

California Pest Rating Proposal for
***Phyllosticta sphaeropsoidea* Ellis & Everh. 1883**
(syn= *Guignardia aesculi* (Peck) V.B.Stewart 1916)

Leaf blotch of buckeyes and horse chestnuts

Current Pest Rating: Z

Proposed Pest Rating: C

Kingdom: Fungi; Phylum: Ascomycota

Subphylum: Pezizomycotina; Class: Dothideomycetes

Order: Botryosphaeriales; Family: Botryosphaeriaceae

Comment Period: 7/21/2020 through 9/4/2020

Initiating Event:

In June 2011, a sample of horse chestnut (*Aesculus* sp.) with foliar leaf spotting was submitted by a botanical garden in Sonoma County to the CDFA plant pest diagnostics center. CDFA plant pathologist Suzanne Rooney-Latham identified leaf blotch, caused by *Phyllosticta sphaeropsoidea* (= *Guignardia aesculi*), from the sample by morphology. The pathogen was known to occur in California, so it was given a temporary "Z" rating. The risk to California from *Phyllosticta sphaeropsoidea* is described herein and a permanent rating is proposed.

History & Status:

Background:

The genus *Aesculus* has 19 species and varieties of flowering trees in the soapberry and lychee family, Sapindaceae. Only one species is native to California, *Aesculus californica*, and it is widespread in canyons and slopes along the coast from Orange County to Del Norte County, and in the foothills of the Sierra Nevada. In North America, the native *Aesculus* spp. are commonly called "buckeyes," a name derived from the resemblance of their shiny seeds to the eye of a deer. In the Old World, they're called

“horse chestnuts,” a name that arose from the belief that the trees were close to edible chestnuts (which are in a different family, Fagaceae), and because the seeds were fed to horses as a medicinal treatment (Ridgeway, 2012).

Species of *Phyllosticta* (teleomorph *Guignardia*) cause leaf spot symptoms and fruit diseases on a range of hosts including some economically important crops and ornamentals. Following current conventions, the oldest name takes precedence when naming a pathogen, so the preferred name is *Phyllosticta sphaeropsoidea*. In the past, the telomorphic name was preferred, so the name *Guignardia aesculi* is also in literature. *Phyllosticta* is an important coelomycetous phytopathogenic genus occurring worldwide on a large range of hosts. Species designation of *Phyllostictas* has historically been difficult for taxonomists and was based on morphology, culture characters, and host association. They are mostly phytopathogens with a wide host range, but some species of *Phyllosticta* have also been reported as endophytes and saprobes, and some have host ranges restricted to a single host genus (i.e. *P. sphaeropsoidea*) (Hudson, 1987; Wikee et al., 2011).

Hosts: Buckeyes and horse chestnuts: *Aesculus ambigua*, *A. arguta*, *A. arnoldiana*, *A. bushii*, *A. californica*, *A. carnea*, *A. chinensis*, *A. discolor*, *A. dupontii*, *A. flava*, *A. georgiana*, *A. glabra*, *A. glaucescens*, *A. hippocastanum*, *A. hybrida*, *A. indica*, *A. mississippiensis*, *A. mutabilis*, *A. neglecta*, *A. octandra*, *A. parviflora*, *A. pavia*, *A. splendens*, *A. sylvatica*, *A. turbinata*, and *A. woerlitzensis*; Witch hazel: *Hamaemelis* sp.; and Arborvitae: *Thuja occidentalis* (Farr and Rossman, 2020)

Symptoms: *Phyllosticta sphaeropsoidea* infection causes irregularly shaped spots and blotches on the foliage of *Aesculus* spp. in North America and Europe and its occurrence is essentially ubiquitous on unprotected trees. Soon after bloom, water-soaked, pale green lesions begin to form on the leaf surface. As the lesions expand, they become dry and turn orange brown, and black fungal fruiting bodies become visible. When infections are abundant on the margins, the foliage can curl and wrinkle, becoming generally distorted. In contrast to foliar blights, blotches will reach a certain size and stop expanding. Thus, the foliage is retained and not shed. When climate is conducive to epidemics, and there are repeat cycles of infection, the foliage looks scorched or burned late in the summer. The symptoms can be damaging to nursery stock (Gillman, 2005; Wikee et al., 2011).

Transmission: The disease is spread by warm wind and rain. Pycnidia of the *Phyllosticta* phase and/or ascomata of the *Guignardia* phase develop under the leaf tissue and produce leaf spots. During wet spring or summer weather, conidia of *Phyllosticta* and ascospores of *Guignardia*, and sometimes the spermatial stage are present. Spores are released and ejected from the pycnidia and ascomata. The spores are carried by rain and wind to other leaves and young fruits. Germ tubes develop from spores and grow into host leaves and develop within the plant tissue. There can be multiple secondary *Phyllosticta* cycles during the summer. Heavy leaf blotching may not be visible for some time after infection. Movement of infected nursery stock is the primary mechanism of long-distance transmission. (Gillman, 2005; Wikee et al., 2011).

Damage Potential: This is a common disease of *Aesculus* that is problematic in places with high rainfall/overhead irrigation and dense plantings. Severe blotching does not develop until after the

majority of annual growth has occurred for the season, so *Phyllosticta* leaf blotch causes little harm to the health of vigorous trees. Fungicides can be used to improve the appearance of specimen trees and nursery stock. Collecting and disposing of fallen leaves can reduce the overwintering inoculum that initiates new infections. Pruning interior canopy branches to increase air circulation and improve sunlight penetration can reduce disease by reducing the periods of leaf wetness. (Gillman, 2005; Wikee et al., 2011).

Worldwide Distribution: Armenia, Austria, Belgium, Bulgaria, Canada, China, Croatia, Czech Republic, Estonia, France, Germany, Hungary, Italy, Lithuania, Netherlands, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, South Korea, Switzerland, Ukraine, United Kingdom, United States (Farr and Rossman, 2020)

Official Control: None

California Distribution: Older records show detections on “coast north” and recent detections in Sonoma and Santa Clara counties.

California Interceptions: None

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

Consequences of Introduction:

- 1) Climate/Host Interaction:** Extended periods of leaf wetness is necessary to allow infection of the new leaves in the spring. Generally, cooler and wetter areas of the Central Coast, northern California, and the Sierra foothills will have more disease than areas with warmer and drier springs and summers.

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:** *Phyllosticta sphaeropsoidea* causes leaf blotch disease specific to buckeyes and horse chestnuts in Europe and North America (Hudson, 1987).

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.
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- 3) Pest Reproductive Potential:** This pathogen uses multiple spore stages and can utilize repeat cycles of infection to amplify epidemics. Spores are spread by wind and rain.

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 can be cosmetic damage to specimen trees and nursery stock, and a small decrease in photosynthetic capacity from this disease, but serious impacts on tree health have not been observed in North America or Europe (Gillman, 2005).

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

Economic Impact: 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: 1

- **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:** California has one native buckeye, *A. californica*, that is widespread in the state in a variety of habitats (Calflora, 2020). No significant damage as been reported on this species from leaf blotch.

Environmental Impact:

- 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: 1

- **Low (1) causes none of the above to occur.**
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- 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 sphaeropsoides* is Low:

Add up the total score and include it here. **6**

-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 'Medium'. There are reports of the pathogen in only some areas where hosts are native or grown.

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: (Score)**

Final Score: *Score of Consequences of Introduction – Score of Post Entry Distribution and Survey Information = 4*

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for *Phyllosticta sphaeropsoides* is C.

References:

Calflora Database. *Aesculus californica*. Accessed 6/30/2020. Berkeley, CA. calflora.org

EPPO Global Database. 2020. <https://gd.eppo.int/taxon/GUIGAE>. Accessed 6/29/2020

Ridgeway, S. 2012 The Bisexual California Buckeye – sinner or survivalist? UC Sonoma County. sonomamg.ucanr.edu/Plant_of_the_Month/Aesculus_californica_-_California_buckeye/

Farr, D.F., and Rossman, A.Y. Fungal Databases, U.S. National Fungus Collections, ARS, USDA. Retrieved June 30, 2020, from <https://nt.ars-grin.gov/fungaldatabases/>

Gillman, H. D. 2005. Plant Pathologist. UMass Extension Landscape, Nursery & Urban Forestry Program Fall <https://ag.umass.edu/landscape/fact-sheets/guignardia-leaf-blotch>. Accessed 30 June 2020

Hudson, H. 1987. *Guignardia* leaf blotch of horse chestnut. *Trans Br Mycol Soc* 89(3):400–401

Wikee, S., Udayanga, D., Crous, P. W., Chukeatirote, E., McKenzie, E. H., Bahkali, A. H., Dai, D. and Hyde, K. D. 2011. *Phyllosticta*—an overview of current status of species recognition. *Fungal Diversity*, 51(1), pp.43-61.

Responsible Party:

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***Comment Period: 7/21/2020 through 9/4/2020**

***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](mailto: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.
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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
