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 is does not include *all* insect pests known to attack hemlocks but features the most common ones.

Fungal Disease	Appearance	Symptoms	Management
Tip / Shoot Blight caused by *Sirococcus tsugae or Botrytis*	 *Tip blight on eastern hemlock (Photo: USDA Forest Service, Northeastern Area)*	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.	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. 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
Phomopsis twig blight caused by *Phomopsis vaccinii*	 *Young succulent shoots infected in spring by Phomopsis twig blight (Photo: Connecticut Agricultural Experiment Station)*	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. The fungus survives the winter in dead or infected twigs. From bud break to bloom, fungal spores ooze from small black structures (pycnidia) on previously infected twigs and are spread by rain or overhead irrigation	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 such as Bordeauz mix, other copper-based fungicides, and mancozeb can be applied 3-4 times in the spring at 10-14 day intervals to protect the new growth. They can be used anytime a flush of new growth occurs. 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
Fabrella needle blight caused by *Fabrella tsugae*	 *Fabrella needle blight on hemlock (Photo: PSU Dept. of Plant Pathology collection)*	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.	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. 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*

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www.SaveGeorgiasHemlocks.org

Rosalinia needle blight caused by *Hypoxylon herpotrichoides*	 *Rosellinia needle blight affecting branch of hemlock (Photo: Donna Shearer)*	*Rosellina* needle blight can infect hemlocks of all sizes and ages in both landscapes and forested areas, particularly along streams. It can kill small trees (seedlings, saplings, and young trees up to 15-20 feet tall). It usually doesn't kill larger trees but can seriously affect the lower limbs. Thought to be caused by an airborne pathogen, *Rosellinia* becomes active in the spring, but the damage usually doesn't begin to be observable until early summer. The disease causes the needles to turn a uniform light chocolate brown and become matted together at odd angles. The disease continues to spread and get worse through the summer until early fall when the temperature begins to cool and the humidity is lower. In late fall or early winter, the needles drop from the tree where the fungus survives until the following year. Very little is known about the lifecycle of this pathogen. Observation has shown that once the disease is present in a tree, it is likely to continue breaking out each subsequent year unless the cycle is broken by cultural measures.	There is currently no fungicide specifically labeled for this disease on hemlock, so chemical spraying is not an option. **Professional diagnosis of trees thought to be infected with *Rosellinia* is highly recommended.** Since the disease is most severe where moisture and humidity are high and air circulation is low, the best cultural controls include thinning of stands to allow for adequate air circulation, pruning out infected branches and removing the debris, pruning lower limbs to reduce proximity to moist ground, and avoiding overhead watering. 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 only nursery stock but also landscape, forest, and streamside trees. The first web site below is the most up-to-date, but the others may contain some useful information as well. https://plantpath.caes.uga.edu/content/dam/caes-subsite/plant-pathology/extension-pdfs/Extension-Plant-Pathology-Update-October2013.pdf (see page 10) https://www.forestpests.org/nursery/rosellinianeedle.html http://naldc.nal.usda.gov/download/CAT88208799/PDF (see page 83) http://wiki.bugwood.org/Archive:Forestnursery/Rosellinia_herpotrichoides https://www.for.gov.bc.ca/hfd/pubs/Docs/Frr/Frr065part3.pdf (see page 33)
Hemlock twig rust caused by *Melampsora farlowii*	 *Current-year infection of young hemlock twigs by hemlock rust. (Photo: Cornell Dept. of Plant Pathology)*	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	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. NOTE: This is different from the hemlock rust mite, which is an insect problem. http://plantclinic.cornell.edu/factsheets/hemlocktwigrust.pdf

Who to contact in Extension Plant Pathology?

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