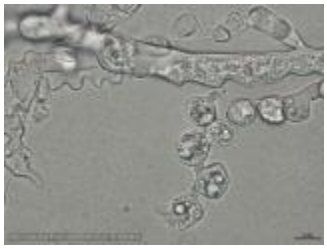
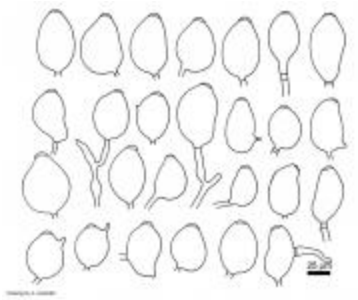
Greslebin, A., Hansen, E. M., and La Manna, L. 2011. *Phytophthora austrocedrae.* Forest Phytophthoras 1(1). doi: 10.5399/osu/fp.1.1.1806

Phytophthora austrocedrae

Overview

Phytophthora austrocedrae Gresl. & E.M. Hansen (2007) was isolated from necrotic lesions of stem and roots of *Austrocedrus chilensis* (Cupressaceae). It is homothallic with semi-papillate sporangia, oogonia with




Sporangium with distorted shape, from Q-bank (left); morphology of sporangia from Greslebin et al. 2007 (right) used with permission.

Genetics

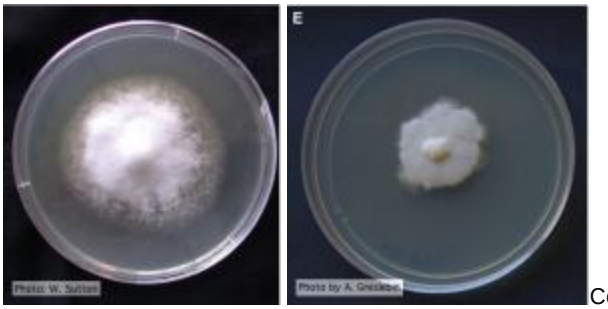
The ITS sequence was identical to sequences of *Phytophthora* DNA extracted from bark of diseased trees. *P. austrocedrae* is in clade 8 of the Cooke et al. (2000) molecular phylogeny of the genus, with *P. lateralis*, another pathogen of Cupressaceae, and other aggressive pathogenic species. *P. syringae* is the closest described relative.


Phylogeny of *P. austrocedrae* based on ITS rDNA sequence analysis (Greslebin et al. 2007)< >

Growth

In V8 and tomato juice (TA) agar the colony was uniform, without growth pattern, cottony, dome-shaped in the center and appressed or mostly submerged at the margins. In corn meal agar (CMA) the colony was appressed, with little or no aerial mycelium and the submerged mycelia showed an arachnoid pattern. In potato dextrose agar (PDA) the colony was uniform, without growth pattern, densely felty to woolly, with abundant and dense aerial mycelium. Growth was very slow and favored by cool temperatures. Optimum temperature was 17.5°C, with no growth at 25°C.

Maximum radial growth rate at optimum temperature on V8 agar ranged from 1.0 – 1.8 mm/day.


Colony morphology of *P. austrocedrae* at 16°C after 4 weeks on tomato juice agar (left) and potato dextrose agar (right).

Distinguishing characteristics for identification

Phytophthora austrocedrae is isolated from necrotic lesions of stem and roots of *Austrocedrus chilensis*. It is homothallic, characterized by semi-papillate sporangia, oogonia with amphigynous antheridia, and very slow growth with optimum temperature lower than most *Phytophthora* species. Phylogenetic analysis indicates

that its closest relative is *Phytophthora syringae*, another species frequently isolated from soil and streams in *A. chilensis* forests.

The searchable web-based database *Phytophthora*-ID is useful for rapid identification of *Phytophthora* species based on sequencing of the ITS or Cox spacer regions, followed by BLAST searching the database. *Phytophthora*-ID maintains a database of sequences that is selective for sequence accessions that come from trusted sources including published, peer-reviewed studies whenever possible.

Disease History

High levels of mortality of *A. chilensis* trees were reported in 1948 in Isla Victoria in Nahuel Huapi National Park, in Patagonia, Argentina, near plantings of exotic trees collected from around the world. In 1953, similar mortality was reported in an *Austrocedrus* stand located near a forest nursery in Epuyen, about 150 km distant from Isla Victoria. Since then, mortality has been reported in many places throughout the range of *A. chilensis* on th


sapwood is superficially stained. Both active and inactive lesions are encountered. When active, lesions are bright chestnut brown, moist and flexible. When inactive, they are dark brown, dry and hard, and difficult to distinguish from the outer bark. Defoliation is associated with the amount of root affected, but it is not totally reliable as an indicator of the percentage of necrotic tissues of main roots and root collar (Floria & Greslebin 2009). Sometimes, especially in stands where the disease is very active, older foliage inside the crown turns bright yellow and then red by the end of the summer. This symptom is usually associated with the presence of active lesions at the root collar. Resin exudation is often associated with *Phytophthora* lesions. Resin flow usually emerges from a resin pocket in the phloem near the active margin of a lesion.

Host Latin Name	Host Common Name	Symptoms	Habitat	Region
Austrocedrus chilensis	Chilean cedar	Canker, Decline	Forest	Argentina

Educational and Management Materials

- Novedades sobre el Mal del Ciprés
- La causa del “mal del ciprés”
- El Mal del Ciprés

References

Amoroso, MM, Larson BC. 2010. Stand development patterns as a consequence of the mortality in *Austrocedrus chilensis* forests. Forest Ecology and Management 259:1981-1992.

Baccal, NB, Rosso PH, Havrylenko MÌ. 1998. *Austrocedrus chilensis* mortality in the Nahuel Huapi National Park (Argentina). Forest Ecology and Management 109:261-269.

Barroetaventildea, C, Rajchenberg M. 1996. Hongos Aphyllophorales (Basidiomycetes) que causan pudriciones en *Austrocedrus chilensis*. Boletiacuten de la Sociedad Argentina de Botaacutenica 31:201-216.

Cooke, DEL, Drenth A, Duncan JM, Wagels G, Brasier CM. 2000. A molecular phylogeny of *Phytophthora* and Related Oomycetes. Fungal Genetics and Biology 30:17-32.

Filip, GM, Rosso PH. 1999. Cypress mortality (mal del cipres) in the Patagonian Andes: comparisons with similar forest diseases and declines in North America. European Journal of Forest Pathology 29(2):89–96.

La Manna, L, Rajchenberg M. 2004. The decline of *Austrocedrus chilensis* forests in Patagonia, Argentina: soil features as predisposing factors. Forest Ecology and Management. 190:345-357.

La Manna, L, Matteucci SD, Kitzberger T. 2008. Abiotic factors related to the incidence of the *Austrocedrus chilensis* disease syndrome at a landscape scale. Forest Ecology and Management 256:1087-1095.

La Manna, L, Collantes M, Bava J. 2008. Seedling recruitment of *Austrocedrus chilensis* in relation to cattle use, microsite environment and forest disease. Ecologia Austral 18:27–41.

Rosso, PH, Baccala´ N, Havrylenko M, Fontenla S. 1994. Spatial pattern of *Austrocedrus chilensis* wilting and the scope of autocorrelation analysis in natural forests. Forest Ecology and Management 67(1-3):273-279.