



Field Identification Guide

Phytophthora austrocedri



Photograph: Sarah Green, Forest Research

Funded by the EU's LIFE programme



Phytophthora austrocedri

Phytophthora austrocedri is an aggressive fungus-like pathogen that causes extensive damage to juniper trees (*Juniperus communis*). The pathogen primarily attacks the roots of its hosts, and forms lesions which extend up into the stem base. The disease is nearly always fatal and has had a major impact on the vulnerable and already declining juniper woodlands in remote landscapes.

Species affected	Common juniper (<i>Juniperus communis</i> Ssp. <i>communis</i> and ornamental varieties) is the main host in the UK, but infections on Lawson cypress (<i>Chamaecyparis lawsoniana</i>) and Nootka cypress (<i>Cupressus nootkatensis</i>) have also occasionally been reported.
Signs and symptoms	<p>The main symptom of this disease is the discoloration and death of the foliage in infected hosts. Foliage is affected uniformly following a root infection, or less commonly in discrete areas associated with infections and lesions on the stem or individual branches.</p> <p>The pathogen produces lesions in the living bark layers of the tree, which eventually girdle stems and branches and deprive the host of water and nutrients. The foliage of infected hosts will initially turn a slightly lighter green colour than healthy counterparts, and then a reddish bronzy brown colour as it dies.</p> <p>The lesions produced by this disease are tongue or flame-shaped, and a cinnamon-brown colour. They may have a yellow periphery (healthy bark is a creamy white colour) and can extend up to 50 cm within diseased stems. Conspicuous resin pockets are occasionally associated with the lesions. Lesions are not visible unless the bark is removed.</p> <p>Similar disease symptoms on juniper trees can be caused by other <i>Phytophthora</i> species such as <i>P. cinnamomi</i>. The pathogenic fungus <i>Diaporthe juniperivora</i> is also able to produce symptoms such as dead needles, shoot dieback and bark lesions. White rots caused by the fungus <i>Amylostereum laevigatum</i> can also be found on the bark of juniper trees leading to discoloration of foliage and the death of branches. Insects such as the juniper webber moth (<i>Dichomeris marginella</i>) can cause browning and death of foliage and shoots in juniper. Herbivore damage and waterlogging</p>

	<p>also lead to discoloration and death of juniper foliage.</p> <p>Other abiotic factors such as drought and snow damage can also result in browning and death of juniper foliage.</p>
Timing	<p>Bark lesions and associated discoloured and dead foliage of infected hosts are visible all year round.</p>
Biosecurity	<p><i>P. austrocedri</i> spreads in water and can survive in soil; therefore, soil adhering to footwear, dogs' paws, bicycle and vehicle wheels, tools and equipment can potentially transmit the pathogen. Transportation and movement of infected plants is also a key means of long-distance spread. There is also a risk from introducing <i>P. austrocedri</i> in planting material used to enrich existing juniper stands. Precautions such as cleaning and disinfecting footwear and tools before and after a site visit are essential in outbreak areas to prevent further spread. Please use the boot-washing stations when provided and follow biosecurity instructions on signage. Keep vehicles on hard tracks and ensure that they are kept clean so that they are easier to disinfect when necessary and check them over for any soil and plant material before leaving an infected site.</p>
Reporting requirements	<p>This is a notifiable pathogen so if you find it you must report it. Please report through Tree Alert (www.forestry.gov.uk/treelert).</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>

Based on information available in September 2017.

Signs and symptoms



Photograph: Forest Research

Landscape effects of *Phytophthora austrocedri* on juniper populations.



Photograph: Forest Research

Dead and dying juniper that has been infected by *Phytophthora austrocedri*.

Signs and symptoms



Photograph: Forest Research

Dead and dying juniper that has been infected with *Phytophthora austrocedri*.



Photograph: Forest Research

Juniper with dying foliage that has been infected with *Phytophthora austrocedri*.

Signs and symptoms



Photograph: Ana Pérez-Sierra, Forest Research

Discoloured foliage of dying juniper that has been infected by *Phytophthora austrocedri*.



Photograph: Forestry Commission/Martin Furness, Natural England

Discoloured foliage of dying juniper that has been infected by *Phytophthora austrocedri*.

Signs and symptoms



Photograph: Suzanne Sandasi-Frey, Forest Research

Discoloured foliage of dying juniper that has been infected by *Phytophthora austrocedri*.



Photograph: Ana Pérez-Sierra, Forest Research

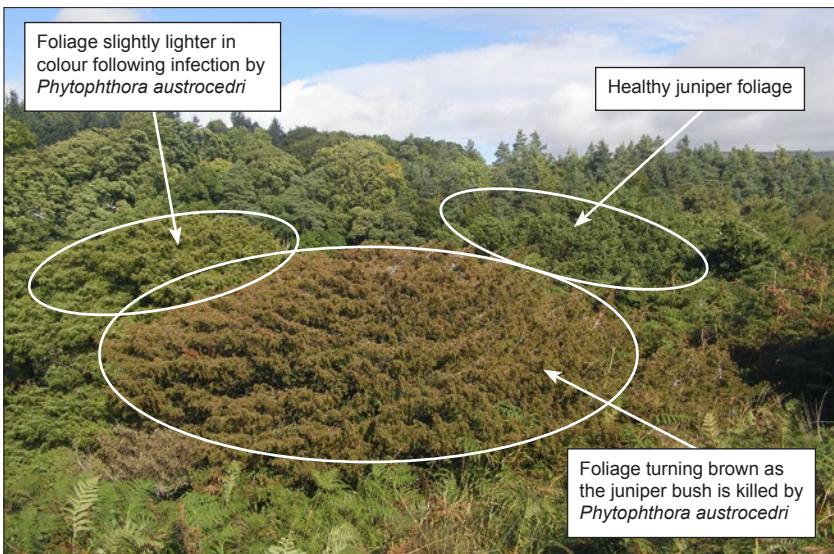
Dead and dying juniper that has been infected by *Phytophthora austrocedri*.

Signs and symptoms



Photograph: Suzanne Sandisi-Frey, Forest Research

Discoloured and dying foliage associated with a *Phytophthora austrocedri* bark infection on a juniper branch.



Photograph: Suzanne Sandisi-Frey, Forest Research

Juniper foliage at different stages of infection by *Phytophthora austrocedri*.

Signs and symptoms



Photograph: Ana Pérez-Sierra, Forest Research

Basal lesion caused by a *Phytophthora austrocedri* infection which has spread from the roots into the base of the stem.

Signs and symptoms



Photograph: Ana Pérez-Sierra, Forest Research

Branch lesion caused by an aerial *Phytophthora austrocedri* infection.

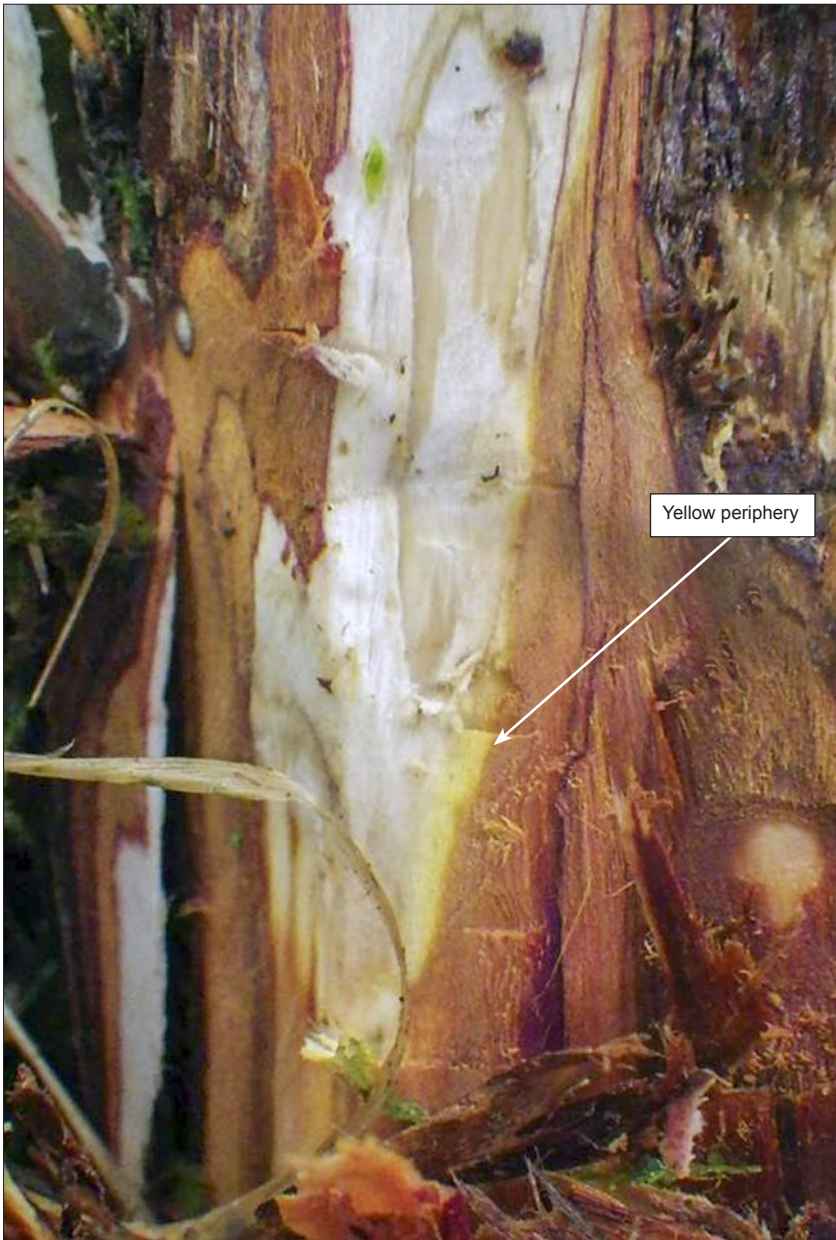
Signs and symptoms



Photograph: Ana Pérez-Sierra, Forest Research

Lesion with yellow periphery caused by *Phytophthora austrocedri* on juniper.

Signs and symptoms



Photograph: Forest Research

Lesion with yellow periphery caused by *Phytophthora austrocedri* on juniper.

Look-alike signs and symptoms



Photograph: Forestry Commission

Discoloration and death of discrete patches of foliage caused by aerial infections of *Diaporthe juniperivora*.

Look-alike signs and symptoms



Photograph: Forest Research

Discoloration and death of discrete patches of foliage caused by aerial infections of *Diaporthe juniperivora*.

Look-alike signs and symptoms



Photograph: Robert Strouts, Forestry Commission

Discoloration and death of discrete patches of foliage caused by aerial infections of *Diaporthe juniperivora*.



© Crown copyright 2017.

Published by Forest Research as part of the Observatree project.

Observatree aims to create a tree health early warning system using citizen science. Funded by the EU's LIFE programme, Observatree is a partnership project led by Forest Research, the research agency of the Forestry Commission. Project partners are Fera Science Ltd, Forestry Commission (GB and countries), the National Trust and the Woodland Trust. Supporting the project are the Animal & Plant Health Agency (APHA), the Department for Environment, Food & Rural Affairs (Defra) and Natural Resources Wales.

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:

Observatree: **www.observatree.org.uk**

Forestry Commission: **www.forestry.gov.uk**

Forest Research: **www.forestry.gov.uk/forestresearch**