CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Pseudocercospora fuligena (Roldan) Deighton 1976

Black leaf mold

Current Pest Rating: none

Proposed Pest Rating: A

Kingdom: Fungi, Phylum: Ascomycota,
Subphylum: Pezizomycotina, Class: Dothideomycetes,
Subclass: Dothideomycetidae, Order: Capnodiales,
Family: Mycosphaerellaceae

Comment Period: 08/10/2021 through 09/24/2021

Initiating Event:

The USDA's Federal Interagency Committee on Invasive Terrestrial Animals and Pathogens (ITAP.gov) Subcommittee on Plant Pathogens has identified the worst plant pathogens that are either in the United States and have potential for further spread or represent a new threat if introduced. *Pseudocercospora fuligena* is on their list. A pest risk assessment of this fungus is presented here, and a pest rating for California is proposed.

History & Status:

Background: Cercospora leaf mold on tomato caused by *Cercospora fuligena* was first reported by Solheim and Stevens (1931), and described by Roldan (1938), in the Philippines. In 1951 it was documented to be in Japan by Yamada. The first report in the United States was by Blazquez and Alfieri (1974) from plants collected in Florida in Hillsborough and Collier Counties. Deighton (1976) transferred the fungus to the genus P*seudocercospora*.

The disease has primarily been reported from Asia where hot and humid conditions are favorable for fungal infection and reproduction. The disease has not been found in Florida since 1974, after growers quickly moved away from planting tomato cultivars that were susceptible to *P. fuligena*. There have been recent detections in Ohio (Subedi et al, 20015), and North Carolina (Lookabaugh et al, 2018), primarily on greenhouse grown tomatoes.

Hosts: Solanum cheesmaniae (Galapagos tomato), *S. habrochaites* (wild hairy tomato), *S. lycopersicum* (tomato), *S. melongena* (eggplant), *S. nigrum* (black nightshade), *S. peruvianum* (Peruvian tomato), *S. pimpinellifolium* (currant tomato), and *Withania somnifera* (Indian ginseng).

Symptoms: This disease causes leaf spots and spots on petioles, stems, and fruit peduncles, but not on the fruit itself. Major symptoms occur on the foliage as spots, 2–8 mm in diameter, yellow on upper surface, and brown to dark brown on the lower surface; brown to dark brown in the center, and with a yellowish to yellowish brown margin (Phengsintham et al., 2012). Lesions on the lower leaf surface are initially covered with white mycelium that turns grey to black as the fungus sporulates (Yamada, 1951). Lesions have no definite margins on either the upper or lower leaf surfaces (Blazquez and Alfieri, 1974). Infected leaves may become twisted, wilted, dried with age, brittle and generally remain hanging on the plant with a soot-covered appearance. Defoliation may also occur (Baysal-Gurel, 2020).

Transmission: This fungus, like closely related species, probably survives in debris from diseased plants. It can produce spores on this debris at the beginning of the growing season. The spores can be splashed by rain, washed by irrigation water, or carried clothes of workers, tools, equipment (Kirino and Kawaguchi, 2019). Long distance spread is wind. It is not known to be seed borne (Baysal-Gurel, 2020).

Yamada (1951) showed that conidia can survive 6 months on dried leaves stored in clay pots indoors. Kirino and Kawaguchi (2019) found viable conidia on equipment in greenhouses that had had a large disease outbreak the previous year. They hypothesized that conidia on agricultural equipment could be the primary inoculum in commercial greenhouses between crops.

Damage Potential: Disease incidence in greenhouse tomatoes in North Carolina was reported as moderately high with 25 to 35% of plants affected (Lookabaugh et al., 2017). In greenhouse tomatoes in Ohio, Subedi et al. (2015) reported a 60% decrease in leaf area from fungal infections. Yield losses of between 40-60% were observed on susceptible tomato cultivars by Wang et al. (1996) in Taiwan. The yield reduction was due to a reduction in fruit weight and fruit number. On Indian ginseng, disease incidence reached 20% and had the potential to significantly reduce yield of the roots (Saroj, et al., 2014).

Worldwide Distribution: Africa: *Cote d'Ivoire, Gabon, Gambia, Nigeria, Senegal, Somalia, Tanzania, Togo, Uganda*. America: *Brazil, Cuba, Mexico, Netherlands Antilles, United States of America* (Florida, North Carolina, Ohio). Asia: *Bangladesh, Brunei Darussalam, Cambodia, China, India, Japan, Laos, Malaysia, Philippines, Thailand, Vietnam*. Oceania: *Australia, Cook Islands, New Caledonia, Palau, Papua New Guinea, Solomon Islands, Vanuatu* (EPPO, 2021; Farr and Rossman, 2021).

Official Control: *Pseudocercospora fuligena* is on the USDA PCIT's harmful organism list for Ecuador and Peru (USDA, 2021).

California Distribution: None

California Interceptions: None

The risk *Pseudocercospora fuligena* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** Most reports of this disease are in tropical or subtropical climates where there is high humidity and summer rainfall. Although these conditions are not anticipated in field situations in California, growing conditions for greenhouse tomatoes put them at risk for disease epidemics.

   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 mainly species of tomatoes, plus a few other members of the genus Solanum, plus *Withania somnifera* (poisonous gooseberry).

   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:** The pathogen reproduces with asexual spores that can be wind borne and spread with contaminated equipment or infected transplants.

   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:**

   There is a high potential for serious economic damage to the yield of susceptible tomato cultivars. Fungicide treatments may be available.

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

   Economic Impact: A, B, D

   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:** *Solanum nigrum* (black nightshade) is a host of this pathogen. This is an annual herb that is not native to California but is widely distributed along the coast and in the Central and San Joaquin valleys where commercial tomatoes are grown (CalFlora.org, 2021). It could be a reservoir of inoculum in the environment. This pathogen has been found by home gardeners in Ohio.

Evaluate the environmental impact of the pest to California using the criteria below

Environmental Impact: A, 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: 3
- 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 *Pseudocercospora fuligena:* Medium

Add up the total score and include it here. **12**
-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* ***= 12***

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating *Pseudocercospora fuligena* for is A.

References:

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Responsible Party:

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***Comment Period: 08/10/2021 through 09/24/2021**

***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: A