

CAPS Datasheets provide pest-specific information to support planning and completing early detection surveys.

Pseudopezicula tracheiphila

Scientific Name

Pseudopezicula tracheiphila

Synonyms:

Phialophora tracheiphila (anamorph)

Pseudopeziza tracheiphila

Common Name

Disease: Red fire disease of grapevine, Rotbrenner disease of grapevine, Roter brenner

Type of Pest

Plant fungal pathogen

Taxonomic Position

Phylum: Ascomycota, **Class:** Leotiomycetes, **Order:** Helotiales,

Family: Discinellaceae

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. For morphological descriptions, see the Identification/Diagnostic resources on the AMPS pest page on the CAPS Resource and Collaboration website.

Symptoms/Signs

Pseudopezicula tracheiphila occurs on leaves, mostly in association with the vascular elements (König et al., 2009). Lesions on leaves (Fig. 1, 2) are initially yellow on white cultivars and bright red to reddish brown on red cultivars (Mohr and Herrmann, 2005). A reddish-brown necrosis develops in the center of the lesion (Fig. 2), leaving only a thin margin of yellow or red tissue between the necrotic and green areas of the leaf (Mohr and Herrmann, 2005). The lesions are typically confined to the major veins and the edge of the leaf and are more than an inch wide (Mohr and Herrmann, 2005). Early infections occur on the first to the sixth leaf position of young shoots, resulting in minor losses (Mohr and Herrmann, 2005). Young leaves are susceptible to infection after they reach a width of about two inches, but the probability of infections increases from the 6-leaf stage (König et al., 2009). Later infections attack leaves up to the 10th or 12th position on the shoot, which results in severe defoliation. The fungus also attacks the inflorescences and berries causing them to rot, dry out, and fall (Mohr and Herrmann, 2005).



Figure 1. Rotbrenner infection of grape leaves. Photos courtesy of Dr. Michael Maxiner, Julius Kühn Institute (JKI), Federal Research Centre for Cultivated Plants Institute for Plant Protection in Fruit Crops and Viticulture

Easily Mistaken Species

Identification of *P. tracheiphila* requires morphological or molecular diagnostic methods and cannot be conclusively done in the field. Symptoms of infected hosts may resemble symptoms of abiotic stress or infection by other plant pathogens. *Pseudopezizicula tetraspora*, the causal agent of angular leaf scorch, causes similar symptoms to *P. tracheiphila* in grape (Pearson et al., 1988). Diagnostic features for these two fungi are similar, but *P. tetraspora* only produces four ascospores in contrast to *P. tracheiphila*, which produces eight ascospores.

Biology and Ecology

Pseudopezizicula tracheiphila forms tiny, densely aggregated apothecia, mostly on the lower surface of leaves (Korf et al., 1986). The fungus overwinters in infected vine leaves on the ground (König et al., 2009). The source of inoculum of the disease is ascospores, which are formed sexually in asci within apothecia. Apothecia are formed primarily on fallen leaves during the spring. Apothecia may also develop on current-season infected leaves during late summer or fall. Apothecia development requires sufficient wetness on fallen leaves (König et al., 2009). Depending on weather conditions, apothecia with mature ascospores may be present throughout the season (Pearson et al., 1991). Under wet and warm conditions, ascospores are released before bud burst. Disease incidence and severity depend on the abundance of apothecia on fallen leaves on the ground of the vineyard and on the number of released ascospores and leaf wetness (König et al., 2009). Heavy rainfall and prolonged leaf wetness favor infection and lead to severe disease. The fungus has an incubation period of 2–4 weeks from infection to symptom development (König et al., 2009).

Known Hosts

Major Host: *Vitis vinifera* (grape), *Vitis* spp. (grape) (Korf et al., 1986).

Other known hosts: *Parthenocissus quinquefolia* (Virginia creeper), *Parthenocissus tricuspidata* (Boston ivy) (Farr and Rossman, 2022; Korf et al., 1986).

Pest Importance

Pseudopezizicola tracheiphila is an important grape pathogen in the cool viticulture regions of Europe (e.g., Austria, France, Germany, Hungary, and Switzerland) (Pearson et al., 1991). This pathogen causes economic yield loss in all common European cultivars of grape, especially 'Elbling', 'Müller-Thurgau', and 'Domina', where it causes strong early leaf-drop and decreased sugar content of the grapes. The decreased grape sugar content leads to a reduction in the quality of wine made from these grapes (Pearson et al., 1991).



Figure 2. Closeup of rotbrenner on grape leaves. Photo courtesy of Dr. Michael Maxiner, Julius Kühn Institute (JKI), Federal Research Centre for Cultivated Plants Institute for Plant Protection in Fruit Crops and Viticulture

Infection of grape flower clusters may result in a fruit yield reduction of 25–100%. High levels of infection during flowering can lead to severe yield losses of up to 90%. Early infections generally result in less loss than late infections (Holz, 2000).

Pseudopezizicola tracheiphila is listed as a harmful organism in Brazil, China, Colombia, Egypt, and Honduras (PExD, 2022). There could be trade implications with these countries if the pathogen is found in the United States.

Known Vectors (or associated insects)

The fungus does not have a known vector and does not have any associated organisms.

Known Distribution

Asia: Jordan, Turkey. **Europe:** Austria, France, Germany, Hungary, Luxembourg; Moldova, Montenegro (former Yugoslavia), Romania, Russia. Serbia, Switzerland, Ukraine; **Africa:** Tunisia; **South America:** Brazil (Crous et al., 2020; Farr and Rossman, 2022; Korf et al., 1986)

Status of presence in the United States (Month Year)

Pseudopezizicola tracheiphila has not been conclusively found in the United States. A North American report from New York and Pennsylvania in 1986 is now known to be a related fungal species *Pseudopezizicola tetraspora* (Korf et al., 1986; Pearson et al., 1986; Pearson et al., 1988).

Pathway

The natural spread of *P. tracheiphila* is primarily by water and airborne spores (Plant Health Australia, 2009). Long-distance dispersal of the pathogen occurs through the movement of infected host planting material. For this reason, the transport of *Vitis* spp.

is regulated to prevent the spread of *P. tracheiphila*. *Vitis* spp. (all propagules except seeds) are Not Authorized Pending Pest Risk Analysis (NAPPRA) from all countries except for Canada when meeting the required import conditions (Plants for Planting Manual, 2022).

Parthenocissus propagative material, however, doesn't appear to be subject to regulations. Although shipments appear to be mostly seeds, there were nine shipments of *Parthenocissus* spp. propagative material since 2019 from countries where *P. tracheiphila* is known to occur. There were an additional 69 shipments of *Vitis* spp. propagative material from countries where this pest is known to occur. These shipments also appear to be mostly seed (ARM, 2022).

There have been one hundred interceptions of host material that could harbor *P. tracheiphila* from countries known to have the disease. Many (~90) of these interceptions were destined for propagation (ARM, 2022).

Use the PPQ Commodity Import and Export manuals listed below 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. These manuals are updated regularly.

Agricultural Commodity Import Requirements(ACIR) manual: ACIR provides a single source to search for and retrieve entry requirements for imported commodities. <https://acir.aphis.usda.gov/s/>

Plants for Planting Manual: This manual is a resource for regulating imported plants or plant parts for propagation, including buds, bulbs, corms, cuttings, layers, pollen, scions, seeds, tissue, tubers, and like structures. https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/plants_for_planting.pdf

Treatment Manual: This manual provides information about treatments applied to imported and domestic commodities to limit the movement of agricultural pests into or within the United States. https://www.aphis.usda.gov/import_export/plants/manuals/ports/downloads/treatment.pdf

Potential Distribution within the United States

Based on the global distributions of this pathogen, it can be presumed that *P. tracheiphila* may occur in Plant Hardiness Zones 1–12 (Takeuchi et al., 2022). Grapes are grown throughout the continental United States. California, where wine and table grapes are grown, has the most grape growing acreage of any state (USDA-NASS, 2020). Other states with a significant commercial grape growing industry include: Colorado, Illinois, Oregon, Michigan, New York, North Carolina, Pennsylvania, Texas, Virginia, and Washington (USDA-NASS, 2020).

Survey and Key Diagnostics

For the most up-to-date methods for survey and identification, see Approved Methods on the CAPS Resource and Collaboration Site, <https://caps.ceris.purdue.edu/approved-methods>.

References

- ARM. 2022. Agriculture Risk Management (ARM) Data Mart. Diagnostic Request Detail. United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine.
- Crous, P. W., M. J. Wingfield, Y.-H. Chooi, C. L. Gilchrist, E. Lacey, J. I. Pitt, F. Roets, W. J. Swart, J. F. Cano-Lira, and N. Valenzuela-Lopez. 2020. Fungal Planet description sheets: 1042–1111. *Persoonia: Molecular Phylogeny and Evolution of Fungi* 44:301.
- Farr, D. F., and A. Y. Rossman. 2022. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. *in*. <https://nt.ars-grin.gov/fungaldatabases/>.
- Holz, B. 2000. Integrated control of Rotbrenner (*Pseudopezicula tracheiphila* (Mull.-Thurg.) Korf & Zhuang (Discomycetes Helothiales) in the wine growing region Moselle-Saar-Ruwer. *IOBC WPRS BULLETIN* 23(4):59-62.
- König, H., G. Uden, and J. Fröhlich. 2009. Biology of Microorganisms on Grapes, in Must and in Wine. Springer.
- Korf, R., R. Pearson, W. Zhuang, and B. Dubos. 1986. *Pseudopezicula* (Helotiales, Peziculoideae), a new discomycete genus for pathogens causing an angular leaf scorch disease of grapes ("Rotbrenner"). *Mycotaxon* 26:457-471.
- Mohr, H. D., and J. V. Herrmann. 2005. *Farbatlas Krankheiten. Schädlinge und Nützlinge an der Weinrebe*:125-126.
- Pearson, R., B. Dubos, and R. Korf. 1986. Occurrence of *Pseudopeziza tracheiphila* causal agent of rot brenner on grape in New York. *Plant Disease* 71:628-632.
- Pearson, R., W. Siegfried, M. Bodmer, and H. Schüepp. 1991. Ascospore discharge and survival in *Pseudopezicula tracheiphila*, causal agent of Rotbrenner of grape. *Journal of Phytopathology* 132(3):177-185.
- Pearson, R. C., F. D. Smith, and B. Dubos. 1988. Angular leaf scorch, a new disease of grapevines in North America caused by *Pseudopezicula tetraspora*. *Plant Disease* 72(9):796-800.
- PExD. 2022. Phytosanitary Export Database (PExD), United States Department of Agriculture. <https://pcit.aphis.usda.gov/PExD/faces/reportFormat.jsf> (Date Access: Sept 26, 2022).
- Plant Health Australia. 2009. Pest Risk Review: Rotbrenner. Viticulture Industry Biosecurity Plan 2009.
- Plants for Planting Manual. 2022. Animal and Plant Health Inspection Service (APHIS), United States Department of Agriculture (USDA).
- Takeuchi, Y., G. Fowler, and A. S. Joseph. 2022. SAFARIS: Global plant hardiness zone development. . North Carolina State University, Center for Integrated Pest Management/United States Department of Agriculture, Animal and Plant Health Inspection Service, Plant Protection and Quarantine, Science and Technology, Plant Epidemiology and Risk Analysis Laboratory, Raleigh, NC. 6p.. <https://safaris.cipm.info/safarispestmodel/StartupServlet?phz>.

USDA-NASS. 2020. United States Department of Agriculture, National Agricultural Statistics Service (NASS).

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Versions

January, 2013: Datasheet completed (Version 1)

December, 2022: Datasheet completely revised and incorporated into new template (Version 2)

Reviewers

- Dr. Summaira Riaz, USDA-ARS, San Joaquin Valley Agricultural Sciences Center, Parlier, CA.
- Dr. Megan Romberg, National Specialist/Mycology, USDA-APHIS-PPQ-NIS, Beltsville, MD.