CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Profile for

Phorodon cannabis Passerini: cannabis aphid

Hemiptera: Aphididae

Pest Rating: A

Comment Period CLOSED: 4/30/2019 through 6/14/2019

Initiating Event:

On February 26, 2019, *Phorodon cannabis* was found on cannabis plants in a nursery in Mendocino County. This aphid has not been rated. A permanent pest rating proposal is required to support an official pest rating.

History & Status:

Background: Multiple sources report cannabis (*Cannabis sativa*) to be the sole host plant of *P. cannabis* (Bodlah et al., 2011; Heie, 1993; Khan and Shah, 2017). However, it has also been reported from other plants, including other *Cannabis* species and the genera *Artemisia*, *Cnicus*, *Humulus* (including hops, *Humulus lupulus*), and *Prunus* (Das, 1918; Higuchi and Miyazaki, 1969; Müller and Karl, 1976). The ability of *P. cannabis* to feed on and complete development on plants other than *C. sativa* is somewhat in doubt for the following two reasons. The similar species *P. humuli* (Schrank) (hops aphid) feeds on hops and *Prunus* species, and reports of *P. cannabis* on some of these plants could represent misidentifications of *P. humuli* (Oregon Department of Agriculture, 2017). Transfer trials failed to establish *P. cannabis* on hops (Cranshaw, 2018).

Feeding by *P. cannabis* is reported to cause wilting and yellowing of cannabis (Oregon Department of Agriculture, 2017). In examination of outdoor hemp plants infested with *P. cannabis*, Cranshaw et al. (2018) did not observe any plant injuries resulting from aphid feeding, but they did report large

quantities of honeydew. They observed large numbers of predaceous insects with *P. cannabis* in the field that they speculated were exerting pressure on the aphids, and they noted that that damage in greenhouses (where there would likely be less control by natural enemies) could be more significant.

There appears to have been little work done regarding control of *P. cannabis*. The California Department of Pesticide Regulation (2015) lists azadirachtin, horticultural oil, insecticidal soap, rosemary and peppermint oils, and *Beauveria bassiana* as potential agents for the control of aphids on cannabis, including *P. cannabis*.

Phorodon cannabis is reported to vector at least two viruses (cucumber mosaic virus and alfalfa mosaic virus) to *Cannabis sativa* (Schmidt and Karl, 1970).

Worldwide Distribution: *Phorodon cannabis* is reported to occur in Europe (including Germany and Romania), Asia (including Pakistan and India), North Africa, and North America (Canada and the United States) (Amin et al., 2017; Batra, 1976; Blackman and Eastrop, 2019; Müller and Karl, 1976; Trotuş and Naie, 2008). In the United States, *P. cannabis* has been found in hemp fields in Colorado, Minnesota, and Virginia, on hemp in a greenhouse in Kentucky, and in suction traps in Illinois, Indiana, Iowa, Kansas, and Wisconsin (Cranshaw et al., 2018; Lagos-Kutz, 2018; Villanueva, 2019). The species may be established in Oregon (Oregon Department of Agriculture, 2017).

Official Control: *Phorodon cannabis* is considered reportable by the USDA (USDA-APHIS).

California Distribution: *Phorodon cannabis* has been found in greenhouses and hoop houses. The species is presumed not to be established in California.

California Interceptions: *Phorodon cannabis* was found on cannabis in greenhouses in Humboldt, Mendocino, and Monterey counties in 2018 and 2019 (six total interceptions) (California Department of Food and Agriculture).

The risk *Phorodon cannabis* poses to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:** *Phorodon cannabis* has become established in areas with a temperate climate (Colorado, Virginia, etc.) and it is likely to tolerate the range of climates found over much of California. The distribution of *Cannabis sativa* is presumed to be fairly patchy in California. Therefore, *P. cannabis* receives a **Medium (2)** in this category.

   – 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:** *Phorodon cannabis*, for the reasons stated in the Background (above), is presumed to be restricted to species of the genus *Cannabis*. Therefore, it receives a **Low (1)** in this category.

   – 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 and Dispersal Potential:** The reproduction of *Phorodon cannabis* alternates between sexual and parthenogenetic (cyclic parthenogenesis) (Gavrilov-Zimin et al., 2015). Movement of infested plant material is probably the most effective means of long-distance dispersal. Therefore, it receives a **Medium (2)** in this category.

   – 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:** Infestations of cannabis by *Phorodon cannabis* could result in higher crop production costs and altered cultural practices for nurseries to avoid honeydew and possible damage resulting from feeding by aphids. This aphid is a known vector of at least two viruses, including Alfalfa mosaic virus, which is a C-rated pest of alfalfa that also affects hemp and possibly cannabis as well. Therefore, it receives a **High (3)** in this category.

Economic Impact: B, D, E

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: High

– 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:** Infestations of cannabis by *P. cannabis* could trigger private treatments. Home cannabis plantings could be impacted by this aphid. Therefore, it receives a **High (3)** in this category.

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

Environmental Impact: D, 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: High

– 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 *Phorodon cannabis*: Medium (11)

Add up the total score and include it here.

–Low = 5-8 points

–Medium = 9-12 points

–High = 13-15 points

6) **Post Entry Distribution and Survey Information:** *Phorodon cannabis* has been found in nursery greenhouses in three counties. It is presumed not to be established in the environment in California. It receives a **not established (0)** in this category.

–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.

Final Score:

7) The final score is the consequences of introduction score minus the post entry distribution and survey information score: **Medium (11)**

Uncertainty:

Phorodon cannabis may be established in California, but the only records available are from greenhouses. Cannabis pests have (understandably) received little attention from agricultural entomologists until recently because of this crop's legal status. If it is determined that *P. cannabis* is established in California, the pest rating for this species will need to be modified.

The recent change in the legal status of cannabis in California means that this crop is likely to be more widely grown in the future. Therefore, it may be capable of establishing over a larger area in the state than was predicted in this proposal.

There is significant uncertainty regarding control of *P. cannabis*. Natural enemies (predators and/or parasitoids) could limit outdoor populations of *P. cannabis*, but insufficient data is available to assess this possibility.

Very little information was found regarding the impact of alfalfa mosaic virus on hemp or cannabis. This virus is reported to cause yellowing and weakened growth in hemp (Schmidt and Karl, 1970).

Conclusion and Rating Justification:

Phorodon cannabis is an aphid that has the potential to impact cannabis cultivation in California. The species is not known to be established in the state. For these reasons, an "A" rating is justified.

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