

Native Insect Pests of Hemlock

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Roaming through the hills of Vermont as a youngster and, later, working in the “big woods” of northern Maine, I always treasured moments spent moving through a stand of eastern hemlock. For reasons difficult to explain, entering a patch of hemlock always made me feel as if I were truly in the north country and had stepped back in time a hundred years or so. Something to do, I think, with the quiet, cool, dark, and primeval atmosphere one senses when moving from relatively open hardwoods into the confines of a hemlock stand.

I think many foresters and forest owners enjoy an aesthetic connection with hemlock. Certainly, a variety of birds, small mammals and the white-tailed deer take advantage of this species for food or protection from inclement weather afforded by its dense, interconnecting crowns.

In addition to the noncommodity and ecological values we appreciate today, hemlock has substantial economic importance to certain areas of the paper industry. Current interest in this species has been stimulated by an apparent absence of adequate regeneration at many locations throughout its distribution and the concern for outbreaks of hemlock woolly adelgid (see *Forest Owner* May/June 1993). The latter, an introduced species, is now found in eleven northeastern states, and tree mortality has been reported from Virginia, New Jersey, Connecticut and southeastern New York. In addition to the hemlock adelgid, however, a variety of native defoliators and inner-bark feeding insects are linked with this conifer, some of which can do significant damage.



Figure 3 Needles damaged by hemlock needleminer (arrow).

The most important defoliator is the eastern subspecies of **hemlock looper**. It occurs from eastern Canada as far west as the Rocky Mountains in Alberta. Unlike most foliage feeding insects, it can feed on a range of both broad-leaved and needle-bearing hosts. Infestations, however, are confined to mature

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Figure 1 Adult hemlock looper.



Figure 2 Mature hemlock looper caterpillar.



Figure 4 Hemlock borer.

stands of balsam fir and eastern hemlock. Outbreaks typically last for only two to three years, but extensive tree mortality often results.

The long-lived **moths** have tan to grayish-brown wings. When extended, the front wings span 1.0 to 1.25" and each is crossed transversely by two irregular tawny to purplish lines with a distinct dot of the same color between them near the leading edge of each wing (Fig. 1). Adults emerge in late summer or early fall and represent one of several species referred to as "hunter's moths," because they are frequently active well into November or until the first hard frost occurs.

The **full grown caterpillar** is approximately 1.25" long, and its basic appearance varies from greenish yellow to brown. The back or top of most specimens is a mottled light brown to gray and the caterpillar's sides have wavy lines of varying shades of reddish to dark brown. The head and back are distinctly marked with pairs of irregular brown to black spots (Fig. 2).

Hemlock looper feeding is wasteful, because rarely is a whole needle consumed. This partially damaged, discolored foliage remains attached to branches and eventually results in a general browning of heavily infested trees.

Hemlock needle miner is another very frequent inhabitant of eastern hemlock. Unlike the hemlock looper, though, its feeding mainly detracts from the aesthetic quality of hemlock used for hedges or ornamentals and is very unlikely to significantly reduce growth or cause tree mortality. Typical **needle miner damage** is characterized by six or more mined (translucent, light brown) needles tied loosely with silk (Fig. 3).

The most dangerous pest of eastern hemlock is the **hemlock borer**. This beetle belongs to a family called flat-headed borers or metallic beetles — common names that reflect characteristics of the larval and adult stages, respectively. The larval or immature stages of hemlock borer are inner bark feeders; that is, they feed and excavate galleries just beneath the bark of the host, but do not construct tunnels in the wood. From a forest protection standpoint, most flat-headed borers are considered "secondary" insects, because they can only successfully attack a host that is stressed. Their normal ecological role is one of assisting with the decomposition of dead, dying or severely stressed woody plants.

The **adult** hemlock borer is 0.3 to 0.4" long with a hard, boat-shaped body and three yellowish to orange spots on each wing cover (Fig. 4). Beetles have a metallic sheen and move very quickly when disturbed. The **larva** (lar-vah) is typical of the family; distinctly segmented, whitish to off-white and legless with a distinctly flattened almost triangular "head" (Fig. 5). Larvae (lar-vee) hatch from eggs laid in bark crevices of weakened or windthrown trees and burrow beneath the bark. Their winding, frass-filled galleries (Fig. 5)

destroy tissue that is essential for tree survival. When populations are high enough, these galleries coalesce and eventually girdle the tree. Frass is a mixture of waste material and undigested wood particles.

As mentioned above, hemlock borer requires a stressed or weakened host. The two major causes of stress for hemlock are defoliation and drought. Susceptibility to drought results from the fact that this conifer is very shallow rooted and typically does best on moist to wet sites. The species is so sensitive to changes in soil moisture conditions that merely opening up a stand of hemlock too much or removing associated hardwoods in mixed stands and leaving the hemlock is often enough to set the stage for hemlock borer. **▲**

This is the 49th in the series of articles contributed by Dr. Allen, Professor of Entomology at SUNY-ESF. Reprints of this and the complete series are available from NYFOA. It is also possible to download this collection from the DEC Web page at: <http://www.dec.state.ny.us/df/privland/forprot/health/nyfo/index.html>. Photographs 1 and 2 courtesy of the Canadian Forest Service.



Figure 5 Larval stage of hemlock borer, with gallery (arrow).