

PESTS OF HEMLOCKS – Fungal Diseases

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.

Fungal Disease	Appearance	Symptoms	Management
<p>Tip / Shoot Blight caused by <i>Sirococcus tsugae</i> or <i>Botrytis</i></p>	 <p style="text-align: center;"><i>Tip blight on eastern hemlock (Photo: USDA Forest Service, Northeastern Area)</i></p>	<p>Tip blight infects the current year's shoot tips of seedlings, saplings, mature ornamentals, and forest trees, seldom killing more than one-half inch of the new growth but sometimes extending farther up the shoot. The disease is characterized by light brown discoloration of needles, followed by dieback of the affected shoots and partial shedding of needles. It first appears in spring, but dead tips may remain attached to the branch for several months. While not considered a major problem for mature hemlocks, it can seriously disfigure or even kill seedlings.</p>	<p>Currently there are no known effective controls. Snip off dead branch tips. In dense stands, thin trees to reduce overcrowding and improve air circulation. Protectant fungicides can reduce disease incidence in nursery beds. Repeated sprays during shoot elongation may be required, however. Another option is spraying with horticultural oil such as Neem.</p> <p>http://homeguides.sfgate.com/spruce-sirococcus-blight-71242.html http://na.fs.fed.us/pubs/palerts/tip_blight/tip_blight_lo_res.pdf http://www.apsnet.org/publications/plantdisease/2011/May/Pages/95_5_612.3.aspx http://www.ct.gov/caes/lib/caes/pdio/disease_management_guide/mgmt_guide.pdf http://www.eppo.int/QUARANTINE/Alert_List/fungi/Sirococcus_tsugae.htm http://www.forestryimages.org/browse/detail.cfm?imgnum=5503924</p>
<p>Phomopsis twig blight caused by <i>Diaporthe conorum</i></p>	 <p style="text-align: center;"><i>Young succulent shoots infected in spring by Phomopsis twig blight (Photo: Connecticut Agricultural Experiment Station)</i></p>	<p>Primarily a pest of junipers, Phomopsis can also infect hemlocks. Tips of affected branches turn brown or ash gray and often show progressive dieback. Small black fruiting bodies of the causal fungus may be found on the twigs. While generally occurring in spring, the fungus can infect any time of the year when young succulent tissue is present.</p>	<p>Dead tissue should be pruned several inches above symptomatic tissue and removed from the planting area. Pruning should be done when foliage and bark are dry. Tools should be disinfected with a 10% solution of household bleach or a 70% solution of alcohol. Avoid overhead watering and ensure proper spacing for adequate air circulation. In nursery settings, protective fungicides like benomyl may be applied regularly at 7- to 10-day intervals during the growing season to supplement cultural control strategies.</p> <p>http://ipm.illinois.edu/diseases/series600/rpd622/ http://trace.tennessee.edu/cgi/viewcontent.cgi?article=1031&context=utk_agexdise http://www.ct.gov/caes/lib/caes/documents/publications/fact_sheets/plant_pathology_and_ecology/juniper_tip_blights_09-26-12_r.pdf http://www.forestpests.org/nursery/phomopsisblight.html</p>
<p>Fabrella needle blight caused by <i>Fabrella tsugae</i></p>	 <p style="text-align: center;"><i>Fabrella needle blight on hemlock (Photo: PSU Dept. of Plant Pathology collection)</i></p>	<p>Needles in the lower part of the tree turn brown and fall in late summer, leaving bare twigs. Fungal fruiting structures appear as small dots on the underside of the needle, white at first but then darken, lining either side of the main vein.</p>	<p>No control is recommended. Damage is generally not considered to be significant, but can lead to twig and branch dieback when coupled with other stressors such as drought or hemlock woolly adelgid. Gathering and destroying fallen needles from around the tree in the fall may reduce damage to the lower crown. Avoid overhead watering and ensure proper spacing for adequate air circulation.</p> <p>http://extension.psu.edu/plant-disease-factsheets/all-fact-sheets/hemlock-diseases http://www.dcnr.state.pa.us/cs/groups/public/documents/document/dcnr_007191.pdf</p>



<p>Rosalinia needle blight caused by <i>Hypoxylon herpotrichoides</i> (formerly known as <i>Rosellinia herpotrichoides</i>)</p>	 <p><i>Rosellinia</i> needle blight affecting branch of hemlock (Photo: Donna Shearer)</p>	<p>Once thought to affect only nursery stock in the western U. S., this fungus has been present in Georgia for at least 15 years. It attacks several kinds of conifers including hemlocks of all sizes and ages. It can kill small trees (saplings and young trees up to maybe 20 feet tall), but it usually doesn't kill larger trees. On larger trees it affects swaths of the foliage on lower and inner branches, turning the needles a uniform light chocolate brown and making them look matted together at odd angles. The fungus becomes active in the spring, but the damage usually doesn't begin to be observable until early summer. An airborne pathogen, it continues to spread and get worse through the summer until early fall when the temperature begins to cool and the humidity is lower.</p>	<p>Cultural controls include thinning trees to achieve proper spacing for adequate air circulation, pruning lower infected branches and removing the debris, and avoiding overhead watering. There is no fungicide specifically labeled for Rosellinia needle blight at this time, but there are several labeled for needle blight in general. Most of these products are applied by foliar spray. Treatment should start in early spring just as new growth appears and should continue through the summer at intervals indicated on the various products, taking care to alternate classes of fungicides to avoid resistance. Professional treatment is highly recommended as some of the products are restricted.</p> <p>NOTE: Some of the research articles cited below were written before it was confirmed that Rosellinia is present in the southeastern U. S. and affecting not just nursery stock but landscape and forest trees. The web site in bold type is the most up-to-date.</p> <p>http://forestrydev.org/diseases/nursery/pests/rosellin_e.html http://naldc.nal.usda.gov/download/CAT88208799/PDF http://plantpath.caes.uga.edu/extension/documents/ExtensionPlantPathologyUpdateOctober2013.pdf http://wiki.bugwood.org/Archive:Forestnursery/Rosellinia_herpotrichoides http://www.cabdirect.org/abstracts/19371101305.html;jsessionid=017FA56A1D29C04BC4043E2CA7525337;jsessionid=BCFE73461276C9EE54A60325607FF5A4;jsessionid=73A49FC1D2B96F45C8BF1946709552FD http://www.na.fs.fed.us/spfo/pubs/fidls/disease_west/nur_diseases.htm</p>
<p>Hemlock rust caused by <i>Melampsora abietis-canadensis</i>, <i>Pucciniastrum myrtilli</i>, or <i>Pucciniastrum hydrangeae</i></p>	 <p>Current-year infection of young hemlock twigs by hemlock rust. (Photo: Dept. of Plant Pathology and Plant Microbe-Biology, Cornell University)</p>	<p>The infected needles of hemlock become chlorotic or discoloured and may be shed prematurely. Diseased trees therefore show symptoms of needle necrosis and thinning foliage. Current-season growth is slightly swollen and curled. Other symptoms of infection vary but include the presence of pustules or tubes on needles. These break open to reveal the rusty-colored spores for which these diseases get their name. Infected plant parts die in the summer. This fungus, which over-winters on poplar, blueberry, or hydrangea respectively and then spreads to hemlock and back to alternative host</p>	<p>Cultural control is best effected by removal of alternate host or by planting alternate hosts that are resistant to rust, thereby breaking the life cycle. For chemical control, apply triadimefon, neem oil, or mancozeb once when buds break and twice at 7 – 14-day intervals.</p> <p>NOTE: This is different from hemlock rust mite, which is an insect problem.</p> <p>http://forestrydev.org/diseases/ctd/Group/Rust/rust10_e.html http://plantclinic.cornell.edu/factsheets/hemlocktwigrust.pdf http://www.na.fs.fed.us/pubs/silvics_manual/Volume_1/tsuga/canadensis.htm</p>