

## PESTS OF HEMLOCKS – Insects & Mites

The text and photos in this document are, for the most part, excerpts from various non-commercial research articles, the web sites for which are listed in the Management column. It does not include *all* insect pests known to attack hemlocks but features the most common ones.

Insect Pest	Appearance	Symptoms/Damage	Management
Bagworm	 <p style="text-align: center;"><i>Bagworm on hemlock branch tip</i> (Photo: advancedlawnsolutions.com)</p>	<p>Green or brown cone-shaped bags 1/4" - 3" carefully interwoven using silk and bits of leaves and twigs from the host plant. The tops of young larvae are shiny black, and their undersides are dull amber. When fully grown, bagworms are a dull dirty gray with darker marking toward the head. The adult male develops into a moth that can fly, but the female remains grub-like and stays inside the bag. In addition to the presence of bags, symptoms include defoliated areas of plants. Infestation spreads slowly from one plant to adjacent plants with bagworms being windblown or crawling to other host plants.</p>	<p>Bags can be hand-picked any time of year. Insecticide control needs to be aimed at young larvae in late June to early July to be effective. Insecticides currently labeled for bagworm control include <i>Bacillus thuringiensis</i>, acephate, carbaryl, cyfluthrin, malathion and permethrin. Affected plants must be thoroughly covered with insecticide so the insects ingest it as they feed.</p> <p> <a href="http://ento.psu.edu/extension/factsheets/bagworm">http://ento.psu.edu/extension/factsheets/bagworm</a>  <a href="http://lancaster.unl.edu/hort/bagworms.shtml">http://lancaster.unl.edu/hort/bagworms.shtml</a>  <a href="http://lancaster.unl.edu/hort/bagworm.pdf">http://lancaster.unl.edu/hort/bagworm.pdf</a>  <a href="http://woodypests.cas.psu.edu/factsheets/insectfactsheets/html/bagworm.html">http://woodypests.cas.psu.edu/factsheets/insectfactsheets/html/bagworm.html</a> </p>
Elongate hemlock scale ( <i>Fiorinia externa</i> )	 <p style="text-align: center;"><i>Damage caused by elongate hemlock scale.</i> (Photo by Eric R. Day, Virginia Polytechnic Institute and State University, Bugwood.org)</p>	<p>Feeding on lower surface of needles causes foliage to turn yellow and drop prematurely. Dieback of major limbs progresses from the bottom of the tree upwards</p>	<p>Horticultural oil applied by foliar spray during crawler stage in late spring and repeated in 14 days; Dinotefuran (Safari) applied by soil injection, soil drench, or trunk spray. Discontinue nitrogen fertilization.</p> <p> <a href="http://ento.psu.edu/extension/factsheets/pdf/elongateHemlockScale.pdf">http://ento.psu.edu/extension/factsheets/pdf/elongateHemlockScale.pdf</a>  <a href="http://ento.psu.edu/extension/factsheets/elongate-hemlock-scale">http://ento.psu.edu/extension/factsheets/elongate-hemlock-scale</a>  <a href="http://na.fs.fed.us/pubs/detail.cfm?id=8928">http://na.fs.fed.us/pubs/detail.cfm?id=8928</a>  <a href="http://ufdcimages.uflib.ufl.edu/UF/00/09/88/13/00011/SN00154040_0089_00419.pdf">http://ufdcimages.uflib.ufl.edu/UF/00/09/88/13/00011/SN00154040_0089_00419.pdf</a>  <a href="http://www.ct.gov/caes/cwp/view.asp?a=2823&amp;q=377730">http://www.ct.gov/caes/cwp/view.asp?a=2823&amp;q=377730</a>  <a href="http://www.forestthreats.org/featured-forest-threats/elongate-hemlock-scale-fiorinia-externa">http://www.forestthreats.org/featured-forest-threats/elongate-hemlock-scale-fiorinia-externa</a>  <a href="http://www.maine.gov/doc/mfs/EH_Scale.htm">http://www.maine.gov/doc/mfs/EH_Scale.htm</a>  <a href="http://www.na.fs.fed.us/spfo/pubs/pest_all/ehscale/ehscale.htm">http://www.na.fs.fed.us/spfo/pubs/pest_all/ehscale/ehscale.htm</a> </p>



<p>Hemlock borer (<i>Melanophila fulvoguttata</i>)</p>	 <p>Larval gallery of hemlock borer. Forest Pest Alert. (Photo: USDA Forest Service)</p>	<p>This insect usually attacks weakened trees. The larvae are legless grubs with a widened thorax. Adults are flattened, metallic black beetles with three small white spots on each wing cover. Emerging hemlock borers leave small oval holes in the bark, about 3 mm in diameter, filled with dark excrement. Larval galleries can be found on the surface of the sapwood by removing the bark. The tree's shoot tips turn yellow. Woodpeckers often attack infested trees searching for grubs.</p>	<p>Maintaining healthy trees is the best means of minimizing hemlock borer infestations. For example, hemlocks have shallow roots and are susceptible to droughty conditions, so ornamental trees should be watered in dry years. Also, damage from pests like hemlock woolly adelgid, scale insects, and loopers should be controlled to maintain healthy, vigorously growing trees. In forests, declining hemlocks should be salvaged to prevent buildup of borer populations. Once the borers emerge and the holes are visible, the damage has been done.</p> <p><a href="http://www.bioforest.ca/documents/assets/uploads/files/en/hemlock_borer_leaflet_june_04.pdf">http://www.bioforest.ca/documents/assets/uploads/files/en/hemlock_borer_leaflet_june_04.pdf</a>  <a href="http://www.dec.ny.gov/docs/lands_forests_pdf/hemlockpests.pdf">http://www.dec.ny.gov/docs/lands_forests_pdf/hemlockpests.pdf</a>  <a href="http://www.forestpests.org/acrobat/hborer.pdf">http://www.forestpests.org/acrobat/hborer.pdf</a>  <a href="http://www.forestpests.org/vermont/hemlockborer.html">http://www.forestpests.org/vermont/hemlockborer.html</a>  <a href="http://www.fs.fed.us/r6/nr/fid/fidls/fid-109.pdf">http://www.fs.fed.us/r6/nr/fid/fidls/fid-109.pdf</a></p>
<p>Hemlock looper (<i>Lambdina fiscellaria</i>)</p>	 <p>Eastern hemlock looper on hemlock (Photo: Bugwood.org)</p>	<p>Native to North America, the hemlock looper is a defoliating insect that feeds primarily on hemlock and balsam fir. Hatching in late May to mid-June, the larvae feed initially on new foliage but quickly move to old foliage. The looper is a wasteful feeder, often nipping only a small part of a needle before moving to another. As these needles dry out, they change color and along with the exposed twigs turn a reddish-brown color. Often a mat of clipped needles collects under the tree.</p>	<p>Control may be achieved to some extent by mechanical means – picking them off by hand or knocking them off with a water hose. Parasites and birds may also contribute to population reduction. The preferred pesticide registered for use against the looper is a biological agent <i>Bacillus thuringiensis</i> (Bt). Early detection and proper timing are critical when using Bt as application must be made as soon as the larvae appear.</p> <p><a href="http://forestry.valentbiosciences.com/valent-biosciences-corporation-forest-home/pests/hemlock-looper">http://forestry.valentbiosciences.com/valent-biosciences-corporation-forest-home/pests/hemlock-looper</a>  <a href="http://forestpests.org/book/8662.html">http://forestpests.org/book/8662.html</a>  <a href="http://wiki.bugwood.org/Archive:Caterpillars/Lambdina_fiscellaria_fiscellaria">http://wiki.bugwood.org/Archive:Caterpillars/Lambdina_fiscellaria_fiscellaria</a>  <a href="http://www.bioforest.ca/documents/assets/uploads/files/en/hemlock_looper_leaflet_june_04.pdf">http://www.bioforest.ca/documents/assets/uploads/files/en/hemlock_looper_leaflet_june_04.pdf</a>  <a href="http://www.na.fs.fed.us/spfo/pubs/pest_all/hem-looper/hem-looper.htm">http://www.na.fs.fed.us/spfo/pubs/pest_all/hem-looper/hem-looper.htm</a>  <a href="https://www1.maine.gov/dacf/mfs/archive/HemlockLooper_new.htm">https://www1.maine.gov/dacf/mfs/archive/HemlockLooper_new.htm</a>  <a href="http://www.glfrc.forestry.ca/VLF/ForumPresentations/heberthemlocklooper_08e.pdf">http://www.glfrc.forestry.ca/VLF/ForumPresentations/heberthemlocklooper_08e.pdf</a></p>
<p>Hemlock rust mite (<i>Nalepella tsugifoliae</i>)</p>	 <p>Yellow hemlock needles caused by hemlock rust mites. (Photo: Phil Nixon and Morton Arboretum, University of Illinois)</p>	<p>The rust mite is an eriophyid mite which is much smaller than a spider mite, being visible only with a higher-power hand lens or microscope. The mites are cigar-shaped, with only four legs at the front end. Feeding is primarily on the lower surface of needles and causes yellowing and premature dropping of needles farther back from the branch tips. Most damage occurs in spring.</p>	<p>Treatment may not be necessary if natural predators such as lady beetles, lacewings, or phytoseiid mites are present. Not all miticides are effective in controlling eriophyid mites. Foliar spraying of Abamectin (Avid), bifenthrin (Onyx), insecticidal soap, summer spray oil, and spiromesifen (Forbid) provides effective control. If insecticidal soap or summer spray oil is used, apply twice, 1 week apart; the other miticides should provide control with one application.</p> <p><a href="http://cues.cfans.umn.edu/old/Web/146HemlockRustMite.pdf">http://cues.cfans.umn.edu/old/Web/146HemlockRustMite.pdf</a>  <a href="http://hyg.ipm.illinois.edu/pastpest/200804f.html">http://hyg.ipm.illinois.edu/pastpest/200804f.html</a>  <a href="http://www.entomology.umn.edu/cues/Web/146HemlockRustMite.pdf">http://www.entomology.umn.edu/cues/Web/146HemlockRustMite.pdf</a>  <a href="http://extension.psu.edu/plants/green-industry/news/2012/hemlock-rust-mite-in-pennsylvania">http://extension.psu.edu/plants/green-industry/news/2012/hemlock-rust-mite-in-pennsylvania</a>  <a href="http://extension.psu.edu/pests/ipm/agriculture/christmas-tree/pest-fact-sheets/needle-discoloration-and-injury/eriophyid-rust-sheath-mites.pdf">http://extension.psu.edu/pests/ipm/agriculture/christmas-tree/pest-fact-sheets/needle-discoloration-and-injury/eriophyid-rust-sheath-mites.pdf</a></p>

<p>Hemlock woolly adelgid (<i>Adelges tsugae</i>)</p>	 <p>Photo: Donna Shearer Hemlock woolly adelgid egg sacs on branch. (Photo: Donna Shearer)</p>	<p>Small white cottony egg sacs at base of needles on underside of branches, thinning of needles, drab gray-green color of foliage, branch die-back followed by death of the tree.</p>	<p>Imidacloprid applied by soil injection or soil drench; can be done year-round in the South except when soil is saturated or frozen. Dinotefuran (Safari) applied by soil injection, soil drench, or trunk spray; horticultural oil applied by foliar spray April through mid-May or mid-June through September; recommended as a rescue product for very large infested trees and/or badly infested trees of any size.</p> <p><a href="http://ento.psu.edu/extension/factsheets/hemlock-woolly-adelgid">http://ento.psu.edu/extension/factsheets/hemlock-woolly-adelgid</a>  <a href="http://www.invasivespeciesinfo.gov/animals/hwa.shtml">http://www.invasivespeciesinfo.gov/animals/hwa.shtml</a>  <a href="http://na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm">http://na.fs.fed.us/spfo/pubs/pest_al/hemlock/hwa05.htm</a>  <a href="http://www.gatrees.org/forest-management/forest-health/hemlock-woolly-adelgid/index.cfm">http://www.gatrees.org/forest-management/forest-health/hemlock-woolly-adelgid/index.cfm</a>  <a href="http://www.na.fs.fed.us/fhp/hwa/">http://www.na.fs.fed.us/fhp/hwa/</a>  <a href="http://www.nrs.fs.fed.us/disturbance/invasive_species/hwa/">http://www.nrs.fs.fed.us/disturbance/invasive_species/hwa/</a>  <a href="http://www.nps.gov/grsm/learn/nature/hemlock-woolly-adelgid.htm">http://www.nps.gov/grsm/learn/nature/hemlock-woolly-adelgid.htm</a></p>
<p>Indian wax scale</p>	 <p>North Carolina Cooperative Extension Service (Photo: J.R. Baker and S.Bambara and Bugwood.org)</p>	<p>White, waxy, cap-shaped cover with circular to oval-shaped reddish insect inside is found on stems. Leaves may yellow and drop early. All females; eggs are laid in March and hatch in May. Crawlers are mobile and secrete sugary honeydew which attracts black sooty mold. After inserting their piercing-sucking mouth part into the stem, they secrete the waxy covering and remain fixed, feeding throughout the summer and then overwinter as adults.</p>	<p>Horticultural oil applied by foliar spray during crawler stage in spring and repeated 14 days later; Imidacloprid or Dinotefuran applied by soil injection or soil drench. Carbaryl applied in June is reported to give good control.</p> <p><a href="http://www.ces.ncsu.edu/depts/ent/notes/Ornamentals_and_Turf/shrubs/note13/note13.html">http://www.ces.ncsu.edu/depts/ent/notes/Ornamentals_and_Turf/shrubs/note13/note13.html</a>  <a href="http://kentcoopextension.blogspot.com/2009/04/landscape-scale-insects-indian-wax.html">http://kentcoopextension.blogspot.com/2009/04/landscape-scale-insects-indian-wax.html</a>  <a href="http://pubs.ext.vt.edu/444/444-622/444-622_pdf.pdf">http://pubs.ext.vt.edu/444/444-622/444-622_pdf.pdf</a>  <a href="http://www.walterreeves.com/gardening-q-and-a/wax-scale-control/">http://www.walterreeves.com/gardening-q-and-a/wax-scale-control/</a></p>
<p>Spruce spider mite (<i>Oligonychus ununguis</i>)</p>	 <p>Spider mite damage on hemlock branchlets. (Photo: Donna Shearer)</p>	<p>Spruce spider mites feed on the foliage of hemlocks and other host plants. As they feed on the needles, the foliage turns yellow, then brown and eventually fall off. Fine webbing may also be present. The majority of feeding occurs in the autumn and spring, though damage is rarely noticed before the summer</p>	<p>Horticultural oil, Floramite, Avid, or Hexygon sprayed in cool part of spring or fall. Follow-up sprays often required if using horticultural oil.</p> <p><a href="http://ento.psu.edu/extension/factsheets/spruce-spider-mite">http://ento.psu.edu/extension/factsheets/spruce-spider-mite</a>  <a href="http://woodypests.cas.psu.edu/FactSheets/InsectFactSheets/html/Spruce_Spider_Mite.html">http://woodypests.cas.psu.edu/FactSheets/InsectFactSheets/html/Spruce_Spider_Mite.html</a></p>