



## What is the Hemlock Woolly Adelgid?

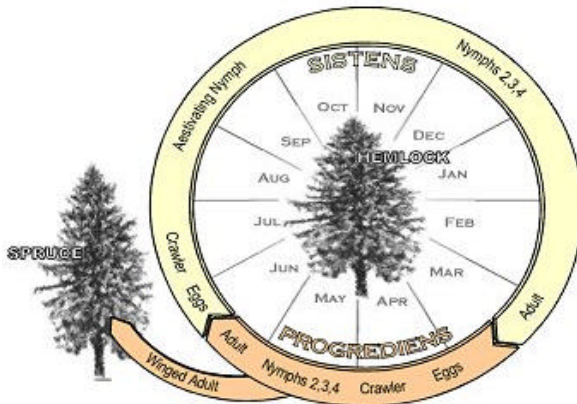
*Adelges tsugae*, the hemlock woolly adelgid, is a fluid-feeding insect that feeds on hemlock trees throughout eastern North America, including Pennsylvania. The egg sacs of these insects look like the tips of cotton swabs clinging to the undersides of hemlock branches.



Hemlock woolly adelgid was introduced from Asia into the Pacific Northwest in 1924. It was probably introduced into the northeastern US in the 1950's, and it was first discovered in Pennsylvania in 1967. This insect has been damaging hemlock ever since, and it is spreading. To date, 49 Counties in the eastern two-thirds of PA have been infested with this insect.

Hemlock woolly adelgid has two generations per year in Pennsylvania. All populations are made up of females that reproduce asexually. In early spring, overwintering females lay between 100 and 300 eggs in the woolly egg sacs beneath the branches. Mobile larvae, known as crawlers, emerge from the eggs in April or May to search for suitable feeding sites. Wind,

birds and mammals often spread crawlers to nearby hemlocks. Once settled at the base of hemlock needles, crawlers become immobile nymphs which feed and mature into wingless or winged adult females by early summer. The winged form will die after searching for a suitable spruce tree that is not found in North America.



*Life Cycle, Courtesy of Vince D'Amico and Mike Montgomery*

The wingless form lays another 100 to 300 eggs on hemlock. Crawlers emerge from these eggs to search for suitable feeding sites. Once settled, the hemlock woolly adelgid becomes dormant until October or November, when it resumes development. Feeding continues throughout the winter and early spring.

Eastern hemlock (Pennsylvania's state tree) and Carolina hemlocks (found

further south in the Smokey Mountain sections of the Appalachians) are more susceptible to hemlock woolly adelgid damage than Asian and western hemlock trees due to feeding tolerance and predators that protect the latter species. Hemlock woolly adelgid sucks fluid from the base of hemlock needles. It may also inject toxins into the tree as it feeds, accelerating needle drop and branch dieback. Although some trees die within four years, trees often persist in a weakened state for many years. Hemlocks that have been affected by hemlock woolly adelgid often have a grayish-green appearance (hemlocks naturally have a shiny, dark green color).

Other factors can influence the impact of the hemlock woolly adelgid. Other insects, such as [elongate hemlock scale](#), [hemlock borer](#), and spittlebugs, which are also found on hemlock, can compound the impact of hemlock woolly adelgid. Drought and fungi, such as *Fabrella* or *Korfia tsugae* can weaken hemlock and cause it to become more susceptible to insect damage. Low winter temperatures, cold snaps (episodes of freezing and thawing), and heavy thunderstorms can reduce populations of the hemlock woolly adelgid. Particularly in the mountains, it is not uncommon to find hemlocks where the insect has been killed on the top third of the trees, where it's colder and windier, but survive on the bottom two-thirds. On the other hand, mild winters can result in sharp increases in hemlock woolly adelgid populations.



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