California Pest Rating Proposal for

Phacidiopycnis tuberivora (H.T. Güssow & W.R. Foster) B. Sutton 1980

Current Pest Rating: Q

Proposed Pest Rating: B

Kingdom: Fungi, Phylum: Ascomycota
Subphylum: Pezizomycotina, Class: Leotiomycetes
Order: Rhytismatales; Family: Cryptomycetaceae

Comment Period: 03/23/2021 through 05/07/2021

Initiating Event:

In April 2019, a Cal Fire forest pest specialist submitted a sample of roots from a dying Port Orford cedar (*Chamaecyparis lawsoniana*) collected at a USDA forest service campground in Humboldt County. In June 2019, he submitted a second sample root sample from a dying Monterey pine (*Pinus radiata*) growing on State property in Mendocino County. CDFA plant pathologist Cheryl Blomquist isolated *Phacidiopycnis tuberivora* in culture from the rotted roots of both trees. Her identification was confirmed with DNA sequence analysis using the ITS area of the ribosomal DNA, and she assigned it a temporary Q rating. In October 2020, a University of California co-operative extension advisor submitted a sample of acacia trees experiencing dieback in Alameda County. CDFA plant pathologist Suzanne Rooney-Latham isolated *Phacidiopycnis tuberivora* from the roots and detected *Phytophthora* spp. by immunoassay. A follow-up official sample was collected and submitted in November 2020 by agricultural officials from Alameda County, and *P. tuberivora* was detected again, along with *Stereum hirsutum* and *Diaporthe foeniculina*. None of trees are proven hosts of *Phacidiopycnis tuberivora*. The risk to California is described herein and a permanent rating is proposed.

History & Status:

Background:

In 1932, Güssow and Foster isolated and identified a fungal pathogen causing sunken lesions on potato in British Columbia and gave it the name *Phomopsis tubivora*. In 1980, the name was changed to *Phacidiopycnis tuberivora* by Sutton. Over the decades, the host list has slowly expanded to include several families of woody plants, all that experience a stem end rot, progressive dry rot, or a corky rot of roots and other below ground structures such as tubers and taproots (Farr and Rossman, 2020;

Punithalingam, 1985). One significant disease caused by *Phacidiopycnis tuberivora* is red crown rot of hop. It has been observed causing root rot symptoms and even plant death in Oregon and Australia (McGee, 1997; Gent et al., 2013).

Hosts: Alnus (alder), *Beta vulgaris* (beet), *Escallonia*, *Eucalyptus*, *Hoya, Humulus lupulus* (hops), *Medicago*, *Olearia, Ribes, Syringa* (lilac)*, Vaccinium*, and *Solanum tuberosum* (potato) (Punithalingam, 1985; Farr and Rossman, 2020).

Symptoms: On hop, infected plants have underdeveloped lateral branches, uneven and weak bines, chlorotic leaves, and in severe cases, plants can die. The pith of affected roots is reddish-brown in color, dry, and friable, with a well-defined margin between healthy and diseased tissues. In severe cases crowns can be entirely consumed by dry rot (McGee et al, 2009; Gent et al., 2013).

In potatoes, symptom expression is variable with cultivar, ranging from lesions the size of pin heads to those involving the entire tuber. Roots show a hard, dry, corky, stem-end rot with a sharply defined margin. Lesions on potato tubers become sunken, circular, with a well-defined margin or a corky rot. Immature tubers can become mummified (Foster and Macleod, 1932). Recent California detections have been from pine, cedar, and acacia with symptoms of root rot.

Transmission: No specific studies are reported. Probably conidia are discharged from the conidiomata (a blister-like fruiting structure) during alternating dry and wet conditions and penetration of tubers, taproots and roots occurs through wounds and abrasions (Punithalingam, 1985). Spread can occur with anything that moves soil including people, tools, or water, or with infected nursery stock.

Damage Potential: Significant losses have been reported on potato tubers, and presumably yield loss occurs on infected beets. Damage to hops is variable by site in Oregon but in one yard in Oregon, Gent et al. (2013) reported 15% of plants were weak and nearly 2% died.

In California, this pathogen is associated with the roots of two conifers that were dead or dying. However, Koch's postulates have not been completed and pathogenicity has not yet been proven. *Phacidiopycnis tuberivora* has been isolated from the roots of acacia trees with significant dieback, but the involvement of other pathogens or environmental factors is likely, and again pathogenicity has not been established.

Worldwide Distribution: Australia, Canada, India, New Zealand, United Kingdom, United States (California, Oregon, Washington) (McGee, 1997; Foster and MacLeod, 2011; Farr and Rossman, 2020).

Official Control: *Phacidiopycnis tuberivora* is on the USDA PCIT harmful organism list for Republic of Korea (USDA, 2021). There are no restrictions listed in the EPPO database (EPPO, 2021).

California Distribution: Alameda, Humboldt, and Mendocino counties (CDFA PDR Database).

California Interceptions: None

The risk ***Phacidiopycnis tuberivora*** would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen has been reported from temperate climates including British Columbia, Washington, and Oregon, and from hotter, dryer areas of Australia. It is likely to be able to survive wherever its hosts can grow.

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

   Score: **3**
   - 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 pathogen has been associated with plants in diverse herbaceous and woody families.

   Evaluate the host range of the pest.

   Score: 3
   - 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:** Conidia are the only spore type reported. This species seems specialized to roots and below ground storage organs, making aerial dispersal less probable.

   Evaluate the natural and artificial dispersal potential of the pest.

   Score: 1
   - 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:** Reports of damage are limited in the literature. Some damage to yield has been reported in potatoes and in hops.

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

   Economic Impact: A, B
   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:** Pathogens with wide host ranges have more potential environmental impact. All three of the California detections were made on trees in forest or wildland settings. The Monterey pine and the Port Orford cedar are both native to California. Acacia is non-native but widespread, sometimes invasive in parts of the state.

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 *Phacidiopycnis tuberivora* is Medium.

Add up the total score and include it here. **11**
-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.

Evaluation is 'low'. Detections have been made in Mendocino, Humboldt, and Alameda Counties.

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 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* **= 10**

Uncertainty:

Detections have been made on trees from several California locations, but pathogenicity has not been established and these should not be considered confirmed hosts. Additional pathogens were detected with the acacias in Alameda County and the contribution of each to the dieback observed has not be determined. Although detections have been made for nearly a century, it is rare for *Phacidiopycnis tuberivora* to be associated with serious yield losses or plant death.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Phacidiopycnis tuberivora*** is **B**.

References:

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Responsible Party:

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***Comment Period: 03/23/2021 through 05/07/2021**

***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.

Proposed Pest Rating: B