

# JKI Data Sheets

## Plant Diseases and Diagnosis

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### *Phytophthora* on *Chamaecyparis lawsoniana* Murr. (Lawson cypress or Port-Orford-Cedar)



## Imprint

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## Importance of *Chamaecyparis lawsoniana*

Aside from a few forestry plantations, in Europe *C. lawsoniana* is planted in amenity situations and parks and used in hedgerows, windbreaks (<http://www.discoverlife.org>).

It is one of the most important conifers in the European ornamental nursery plant trade. A total amount of 75 (1999), 130 (2002) and 50 (2001 and 2003) tonnes of ornamental nursery stock were imported from North America to the EU (Global ornamental trade data, AIPH, International Statistics on Flowers and Plants).

## *Phytophthora* species

From *C. lawsoniana* trees with characteristic disease symptoms the following *Phytophthora* species have been isolated directly from the tissue or from the soil:

<i>Phytophthora</i> species	Disease symptoms	Reference
<i>lateralis</i>	nursery stock mortality bleeding canker branch infection leaf infections	Tucker & Milbrath, 1942 Roth <i>et al.</i> , 1957 Robin <i>et al.</i> , 2011 Trione & Roth, 1957
<i>eruigena</i>	stem and collar root	Clancy & Kavanagh, 1977
<i>hibernalis</i>	canker, foliage infection	Brasier & Strouts, 1978
<i>cinnamomi</i>	root rot	Torgesson, 1954
<i>citricola</i>		Bakonyi <i>et al.</i> , 2006

## Disease symptoms (see figures)

The most frequent symptoms of disease caused by *P. lateralis* are root and collar lesions. Fine roots are the first target of zoospores, and then hyphae develop in larger roots and in collar where they kill the inner bark (Oh & Hansen, 2007). After the removal of outer bark, a sharp margin is visible between necrotic phloem, discoloured in cinnamon-brown, and healthy cortical tissues. The whole canopy of infected trees turns to pale green, yellow and then light-brown, when the tree is dying.

Another type of symptoms caused by *P. lateralis* was observed. Dead branches with necrotic lesions (same colour as in collar) were observed in the middle or low part of the canopy and seemed to be progressive, spreading from the needles towards the trunk. Foliar infections by *P. lateralis* have been reported in Oregon (USA, Trione & Roth, 1957), in France, in the Netherlands, in UK and in Ireland (EPPO Reporting Service 2011/026, 2011/027, 2011/029, 2011/221, Green *et al.*, 2012).

## Possibility of Symptom Confusion

The collar and root lesions presented in the figures are quite specific for *Phytophthora* infection. General dieback could be caused by other stresses when not associated with root infections. Foliar and aerial infections can be caused by other pathogenic fungi.

## Disease development

The root system infection and invasion lead to the quick mortality of the trees (a few years). Disease in the USA is still spreading but slowly thanks to preventive methods (Hansen *et al.*, 2000).

## Diagnosis

It is not possible to identify a *Phytophthora* infection only by disease symptoms. Different diagnostic techniques like direct isolation, molecular and serological methods help to identify *Phytophthora* as the cause of the tree disease and to specify the *Phytophthora* species. Information on *Phytophthora* diagnosis on trees or in general are given for example in <http://forestphytophthoras.org/key-to-species>, <http://www.phytophthoradb.org>, <http://phytophthora-id.org/> and in Martin *et al.* (2012). For *Phytophthora lateralis* information on diagnosis are for example in: <http://www.jki.bund.de/plant-diseases.html>.

Please contact your national authorities (see next chapter) for help with diagnosis.

## What to do in case trees are suspected to be infected?

Contact your responsible national authorities, for example:

### Austria:

- Bundesforschungs- und Ausbildungszentrum für Wald, Naturgefahren und Landschaft (BWF)  
Federal Research and Training Centre for Forests, Natural Hazards and Landscape (BFW)  
Seckendorff-Gudent-Weg 8, 1131 Vienna, Austria; <http://www.bfw.ac.at/>
- Österreichische Agentur für Gesundheit und Ernährungssicherheit  
Austrian Agency for Health and Food Safety, Institute for Sustainable Plant Production  
Spargelfeldstraße 191, 1220 Vienna; <http://www.ages.at>

### Belgium:

- Département Sciences du Vivant, Centre Wallon de Recherches Agronomiques  
Life Sciences Department, Walloon Agricultural Research Centre  
Rue de Liroux 4, B-5030 Gembloux;  
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### Bulgaria:

- Българска Агенция по безопасност на храните: Централна лаборатория по карантина на растенията  
plant protection regional services: <http://www.babh.government.bg/en/labs.html>
- Агробιοинститут, Селскостопанска Академия бул 8, Драган Цанков № 8, София 1164  
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The Danish AgriFish Agency, <http://www.naturerhverv.fvm.dk>
- Institut for Geovidenskab og Naturforvaltning, Det Natur- og Biovidenskabelige Fakultet,  
Københavns Universitet  
Department of Geosciences and Natural Resource Management, Faculty of Science, University of  
Copenhagen | [www.ign.ku.dk](http://www.ign.ku.dk)

**Finland:**

- Elintarviketurvallisuusvirasto Evira, Kasvinterveysyksikkö  
Finnish Food Safety Authority Evira, Plant Health Mustialankatu 3, FI-00790 Helsinki  
[http://www.evira.fi/portal/fi/kasvit/viljely\\_ja\\_tuotanto/metsanviljely/valvonta/](http://www.evira.fi/portal/fi/kasvit/viljely_ja_tuotanto/metsanviljely/valvonta/)
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Regional Plant Protection services  
<http://agriculture.gouv.fr/suivi-de-la-sante-des-forets>  
<http://agriculture.gouv.fr/services-deconcentres>
- Laboratoire de Santé végétaux, unite de Mycologie, ANSES  
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- Pôle interrégionaux du Département de la santé des forêts:  
Regional forest health survey organisation:  
<http://agriculture.gouv.fr/departement-de-la-sante-des-forets>

**Germany:**

- Pflanzenschutzdienststellen der Bundesländer, Adressenliste siehe:  
regional plant protection services, address list see: <http://www.jki.bund.de/de/startseite/unsere-service/linksammlung.html>
- Julius Kühn Institut – Bundesforschungsanstalt für Kulturpflanzen (JKI), Institut für Pflanzenschutz in Gartenbau und Forst (JKI-GF)  
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Regional offices of NFCSO, Directorate of Plant Protection and Soil Conservation  
<http://www.nebih.gov.hu/elerhetosegek>
- MTA ATK Növényvédelmi Intézet  
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**Latvia:**

Valsts augu aizsardzības dienests

State Plant Protection Service <http://www.vaad.gov.lv/english/contacts/departments.aspx>

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Nationaal Referentie Centrum,

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[http://www.wsl.ch/dienstleistungen/waldschutz/index\\_EN](http://www.wsl.ch/dienstleistungen/waldschutz/index_EN)

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## Management and control

Management and control of the disease in the United States have been reviewed by Hansen *et al.* (2000).

Several cedar trees that have survived to natural epidemics or in artificially infested raised beds proved to have significant genetic resistance to *P. lateralis* using different inoculation procedures (Hansen *et al.*, 1989).

A breeding program was initiated by USDA Forest Service (USFS) in cooperation with Oregon State University to use these resistant trees in seed orchards aiming at providing resistant progenies for forest regeneration (<http://www.fs.fed.us/r6/dorena/poc/>). Some of these trees or their progenies are currently studied to confirm their resistance to European isolates.

In Europe, infected trees detected in new disease foci should be eradicated.

## Quarantine recommendation

*P. lateralis* was added to the European and Mediterranean Plant Protection Organisation (EPPO) A1 List in 2009 but was transferred to the A2 List in 2011 (EPPO Reporting Service 2011/187, <http://www.eppo.int/QUARANTINE/listA2.htm>).

## Literature used

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## Links to further information

[http://agriculture.gouv.fr/IMG/pdf/Phytophthora\\_lateralis.pdf](http://agriculture.gouv.fr/IMG/pdf/Phytophthora_lateralis.pdf)

<http://www.forestry.gov.uk/forestry/INFD-8BPLHD>

*Phytophthora* in the Forests: <http://forestphytophthoras.org/>

*Phytophthora* determination keys: <http://apsjournals.apsnet.org/doi/abs/10.1094/PDIS-08-11-0636>

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[http://www.cost.eu/domains\\_actions/fps/Actions/FP0801](http://www.cost.eu/domains_actions/fps/Actions/FP0801)

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## Disease symptoms of *Phytophthora* on *Chamaecyparis lawsoniana* (Lawson cypress or Port-Orford-Cedar)



**Symptoms on the upper plant parts**

**Left:** Tree dyback and mortality

**Right:** Aerial canker and branch mortality



**Cambium necrosis**

**Left:** cortical lesions spreading from one branch to the stem

**Central:** at the collar

**Right:** spreading from roots