

RECOMMENDATIONS FOR HEMLOCK WOOLLY ADELGID CONTROL

IN THE LANDSCAPE

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STEP 1: EVALUATE TREES. It may not be possible to save every hemlock. Some may have been growing poorly before being infested with hemlock woolly adelgid (HWA). These trees may be very old or may be growing off-site, and therefore may not be worth trying to save. In some cases, not all hemlocks may be saved because it would be too expensive to do so. Insecticide treatments will need to be applied every few years. Consider the cost! But also consider the cost of removing dead trees that are near homes and other structures. Treat the hemlocks that are the healthiest, most vital to the landscape, easiest to reach with a sprayer, and furthest from sources of water. Removing trees that will not be treated will eliminate a nearby source of the insect to reinfest treated trees, though if you are near natural stands of infested hemlocks or neighbors with infested and untreated trees, this may not make a difference.

If trees do not have any HWA on them at all, they do not need treating. However, if the infestation is very light, or if adjacent trees are infested, it is best to start making insecticide applications to keep the tree from going into decline. If the tree is severely defoliated, soil or trunk injections with an insecticide will probably not work well. Spraying lower branches will give the tree the best chance at recovery. Treating HWA aggressively while the tree is still in good health is the best way to maintain a healthy tree.

STEP 2: DECIDE INSECTICIDE TREATMENT. The use of any insecticide can have unwanted consequences to the environment. Be sure to follow all label directions. Do not apply pesticides through sprays or soil injections near surface water such as streams or ponds. Do not exceed labeled rates of products. Applying a higher rate than what is labeled will not increase control. The following are the current recommendations of insecticide applications.

- **INSECTICIDAL SOAP/HORTICULTURAL OIL.** The safest insecticides for controlling HWA are foliar sprays with either horticultural oil or insecticidal soap. These products are not toxic, but kill the insect by smothering it as the spray dries on the pest, making them safe to use around the home. Even if the entire tree is too tall for complete coverage, spraying as much of the tree as can be treated will help at least part of the tree recover. Make these treatments in the fall from August until it gets too cold to spray. These treatments are timed when eggs are not present as this stage is not readily killed by the smothering action of these insecticides. Also, during the growing season, these products may burn foliage. Only spray trees if the material will not drift into open water such as streams or ponds or onto adjacent property. Both of these products are used at a 1-2% solution with the higher rate giving better control. (2% solution = 2.6 ounces of spray material per gallon of water). Once these materials dry, they will no longer control HWA. Therefore there is no residual control. Trees will probably need to be treated yearly. Treating other times of year will result in poorer control and may result in foliage burn. Be sure that the oils especially stay well mixed with the water during application.
- **OTHER INSECTICIDES SPRAYED ON THE TREE FOLIAGE.** Other insecticides labeled for use in the landscape will last on the foliage to continue killing the insects once the spray has dried. Therefore timing of spray applications is not as critical as they should last long enough on the tree to kill the crawler that hatches from the egg. However, these materials are more toxic and should be used with care near homes. Materials include Merit (imidacloprid), Talstar (bifenthrin), Onyx (also a bifenthrin product), Astro (permethrin) and DeltaGuard T&O 5 SC (deltamethrin). Of these, Talstar (bifenthrin) has been the most widely used, providing excellent control any time through the growing season. Control from spraying Talstar has given two and sometimes three years of control. Again, do not spray trees if the material will drift into open water or other property. Spraying any of these materials may result in increased spider mite and hemlock rust mite occurrence.
- **SOIL DRENCHES/SOIL INJECTIONS/BARK SPRAYS.** In large trees that cannot be completely sprayed, consider soil drenches or soil injections. In this case, the tree roots take up the product and move it into the foliage where the insect is killed. Soil drenches should be applied when there is adequate soil moisture in either the spring or fall so that the tree will take up the product. Do not use in areas near streams or ponds or where the soil is too rocky. The rates of these products are based on the size of the tree trunk or height in the case of a hedge. Most soil drenches are made with an imidacloprid product including Merit 75 WP, Malice 75 WSP, Zenith 75 WSP. Any of these can be purchased by the homeowner where pesticides are sold. Bayer Advance Garden Tree and Shrub Insect Control, an imidacloprid product for homeowners, is more readily available and can be purchased from home improvement stores. There are other imidacloprid products coming on the market. Any may be used as long as they have a landscape label. Imidacloprid products used thus far have all had 75% active ingredient. Another similar product with slightly faster uptake by the tree is Safari 20 SG (dinotefuran). This may be used as soil drench or bark spray.

- Homeowners (**READ the LABEL!**) can use soil drenches by the following steps:
 - With Bayer's Advance Garden Tree and Shrub Insect Control: measure at chest level the total amount of inches in circumference around the tree. If you use Merit, Malice, Zenith, or Safari D measure at chest level the number of inches of tree circumference and divide by 3 to get the diameter.
 - Bayer's Tree and Shrub Insect Control will treat ~ 32 inches of trunk circumference (equals ~ 10 inch diameter tree) cumulatively.
 - One ounce of either Merit, Malice or Zenith will treat 15 inches of trunk diameter at the high rate or 30 inches at the low rate. If your trees are highly infested with HWA, use the high rate, otherwise consider using the lower rate. This can be then be mixed in any amount of water to pour around the tree.
 - Safari 20 SG can be used at 1.0 to 4.2 ounces of product per 10 inches trunk diameter. This can be mixed in any amount of water to pour around the tree. It is also labeled for trunk spray on the lower 4-5 feet of the trunk.
 - Choose one of the following methods - dig a trench around the circumference of your tree ~ 1 foot away from the trunk or with a metal rod (rebar) or garden trowel make holes in the ground 3 inch to 6 inch deep and 6 to 12 inches apart in a circular pattern about 1 foot away from the trunk of the tree. Apply product in trench or holes with the correct rate.
- TRUNK INJECTIONS. In large trees that are near surface water or where the soil is too rocky for soil injections or drenches, use trunk injections of imidacloprid. With this method, the chemical is put directly into the tree and then taken up into the foliage. It is best to hire a commercial pesticide applicator who has had experience controlling HWA for these treatments. Again these applications are made preferably in the fall or spring when there is adequate soil moisture for the tree to take up the product.

Note about foliar spraying: A homeowner may be able to spray trees eight foot or smaller with backpack or some other type of hand held sprayer. To get complete coverage, spray until you observe droplets running off. Make it a point to spray on the underneath side of the limbs as well as on top. Every branch must have thorough coverage to get control. Larger trees require a high pressure sprayer and may require hiring a commercial pesticide applicator.

Note about soil and trunk injections: For soil or trunk injections to work, the trees must be healthy enough to move the product from the roots or trunk up into the foliage. If trees are already in a state of decline due to HWA, spray as much of the tree as possible to kill as much of the pest as possible with either horticultural oil or insecticidal soap so that the tree can take up the imidacloprid. Even if the products are working properly, the soil and trunk injections of imidacloprid products may take a year or longer to show control. Do not expect instant results.

Note on commercial pesticide applicators: Anyone that you pay to apply a pesticide to your property, even if it is only horticultural oil or Roundup, requires a commercial pesticide applicators license from the North Carolina Department of Agriculture and Consumer Services. You can search on-line to determine if a person is properly licensed by typing in their name at:
<http://www.ncagr.com/aspzine/Fooddrug/data/search.asp>

STEP 3: DETERMINING CONTROL. It is not always easy to know if HWA has been successfully controlled. The white spots may still be on the foliage following pesticide treatments. Soil and trunk injections can take several months to be effective. In many cases, it takes examination of the insect under magnification to see if it is dead. The best way to learn if the trees are recovering is to wait until the next flush of hemlock growth to determine if growth has improved. Contact your County Extension Agent to help in determining control. Many commercial pesticide applicators provide monitoring as a service to determine how well controls are working and any need for follow-up treatments.

STEP 4: PLANNING FOLLOW-UP TREATMENTS. Any of these treatments can last anywhere from 1-5 years depending on their success and the proximity to untreated, infested hemlocks. Success of treatments is usually a function of the initial health of the tree and the amount of soil moisture when treatments were made. Keep monitoring the new growth of hemlocks to find the small, pepper-like nymphs or white, waxy wool of the adults. Retreatment is necessary when more adelgids are commonly found on many of the branches.

STRATEGIES FOR LARGE TRACTS OF HEMLOCKS: In wooded areas with many hemlocks, it is not possible to save every tree. If you want to treat with a soil drench, determine your budget for materials and market trees that are most important to the landscape, or important seed trees. Measure and mark trees to be treated. Small understory trees can be sprayed with oil in the fall.

The predatory beetle, *Sasajiscymnus tsugae*, is commercially available from a small rearing lab in western North Carolina. Success of beetles is still being researched and has varied greatly. Released beetles can fly and may leave your property. But some landowners are interested in releasing these beetles in large tracts of land as biological control is the one hope of saving these trees. Currently the rearing lab will only sell no less than 1,000 beetles. These are sent on infested hemlock branchlets that are then attached to branches of the hemlock trees. Releases have worked best where trees are evenly infested but have not started to decline in health. Releases are made in the spring when adelgid eggs are plentiful. This will vary with region and elevation. If interested in releasing beetles, call your County Extension Agent. Beetles will not save individual trees, nor are they appropriate for trees in the home landscape. To save individual trees, use an insecticide.

For more information on HWA:

US Forest Service HWA web site at: <http://www.na.fs.fed.us/fhp/hwa/>

Save Our Hemlocks web site at: <http://www.saveourhemlocks.org/>

The Partnership for Saving Threatened Forests: <http://www.threatenedforests.com/>

Sasajiscymnus rearing lab, Conservation Concepts, LLC: <http://www.conservationconcepts.org/>

For more information on trunk injection systems:

Arborjet systems: <http://arborjet.com/>

Arborsystems: <http://www.arborsystems.com/>

Mauget micro-injections: <http://www.mauget.com/home.html>

For more information on imidacloprid, see: <http://npic.orst.edu/factsheets/imidacloprid.pdf>

Recommendations for the use of chemicals are included in this publication as a convenience to the reader. The use of brand names and any mention of commercial products or services in this publication does not imply endorsement by the North Carolina Cooperative Extension Service nor discrimination against similar products or services not mentioned. Individuals who use chemicals are responsible for ensuring that the intended use complies with current regulations and conforms to the product label. Be sure to obtain current information about usage and examine a current product label before applying any chemical. For assistance, contact an agent of the North Carolina Cooperative Extension Service in your county.

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