CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Fusarium citricola Guarnaccia, Sandoval-Denis & Crous 2018

Pest Rating: B

Kingdom: Fungi, Phylum: Ascomycota,
Subphylum: Pezizomycotina, Class: Sordariomycetes,
Subclass: Hypocreomycetidae, Order: Hypocreales,
Family: Nectriaceae

Comment Period: 03/24/2025 through 05/08/2025

Initiating Event:

Fusarium citricola was first detected in 2020 in a declining box elder tree (*Acer negundo*) in Ventura County. It was submitted by a Ventura County Agricultural inspector from a tree suspected to be infected by pathogenic *Fusarium* sp. spread by an invasive shothole borer *Euwallacea sp.* CDFA Plant Pathologist Albre Brown grew the fungus in culture from wood associated with beetle damage and made the identification via DNA sequence analysis. This was the first report of this species in the Americas and it was assigned a Q-rating. Additional detections were made in Santa Clara County in 2024 and 2025 under similar circumstances.

Fusarium citricola was isolated from a declining *Pittosporum* sp. from a landscape planting submitted to CDFA in 2023 by a Mendocino County Agricultural inspector. In 2025, the first detection was made from a stem canker on a lemon tree from Santa Clara County. This pathogen has not been through the pest rating process. The risk to California from *Fusarium citricola* is described herein and a permanent rating is proposed.

History & Status:

Background: The genus *Fusarium* (Hypocreales, Nectriaceae), in the broad sense, holds many morphologically and phylogenetically diverse fungi, commonly found as air-, soil- or waterborne saprobic organisms. They are also commonly isolated from dead or living plant material as endophytes and epiphytes. More than 1,400 *Fusarium* names are listed in the Index Fungorum and MycoBank databases. Many *Fusarium* spp. are important plant pathogens or secondary invaders with global distributions (Aoki et al., 2014). Some species are significant producers of mycotoxins or causes of human and animal diseases that are isolated from immunocompromised hosts (O'Donnell et al., 2009).

Fusarium species are considered one of the most important pathogen groups causing severe symptoms in citrus, including dry root rot, vascular wilt, root and stem rot, crown rot, twig rot, dieback, and twig blight. Previous studies have shown there is a complex of different *Fusarium* species that attack citrus. Sandoval-Denis et al. (2018), using morphological and molecular multi-locus analyses, described two new *Fusarium* species, *F. citricola* and *F. salinense* belonging to the newly described *F. citricola* species complex. *Fusarium citricola* has similar morphological characteristics to *F. salinense*, and both species are citrus twig pathogens. Previously, *Fusarium solani* was found to be the predominant *Fusarium* pathogen in citrus orchards, causing dry root rot. Dry root rot is one of the main causes of citrus decline worldwide, worsened by biotic and abiotic stresses (Ezrari et al., 2022).

Hosts: The published host list is limited to three species of citrus: *Citrus limon, C. sinensis,* and *C. reticulata* (Sandoval-Denis et al., 2018). It has been isolated from diseased *Pittosporum* spp. and *Acer negundo* in California, but pathogenicity has not been established for these hosts.

Symptoms: There are limited observations of *F. citricola* in citrus orchards in southern Italy. The ability of this species to cause twig canker disease was confirmed by pathogenicity tests. It was a prominent pathogen in the orchards surveyed, producing canker symptoms on three different *Citrus* species (Sandoval-Denis, et al., 2018).

Colletotrichum sp. were recently described as causing emerging new diseases of citrus in the Central Valley, distinct from the typical anthracnose of fruit, leaves, and twigs. Symptoms of dieback caused by *Colletotrichum* sp. included chlorosis, crown thinning, necrotic blotches on leaves, blight, and shoot and branch dieback (Mayorquin et al, 2019; Eskalen et al., 2019). Diagnosis of *Fusarium* vs. *Colletotrichum* twig dieback disease in the field will be difficult and, in some orchards, they may co-occur.

Transmission: The initial infection may occur at planting or at any time during the life of the tree. *Fusarium citricola* produces micro and macroconidia, but chlamydospores have not been found. Movement of nursery stock could be responsible for long-distance spread, along with plant debris, soil, air currents, rainwater splash, and contaminated equipment. It is not known to be seed-borne.

Damage Potential: Precise losses due to *F. citricola* have not been reported. More than one *Fusarium* species and/or other fungal species may be present on cankered trees (Sandoval-Denis et al., 2018). *Fusarium* sp. may remain cryptic and asymptomatic within the host, and the canker phase does not become apparent unless trees are subjected to some physiological stress, such as drought or temperature stress. Asymptomatic, infected nursery trees may result in the development of the disease and losses in production in the field.

Worldwide Distribution: Italy, USA (California) (Sandoval-Denis et al., 2018; CDFA PDR database, 2025).

Official Control*: Fusarium citricola* is not listed as a harmful organism by USDA-PCIT or the European Plant Protection Organization. It is not a U.S.-regulated pest.

California Distribution: Mendocino, Santa Clara, and Ventura counties.

California Interceptions: none.

The risk that *Fusarium citricola* 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 be established in a larger but limited part of California.
   - High (3) likely to establish a widespread distribution in California.

2) **Known Pest Host Range:** The published host range is limited to citrus, but in California, it has been found with declining woody plants of other species and associated with invasive shothole borers.

   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:** *Fusarium citricola* reproduces with two types of asexual spores. No sexual stage has been found and chlamydospores are absent.

   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:** Damage has been observed in the form of twig dieback, which could lead to a reduction in yield and require additional fungicide treatments.

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

   Economic Impact: A, B, D
   A. The pest could lower crop yield.
   B. The pest could lower crop value (including increasing crop production costs).
   C. The pest could trigger the loss of markets (including 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 disease on citrus can be a problem for home and urban gardeners.

Evaluate the environmental impact of the pest on California using the criteria below.

Environmental Impact: E
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 *Fusarium citricola:* 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.

Fusarium citricola has been found in the trees in the landscape in 3 counties; Ventura, Santa Clara, and Mendocino.

Evaluation is 'medium'.

Score: -2

-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:

It is not known what the ecological role of *F. citricola* is in all the places where it has been found in California. It could be functioning as an endophyte in some woody plants, or it could be causing dieback disease in plants other than citrus. It could have a role similar to what has been described for the fungal symbionts of invasive shothole borers (ISHB). If *F. citricola* is confirmed to be associated with ISHB and Fusarium decline (FD), it could pose a threat of significant concern to trees in urban, residential, and natural settings. Survey data from southern California suggest ISHB-FD may potentially become established in a variety of plant communities in the state and worldwide. In a survey of botanical gardens in southern California, Eskalen et al. (2013) found many hundreds of tree species were susceptible to ISHB-FD and extrapolated that 38% of the street trees planted in southern California are potential hosts of FD. These susceptible trees include 11 species native to California and 13 that are important to agriculture.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Fusarium citricola*** **is B.**

References:

Aoki, T., O'Donnell, K., Geiser, D. M. 2014. Systematics of key phytopathogenic *Fusarium* species: current status and future challenges. Journal of General Plant Pathology 80: 189–201.

Eskalen, A., Stouthamer, R., Lynch, S., Rugman-Jones, P., Twizeyimana, M., Gonzalez, A., Thibault, T. 2013. Host Range of *Fusarium* dieback and its Ambrosia Beetle (Coleoptera: Scolytinae) Vector in Southern California. Plant disease, 97 (7): 938-951.

Eskalen, A., Dohuan, G.W., Craig, K. and Mayorquin, J.S., 2019. *Colletotrichum* dieback of mandarins and Navel oranges in California: A new twig and shoot disease in the Central Valley. Citrograph, 10, pp.50-54

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Farr, D.F., and Rossman, A.Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved 12/18/2024, from https://nt.ars-grin.gov/fungaldatabases/

Mayorquin, J.S., Nouri, M.T., Peacock, B.B., Trouillas, F.P., Douhan, G.W., Kallsen, C., and Eskalen, A. 2019. Identification, Pathogenicity, and Spore Trapping of *Colletotrichum karstii* Associated with Twig and Shoot Dieback in California. Plant Dis. 103:1464–1473.

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Responsible Party:

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***Comment Period: 03/24/2025 through 05/08/2025**

***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: B