California Pest Rating Proposal for

Campylocarpon fasciculare Schroers, Halleen & Crous 2004

Black foot disease

Current Pest Rating: Z

Proposed Pest Rating: C

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

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Comment Period: 03/16/2021 through 04/30/2021

Initiating Event:

In September 2020, CDFA and Kern County agricultural inspectors collected samples of grapevines from a nursery in Kern County. They were tested for pathogens at the CDFA's Plant Pest Diagnostics Center in Meadowview prior to issuance of a phytosanitary certificate for export. Two fungal pathogens associated with black foot disease were detected: *Dactylonectria torresensis* (syn. *Ilyonectria torresensis*), which has previously been reviewed and rated (https://blogs.cdfa.ca.gov/Section3162/?p=7570), and a first detection of *Campylocarpon fasciculare*. CDFA plant pathologist Suzanne Rooney-Latham made the identifications by morphology following culturing the fungus from the plants and confirmed her identification with PCR and genetic sequencing. She assigned it a temporary Z rating. The risk to California from *C. fasciculare* is described herein and a permanent rating is proposed.

History & Status:

Background: Fungi with cylindrocarpon-like asexual morphs occur worldwide and can be isolated from soils, from dead or dying plant material, as non-pathogenic endophytes, or latent pathogens, or as pathogens causing cankers and root rots of grapevines. Halleen et al. (2004) observed morphological variation among cylindrocarpon-like isolates collected from grapevine rootstocks in nurseries and vineyards in Australia, France, New Zealand, and South Africa. Theirs was the first formal taxonomic revision of divergent cylindrocarpon-like asexual morphs from the genus *Cylindrocarpon*. Using phylogenetic analyses, they presented the first evidence that cylindrocarpon-like fungi were not

monophyletic, and they segregated some cylindrocarpon-like asexual morphs from grapevines as a unique lineage that they described as *Campylocarpon*, based on *C. fasciculare*. To date at least 24 species of cylindrocarpon-like fungi have been associated with black foot disease of grapevine (Úrbez-Torres et al. 2014) and they are distributed throughout the main viticultural regions of the world (Lawrence et al., 2019).

Hosts: Vitis sp. (grapevine), and *Vitis vinifera* (Farr and Rossman, 2021).

Symptoms: Symptoms of black foot disease on grapevines include necrotic root crowns, reduced root biomass, root rot, sunken root lesions, xylem necrosis, vascular streaking, and general decline of the vine canopy. Poor growth and eventually wilting and collapse of entire plants can occur. Fruit yield is reduced. Infected vines are often stunted with short internodes and leaves that appear scorched by water stress; eventually the entire vine is killed (Scheck et al., 1998). Roots of declining plants showed necrotic lesions, dark vascular streaking as well as root rot characterized by black discoloration of the root cortex, epidermis, and vascular tissues. In many instances, black foot disease is found in plants suffering stress conditions in the root system including poor planting (J-rooting) and poor soil conditions such as poor water drainage (Petit and Gubler, 2013).

Transmission: The source of inoculum for new infections can be nurseries or be present in vineyard soils. Plants can become infected during the grafting process or from infected rootstock mother vines, and *Campylocarpon* spp. are frequently isolated from roots, rootstocks, and graft unions of young vineyards. Some species produce chlamydospores, which are thick walled, fungal resting structures, but these have not been observed with *C. fasciculare*, which only produces macroconidia that move in infested soil, on tools and equipment, and with infected planting stock (Halleen et al., 2006).

Damage Potential: Black-foot disease caused by *C. fasciculare* and other species causes substantial economic losses in young grape vineyards because diseased plants must be removed and replanted (Agusti-Brisach and Armengol, 2013). Infected vineyards can show a high percentage of declining vines (Rego et al., 2000). Soilborne pathogens such as *C. fasciculare* that can live as saprobes colonizing dead and dying plant material, as a latent pathogen, or as endophytes, can be very difficult to eradicate and control in vineyards and management options are limited (Langenhoven et al., 2018).

Worldwide Distribution: Brazil, South Africa, Turkey, United States (California).

Official Control: None

California Distribution: Fresno and Kern counties

California Interceptions: None

The risk *Campylocarpon fasciculare* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** This pathogen is likely be able to establish in most agricultural regions of California, possibly excluding the desert as it is usually associated with cool, wet soils.

   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 for this pathogen is small and only includes *Vitis* spp.

   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 Reproductive Potential:** This pathogen does not have chlamydospores, which other species have. It uses only one type of asexual spore (macroconidia) to infect new hosts through the roots or during propagation, no airborne dispersal has been observed.

   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:** Infected plants may grow poorly with low yields or even die. Replanting costs for perennial crops such as grapes can be significant.

   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: No environmental impacts have been reported. It impacts cultural practices as affected plantings must be removed and replaced.

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 *Campylocarpon fasciculare:* Low

Add up the total score and include it here. **8**
-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.

This fungus has been isolated from grapevines in Fresno and Kern counties.

***Evaluation is* 'low'**.

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* ***= 7***

Uncertainty:

Black foot pathogens a will continue to be disseminated around the world on planting material, either as latent pathogens or as endophytes. Many vineyards worldwide show high diversity of fungal trunk pathogens and it is common for multiple genera and many species to be co-infecting declining vines, making it difficult to assess the impact of individual species.

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for *Campylocarpon fasciculare* is C.

References:

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Responsible Party:

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***Comment Period: 03/16/2021 through 04/30/2021**

***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: C