

Field Identification Guide

Sirococcus tsugae



Photograph: Richard Baden, Forest Research

Sirococcus tsugae

Sirococcus tsugae is a fungal pathogen that causes shoot blight and cankers on cedar trees (*Cedrus* spp.), and shoot blight on hemlock (*Tsuga* spp.). *Sirococcus tsugae* can attack seedlings and saplings as well as mature trees. This pathogen has the potential to cause considerable damage to valuable ornamental trees in public and private gardens and economic losses for the forestry and nursery sectors in the UK.

Species affected	The hosts of <i>S. tsugae</i> include the Atlas cedar (<i>Cedrus atlantica</i>), the deodar cedar (<i>C. deodara</i>) and the cedar of Lebanon (<i>C. libani</i>). The pathogen also infects western hemlock (<i>Tsuga heterophylla</i>), eastern hemlock (<i>T. canadensis</i>) and mountain hemlock (<i>T. mertensiana</i>). <i>C. atlantica</i> var. <i>glauca</i> appears to be the most susceptible host in the UK.
Signs and symptoms	<p>The most conspicuous symptom of this disease in the Atlas cedar is a pink colouration of needles (in other host species the infected needles turn brown rather than pink) followed by dieback of the affected shoots and partial shedding of needles. Cankers can also be produced on the bark of shoots and branches. The cankers can cause dieback and death of shoots and branches when they become severe. Dieback in the side shoots can cause the shoots to have a bent over/shepherd's crook appearance which occurs as the shoot dies back from the tip. The cankers can be difficult to see as they are fairly indistinctive and are observed only as slightly depressed areas of purplish bark. Gum/resin production is often associated with these cankers and small black fruiting bodies may also occur on the surfaces of cankers and on dead needles.</p> <p>Dieback in cedars can also be caused by root and butt rots and other root problems. The fungal pathogen <i>Allantophomopsiella pseudotsugae</i> can also cause girdling lesions which can kill twigs and branches in cedar trees.</p>

Timing	<p>Primary infection is believed to occur in the spring, shortly after new shoot growth starts and this is when the needles begin to turn pink. This discolouration becomes very conspicuous in June and July. The pink needles turn brown as the season progresses.</p> <p>Dieback and defoliation can be observed throughout the year.</p> <p>The fruiting bodies of <i>S. tsugae</i> may be seen on the surfaces of cankers during the winter months and into the spring.</p>
Biosecurity	<p>The disease is spread by spores produced inside the fruiting bodies on the needles and bark of infected trees. These spores are dispersed locally by rain splash and over longer distances by strong winds. Therefore it is extremely important that no wood or foliage from infected trees is removed from a site. All clothing (including the inside of boots, hoods and outer pockets) should be brushed down and checked for needles and bark material. Boots should be cleaned and disinfected before and after every site visit. Keep vehicles on hard tracks and ensure that they are kept clean so that they are easier to disinfect when necessary. If any tree material is intentionally removed from a site [e.g. samples] then it should first be triple-wrapped in strong and robust plastic bags or double-wrapped in bags which then must be secured within a plastic container. Sampling should not be carried out in wet and windy conditions as these conditions favour spread of the disease. One of the main pathways for introduction of the disease is on new plantings of host trees.</p>
Reporting requirements	<p>If you find this disease, please report it through Tree Alert (https://treealert.forestresearch.gov.uk).</p> <p>In Northern Ireland please report via the TreeCheck website (www.treecheck.net) or phone app, or by emailing planthealth@daera-ni.gov.uk</p> <p>For traded plants and any non-tree hosts please email planthealth.info@apha.gov.uk (England & Wales), or hort.marketing@gov.scot (Scotland).</p>

Based on information available in March 2017.

Signs and symptoms



Photograph: Barnaby Wylder, Forestry Commission England Tree Health team

Atlas cedar infected with *Sirococcus tsugae* showing characteristic pink foliage.

Signs and symptoms



Photograph: Forestry Commission / Sam Milner. © Natural Resources Wales

Pink coloration of needles of an Atlas cedar tree infected with *Sirococcus tsugae*.

Signs and symptoms



Photograph: Ana Perez-Sierra, Forest Research

Pink coloration of needles of an Atlas cedar tree infected with *Sirococcus tsugae*.



Photograph: Suzanne Sancisi-Frey, Forest Research

Shoot of an Atlas cedar tree bearing both healthy blue/green needles, and pink needles that have been affected by *Sirococcus tsugae*.

Signs and symptoms



Photograph: Richard Baden, Forest Research

Wilting shoots of an Atlas cedar tree infected with *Sirococcus tsugae*.

Signs and symptoms



Photograph: Richard Baden, Forest Research

Wilting shoots and pink needles of an Atlas cedar tree infected with *Sirococcus tsugae*.



Photograph: Suzanne Sancisi-Frey, Forest Research

Wilting and bent over shoot/shepherd's crook appearance of an Atlas cedar tree infected with *Sirococcus tsugae*.

Signs and symptoms



Photograph: Suzanne Sandisi-Frey, Forest Research

Defoliated and bent over shoots/shepherd's crook appearance in the canopy of an Atlas cedar tree infected with *Sirococcus tsugae*.



Photograph: Suzanne Sandisi-Frey, Forest Research

Defoliation, dieback and thin canopy of an Atlas cedar infected with *Sirococcus tsugae*.

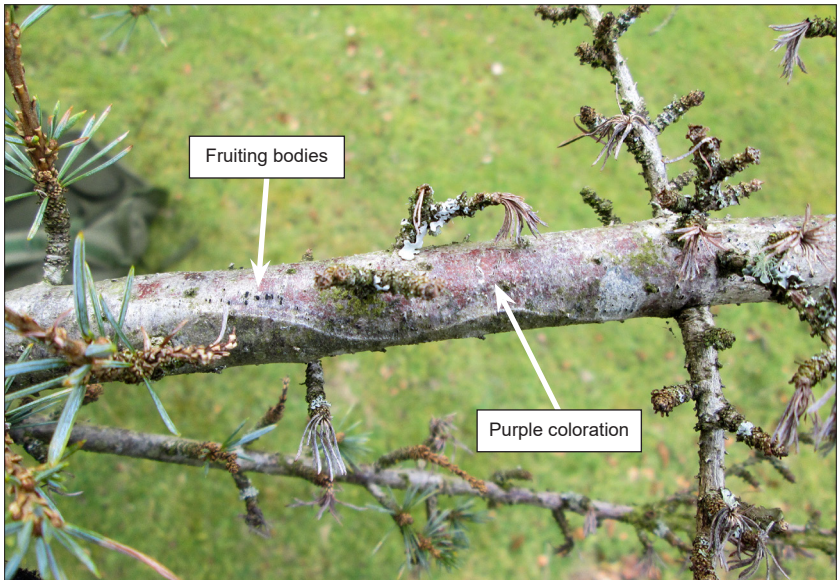
Signs and symptoms



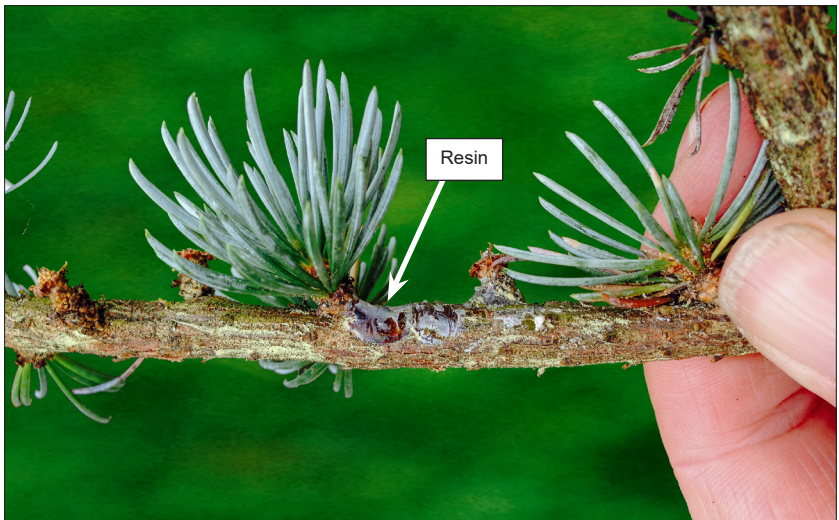
Photograph: Richard Baden, Forest Research

Extensive needle drop of an Atlas cedar infected with *Sirococcus tsugae*.

Signs and symptoms



Slightly depressed and purple bark canker of *Sirococcus tsugae* on an infected Atlas cedar tree. Small black fruiting bodies sometimes occur on the canker surface.



Profuse resin production is characteristic of *Sirococcus tsugae* infection.

Signs and symptoms



Photograph: Ana Perez-Sierra, Forest Research

Sirococcus tsugae fruiting bodies (small black dots) on the dead needles of an infected tree.



Photograph: Ana Perez-Sierra, Forest Research

Sirococcus tsugae fruiting bodies on the surface of a canker on the bark of an infected tree.

Signs and symptoms



Photograph: Barnaby Wylder, Forestry Commission England Tree Health team

Western hemlock foliage infected with *Sirococcus tsugae* showing small black fruiting bodies on the underside of the leaves.



Photograph: Ana Perez-Sierra, Forest Research

On western hemlock, *Sirococcus tsugae* causes dieback of the shoot tips.

Signs and symptoms



Photograph: Ana Perez-Sierra, Forest Research



Photograph: Ana Perez-Sierra, Forest Research

On eastern hemlock, *Sirococcus tsugae* causes dieback of the shoot tips.

Look-alike signs and symptoms



Photograph: Forestry Commission

The fungal pathogen *Allantophomopsiella pseudotsugae* can also cause girdling lesions which ultimately lead to the death of twigs and branches on cedar trees.

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Published by Forest Research as part of the Observatree project.

Observatree aims to create a tree-health early-warning system using citizen science.

Observatree is a partnership project led by Forest Research, the research agency of the Forestry Commission. Project partners are the Animal & Plant Health Agency (APHA), Department for Environment, Food & Rural Affairs (Defra), Fera Science Ltd, the Forestry Commission, the National Trust, Scottish Forestry, the Welsh Government and the Woodland Trust. Supporting the project is Natural Resources Wales. The first four years of this project was 50% funded by the EU's LIFE programme.

Acknowledgements:

Dr Suzanne Sancisi-Frey, Forest Research, for compiling this guide based on a review of current literature and with technical contributions from experts across the Observatree partnership.

All those who have given permission for images to be used within the guide.

The Communications Team, Forest Research, for the original design and creation of the guide.

This booklet forms part of a set that supports Observatree volunteers when out looking for priority pests and diseases. It supplements face-to-face training and is not intended as a full or detailed description. It will also be useful for others who have some knowledge of the particular pest or disease and understand how to look for these. Further information is available online from the websites listed below:

www.observatree.org.uk

www.forestresearch.gov.uk/tools_and_resources/fthr/pest-and-disease-resources/

www.gov.uk/guidance/prevent-the-introduction-and-spread-of-tree-pests-and-diseases

<https://planthealthportal.defra.gov.uk>