CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Phytophthora mediterranea C. Bregant, Mulas & Linald. (2021)

Pest Rating: C

Kingdom: Chromista, Phylum: Oomycota,
Class: Oomycetes, Order: Peronosporales,
Family: Peronosporaceae

Comment Period: 12/05/2024 through 01/19/2025

Initiating Event:

In August 2024, a plant nursery in a Federal park in San Francisco submitted pear baits that had been incubated in run-off water collected from nursery blocks to the CDFA Plant Pest Diagnostics Center at Meadowview. From the pears baited with the water from *Leucadendron* shrubs, CDFA plant pathologist Wei Belise isolated *Phytophthora mediterranea* and *P. cinnamomi*. She confirmed her diagnosis by PCR and sequencing analysis and assigned *P. mediterranea* a temporary Z-rating. *Phytophthora mediterranea* has not been through the pest rating process. The risk to California from *P. mediterranea* is described herein and a permanent rating is proposed.

History & Status:

Background:

Phytophthora is a genus of major importance with over 150 described species and informally designated taxa. Most are plant pathogens that are responsible for branch, foliar, and fine root diseases and collar rots of woody plant species (Brasier, 2009). *Phytophthora* species can be highly invasive, and when they are introduced to new areas, they can affect the health and life span of trees drastically, sometimes destabilizing ecosystems. Several of the most destructive epidemics of trees and forests have been caused by *Phytophthora* species including the extensive mortality of *Quercus* spp. and *Notholithocarpus densiflorus* in California by *P. ramorum* (Rizzo et al., 2002; Grunwald et al., 2012).

Phytophthora mediterranea sp. nov. was described first in Italy. This new species was shown to be associated with collar and root rot symptoms on myrtle (*Myrtus communis*) seedlings grown in a forest nursery. Pathogenicity tests have also shown that *P. mediterranea* was pathogenic to mastic (*Pistacia*

lentiscus) tree seedlings, and thus has the potential to threaten the native Mediterranean maquis vegetation (Bregant et al., 2021). The first report of *P. mediterranea* in California was published in 2022 by Troullais et al. It was isolated from several pistachio and almond orchards with declining trees in the Central Valley. It has been placed in the subclade 7c of *Phytophthora,* close to *P. parvispora* and *P. cinnamomi* (Abad et al., 2023).

Hosts: Myrtis communis (myrtle), *Prunus dulcis* (almond), *Pistacia atlantica* (Mt. Atlas pistache), *P. lentiscus* (mastic), and *P. vera* (pistachio) (Farr and Rossman, 2024). It has been associated with *Leucodendron* nursery stock but pathogenicity has not been established (CDFA PDR database, 2024).

Symptoms: Pistachio and almond trees show symptoms of chlorotic foliage and defoliation. An early symptom is trunks exuding a light beige gum that turns black over time. Basal crown rot, that extends from below the soil line up into the rootstock portion of the trunk, can be seen if the outer bark is removed. Mature trees show poor vigor, crown rot, and later profuse gumming on the lower portions of the trunk (Trouillas et al., 2022). In Italy, nursery trees were selected for *Phytophthora* testing if they had disease symptoms such as chlorosis, defoliation, shoot blight, sudden death, as well as collar and root rot. *Phytophthora mediterranea* was shown to be associated with collar and root rot symptoms in myrtle seedlings (Bregant et al., 2021).

Transmission: Phytophthora mediterranea produces asexual spores (sporangia) but sexual spores (oospores) have not been observed. Resting spores (chlamydospores) are produced abundantly. Soilborne *Phytophthora* species can survive as spores in soil or water with infected roots and organic debris. The movement of contaminated soil and water and infected plants for planting are the major pathways for *Phytophthora* movement on a regional, national, or international scale. *Phytophthora* infestations of nursery stock are well documented in Oregon (Parke et al., 2014) and California (Rooney-Latham et al., 2019). Nursery stock is seen as a major pathway of *Phytophthora* diseases into forests and semi-natural ecosystems within and between continents (Jung et al., 2016).

Damage Potential: Several *Phytophthora* species are known to be pathogenic to pistachio and almond in California. Sampling from 16 commercial orchards in five counties by Trouillas et al. (2022) identified P*. mediterranea* as widely occurring on pistachio rootstock UCBI, *P. atlantica* and *Prunus dulcis* (almond). Damage was visible as poor vigor and crown rot. Some orchards had tree mortality, with *P. mediterranea* killing phloem, cambium and bark tissues.

Worldwide Distribution: Italy, USA (California).

Official Control: none

California Distribution: Merced, Fresno, Madera, Kern and San Francisco Counties (Trouillas et al., 2022; CDFA PDR Database, 2024).

California Interceptions: none

The risk *Phytophthora mediterranea* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen is likely to be found wherever its hosts can grow.

   Evaluate if the pest would have suitable hosts and climate to establish in California.

   Score: **2**
   - Low (1) Not likely to establish in California; or likely to establish in very limited areas.
   - Medium (2) may be able to establish in a larger but limited part of California.
   - High (3) likely to establish a widespread distribution in California.

2) **Known Pest Host Range:** The host range is plants in the genus *Pistache*, *Prunus dulcis*, plus *Myrtus communis.*

   Evaluate the host range of the pest.

   Score: 2
   - Low (1) has a very limited host range.
   - Medium (2) has a moderate host range.
   - High (3) has a wide host range.

3) **Pest Reproductive Potential:** This *Phytophthora* species produces multiple types of spores that move with water and soil. The greatest known risk of inadvertent long-distance dispersal of *P. mediterranea* both regionally and internationally is via the plant trade.

   Evaluate the natural and artificial dispersal potential of the pest.

   Score: 2
   - Low (1) does not have high reproductive or dispersal potential.
   - Medium (2) has either high reproductive or dispersal potential.
   - High (3) has both high reproduction and dispersal potential.

4) **Economic Impact:** Pistachios and almonds are a valuable nut crops for California. This pathogen can cause tree mortality. It is spread with moving water.

   Evaluate the economic impact of the pest to California using the criteria below.

   Economic Impact: A, G

   A. The pest could lower crop yield.
   B. The pest could lower crop value (includes increasing crop production costs).
   C. The pest could trigger the loss of markets (includes quarantines).
   D. The pest could negatively change normal cultural practices.
   E. The pest can vector, or is vectored, by another pestiferous organism.
   F. The organism is injurious or poisonous to agriculturally important animals.
   G. The organism can interfere with the delivery or supply of water for agricultural uses.

Economic Impact Score: **2**
- Low (1) causes 0 or 1 of these impacts.
- Medium (2) causes 2 of these impacts.
- High (3) causes 3 or more of these impacts.

5) **Environmental Impact:** As a relatively newly described species of *Phytophthora*, its full host range is likely to be unknown. Although it does not have any hosts native to California described now, it has the potential to become invasive.

Evaluate the environmental impact of the pest to California using the criteria below

Environmental Impact: A
A. The pest could have a significant environmental impact such as lowering biodiversity, disrupting natural communities, or changing ecosystem processes.
B. The pest could directly affect threatened or endangered species.
C. The pest could impact threatened or endangered species by disrupting critical habitats.
D. The pest could trigger additional official or private treatment programs.
E. The pest significantly impacts cultural practices, home/urban gardening or ornamental plantings.

Environmental Impact Score: 2
- Low (1) causes none of the above to occur.
- Medium (2) causes one of the above to occur.
- High (3) causes two or more of the above to occur.

Consequences of Introduction to California for *Phytophthora mediterranea:* Medium

Add up the total score and include it here. **10**
-Low = 5-8 points
-Medium = 9-12 points
-High = 13-15 points

6) **Post-Entry Distribution and Survey Information**: Evaluate the known distribution in California. Only official records identified by a taxonomic expert and supported by voucher specimens deposited in natural history collections should be considered. Pest incursions that have been eradicated, are under eradication or have been delimited with no further detections should not be included.

This pathogen appears to be established in the Central Valley. The San Francisco detection from a nursery does not count towards establishment.

Evaluation is 'low'.

Score: -1
-Not established (0) Pest never detected in California or known only from incursions.
-Low (-1) Pest has a localized distribution in California or is established in one suitable climate/host area (region).
-Medium (-2) Pest is widespread in California but not fully established in the endangered area, or pest established in two contiguous suitable climate/host areas.
-High (-3) Pest has fully established in the endangered area, or pest is reported in more than two contiguous or non-contiguous suitable climate/host areas.

7) **The final score is** the consequences of the introduction score minus the post-entry distribution and survey information score: (Score)

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* ***= 9***

Uncertainty:

The importance and impact of this pathogen on ornamental nursery stock is an unknown. There has been one detection associated with *Leucadendron* spp. made via pear baiting.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Phytophthora mediterranea*** **is C.**

References:

Abad, Z.G., Burgess, T.I., Redford, A.J., and Bienapfl, J.C. 2023. IDphy: An International online resource for molecular and morphological identification of Phytophthora based on type specimens. Plant Disease 107: 987–998. DOI:10.1094/PDIS-02-22-0448-FE

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Responsible Party:

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*Comment Period: 12/05/2024 through 01/19/2025

*NOTE:

You must be registered and logged in to post a comment. If you have registered and have not received the registration confirmation, please contact us at permits[@]cdfa.ca.gov.

Comment Format:

- Comments should refer to the appropriate California Pest Rating Proposal Form subsection(s) being commented on, as shown below.

  Example Comment:

  Consequences of Introduction: 1. Climate/Host Interaction: [Your comment that relates to "Climate/Host Interaction" here.]

- Posted comments will not be able to be viewed immediately.

- Comments may not be posted if they:

  Contain inappropriate language which is not germane to the pest rating proposal;

  Contains defamatory, false, inaccurate, abusive, obscene, pornographic, sexually oriented, threatening, racially offensive, discriminatory or illegal material;

  Violates agency regulations prohibiting sexual harassment or other forms of discrimination;

  Violates agency regulations prohibiting workplace violence, including threats.

- Comments may be edited prior to posting to ensure they are entirely germane.
- Posted comments shall be those which have been approved in content and posted to the website to be viewed, not just submitted.

Pest Rating: C