California Pest Rating Proposal for

Colletotrichum fioriniae (Marcelino & Gouli) Pennycook 2017

Current Pest Rating: Z

Proposed Pest Rating: B

Comment Period: 4/17/2019 through 6/1/2019

Initiating Event:

On January 28, 2019, leaf and twig samples of California coffeeberry (*Frangula californica*) showing symptoms of twig dieback, were collected from a regional park in Alameda County by park officials and submitted to the CDFA Plant Pathology Lab for diagnosis of the associated pathogen. On February 14, 2019, Suzanne Latham, CDFA Plant Pathologist, identified the associated pathogen as *Colletotrichum fioriniae*. Prior to this detection, *C. fioriniae* had been reported from California in 2017 (see: 'Background'), and therefore, was assigned a temporary Z rating for a generally distributed pathogen of economic and environmental importance. However, its intrastate distribution had not been verified. Therefore, the current status and risk of infestation of *C. fioriniae* in California is herein evaluated and a permanent rating is proposed.

History & Status:

Background: *Colletotrichum fioriniae* is an endophytic fungal pathogen that causes anthracnose symptoms of leaf spot and fruit rot in its host plants (Farr and Rossman, 2019). The pathogen belongs to the morphologically and physiologically variable *C. acutatum* species complex from which it is molecularly differentiated from other species of the complex (Damm et al., 2012). *C. fioriniae* was originally named *C. acutatum* var. *fioriniae,* which was later regarded an invalid name and was corrected to *Glomerella acutata* var. *fioriniae* (Pennycook, 2017). The name *C. fioriniae* was based on the original name (now invalid), for strains of the fungus that were isolated from an epizootic infection of the exotic scale insect *Fiorinia externa* in New England. Strains of *C. fioriniae* were found to occur widely as an endophyte in the host plant of the sap-sucking scale insect and believed to act as natural protectants against plant feeding insects (Damm et al., 2012).

In California, pistachios showing severe anthracnose symptoms of black, sunken, and circular lesions in fruit, leaves, and rachises, were observed in Glenn County in 2010 and 2016. Subsequently, *Colletotrichum fioriniae* was isolated from those pistachio trees and, in 2017, this pathogen was reported for the first time in California (Lichtemberg et al., 2017). The current CDFA detection of *C. fioriniae* in California coffeeberry would indicate a new, non-reported host for the pathogen.

Hosts: Acacia acuminata (mangart/jam), *Actinidia chinensis* (kiwi), *Allium amperoprasum* (wild leek/broadleaf wild leek), *Anemone* sp., *Camellia sinensis* (tea plant), *Capsicum annuum* (bell pepper), *Capsicum frutescens* (chili pepper), *Capsicum* sp., *Carica papaya* (papaya), *Cinnamonmum subavenium*, *Citrus* sp., *C. unshiu* (satsuma mandarin), *Corylus avellana* (common hazel), *Eustoma grandiflorum* (lisianthus), *Ficus virens* (white fig), *Fiorinia externa* (elongate hemlock scale), *Fiorinia* sp., *Fragaria x ananassa* (strawberry), *Ilex serrata-verticillata* ('Sparkleberry'), *I. verticillata* (winterberry holly), *Juglans regia* (English walnut), *Liriodendron tulipifera* (tulip tree/tulip poplar), *Lycium barbarum* (matrimony vine), *L. chinense* (Chinese boxthorn), *Magnolia* sp. *Malus domestica* (apple), *Malus* sp., *Mangifera indica* (mango), *Mangifera* sp., *Michelia champaca* (Joy perfume tree), *Nandina domestica* (heavenly bamboo), *Olea europaea* (olive), *Persea americana* (avocado), *Persea* sp., *Pinus radiata* (Monterey pine), *Pistacia vera* (pistachio), *Prunus armeniaca* (apricot), *P. persica* (peach), *Pyrus communis* (common pear), *Rhododendron* sp., *Rubus* sp., *Salvia leucantha* (Mexican bush sage), *Solanum melongena* (eggplant), *Toxicodendron radicans* (eastern poison ivy), *Tulipa* sp., *Vaccinium corymbosum* (northern highbush blueberry), *V. myrtillus* (bilberry/whortleberry), *Vaccinum* sp., *Vitis* sp., *Vitis vinifera* (grape) (Farr and Rossman, 2019).

In California, *Colletotrichum fioriniae* was detected in *Frangula californica* (California coffeeberry; see: 'Initiating Event').

Symptoms: In general, *Colletotrichum*-infected host plants exhibit symptoms of anthracnose which include dark brown leaf, stem and fruit spots and wilting of leaves often resulting in dieback and reduction in plant quality. In pistachio, *C. fioriniae* exhibits anthracnose symptoms of black, sunken, and circular lesion in fruit, leaves, and rachises (Lichtemberg et al., 2017). Strains of *C. acutatum* that were later identified as *C. fioriniae* have been implicated in fruit rot of cranberry and blueberry in northern USA and in British Columbia (Damm et al., 2012)

Disease cycle: It is likely that *Colletotrichum fioriniae* has a similar life cycle to that of other *Colletotrichum* species and survives 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) which bear conidiophores, on the plant surface. Conidia (spores) are produced at the tips of the conidiophores and 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. These requirements in particular may limit the occurrence of the pathogen in California fields and subsequently, the pathogen may be more of a problem under controlled environments of greenhouses. Conidia germinate, penetrate host tissue by means of specialized hyphae (appresoria) and invade host tissue.

Dispersal and spread: Wind, wind-driven rain, cultivation tools, and human contact.

Damage Potential: Anthracnose disease caused by *Colletotrichum fioriniae* can result in reduced plant quality and growth. Estimates of yield/crop loss due to this pathogen have not been reported. Nursery production of potted host plants or in greenhouses are particularly at risk as nursery conditions are often conducive to infection by *Colletotrichum* species. In cultivated fields, disease development may be sporadic as it is affected by levels of pathogen inoculum and environmental conditions.

Worldwide Distribution: *Asia*: China, Japan, Malaysia, South Korea, Turkey; *Europe*: Belgium, Croatia, France, Italy, Poland, Portugal, Slovenia, United Kingdom; *North America*: United States; *South America*: Brazil; *Oceania*: Australia, New Zealand (Farr and Rossman, 2019; Liu et al., 2016; Munda, 2016; Pszczókowska et al., 2016; Sun et al., 2012; Zhu et al., 2015).

Within the United States, *Colletotrichum fioriniae* has been reported from California, Hawaii, Kentucky, Maryland, Massachusetts, Michigan, New York, Ohio, and Virginia (Farr and Rossman, 2019).

Official Control: None reported.

California Distribution: Alameda and Glenn Counties.

California Interceptions: There have been no interceptions of plants infected with *Colletotrichum fioriniae* (see: 'Initiating Event').

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

Consequences of Introduction:

1) **Climate/Host Interaction:** *Colletotrichum fioriniae* has already been detected in pistachio and coffeeberry plants cultivated in two counties. However, considering its wide range of host plant, most of which are present in California, it is possible for the pathogen to have a larger distribution, but limited due to the requirement of prolonged, wet weather conditions for the pathogen's development.

   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 of *Colletotrichum fioriniae* is very diverse and includes several plant 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 Dispersal Potential:** The pathogen has high reproductive potential and conidia are produced successively. They are transmitted by wind, wind-driven rain, cultivation tools, and human contact. Conidial germination and plant infection require long, wet periods.

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.**

4) **Economic Impact:** Under suitable climates, the pathogen could lower plant growth and value and trigger the loss of markets.

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:** The pathogen could significantly impact cultural practices, home gardening or ornamental plantings.

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

Environment 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 *Colletotrichum fioriniae*:

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

Total points obtained on evaluation of consequences of introduction to California =

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 Medium. Presently, *Colletotrichum fioriniae* has not fully established in the endangered area but has been detected in the Northern Central Valley County of Glenn, and Alameda County in the East Bay. Therefore, it is given a score of -2 in this category.

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 introduction score minus the post entry distribution and survey information score:

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* ***= 11***

Uncertainty:

Conclusion and Rating Justification:

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

References:

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*Comment Period: 4/17/19 through 6/1/2019

*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 plant.health[@]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