

This datasheet provides pest-specific information to support planning and completing early detection surveys. *Phytophthora austrocedri* is a former priority pest.

## ***Phytophthora austrocedri***

### **Scientific Name**

*Phytophthora austrocedri* Gresl. & E. M. Hansen, 2007

### **Synonym:**

*Phytophthora austrocedrae* Gresl. & E. M. Hansen, 2007

### **Common Names**

‘Mal del ciprés’ (MDC, cypress sickness), cypress wither/mortality, Austrocedrus Root Disease (ARD), ‘secamiento del ciprés’ (cypress drying), juniper decline

### **Type of Pest**

Oomycete (fungal-like organism)

### **Taxonomic Position**

**Class:** Oomycetes, **Order:** Peronosporales, **Family:** Peronosporaceae

### **Pest Recognition**

*This section describes characteristics of the organism and symptoms that will help surveyors recognize possible infestations/infections in the field, select survey sites, and collect symptomatic material.*

#### **Symptoms**

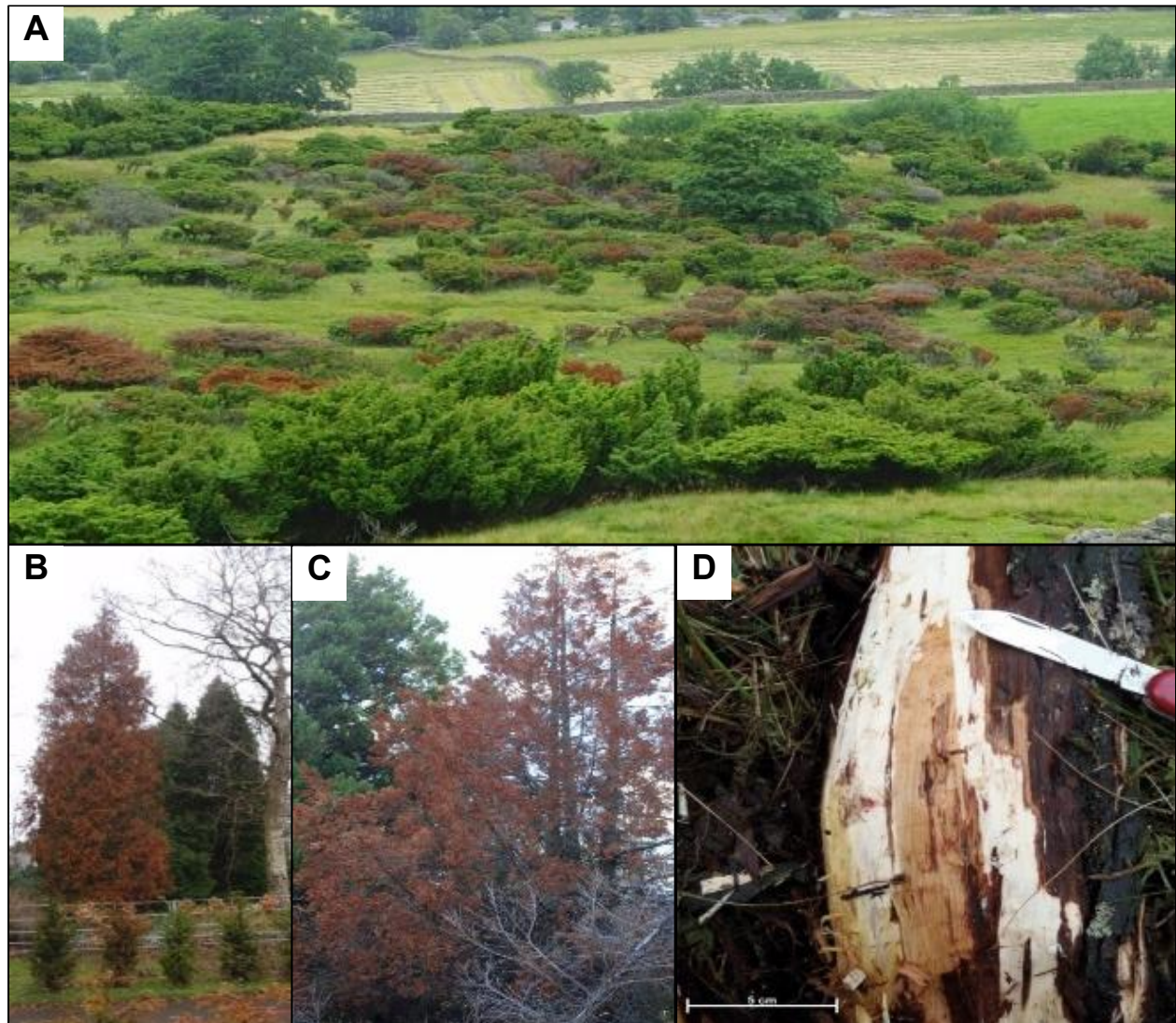
*Phytophthora austrocedri* symptoms are common among many root-rotting pathogens of woody plants. The most striking symptom is red to brown colored, foliar dieback (Fig. 1A-C), which develops over weeks to years (Green et al., 2015). Dieback occurs after roots are infected and the pest slowly progresses up the stem/trunk. Like other *Phytophthora* diseases, foliar dieback may become apparent after drought conditions because of the compromised root systems.

*Phytophthora austrocedri* produces an orange-brown, sometimes V-shaped, internal trunk lesion (Fig. 1D). Bark must be removed to see the lesion and sampling is done by carving tissue from its border. Mold, sporulation (spore production), or other signs of *P. austrocedri* will not be visible on affected plants, though lesions may “bleed” plant resin under the bark (Greslebin and Hansen, 2010).

#### **Pest Description**

*Phytophthora austrocedri* is a fungal-like, water mold pathogen (oomycete). In lab conditions, it grows extremely slow, taking several weeks to reach the size of a U.S.

quarter (Henricot et al., 2017). The global origin of *P. austrocedri* is unknown (Donald et al., 2021; Henricot et al., 2017).



**Figure 1.** *Phytophthora austrocedri* infected trees. Red-brown foliar dieback in (A) *Juniperus communis* (Common juniper) landscape, (B) *Chamaecyparis nootkatensis* (Nootka cypress), and (C) *Austrocedrus chilensis* (Chilean cedar). Orange-brown lesion in (D) the phloem expanding up from the trunk collar in an infected juniper. Figures A, B, and D: Crown Copyright, Forest Research. Figure C: courtesy of Alina Greslebin.

## Easily Mistaken Species

Several other *Phytophthora* species present in the U.S. can cause similar symptoms of dieback, internal trunk lesions, and/or root rot on junipers and cypresses. These include, but may not be limited to, *P. cactorum*, *P. cinnamomi*, *P. citrophthora*, *P. cryptogea*, *P. drechsleri*, *P. lateralis*, *P. niederhauseri*, and *P. syringae*, all of which can occur in ornamental systems (Abad et al., 2014; Doubrava et al., 2024; Jung et al., 2017; Molnar et al., 2020; Peterson et al., 2020; USDA, 2024a). In areas where it is established, *P.*

*austrocedri* has notably been detected with several other *Phytophthora* spp. (Riddell et al., 2019; Schiffer-Forsyth et al., 2023; Vélez et al., 2020).

Other pathogens, such as *Fusarium* spp., *Rhizoctonia* spp., *Pythium* spp., and *Phytophthora* spp., can cause cypress and juniper symptoms (University of Minnesota Extension, 2024) similar to *P. austrocedri*. However, these are likely to appear as root rotting with stem/trunk girdling and softened external layers of plant tissue. Foliar pathogens of cypresses that can cause similar dieback without root rotting and minimal stem/trunk lesions include *Phomopsis* spp., *Kabatina* spp., and rust pathogens (Doubrava et al., 2024; University of Minnesota Extension, 2024).

## Biology and Ecology

*Phytophthora austrocedri* produces multiple types of spores that serve different roles in its lifecycle. As little as 3 weeks after infection, *P. austrocedri* can self-fertilize to produce a resting spore (oospore) that is long-lived and can survive challenging conditions such as extreme cold, hot, and dry environments (Greslebin et al., 2007). Resting spores can persist through these conditions in soil, potting media, or infected roots until cool, wet conditions permit active growth and spread. In addition, during cool, wet conditions, *P. austrocedri* produces an intermediate spore type (sporangia) that differentiates into epidemic spores (zoospores). Zoospores can swim short distances toward plant roots in water films (Green, 2018). Like other *Phytophthora* spp., these swimming spores can cause numerous new infections per year, being released any time conditions are favorable (Hansen, 2015). Swimming spore production stops during dry, hot conditions (Taccari et al., 2019), so spread to new plants may be slower during these times.

When cultured, *P. austrocedri* grows slowly with a cool optimal growth temperature of 63.5 °F (Greslebin et al., 2007). It scarcely grows above 72.5 °F (Henricot et al., 2017), but it is unknown if *P. austrocedri* is killed or simply dormant in warm temperatures. In addition to cool conditions, *P. austrocedri* grows well in wet soil, including areas with flat slopes; heavy, water-holding soil textures; and frequent flooding, irrigation, or rain (Giordana et al., 2020; La Manna et al., 2008; Riddell et al., 2020; Vélez et al., 2020).

Seedlings as well as mature trees can be infected by *P. austrocedri*, but symptoms and plant death occur more quickly in young plants (Greslebin and Hansen, 2010); (Green et al., 2015); (Taccari et al., 2019). In natural areas, cypresses close to other infected cypresses are more likely to develop symptoms (Vélez et al., 2020).

Stems, trunks, and branches can be infected by *P. austrocedri*, but most natural infections occur through fine roots and progress upward into the stem/trunk (Green et al., 2015); (Greslebin and Hansen, 2010). New infections occur during wet, cool conditions that favor pathogen growth and sporulation, but due to its slow growth, foliar dieback appears after the plant has been infected for a long time (Green et al., 2015); (Greslebin and Hansen, 2010). Like other root diseases, aerial symptoms may only become apparent after plants undergo water stress, since *P. austrocedri* damages roots

and vascular tissue (Green et al., 2015); (Greslebin and Hansen, 2010); (Henricot et al., 2017).

## Known Vectors (or associated insects)

*Phytophthora austrocedri* is not a known vector and has no insect vectors.

## Known Hosts

The natural host range of *P. austrocedri* is likely limited to Cupressaceae, the cypress and juniper plant family. Where it causes epidemics, *P. austrocedri* spread from horticultural-industry plants to cypress or juniper growing in natural areas (Donald et al., 2021; Henricot et al., 2017; Vélez et al., 2020).

*The host list below includes cultivated and wild plants that 1) are infected by the pathogen under natural conditions, 2) are described as major, primary, or preferred hosts, and 3) have primary evidence for damage documented in the literature.*

**Table 1.** Naturally infected hosts of *Phytophthora austrocedri*.

Scientific Name	Common Name	Type/Use	References/Notes
<i>Austrocedrus chilensis</i> *	Chilean cedar	Arboretum tree (in U.S.)	(Greslebin and Hansen, 2010)
<i>Chamaecyparis lawsoniana</i> **	Port Orford cedar/Lawson cypress	Forest tree	(Henricot et al., 2017)
<i>Chamaecyparis nootkatensis</i> **	Nootka cypress	Forest tree	(Green et al., 2016)
<i>Cupressocyparis leylandii</i> **	Leyland cypress	Ornamental tree	(Green, 2018; Green et al., 2015)
<i>Cupressus sempervirens</i> **	Mediterranean cypress	Ornamental tree	(Mahdikhani et al., 2017)
<i>Juniperus communis</i> **	Common juniper	Forest shrub/tree	(Green et al., 2012)
<i>Juniperus horizontalis</i> **	Creeping juniper	Ornamental shrub/tree	(Werres et al., 2014)

\*Hosts with an asterisk are present in the U.S., but in limited plantings or arboreta (GBIF, 2024); (Sudianto et al., 2020); (USDA, 2024b).

\*\*Hosts with two asterisks are present in broader distributions in the U.S. (GBIF, 2025).

### Naturally Infected Hosts with Symptoms that Tested Positive for *P. austrocedri*

*Chamaecyparis obtusa* (hinoki false cypress), *Ch. pisifera* (sawara-cypress), *Juniperus chinensis* (Chinese juniper), *J. sabina* (savin), *J. scopulorum* (Rocky Mountain juniper), *J. squamata* (flaky juniper), *J. virginiana* (eastern red cedar), *J. x media*, *J. x pfitzeriana*, *Thuja occidentalis* (Arborvitae), and *T. orientalis* (oriental arborvitae) (DEFRA, 2017); (Gilligan, 2024). Pathogenicity tests are needed to confirm these hosts.

## Potential Hosts

In lab conditions, *Fitzroya cupressoides*\* (Patagonian cypress), *Pilgerodendron uviferum*\* (Guitacas cypress), and *Taxus baccata*\*\* (English yew) became infected with *P. austrocedri* (Green et al., 2015); (Green, 2025); (Taccari et al., 2019).

## Known Distribution

The native range of *P. austrocedri* is unknown.

*Phytophthora austrocedri* has been introduced and is established in:

**South America:** Argentina (Greslebin et al., 2007).

**Europe:** United Kingdom (Green et al., 2015).

*Phytophthora austrocedri* has been detected in ornamental plants from nurseries or the plant trade, originating from the following areas:

**Europe:** France, Germany, Italy, Netherlands, Slovakia (Henricot et al., 2017); (Jung et al., 2016); (Spence, 2016).

**Asia:** Iran (Mahdikhani et al., 2017).

## Status of Infestation in the United States (February 2025)

In 2024, *P. austrocedri* was detected in commercial ornamental nurseries in Oregon.

## Pest Importance

*Phytophthora austrocedri* threatens wild stands in Argentina and the United Kingdom. In Argentina, it reduces Chilean cedar stands by 50 to 90%, a tree that provides valuable wildlife habitat and lumber, and prevents desertification (Greslebin et al., 2015). In the UK, mortality varies by site with *P. austrocedri* causing symptoms at some sites in up to 80% (Green et al., 2015) of common juniper, an ecologically important, native conifer (Forest Research, 2024). Epidemics in the UK were worsened due to the planting of undetected infected nursery juniper for environmental restoration (Donald et al., 2021).

The United Kingdom initiated eradication efforts for *P. austrocedri* in 2011, followed by placing it under official control in 2012 (EPPO, 2024; Webber et al., 2012). In 2020, the UK recategorized it as a Regulated non-Quarantine Pest (EPPO, 2024). Multiple reports state that *P. austrocedri* is intercepted or found on imported horticultural plants and in nursery waste (Riddell et al., 2019; Schiffer-Forsyth et al., 2023; Spence, 2016; Werres et al., 2014).

In the U.S., *P. austrocedri* was listed as a CAPS Priority Pest in 2020, but was later removed to focus efforts on higher priority pests.

## Pathway

*Phytophthora austrocedri* moves over long distances into new areas through infected ornamental plants that are not showing outward symptoms (Giordana et al., 2020; Henricot et al., 2017; Riddell et al., 2019; Vélez et al., 2020). Imported plants pose a risk

of *P. austrocedri* introduction because symptoms take a long time to develop and can resemble other diseases, insect issues, or abiotic problems (Forest Research, 2024; Green et al., 2015; Greslebin and Hansen, 2010). Infected nursery plants used for restoration plantings accelerated the *P. austrocedri* epidemic in UK junipers (Donald et al., 2021). Over shorter distances, *P. austrocedri* can spread naturally through soil (Elliot et al., 2015; Riddell et al., 2020), run-off and irrigation sources (Riddell et al., 2020; Schiffer-Forsyth et al., 2023), and on animal hooves and hiking boots (Elliot et al., 2015). *Phytophthora austrocedri* does not spread from plant to plant through spore splashing (Riddell et al., 2020), which differs from related pathogens like *P. ramorum*.

As of February 2025, Agricultural Commodity Import Requirements restrict *P. austrocedri* hosts from countries where the pathogen occurs. The most common *P. austrocedri* hosts (juniper and cedar) are Not Authorized Pending Pest Risk Analysis (NAPPRA) from the UK and European Union (ACIR, 2025b). Due to other exotic pests, some *P. austrocedri* hosts (juniper and cypress) from Argentina and elsewhere are either imported with increased-requirements for phytosanitary certifications (ACIR, 2025a) or subject to a lengthy post-entry quarantine (ACIR, 2025c).

Use the [Agricultural Commodity Import Requirements\(ACIR\) manual](#) to determine 1) if host plants or material are allowed to enter the United States from countries where the organism is present and 2) what phytosanitary measures (e.g., inspections, phytosanitary certificates, post entry quarantines, mandatory treatments) are in use. This manual is updated regularly.

## Potential Distribution Within the United States

Based on daily temperature information, nearly all areas of the continental United States have portions of the year in which *P. austrocedri* could grow (PPRA, 2024). Areas with the greatest proportion of the year in optimal temperature conditions are considered higher risk. These places include (1) the Pacific Coast in California, Oregon, and Washington; (2) coastal portions of the Eastern Seaboard (from North Carolina north to Maine) and the Gulf Coast; and 3) some high-elevation sites in North Carolina, Virginia, and West Virginia (PPRA, 2024). Ornamental nurseries with regular irrigation are likely to supply sufficient moisture for *P. austrocedri* growth.

## Survey and Key Diagnostics

### **Methods for Pest Surveillance:**

*Phytophthora austrocedri* is a former National Priority Pest for the Cooperative Agricultural Pest Survey (CAPS) program. Please use this datasheet for guidance for survey and identification. The former approved methods for pest surveillance on the CAPS Resource and Collaboration website will not be updated.

### **Human and Animal Pathogens Transmitted:**

Not known to transmit any human or animal pathogens.

### **Plant Pathogens and Organisms Vectored:**

Not known to vector any pathogens or other associated organisms.

### **Survey Method**

The survey method is destructive sampling of woody, diseased trunk tissue carved from under the bark of juniper and cypress hosts.

### **Method Notes:**

Tissue sampling will rely on extremely sharp knives or potentially a hatchet for bark removal. For larger shrubs and trees, a drill with a Forstner bit or hole saw, of slightly greater than 2 inch diameter, may be the most effective way to attain a 2 × 2 inch sample. A chisel may be used after the hole saw to remove tissue.

Trees and shrubs that do not have an orange-brown lesion under the bark should not be sampled.

### **Survey Recommendations:**

#### **Time of Year to Survey:**

*Phytophthora austrocedri* symptoms take weeks to years to develop in their perennial, evergreen hosts, so sampling is not season-specific. If entering high-risk sites, avoid sampling in extremely rainy or muddy conditions to reduce the risk of spreading the pathogen to unexposed locations on boots or equipment.

#### **Survey Design:**

Surveyors should perform a phased visual survey (described below) followed by sampling plants for molecular detection of *P. austrocedri*.

1. At the field scale, visually evaluate cypress and juniper plants for reddish-brown dieback on all or part of the foliage. Then, look closer for fungal sporulation or signs of insect infestation; if absent, proceed to 2. Otherwise, evaluate another plant with reddish-brown dieback.
2. Using a sharp knife or hatchet, remove thin sections of bark from the transition between the crown and the trunk to see inner tissue (cambium). If orange-brown, remove additional thin sections of tissue higher on the plant to identify the junction between diseased (orange-brown) and healthy (cream-white) tissue. If not orange-brown, return to 1 and assess another plant.
3. Using a sharp knife, hatchet, or drill, remove about a 2 × 2 inch section of woody tissue from the transition between diseased and healthy tissue. Place directly into labeled sample bag.

#### **Survey Site Selection:**

Survey for *P. austrocedri* in cypress and juniper family plants, especially in the *Chamaecyparis*, *Cupressus*, *Juniperus*, and *Thuja* genera. Common names include Arborvitae, and eastern and western red cedar. Nursery plants are at higher risk of

disease. Larger nurseries with high proportions of shipped-in plants (instead of those propagated on-site) may be good locations to survey.

#### Site Inspection:

Areas where wet soil conditions occur, whether from flooding, standing water, or irrigation, are more likely to allow *P. austrocedri* growth and establishment. Higher-risk plants are those close to other diseased plants, in shared standing water, downstream of infected plants, and that are over-irrigated.

#### Sample Collection Instruction:

Woody plant tissue from inside the bark of cypress and juniper plants is sampled using a sharp knife, hatchet, or drill. This is sampled only after confirming an orange-brown lesion under the trunk bark (healthy tissue is cream-white). Each sample should be about 2 × 2 inches of tissue, collected from the area where the orange-brown lesion borders healthy tissue. At least one sample from each “lot” (a group of plants of the same age and variety, in the same general location) of potential hosts should be collected per location. Samples should be submitted in individual paper or plastic bags labeled with the variety, location, and date. Bags should be placed on ice and sent overnight to your screening lab. Please verify the screening lab is equipped to process woody tissue for *Phytophthora* prior to beginning surveys.

#### Diagnostic Method

##### ID/Diagnostic:

Molecular: Quantitative real-time polymerase chain reaction (qPCR). A rapid test such as the *Phytophthora* ELISA test system (Agdia Inc. Elkhart, IN) may be used to pre-screen samples to genus and discard negative samples.

##### Identification Resources:

Diagnostic: Symptoms of *P. austrocedri* overlap with numerous root-rot pathogens of cypress and juniper, making molecular detection essential for diagnosis.

##### Mistaken Identities:

*Phytophthora austrocedri* symptoms are non-specific and can be mistaken for other issues. Commonly encountered non-targets are other *Phytophthora* spp., root rot pathogens (either fungal or other water molds), insect pests, or abiotic damage caused by heavy snow, drought, nutrient deficiencies, and herbicide damage. Insect pests that affect juniper and cypress include moths, aphids, midges, spider mites, scales, bagworm, webworms, root weevils, and nematodes (Doubrava et al., 2024);(Lightle, 2024). Most insect pests and foliar fungi can be differentiated from *P. austrocedri* based on signs (presence of insect bodies, eggs, frass, sporulation, or mold). Sampled tissue must only be from an inner trunk that has an orange-brown lesion.

##### Survey Resources:

Doubrava, N., Scott, J.M., Blake, J.H., Gorsuch, C.S. and Williamson, J., 2024. Juniper diseases and insect pests, Home and Garden Information Center. Clemson

- University Cooperative Extension, <https://hgic.clemson.edu/factsheet/juniper-diseases-insect-pests/>.
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## Versions

2013 Datasheet completed (Version 1)

2026 Datasheet updated with methods included. AMPS were not updated as this is not a National Priority Pest (Version 2)