Hemlock Woolly Adelgid (HWA)

Treatment Decision Key

Criteria suitable for Imidacloprid products

Hemlock woolly adelgid (HWA) is an aphid-like insect (aphids suck fluid from plants) that attacks and kills hemlock trees by feeding on nutrient and water storage cells at the base of needles.

START

Is HWA present?

Check underside of branch tips that are within reach, and fallen branch tips on ground for white woolly balls. (HWA egg sacs)

Photo © Jonathan Carpenter

YES → Old growth or older, larger Hemlocks

NO → Old growth or older, larger Hemlocks present?

- **NO** → **Continue to Monitor for HWA**
  Assess trees late winter-spring. Look for white wool, canopy thinning, new growth. Record canopy density score.
- **YES** → Is HWA nearby?
  - **YES** → **Treat Tree**
    Old growth should be treated early even before HWA arrives. Old trees may require 1 yr before imidacloprid reaches canopy.
  - **NO** → **Do not Treat**
    If tree cannot produce new growth it may not recover following treatment.

Old growth or older, larger Hemlocks

- **NO** → Tree has new growth tips? (check tree tops)
  - **NO** → **Do not Treat**
    If tree cannot produce new growth it may not recover following treatment.
  - **YES** → **Treat with Caution**
    If canopy is thin and new growth tips are mainly absent, tree may not recover. *Consider faster acting chemicals. Canopy density should not drop below 55 %, but younger trees can be more resilient, especially when new growth shoots are present, and may recover.
- **YES** → Canopy density 65% or more? (See canopy density chart)
  - **NO** → **Treat with Caution**
    If canopy is thin and new growth tips are mainly absent, tree may not recover. *Consider faster acting chemicals. Canopy density should not drop below 55 %, but younger trees can be more resilient, especially when new growth shoots are present, and may recover.
  - **YES** → **Treat Tree**
    Greater than 65 % canopy density and presence of new needle growth are key indicators of good health. Old growth should be treated early, even before HWA arrives.

New Growth: Full set of needles

Old Needles on Tips May be sparse/tattered

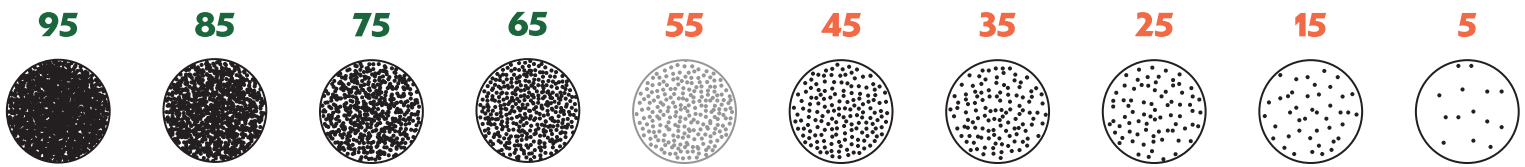
Photo Credit: S. McCoy, Hayfield III, and Salim (2019)

New Growth Tips:

Presence of lime green, tender branch tips in June-early July. Examine fallen tips after storms. New shoots may persist in treetops in heavily declined trees (use binoculars). After mid-July, new needles are same color as older needles, but often in better condition, fuller, on fine texture twigs (not 'stubby' tipped twigs).

Canopy Density Chart

Stand under canopy at arm's length from tree trunk. Look straight up through the canopy. Choose which circle best reflects the canopy density you see. Assess from 2 sides of tree.



Old Growth Hemlock is Irreplaceable.

Tree Treatment Facts

- Treatments are safely conducted using small amounts inside the tree sapwood.
- Treatment using imidacloprid-based products can be administered via basal bark or tree injection.
- The active product ingredient, imidacloprid, is the same used in some tick-flee medications.
- Treatment are not lethal to birds, mammals, or amphibians.
- Treatments incur little or no environmental exposure.
- Treatments using imidacloprid products can last ~ 4-7 years. (faster-acting products are of shorter duration, generally not more than 2 years.)
- Old growth should be treated early if HWA is already nearby.
- Products approved for use in Canada are safe when used according to product labels.
- Biocontrol agents are expected to control HWA in the long-term, but chemical treatment is essential in the interim or trees will die before they can benefit from biocontrols.

Cost Considerations

- Costs of Hemlock removal near buildings, powerlines or other infrastructure may exceed treatment costs
- Hemlocks on stream banks protect bank erosion and road and bridge infrastructures from increased storm runoff. Dead trees falling into waterways can cause culvert blockages and flood homes downstream.
- Treatment costs have declined, with more and cheaper chemicals having been authorized for use. (E.g., Imidacloprid-based basal bark spray is cheap to purchase and fast to apply.)
- You may reduce treatment costs by obtaining your pesticide certification, treating your own trees. Pool resources by sharing equipment purchase costs (e.g., injection gear) with neighbouring landowners.

LOW
1-4 Egg Sacs

MEDIUM
5-20 egg sacs

HIGH
> 20 egg sacs

Photo Credit: S. Salim, Virginia Tech

HWA Infestation Levels

Check undersides of branch tips for HWA levels, examining several branches on opposite sides of the tree. Moderate to high HWA populations on branches will damage hemlock and rapidly impede the tree from producing new shoots. Treatment uptake is eventually impeded.

Low HWA populations on trees with new growth can be effectively treated with imidacloprid products, which move slowly through the tree, and last a long time.

High HWA Populations use faster-acting products containing dinotefuran or azadirachtin (e.g., Starkle™ and TreeAzin™, respectively) move quickly through the tree to provide rapid knockdown of high HWA populations, particularly useful on trees with heavy decline. Follow-up with longer-lasting imidacloprid products is required for sustained protection.

Photo Credit:: Donna Cross land

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Extra Considerations for Treatment

High Value Trees

Hemlocks may live 3 to 5 centuries. Trunks occasionally exceed 1 m in diameter. Old growth hemlock is irreplaceable and often holds spiritual value. A mature, closed canopy, or old growth hemlock forest will be very rare, almost nonexistent in future due to HWA. Conserving hemlocks through chemical treatments enables them to benefit from biocontrol agents and saves them from permanent loss. Hemlocks that line stream banks are of high value to both forest and stream, their dense canopies shading, cooling and sheltering many species: trout, salmon, marten, fisher, moose, deer and birds.

Branch Dieback

HWA infestation severity can be gauged by amount of fine branch tip dieback where needles have recently dropped. *Note: Healthy hemlock commonly feature broken and jagged coarse lower branches, a normal growth habit.

Canopy Density

Criteria are still being refined for precisely when trees are healthy enough to use only imidacloprid-based products. Generally, trees with a canopy density of 65 % or greater (& still producing new growth) can recover using only imidacloprid. Trees with lower canopy densities (~45-64 %), featuring some new growth, may benefit from fast-acting products. *Recovery is slow, not evident until 2+ years following treatment as small, new, green tips.

Percent Live Crown Ratio (LCR)

The Live Crown Ratio is the percent of total tree height that supports live branching. A tree with a healthy crown larger than 30% of total height is likely to be more responsive to treatment. Choosing trees with a large LCR likely results in higher treatment success. Choosing trees with a large LCR likely results in higher treatment success.

Why monitor your hemlocks for HWA 1-2 times annually?

HWA can spread quickly by birds, people, pets, wind, etc. Infestations in the upper canopy may go undetected. Canopy decline (needle drop) may be sudden and go unnoticed. Watch for changes in canopy density and amounts of new shoots produced. Record notes. Take photos.

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