

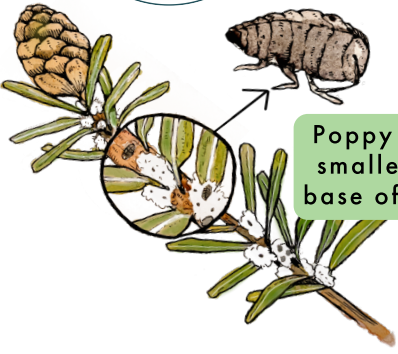


Hemlock Woolly Adelgid (HWA) Treatment Decision Key for Imidacloprid Use Only

START

Is HWA present?

Poppy seed or smaller at the base of needles



HWA egg sacs and new shoots present

Check undersides of branch tips that are within reach and fallen branch tips on ground for white woolly balls

YES

NO

Canopy density 65% or more? (see reverse for canopy density protocol)

Old growth or older, larger hemlocks present?

NO

YES

YES

NO

Old growth hemlock?

Young or mature hemlock?

Tree has new growth tips?

Check tree tops

Is HWA nearby?

NO

CONTINUE TO MONITOR FOR HWA: Assess trees in late winter-early spring. Look for new growth & check canopy density.

TREAT WITH CAUTION: Old trees conduct treatment slowly. If canopy is thin and new growth tips are mainly absent hemlock may not recover.

Tree has new growth tips?

NO

YES

NO

YES

TREAT TREE: Greater than 65% canopy density and presence of new growth are key indicators of tree health. Old growth should be treated early, even before HWA arrives.

DO NOT TREAT: If tree cannot produce new growth it may not recover following treatment.

TREAT WITH CAUTION: Canopy density should not drop below 55%. Younger trees can be more resilient, especially when new growth shoots are present, and may recover.

New Growth Tips: Presence of bright, lime green, tender branch tips, most visible late May-early July. New shoots may persist in tree tops (use binoculars to assist). Check on the ground for canopy samples. After July, all needles are the same colour, new are in better condition (more full) with fine texture twigs.

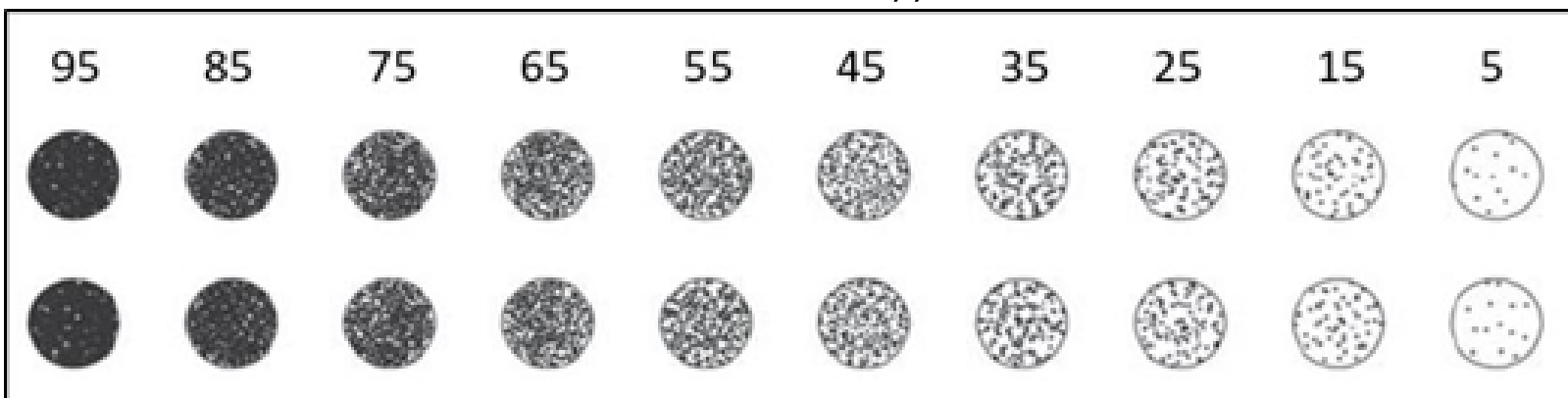


OLD TIPS = DARKER & SPARSER

NEW GROWTH TIP

NEW GROWTH TIP

CANOPY DENSITY SCORE: Assess by standing at arm's length from tree & looking straight up through the canopy. Choose which best reflects the density you see.



1. TREE TREATMENT FACTS

1. Treatment using imidacloprid chemical is safely conducted inside tree sap wood.
2. There is little or no environmental exposure. Chemical amounts are small.
3. Treatments can last ~ 4-6 years.
4. Old growth should be treated early, even before HWA arrives.
5. The active product ingredient is the same used in some tick-flee medications.
6. The treatment is not toxic to birds or mammals.
7. Biocontrol agents are expected to control HWA in the long-term, but chemical treatment is presently essential or tree will die, likely within 3-5 years of infestation.

3. HWA INFESTATION LEVEL

Low Moderate High



1-4 sacs

5-20 sacs

>20 sacs

Why monitor your hemlocks for HWA 1-2 times annually?
 HWA can spread quickly by birds, people and pets. 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.

Cost Considerations:
 - Costs of Hemlock removal near buildings and powerlines may exceed treatment costs.
 - Hemlocks on stream banks protect bank erosion, road and bridge infrastructure from increased storm runoff events. Dead trees falling into waterways can cause blockages at culverts and flooding to homes downstream. Costs to repair infrastructure may exceed treatment costs.
 - Supports for landowners are in place in some US states where HWA is present (e.g. tree injection kit rentals)

2. EXTRA CONSIDERATION FOR TREATMENT

High Value Trees:

Old growth hemlock is irreplaceable. If there is old growth hemlock on your land, you own something very rare that will be almost nonexistent in future unless you treat it.
 HWA causes permanent loss of hemlock. Hemlocks that line stream banks are of high value to both forest and stream, shading, cooling, and sheltering many other species: trout, salmon, marten, fisher, moose, deer, and birds.

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 eventually impede the tree from producing new shoots in spring. Treatment uptake is eventually impeded.

Branch Dieback:

HWA infestation severity can also be gauged by amount of fine branch dieback where needles have recently dropped. Note: Healthy hemlock normally feature broken and jagged coarse lower branches.

Percent Live Crown Ratio (LCR):

Is the % of total tree height that supports live foliage. For e.g.: if live branches reached from the top of the tree all the way to the ground, that tree has a LCR of 100%. A tree with no living branches anywhere on the tree would have an LCR of 0% (dead). If LCR declines to < 25 % from HWA, the tree is less able of conducting a treatment to the canopy.

Percent HWA infestation on new shoots:

Count the total number of new shoots (i.e., new branchlet tips) growing along a 30 cm branch tip. Next, count the number of new shoots with wool present on the underside of the branchlets. Divide number of woolly shoots by total number of shoots. HWA infestations present on > than 30 % of new shoots growing along the sample branch may indicate greatly impeded new growth in the following yr. Trees may not respond to chemical control.