Hemlock Woolly Adelgid (HWA) Frequently Asked Questions

What is this insect?
The hemlock woolly adelgid (HWA) (*Adelges tsugae* Annand) is a tiny insect that is closely related to the aphids. It has a piercing-sucking mouth type and feeds on plant sap. It is found on the twigs at the base of the needles on the host plant. As an immature, it is only about a millimeter in size, flat, oval, black in color with a fine ring of white wax around its perimeter. It is a problem with our native Eastern (Canada) hemlock (*Tsuga canadensis*) and the ornamental Carolina hemlock (*Tsuga caroliniana*).

Is this a serious problem?
The feeding activity of this insect injures the host plant by withdrawing plant sap. In addition, it is believed that the adelgid introduces a toxin into the plant that eventually damages the vascular system, thus incurring plant death. Hemlocks that are suffering from previous stresses, such as drought, may succumb to this damage in 3-5 years. Hemlocks that are healthy prior to attack, and which are on good growing sites, may tolerate the adelgids' presence for 7-10 years before showing visible signs of decline. Once found on a hemlock, they should be treated.

What is the life cycle of the HWA?
The HWA is different than most of the insects found in the Northeast in that it is dormant through much of the growing season and **active throughout much of the winter**. The HWA settles onto the twigs as immatures (crawlers) by mid-July and becomes dormant; they neither feed nor develop during this period. The immatures remain dormant until mid-October when they come out of dormancy and resume feeding. They continue feeding and developing until approximately early March when, as adults, they begin to produce eggs. This is when most people become aware of their presence. The eggs are surrounded by ribbons of a white, waxy material that appears as small cotton balls lined up at the base of the needles. These eggs will hatch and a new generation will begin feeding. These mature in late May - early June and then another batch of eggs is produced. These immatures feed until mid-July and then become dormant. All HWA are females and the vast majority of these are wingless. A very small percentage develop wings and fly away to seek a spruce host. However, there are apparently no appropriate spruce species in this country that support this adelgid and this limited migration of the HWA becomes a dead end for them. Given the cold-tolerant nature of this pest, the HWA has the potential to move throughout the native range of eastern hemlock in all of New England.

How does the HWA get from one tree to another or one geographic region to another if it doesn't fly?
The adelgid is mostly moved by wind, birds, and mammals, including humans. In fact, it is often moved over long distances on nursery plants that are shipped from areas of infestation to uninfested areas. Migrating birds that roost in infested trees can pick up the eggs in their feathers and then move them to a new area. The HWA originally came into southern New England from more southern states on the winds of a hurricane in the mid-1980's.

Can this pest be moved on tree-care equipment like chain saws and chippers or in bark mulch?
It is possible to move this pest on equipment. However, the time of year is important. The eggs are most likely the easiest to move from the original host to a new un-infested tree. Research in this area indicates that once nymphs are settled and feeding on a hemlock, moving them to a new host is difficult. Given that bark mulch is made from the bark of the trunk and major branches, there should be limited or no adelgids present in those areas. However, it is not impossible. Bark mulch should not be used as soon as it is made, for a variety of reasons other than the HWA. If six months has passed from the time of manufacture, and the pile has been turned during this period, then very limited movement of the adelgid would be expected onto another host. Also, the mulch is at the base of the plant and this tiny insect would find it a difficult journey to get up onto the twigs in order to feed. It is important to note that New Hampshire, Maine and Vermont do have specific quarantine restrictions on all hemlock material, including live plants, that originates from areas of known infestations of this insect.

Are there any hemlock species that are resistant to this pest?
Yes. The mountain hemlock (*Tsuga mertensiana*) and the western hemlock (*Tsuga heterophylla*) are both native plants in this country and are highly resistant to HWA. However, when these plants are under previous stress, they can succumb to this pest. The unfortunate note is that neither of these plants grows very well outside of their native range of the Pacific Northwest in the Cascade Range. A few Asian species of hemlock are being looked at that are also resistant and these may have future potential for New England.

What is this new ladybug predator of the HWA and where can I get some?
There are a few ladybug beetles that are being researched for their potential in controlling the HWA. The most common one at this time is *Pseudoscymnus tsugae*. It is about the size of a poppy seed and is all black in color. Currently it is not available to the general public. The cost of producing these for research purposes has been as high as one dollar per beetle and many thousands of beetles may be needed per tree. Other similar species are also being examined.

Are my hemlocks doomed? What should I do?
This insect is manageable in the landscape and nursery if found early and treated. Forest trees pose a different challenge and thus are almost impossible to treat effectively or economically. Many of those may be lost in time. The best overall strategy is to be aware of its signs and to monitor for it on a regular basis. Once found, there are a couple of options.

- Horticultural oil sprays work extremely well when and where they can be properly utilized. It is important to thoroughly apply the oil throughout the tree. Homeowners can treat their own hemlock shrubs and hedges with this product. Large trees will need to be sprayed by a professional arborist with the proper spray application equipment. A dormant oil spray can be applied while the plant is dormant and the correct weather conditions prevail, generally late March into April. Dormant oils must be applied before the buds open and when there will not be freezing temperatures for 24 - 48 hours after application in order to reduce injury to the plants. Do not spray on cold days. Temperatures of at least 45 degrees F. are recommended. However, avoid overcast or wet days which greatly slows the drying time of the oil.

• Horticultural oils can also be applied at the "summer" rate during much of the growing season. Again, avoid cool, overcast days or hot and humid days. Oil sprays are used for established populations of the HWA but offer no preventative benefits if the adelgid isn't present. Hemlocks infested with the HWA should be treated with oil sprays both at the beginning of the growing season and then once again towards the end of summer to insure proper control. Smaller hemlocks (shrubs) may only require one application. Once under control, continue to monitor for future re-infestations and then treat once found.

• Imidacloprid (e.g. Merit*) is also effective against the HWA. It works best as a systemically applied pesticide either through the soil or by injection into the trunk. For soil application, there is a homeowner version of this product or it may be applied by a professional. When soil applied, it may require 8-12 weeks before the insecticide is up in the tree and coming into contact with the adelgid. When trunk injected (by a professional) the translocation time may only be 3-5 weeks. However, more than one application may be needed in a growing season. If a tree has been infested for several years, imidacloprid may not work well since the host's vascular system may have been greatly compromised and the product won't move through the tree to where it is needed. Some general use chemical pesticides are also listed for the HWA and can be applied as a foliar spray. However, many of these will not be effective against the egg stage, while horticultural oil kills all life stages of the HWA, including the eggs.

What's the best strategy for dealing with the HWA? Should I just cut all my hemlocks down now and plant something else?

The best strategy is to be acutely aware of this pest, its signs and damage, and to monitor for it regularly. Once found, it needs to be treated. The HWA is very manageable but hemlocks need to be thought of as high maintenance plants in those areas where the adelgid already exists. The worst thing to do is to not deal with it when it arrives. Such populations will only lead to the demise of the tree and act as a reservoir for the pest for your neighbor's trees. Also, hemlock tends to be a rather shallow-rooted tree and prone to drought stress which can exacerbate the problem with HWA. Be sure to water hemlocks deeply (1 inch of water once a week) during times of high temperatures and limited rainfall.

Should I feed my trees with fertilizer to make them stronger in combating the HWA?

By adding fertilizer to the soil around plants, one is not "feeding" the tree. This is a common misunderstanding. Fertilizers offer the tree additional tools to enhance the natural production of their own food. In most cases, the occasional application of small amounts of fertilizer to trees can result in a more vigorously growing tree. However, it is extremely important to note that the addition of nitrogen (N) to hemlocks that are infested with the HWA only leads to a quicker demise of those plants. Insects seek certain building blocks of life from nature in their food sources. In the case of HWA, a tree that is very succulent and high in these particular building blocks offers to greatly enhance the success of the resident populations of HWA on such trees. Research strongly shows that hemlocks that are infested with HWA should **NOT** be fertilized with nitrogen.

Robert D. Childs and Deborah Swanson
UMass Extension - Landscape, Nursery and Urban Forestry - 5/2002