7 to 10 days following treatment. Rates are determined by the trunk diameter of the tree (see label specifications).

Figure 2. Control of Hemlock Woolly Adelgid

Treatment	Timing	Control
1%Oil	Aug.-Sept.	100%
Insecticidal Soap	Aug.-Sept.	100%
2%Oil	late April	95.6%

(Note: research in Connecticut complements the excellent results from the Rutgers research trials.)

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