

**California Pest Rating Proposal for
Leptosillia pistaciae (Voglmayr et al.) Voglmayr, comb. nov. 2019**

Pistachio canker

Current Pest Rating: Q

Proposed Pest Rating: B

Kingdom Fungi; Division: Ascomycota;

Order: Xylariales; Family: Delonicicolaceae

Comment Period: 03/27/2020 through 05/11/2020

Initiating Event:

In June 2019, a habitat manager from an ecological reserve in San Diego County contacted Pat Nolan, plant pathologist with the San Diego County agricultural commissioner's office, to report multiple dead lemonade berry shrubs (*Rhus integrifolia*) in one of their parks along a trail. Recognizing this as potentially a new problem, samples were collected and sent to CDFA's plant pest diagnostics center where plant pathologist Cheryl Blomquist isolated a fungus from black streaks in the wood. A sample of the fungus was sent to the USDA's national specialist in mycology, Megan Romberg. In November 2019, by morphological characteristics and by DNA sequencing, she identified it as *Leptosillia pistaciae*, the causal agent of pistachio canker. This represents the first detection in the United States and the first detection on this host. It was categorized as a federal quarantine pest by USDA and was given a temporary Q rating by CDFA. The risk this organism poses to California is evaluated herein and a permanent rating is proposed.

History & Status:

Background:

Leptosillia pistaciae is the name given in 2019 for a fungal pathogen previously called *Liberomyces pistaciae*. This pathogen was first described in 2018 from cankers on pistachio trees (*Pistacia vera*) in Sicily, Italy. *Leptosillia pistaciae* is the only member of this fungal genus known to be associated with disease symptoms on plants. Other species in the genus have been isolated as endophytes or found on

dead plant tissues. So far, no sexual morph is known for this species. Morphological description, illustrations, and results of pathogenicity testing have been published by Vitale et al. (2018). *Rhus integrifolia* (lemonade berry or lemonade sumac) is native to California and primarily occurs in the south coastal parts of the state from San Diego to San Luis Obispo, with some populations in the San Francisco Bay area. It is also commercially available in the nursery trade (Calflora, 2020). *Rhus* and *Pistacia* are in the same family, Anacardiaceae (sumacs).

Hosts: Pistacia vera (pistachio), *Rhus integrifolia* (lemonade berry).

Symptoms: On pistachio trees in Italy, symptoms can be observed in the winter and late spring and are described by Vitale et al., 2018. During the winter dormant season, trees had gum exudation and bark scaling on trunks and/or branches. Bark scaling appeared as cracking and peeling of the bark. On trunks and large branches, cankers appeared first as light, dead circular areas that developed in the bark, which subsequently became darker and sunken. Infections on branches expanded in all directions but much faster along the main axis of branches or twigs. Under some environmental conditions, the host reportedly produced callus tissue around dead areas which limited the extent of the canker's expansion. Under the bark, cankers were discolored with necrotic tissues and, in some cases, these extended to the vascular tissues and pith. During the active growing season, the symptomatic plants also showed canopy decline. Inflorescences and shoots, originating from infected branches or twigs, wilted and died. When the trunk was girdled by a canker, a collapse of the entire tree occurred.

On lemonade berry, large clumps of dead adult shrubs were observed on the edge of hiking trails. Some shrubs that had completely dead foliage were resprouting from their bases. Trunks of shrubs that were not completely dead were copiously weeping sap and fluids and showed foliage browning and die back with symptoms of stress.

Transmission: The fungus produces pycnidia conidiomata and conidia on stems and branches of pistachio, and these spores could be spread by wind, rain splashing, and the movement of dead or dying trees, greenwaste, and infected nursery stock. Contaminated pruning tools could also spread the disease.

Damage Potential: Although there is not yet any epidemiological data available, Vitale et al. (2018) suggest that, based on the high disease incidence and frequency of observations in several orchards in Sicily over multiple years, this fungus represents a threat to pistachio production. They also suggest that *L. pistaciae* might have a latent phase within the host tissues since it was also isolated from asymptomatic pistachio plants. Close relatives of this pistachio pathogen, *Liberomyces macrosporus* and *L. saliciphilus*, have been isolated as bark and wood endophytes from several woody hosts (Pažoutová et al. 2012), indicating that the primary ecology of this group may be as endophytes rather than pathogens, making this pathogenic species an anomaly in this genus (Voglmayer et al., 2019).

Asymptomatic infections are overlooked by quarantine inspections. Latent pathogens often have the ability to rapidly cause disease when their hosts are under stress making these types of fungal pathogens a significant threat to agriculture and native forest ecosystems. (Slippers and Wingfield,

2007). To date, there is only one report of deaths of *Rhus integrifolia* from this disease. This is the report in San Diego County described above.

Worldwide Distribution: Italy (Vitale et al., 2018; Farr and Rossman, 2020) United States (California) (see initiating event)

Official Control: None

California Distribution: San Diego County.

California Interceptions: None.

The risk *Leptosillia pistaciae* would pose to California is evaluated below.

Consequences of Introduction:

- 1) Climate/Host Interaction:** Little is known about the range of climate favorable to this pathogen, but the climate of areas it is known to occur in in Sicily is similar to that of areas where lemonade berry is native to in California. It is likely it could also survive in parts of the state where pistachios are grown.

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 limited to two species of woody plants.

Evaluate the host range of the pest.

Score: 1

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

- 3) Pest Dispersal Potential:** The pathogen likely spreads by airborne spores

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.
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- 4) Economic Impact:** This pathogen can kill mature shrubs and trees and reduces the foliage and flowers of pistachios. It is currently a pathogen of quarantine significance in the United States.

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

Economic Impact: A, B, C

- 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: 3

- 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:** This pathogen has been isolated from dying *Rhus integrifolia*.

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 *Leptosillia pistaciae*: 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.

Evaluation is 'Low'. The only records are on one planting of Lemonade berry in San Diego County.

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 = 9*

Uncertainty:

This is a recently described pathogen in Europe and this is a first detection in the United States. Pathogenicity on *Rhus integrifolia* has not yet been conclusively proven by testing. Additional hosts of *L. pistaciae* may be identified in the future. This pest rating covers the pathogen regardless of the host.

Conclusion and Rating Justification:

Based on the evidence provided above **the proposed rating for *Leptosillia pistaciae* is B.**

References:

Calflora Database. *Rhus integrifolia*. Accessed 1/31/2020: calflora.org

Farr, D.F., and Rossman, A.Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved 1/31/2020 from <https://nt.ars-grin.gov/fungaldatabases/>

Pažoutová, S., Šrůtka, P., Holuša, J., Chudíčková, M., Kubátová, A., and Kolařík, M. 2012. *Liberomyces* gen. nov. with two new species of endophytic coelomycetes from broadleaf trees. *Mycologia* 104: 198–210. <https://doi.org/10.3852/11-081>

Slippers, B. and Wingfield, M. J. 2007. Botryosphaeriaceae as endophytes and latent pathogens of woody plants: diversity, ecology and impact. *Fungal Biology Reviews* 21:90-106

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Voglmayer, H., Aguirre-Hudson, M. B, Wagner, H. G., Tello, S., and Jaklitsch, W. M. 2019. Lichens or endophytes? The enigmatic genus *Leptosillia* in the Leptosilliaceae fam. nov. (Xylariales), and *Furfurella* gen. nov. (Delonicicolaceae). *Persoonia* 42:228–260

Responsible Party:

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***Comment Period: 03/27/2020 to 05/11/2020**

*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](mailto: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
