CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Colletotrichum camelliae Massee 1899
Tea anthracnose

Current Pest Rating: Q

Proposed Pest Rating: B

Kingdom: Fungi, Phylum: Ascomycota,
Subphylum: Pezizomycotina, Class: Sordariomycetes,
Subclass: Hypocreomycetidae, Order: Glomerellales,
Family: Glomerellaceae

Comment Period: 05/24/2023 through 07/08/2023

Initiating Event:

In May 2022, agricultural inspectors in San Diego County sampled a shipment of *Smilax* sp. (greenbriers) cut foliage from Pontotoc County, Mississippi, destined for a florist in the city of Vista, California. The foliage had leaf spot symptoms and was submitted to CDFA's Plant Pest Diagnostics Center at Meadowview. Plant pathologist Suzanne Rooney-Latham detected *Colletotrichum* sp. in culture. She was unable to find a match to any published species by multiple gene sequencing, and she assigned a temporary Q-rating.

In March 2023, a second shipment of *Smilax* sp. cut foliage from Wood County, Texas and destined for a florist in Poway, California was inspected by San Diego County and leaf spots were observed. CDFA Plant Pathologist Wei Belisle detected a *Colletotrichum* sp. in culture and using GAPDH sequencing was able to match it (249/250) to the type isolate of *C. camelliae* and to match it to the previous isolate from *Smilax* from Mississippi. The risk of *C. camelliae* to California is described herein and a permanent rating is proposed.

History & Status:

Background:

Camellia is a genus of flowering plants in the family Theaceae, native to eastern and southern Asia. It consists of over 100 species of evergreen shrubs or small trees, with glossy leaves and showy, solitary

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flowers in shades of white, pink, red, and yellow. The most cultivated ornamental species is *Camellia japonica*, which is prized for its large, colorful blooms that appear in late winter or early spring. *Camellias* are popular ornamental plants, widely used in landscaping and as cut flowers, and have also been used in traditional medicine for their purported health benefits. In addition to their aesthetic and medicinal value, some species of *Camellia* are also grown commercially for their oil, which is used in cosmetics, soap, and cooking. The leaves and leaf buds of *Camellia sinensis* are used to produce the popular beverage tea.

The genus *Smilax* is a group of perennial vines and shrubs that belong to the family Smilacaceae. These plants are distributed widely throughout the world, including in tropical and temperate regions. *Smilax* typically have woody stems and produce tendrils that allow them to climb and anchor onto other plants or structures. They are used by florists as "greenery" in floral design, often displayed at weddings and other ceremonies on entrances, altars, benches, and tables.

Colletotrichum Corda, 1831, (teleomorph *Glomerella* spp.), is a highly complex fungal genus composed of pathogens, endophytes, epiphytes, and saprophytes. The majority of *Colletotrichum* have adopted a hemibiotrophic infection strategy to invade host plants; in this strategy, fungi initially develop biotrophic hyphae inside the living host that later transition to necrotrophic secondary mycelia. Many species of *Colletotrichum* will transition among these lifestyles depending on resource availability and survival strategies (Wang et al., 2016). Worldwide, at least 16 different species of *Colletotrichum* have been reported from *Camellia* spp. *Colletotrichum camelliae* was first reported in the United States in 1903, with specimens registered with the U.S. National Fungal Collections (BPI) (Farr and Rossman, 2023) and it has been detected in Florida tea production (Orrock et al., 2020). *Colletotrichum camelliae* is a distinct species belonging to the vastly morphological and physiological variable *C. gloeosporioides* species complex and is generally identified from other species in the complex only by gene sequencing.

Hosts: Camellia spp., *Smilax* spp.

Symptoms: Generally, *Colletotrichum*-infected host plants exhibit symptoms of anthracnose, including dark brown leaf, stem, and fruit spots, fruit rot, and wilting of leaves, that often result in dieback and reduction in plant quality. *Colletotrichum camelliae* can damage tea leaves and cause several diseases, such as tea anthracnose, tea leaf blight, and tea brown blight (Liu et al., 2015; Wang et al., 2016). Symptoms begin as small, water-soaked lesions on young leaves and twigs and later became larger, dark brown, necrotic lesions, 1 to 3 mm in diameter on leaves and 2 to 5 mm long on twigs (Guo et al., 2014).

Transmission: Long distance spread is caused by moving infected nursery plants or cuttings. *Colletotrichum* species survive between crops during winter as mycelium on plant residue in soil, on infected plants, and on seeds. During active growth, the pathogen produces masses of hyphae (stromata) on the plant surface that bear conidiophores. Conidia (spores) are produced at the tips of the conidiophores and are disseminated by wind, rain, cultivation tools, equipment, and field workers. Conidia are transmitted to host plants. Humid, wet, rainy weather is necessary for infection to occur.

Damage Potential: Anthracnose disease caused by *Colletotrichum camelliae* can result in reduced plant quality and growth, fruit production, and marketability. Wang et al. (2020) reported a 20 to 40% fruit drop and up to 40% seed loss in some plantations of *Camellia oleifera* in China. Mortality of branches and sometimes even plants has been reported (Jin et al., 2009). In the presence of appropriate moisture and ambient temperature in the fields of southern China, the disease can spread very quickly and is difficult to control; thus, it can result in severe economic losses and poses a threat to the *Camellia oleifera* industry in that country (Wang et al., 2020). In Taiwan, *Colletotrichum* spp. are a highly limiting factor for tea cultivation. Tea (*Camellia sinensis*) is grown as a specialty crop in Florida. Orrock et al. (2020) tested commonly planted accessions and found them all to be susceptible to *C. camelliae*.

Worldwide Distribution: China, South Korea, Taiwan, United States (Florida, Mississippi, Texas) (Farr and Rossman, 2023; CDFA PDR database; Hassan et al., 2023; Lin et al., 2023).

Official Control: USDA regulates *Colletotrichum* at the species level, but not this species specifically (USDA PCIT, 2023).

California Distribution: none

California Interceptions: There have been two interceptions on interstate shipments of *Smilax* sp. (see 'initiating events').

The risk *Colletotrichum camelliae* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:**

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.

Risk is Medium (2) – Similar to other species of Colletotrichum, C. camelliae *requires humid, wet, rainy weather for conidia to infect host plants. This environmental requirement may limit the ability of the pathogen to fully establish and spread under dry field conditions in California. It is more likely to occur in nursery production greenhouses.*

2) **Known Pest Host Range:**

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.

Risk is low (1) – The known host range of Colletotrichum camelliae *is limited to* Camellia *and* Smilax.

3) Pest Reproductive Potential:

Evaluate the natural and artificial dispersal potential of the pest.

Score: 3
- 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.

Risk is High (3) – The pathogen has high reproductive potential and conidia are produced successively. They are transmitted by wind, wind-driven rain, cultivation tools, and human contact however conidial germination and plant infection require long, wet periods.

4) Economic Impact:

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.

Risk is Medium (2) –Under suitable, wet climates, the pathogen could lower Camellia *and* Smilax *plant growth, fruit production and value and trigger the loss of markets.*

5) Environmental Impact:

Evaluate the environmental impact of the pest to 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.

Risk is Medium (2) – The pathogen could significantly impact cultural practices or home garden plantings.

Consequences of Introduction to California for *Colletotrichum camelliae:* 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 'not established'.

Score: 0

-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:

Periodic surveys need to be conducted to confirm the presence/absence of *C. camelliae* in commercial and private production regions within California. Also the host range may continue to expand, as this is the first official report of a detection on *Smilax* sp.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for ***Colletotrichum camelliae*** **is B.**

References:

Farr, D.F., and Rossman, A.Y. 2023. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. https://nt.ars-grin.gov/fungaldatabases/

Guo, M., Pan, Y.M., Dai, Y.L. and Gao, Z.M., 2014. First report of brown blight disease caused by *Colletotrichum gloeosporioides* on *Camellia sinensis* in Anhui Province, China. Plant Disease, 98(2), pp.284-284.

Hassan, O., Kim, S.H., Kim, K.M. and Chang, T., 2023. First report of leaf anthracnose caused by *Colletotrichum camelliae* on tea plants (*Camellia sinensis*) in South Korea. Plant Disease, doi: 10.1094/PDIS-11-22-2622-PDN.

Jin, A.X., Zhou, G.Y. and Li, H., 2009. Progress, problem and prospect of oil camellia anthracnose (*Colletotrichum gloeosporioides*) research. Forest Pest Disease, 28, pp.27-30.

Lin, S.R., Lin, Y.H., Ariyawansa, H.A., Chang, Y.C., Yu, S.Y., Tsai, I., Chung, C.L. and Hung, T.H., 2023. Analysis of the pathogenicity and phylogeny of *Colletotrichum* species associated with brown blight of tea (*Camellia sinensis*) in Taiwan. Plant Disease, 107(1), pp.97-106.

Liu, F., Weir, B. S., Damm, U., Crous, P. W., Wang, Y., Liu, B., Wang, M., Zhang, M. and Cai, L., 2015. Unravelling *Colletotrichum* species associated with *Camellia*: employing ApMat and GS loci to resolve species in the *C. gloeosporioides* complex. Persoonia, 35, pp.63–86. doi: 10.3767/003158515X687597

Orrock, J.M., Rathinasabapathi, B. and Spakes Richter, B., 2020. Anthracnose in US Tea: pathogen characterization and susceptibility among six tea accessions. Plant Disease, 104(4), pp.1055-1059.

USDA Phytosanitary Certificate Issuance and Tracking System, Phytosanitary Export Database (PExD) Harmful Organisms Database Report. *Colletotrichum camelliae*. Accessed 4/28/23.

Wang, Y.C., Hao, X.Y., Wang, L., Xiao, B., Wang, X.C. and Yang, Y.J., 2016. Diverse *Colletotrichum* species cause anthracnose of tea plants (*Camellia sinensis* (L.) O. Kuntze) in China. Scientific Reports, 6:35287.

Wang, Y., Chen, J.Y., Xu, X., Cheng, J., Zheng, L., Huang, J. and Li, D.W., 2020. Identification and characterization of *Colletotrichum* species associated with anthracnose disease of *Camellia oleifera* in China. Plant Disease, 104(2), pp.474-482.

Responsible Party:

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*Comment Period: 05/24/2023 through 07/08/2023

*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