cdfa CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Phyllosticta ampelicida (Engelmann) van der Aa 1861

Current Pest Rating: Q

Proposed Pest Rating: B

Comment Period: 8/07/2019 through 9/21/2019

Initiating Event:

On May 15, 2019, a shipment of cut *Smilax* foliage was intercepted in San Luis Obispo County by county agricultural inspectors. The shipment originated in Florida and was destined to a floral company in San Luis Obispo County. The county inspectors noticed that foliage of a second type of plant, not *Smilax*, was comingled in the shipment. This foliage showed leaf spotting. A sample of the diseased foliage was submitted to the CDFA Botany Lab for identification and to the Plant Pathology Lab for diagnosis of any associated pathogens. On May 17, 2019, Genevieve Walden, CDFA Botanist, identified the foliage as muscadine grape, *Vitis rotundifolia*, and assigned it a D rating. Also, on May 17, CDFA Plant Pathologist Suzanne Latham identified the fungal pathogen *Phyllosticta ampelicida* by morphology, to be associated with the leaf spotting symptoms. This pathogen has not been reported before from California and therefore, was assigned a temporary Q rating which subsequently resulted in the destruction of the muscadine grape contaminating the shipment. Since *Smilax* sp. is not a reported host of the pathogen and the shipment of Smilax was unaffected by *P. ampelicida*, it was released to the receiver. An assessment of the consequences of introduction of *P. ampelicida* to California is presented here and a permanent rating is proposed.

History & Status:

Background: *Phyllosticta ampelicida* (= *Guignardia bidwelli*) causes black rot of grape, an economically important disease in most grape-growing areas with humid spring and summer climates (Ramsdell and Milholland, 1988). Its distribution is cosmopolitan in most viticultural areas, except in Australasia, Scandinavia, the UK, or the Western USA (California) (Farr and Rossman, 2019). It requires warm weather with high humidity and rainfall in the late spring and summer for spore production and plant infection. When these environmental requirements are met, it can cause epidemics with significant crop losses of fruit rots on vines.

The pathogen is thought to be native to Eastern North America (United States and Canada) and was first observed causing devastating crop damage in Michigan on *Vitis vinifera* imported from Europe (Scribner and Viala, 1888). Black rot is a limiting factor in the cultivation of *V. vinifera* in the Niagara and Great Lakes regions of the US and Canada, and in Germany and Switzerland (Wilcox and Hoffman, 2015; Jermini and Gessler, 1996).

Hosts: This pathogen has a sexual and asexual form in its life-cycle which is common for fungi in the phylum Ascomycota, and both forms parasitize the same host. All cultivars of *Vitis vinifera* appear to be highly susceptible to *P. ampelicida*. Most interspecific hybrid cultivars primarily of *V. labrusca* origin are moderately to highly susceptible. Grapes primarily of *V. aestavalis* origin are moderately resistant, and those of complex origin vary widely depending on their individual parentage and criteria applied in selection. French-American hybrids and American bunch grapes including *V. rotundifolia* are also hosts to the pathogen to varying degrees (Wilcox and Hoffman, 2015).

Symptoms: All new growth is susceptible to infection although the most diagnostic symptoms appear on the leaves and fruit. Infected leaves have circular lesions which vary in size, typically small, up to 10 mm, initially cream in color, becoming brown or tan with age and developing reddish margins. Pycnidia of *P. ampelicida* develop often in a ring within the leaf lesions. Leaf veins may turn black and the discoloration can extend beyond the edge of the lesion. On berries, small cream-colored dots are surrounded by a zone of chocolate brown necrotized tissue. On shoots, petioles and tendrils, black rot lesions are initially brown then turn purple to black in color. Stem lesions appear sunken and are elliptical to elongated in shape and contain black pycnidia. The bark may split. Stem lesions remain localized and do not usually extend more than several centimeters in length. (Wilcox and Hoffman, 2015).

Transmission: The fungus attacks leaves, shoots, tendrils, peduncles and berries. During spring through early summer, rain causes the release of ascospores from pseudothecia and conidia from pycnidia. Localized spread occurs as ascospores are forcibly discharged from the ascus into the air. Both types of spores are moved by wind or with rain splash. Long distance spread can occur though movement of infected propagating material and possibly with infected fruit (Becker and Pearson, 1996). The fungus overwinters as pycnidia (asexual fruiting bodies) and pseudothecia (sexual fruiting bodies) within cane lesions or mummified fruit. Ascospores (sexual spores) are considered the principal form of primary inoculum (Ferrin and Ramsdell, 1977). Conidia (asexual spores) of *P. ampelicida* function as secondary inoculum (Ferrin and Ramsdell, 1978), but can also serve as primary inoculum when released from overwintered grape mummies (Becker and Pearson, 1992) and cane lesions (Becker and Pearson, 1996). Ascocarps are formed again in the fall and overwinter as berry mummies and on stem lesions (Wilcox and Hoffman, 2015).

The optimum environmental conditions for foliar infection are a temperature of 26.5C with 6 hours of leaf wetness, with extremes of 10C - 32C possible, but then requiring 24 and 12 hours of leaf wetness, respectively (Spotts 1977). At 15C, new secondary pycnidia appear in 21 days, while at 26C, new secondary pycnidia appear in only 13 days (Spotts 1980). Both ascospores and conidia can infect young

leaves, canes, and berries if wetness and temperature conditions are favorable. Plant parts become resistant to infection with age. New leaf lesions and infected berries become a source of pycnidia and conidia within the current season as conidia cause repeating cycles of infection during summer rain events (Wilcox et al. 2015). The disease can survive for at least 2 years in the lesions on infected shoots which have been kept as unpruned canes or spurs (Becker and Pearson, 1996).

Damage Potential: Although young leaves, shoots, and tendrils are all susceptible to infection by *P. ampelicida*, this seldom results in economic damage to the vines. It is the infection of the grape clusters that seriously reduces fruit yield and quality (Ferrin and Ramsdell 1977, 1978). In growing regions with highly favorable climatic conditions of temperature and precipitation, such as the Finger Lakes region of New York, black rot can cause complete crop loss with 99% of untreated clusters becoming infected and showing symptoms by harvest (Hoffman et al. 2004).Fungicides are used to control both current-season losses and to stop the build-up of primary inoculum for the following year in eastern, central and midwestern states were a conducive environmental conditions for the disease exist. (Hoffman et al. 2004). Black rot is also a limiting factor in organic vineyards where fungicide use is restricted (Wilcox and Hoffman, 2015).

Worldwide Distribution: Africa: *Morocco, Mozambique, Sudan*; Asia: *China, Christmas Island, India, Iran, Japan, Korea, North Korea, Pakistan, Philippines, Taiwan, Turkey*. North America: *Canada* (British Columbia, New Brunswick, Nova Scotia, Ontario, Quebec), *Mexico, USA* (Alabama, Arizona, Arkansas, Delaware, Florida, Indiana, Illinois, Iowa, Kansas, Massachusetts, Michigan, Mississippi, Missouri, Nebraska, New Jersey, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Texas, Washington, West Virginia); Central America & West Indies: *Barbados, Cuba, Haiti, Jamaica, Martinique, Panama, Salvador, Virgin Islands*; South America: *Argentina, Brazil, Uruguay, Venezuela*; Europe: *Austria, Bulgaria, Cyprus, France, Germany, Italy, Romania, Russian Federation, Slovakia, Switzerland, Ukraine*; Oceania: *Australia* (New South Wales) (CABI Data Sheet, 2019; Farr and Rossman, 2019)

Official Control: *Guignardia bidwellii* (synonym of *P. ampelicida*) is on the 'Harmful Organism List' for Namibia, Algeria, Chile, Colombia, Ecuador, Egypt, Indonesia, Israel, New Zealand, Nicaragua, Oman, Paraguay, Peru, Syrian Arab Republic, Timor-Leste, United Arab Emirates, Viet Nam, and South Africa (USDA PCIT, 2019). In California it currently has a temporary Q rating requiring quarantine action

California Distribution: None

California Interceptions: see 'Initiating Event'.

The risk *Phyllosticta ampelicida* would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction**: *P. ampelicida* requires warm temperatures and a minimum of 6 hours of leaf wetness to germinate and infect grapes. With an arid summer climate in most of California, long periods of leaf wetness from precipitation are rare. Although California has extremely large acreages planted to susceptible hosts, it does not have growing regions with summer rainfall sufficient to cause multiple disease cycles.

   Evaluate if the pest would have suitable hosts and climate to establish in California.

   Score: **1**

   - **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 *Phyllosticta ampelicida* is limited to *Vitis* sp.

   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 Dispersal Potential:** The pathogen produces both ascospores and conidia. There can be multiple cycles of secondary conidia produced throughout the growing season, whenever temperatures and leaf wetness periods are adequate, which can lead to an exponential increase in disease incidence and over time, in disease severity. Spores are dispersed by wind, rain, sprinkler irrigation, and movement of infected plants and fruit.

   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:** The pathogen can cause complete crop failure through heavy levels of grape cluster infection. In areas with favorable environments for epidemics, multiple fungicide applications are required to prevent fruit infection, along with additional sanitation requirements. Infected or potentially infected grapes cannot be exported to countries that have quarantines against the pathogen.

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

Environmental Impact: D
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 *Phyllosticta ampelicida:*

Add up the total score and include it here. **9**
-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'. The pathogen has not been reported in California in scientific literature or by pest control professionals.

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:

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information* ***= 9***

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above **the proposed rating for *Phyllosticta ampelicida is B*.**

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Responsible Party:

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*Comment Period: 8/07/2019 through 9/21/2019

*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
