



CONTROLLING HEMLOCK WOOLLY ADELGID IN NEW HAMPSHIRE

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There are many different strategies and control options to eradicate or manage hemlock woolly adelgid (HWA). To choose the best option for you, follow this three-step process.

Step 1: Assess key components of the infestation.

- Determine the geographic extent of the outbreak. Does the infestation cross ownership boundaries? Is the infestation isolated, increasing the likelihood of successful treatment, or part of a large area with most hemlock infested?
- Evaluate the severity of the infestation. Are many of the trees infested in the area or just a few? Determine the number in the high, moderate and low vigor classes.
- Evaluate the health and vigor of the infested trees. Are they healthy enough to respond to treatment, or are they too far gone?
- Evaluate the value of infested trees to the environment, soil stability, for timber, wildlife, privacy, or as landscape trees.

Hemlock Vigor Classes	
Class	Dead Twig/Branch or Discolored Foliage
High	greater than 50%
Moderate	26 to 50%
Low	10 to 25 %
Healthy	less than 10%

Step 2: Decide on a plan. Based on the information collected in Step 1 you have several options.

1. **Do nothing.** The geographic extent may be too large and the severity too high to result in successful control. The value of hemlock may be too low to make control worthwhile.
2. **Use cultural control.** When the geographic extent is small and the value of the infested trees is low, removing the infested trees is the best option. Remove infested trees and treat the brush created. Brush could be chipped and piled, piled and covered, or simply piled and burned on-site. Chip brush before transporting and the receiving site must cover the chips or destroy them immediately.
3. **Use insecticides.** When the geographic extent is limited, access is good and value is high insecticides can be an effective option. Insecticides should only be applied by those with knowledge of the state and federal rules, pesticide applicator equipment, and an understanding of the best life stage to treat the insect. Proper safety equipment is needed and all instructions on the pesticide label must be followed.

Foliar sprays are effective when infested trees are short, the volume of foliage is small, and foliage is accessible from all directions. The safest and least toxic foliar sprays are insecticidal soaps and horticultural oils. These products coat the insect and prevent breathing. Treat with oil sprays throughout the growing season, carefully following the timing suggested on the product label to prevent damage to foliage during hot summer months. Other foliar sprays which are effective but more toxic to non-target and beneficial insects are products with bifenthrin, or permethrin.

Systemic pesticides are applied so the active ingredient is absorbed into the tree—the woolly adelgid then feeds on treated tissue. Systemic pesticides generally take several months to take effect but last in the tree for several years, providing control. Soil injections, soil drench, stem injections or basal bark sprays are all methods used to apply systemic pesticides. The two most effective ingredients are imidacloprid and dinotefuran. Imidacloprid products act slower but last longer and products with dinotefuran act fast but don't last as long.

- Soil injections require specialized equipment but deliver pesticide directly to the root system and leave no pesticide exposed to the ground surface.
 - Soil drenches are easy to apply. You mix the product in water and pour the mixture over the ground. There is a higher risk of pesticide exposure and runoff with this method.
 - Stem injections need highly specialized injection equipment and damage to the tree's cambium at the injection site is common. Uptake by the tree can be quick and there is low environmental exposure to runoff or drift.
 - Basal sprays—spraying the bark from the root flare to 5 feet all the way around the tree—may be the best compromise of all the systemic pesticide application options. Pesticide products labeled for basal application can be put into most sprayers and applied, with little or no exposure to ground water if applied with the proper pressure and nozzle shape.
4. **Use a combination of cultural treatment and pesticide application.** When HWA is found in state parks, private campgrounds and other large geographic areas an unreasonable amount of insecticide would be needed to control the whole outbreak. You also won't want to cut all the trees or leave the infestation to expand because these hemlocks are valuable for aesthetics, privacy, wildlife, water quality, and much more. These sites may require a variety of control measures. Any hemlock in poor health and unlikely to absorb systemic pesticides should be cut and destroyed. Likewise all heavily infested trees, attracting higher populations of HWA compared to neighboring trees, should be removed. When that work is complete a pesticide application of a systemic insecticide can be applied to a buffer area around the core infestation area to treat those valuable trees left behind.
5. **Biological Control.** Predator beetles for control of HWA aren't available commercially. However, the NH Division of Forests and Lands is looking for suitable sites to release predator beetles. They need heavily infested stands that will not be harvested or converted to housing. If you know of a site contact the forest health office at 464-3016.

STEP 3: Post treatment follow-up. Evaluate the effectiveness of control activities before doing further treatments or activities, especially when pesticides were applied. The white cottony mass (flocculence) may persist on a twig for over a year with no live adelgid inside. Examine samples under a microscope or high-powered hand lens to see if the insect is dead or alive.

The N.H. Division of Forests and Lands, forest health program takes an active role in all types of control and assessment of hemlock woolly adelgid throughout the state. For technical assistance with your infestation contact Kyle Lombard at 464-3016 or kyle.lombard@dred.state.nh.us.

For additional information about hemlock woolly adelgid and other insects and diseases of trees and forests, visit www.nhbugs.org. For assistance about tree care and woodlot management, contact your County Extension Forester (see www.nhwoods.org for a list).

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