



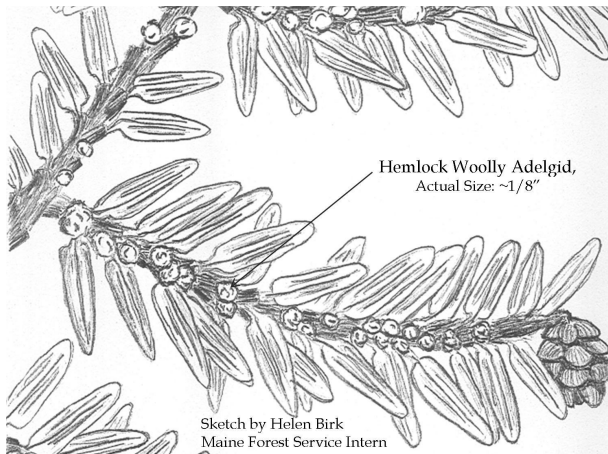
HEMLOCK WOOLLY ADELGID

Adelges tsugae (Annand)

Insect and Disease Laboratory • 168 State House Station • 50 Hospital Street • Augusta, Maine • 04333-0168

The hemlock woolly adelgid (HWA) is a small aphid-like insect that feeds on hemlock (*Tsuga* spp.). This insect was introduced from Japan to Virginia in the early 1950's and has since spread north to Maine and south to Georgia. Known populations in Maine are confined to coastal regions of the state and are scattered. ***If you think you have found HWA please report it to our office to help us target survey and biological and chemical control.***

Hemlocks growing in landscapes can be managed through an integrated approach including monitoring for HWA, cultural practices to enhance tree vigor and limit pest invasion, mechanical and chemical measures to reduce HWA populations and support tree health, and support of natural enemies. Control measures for forest trees are limited, but detection in the forests is important to help limit spread and increase management opportunities.



Description: This insect can be recognized by the presence of a dry, white woolly substance on the young twigs of hemlock. This "wool" can generally be found year round, but it is most abundant and conspicuous in the spring when egg masses are present. The wool covers the insect in all but its earliest life stages. As they feed their woolly covering expands—the "wool" is a waxy material that comes out of pores on the insect's body. It resembles the tip of a cotton swab, but is up to 1/8th inch diameter on average when the insect is mature.

Injury occurs as a result of the insects sucking sap and probably injecting toxic saliva while feeding. Damage from accumulated injuries causes the needles on infested branches to dry, turn a grayish-green color, and then drop from the tree. Buds are also killed, so little new growth is produced on infested branches. Dieback of major limbs progresses from the bottom of the tree upwards, even though the infestation may be found throughout the tree. Trees weakened by HWA often succumb to diseases and wood-boring insects and are readily broken and thrown by wind.

Life Cycle: Hemlock woolly adelgid in our region completes two overlapping generations a year. A general timeline follows. During March and April, adults of the overwintering generation each lay up to 300 eggs within their woolly covering. Crawlers hatch from April through May, and then settle on the twigs near the bases of the needles where they insert their piercing and sucking mouthparts. There they feed throughout their development. This spring generation matures by the middle of June, and deposit an average of 75 eggs each. The crawlers hatch in early July and settle on the new growth. They are generally settled and dormant by the beginning of August. In mid-October feeding resumes and the characteristic woolly covering begins to develop. Nymphs feed during the winter and mature by spring.

Spread: Even though it spends most of its life firmly attached to hemlock twigs HWA has been spreading relatively rapidly in North America. ***Eggs and crawlers, the only stages that are unattached, are present from March through July when they are readily dispersed by wind, birds, deer and other mammals, including people.*** Moving infested plants any time of the year can result in spread of this pest.

Quarantine: *This insect is subject to a State Quarantine. Movement of hemlock material from quarantined areas is restricted.* Details are available on-line: www.maine.gov/doc/mfs/idmquar.htm#hwa, or by calling (207) 287-2431.

Monitoring: It is important to detect HWA infestations early to maximize management options. Visual inspections of the undersides of branches are the best way to tell if a hemlock is infested. Because of the HWA lifecycle, hemlocks should be inspected twice a year—at the beginning and end of Daylight Savings Time. The insects will have little wool in November, but should stand out against the dark green foliage of the hemlock. By March the wool will be well developed. This may seem practical only for ornamental trees, but a simple sampling system is available for forests.

(cont'd)

Cultural Control: A number of cultural practices may reduce the risk of hemlocks becoming infested by HWA. They all work by reducing the risk of exposure to eggs and crawlers of HWA and should be practiced from March through July. Because birds, squirrels and deer are important dispersal agents, any effort to discourage these animals from visiting hemlocks—such as removing bird feeders in the spring and summer—will reduce the risk of those trees becoming infested. Care should also be taken when moving **any** material from infested areas onto uninfested property. Clean vehicles, clothing, etc., after visiting forests, recreational areas, parks or other properties with infested hemlocks.

Plan any hemlock cutting in and around infested areas for August through February to limit risk of spreading this insect. Prune hemlock branches, both infested and uninfested, likely to come in contact with carriers of HWA such as hikers, campers or delivery trucks. **Never** move live hemlock from infested areas.

Maintaining good growing conditions can play an important role in the survival of hemlock. Because hemlock is often shallow rooted, it is particularly prone to stress in dry periods. Therefore, during periods of drought, important ornamental hemlocks should be watered to ensure that they receive 1 inch of water per week (including rainfall) over the area beneath the dripline of the crown. Apply water slowly to allow uptake by the tree. Pruning and reducing crowding of target trees may encourage new shoot growth and help support vigor. Although fertilizer may improve the growth and vigor of uninfested trees, the added nitrogen also enhances adelgid survival and reproduction—*do not fertilize hemlocks in or near adelgid infested areas*.

Mechanical Control: Clipping heavily-infested twigs from branches will reduce adelgid populations. However, extensive clipping may harm appearance and health of the tree. Eggs and crawlers of HWA are often dislodged from hemlock twigs by wind and rain. Most are unable to find their way back onto a host and die. Therefore, directing a strong stream of water at infested branches periodically during April through July may help reduce HWA populations.

Infestations of HWA often start on large hemlocks that intercept the prevailing wind or that are especially attractive to birds and other wildlife. When such a tree becomes heavily infested, it can serve as an effective "launch pad" for adelgid eggs and crawlers. Selective removal of these heavily infested reservoir trees in the fall or winter may reduce local and long distance spread of the pest.

Biological Control: A number of insects feed on the HWA in eastern North America, but overall they have not been able to keep up with adelgid reproduction. Several predator beetles that specialize in adelgid have been introduced in the northeast in the hope that natural controls can be established in the forest. These insects undergo rigorous screening before approval for release. They are not generally recommended for use on ornamental trees because of the time needed for their control to be realized, incompatibility with insecticides, high cost and tendency to disperse. A permit from the Department of Inland Fisheries and Wildlife is necessary before release of these and other animals in Maine.

Chemical Control: Chemical control is an important part of managing the health of HWA infested ornamental hemlocks. Other control measures can reduce adelgid numbers on hemlock, but infested trees usually decline rapidly in the absence of chemical control. It is important to understand that periodic treatments will be necessary over the life of the infested tree to maintain its health and value as an ornamental. The initial decision of whether to use chemicals should weigh the value of the trees relative to the anticipated cost of long term treatments. Consider identifying individual trees or groups of trees that have special value or significance on the property and concentrating control efforts on those trees.

Several pesticides are registered for control of HWA. Some are available for homeowner use, while others are available for commercial use only by a licensed pesticide applicator. An effective method for controlling HWA on ornamentals is to thoroughly drench infested trees with horticultural oil or insecticidal soap. Thorough coverage is necessary for control. This treatment may be needed one or two times a year to protect foliage quality; it has a low impact on beneficial insects.

Systemic insecticides with the active ingredient imidacloprid (eg. Merit 75 WSP, Xytect 75 WSP) can be applied as a soil drench or soil injection. Research from the Connecticut Agricultural Experiment Station demonstrates that the lowest labeled rate is effective on trees up to two feet in diameter at breast height; larger trees require the higher labeled rates. For trees under three feet in diameter, a single application can keep the pest below significantly damaging levels for more than four years. The active ingredient is harmful to a broad array of invertebrates; special care should be taken near water.

Caution : For your own protection and that of the environment, apply the pesticide only in strict accordance with label directions and precautions.

Adapted from University of Rhode Island GreenShare Fact Sheet: Hemlock Woolly Adelgid. www.uri.edu/ce/factsheets/sheets/hemadelgid.html.