CALIFORNIA DEPARTMENT OF FOOD & AGRICULTURE

California Pest Rating Proposal for

Peach rosette mosaic nepovirus

rosette mosaic of peach

Current Pest Rating: none

Proposed Pest Rating: B

Kingdom: Viruses and viroids, Category: Riboviria,
Category: Orthornavirae, Phylum: Pisuviricota,
Class: Pisoniviricetes, Order: Picornavirales,
Family: Secoviridae, Genus: Nepovirus

Comment Period: 07/05/2023 through 08/19/2023

Initiating Event:

This pathogen has not been through the pest rating process. The risk to California from Peach rosette mosaic nepovirus (PRMV) is described herein and a permanent rating is proposed.

History & Status:

Background:

Peach rosette mosaic virus (PRMV) is a single-stranded, positive-sense RNA nepovirus, indigenous to North America, likely from areas near the Great Lakes, specifically Michigan and Western Ontario (Ramsdell et al., 1995). It is absent from the European Union, making it a pest of concern for the European Plant Protection Organization. The principal host is the American grape, *Vitis labrusca*. Some cultivars of *V. vinifera*, and some French American *Vitis* spp. hybrids are susceptible. PRMV is a pathogen of peaches (*Prunus persica*) where crop losses up to 60% have been reported. PRMV also causes disease in blueberry (*Vaccinium corymbosum)* (Ramsdell and Gillett, 1981; Paduch-Cichal et al., 2011).

Nepoviruses are named after two of their important characteristics: they are nematode transmitted and have icosahedral shaped particles. The primary vector of nepoviruses are longidorid nematodes, especially the American dagger nematode, *Xiphinema americanum* sensu lato (Brown et al., 1993). For

a virus to be transmitted by a dagger nematode, virus particles must be acquired and then retained in a specific area of the food canal. Virus transmission occurs when the retained virus particles are later disassociated and directly injected into plant root cells during nematode feeding (Wang et al., 2002). The viruses are not transmitted from the female through the egg and are lost at molting, such that the nematode must feed on an infected plant again to re-acquire the virus as it grows. Field evidence indicates that *X. americanum* has a long lifespan and a low reproduction rate (Jaffee et al., 1987), which makes it difficult for this nematode to maintain high populations in frequently tilled soils.

Longidorus diadecturus is also a known vector of PRMV, reported in one field in Ontario, Canada, (Allen and Ebsary, 1988), but is not known to be in California.

Apart from that caused by PRMV, there are several diseases of peach that use the common name "peach rosette". In Europe, the disease "peach rosette" is caused by Strawberry latent ringspot nepovirus; in Australia, "peach rosette and decline" is due to a combined infection with Prune dwarf and Prunus necrotic ringspot ilarviruses; in parts of the US including California, *Candidatus* Phytoplasma pruni causes "peach rosette" symptoms.

Hosts: Prunus persica (peach), *Prunus salicina* (Japanese plum), *Rumex crispus* (dock), *Solanum carolinense* (Carolina horsenettle), *Taraxacum officinale* (dandelion), *Vaccinium corymbosum* (blueberry), *Vitis labrusca* (Concord grape), *Vitis vinifera* (grape) (CABI, 2023).

Symptoms: Peach trees infected with PRMV show delayed bud break. Leaves produced in spring are mottled, narrower than normal, and distorted, with shortened shoot internodes. This gives the “rosetting” symptom, which is the characteristic trait of the disease in peaches. Infected trees are stunted and produce little or no fruits (Ramsdell, 1995).

Bud break can be delayed in infected grapes, which can show shortened and crooked shoots, mottled and deformed leaves. Clusters are straggly, smaller, and fewer than normal, with extensive shelling of the berries. Infected vines are stunted and show a progressive decline, which may lead to vine death (Ramsdell and Myers, 1974; Ramsdell, 1988). Vines infected with PRMV can have canes with short, crooked growth, giving an umbrella-like appearance. Leaves were asymmetric, puckered, and frequently mottled with flattened petiolar sinuses (Stobbs and Van Schagen, 1995). Infected blueberry plants had elongated, strap-shaped or malformed crescent-shaped leaves on parts of the bushes, and variously deformed leaves (Ramsdell and Gillet, 1981).

Transmission: PRMV is primarily a soil-borne disease. The virus can be transmitted by nematodes from infected weeds to trees or vines or spread from vine to vine or tree to tree. Old orchard or vineyard sites formerly containing trees or vines infected with PRMV, or with PRMV-infected weeds, serve as inoculum to be spread by nematodes to infect new plantings (Ramsdell and Meyers, 1977).

PRMV is seed-borne in dandelion, and their seeds can travel as far as 2 km with wind, potentially producing infected dandelion plants which could be a source of inoculum to new orchards or vineyards. PRMV is seed-borne, but not pollen borne, in grape. Propagating from infected woody

cuttings is also a method of transmission, along with anything that moves soil infested with infected nematode vectors (Ramsdell and Meyers, 1977).

The primary vector, *Xiphinema americanum*, is a widespread, C-rated pest in California https://blogs.cdfa.ca.gov/Section3162/?p=6906.

Damage Potential: Yield of PRMV-infected *Vitis labrusca* 'Concord' grapevines was drastically reduced compared to apparently healthy PRMV-free vines in Michigan (Ramsdell and Meyers, 1974). In Ontario, PRMV infected Concord vines produced berries that were irregular in size and ripened irregularly, resulting in severe berry shelling and yield loss, and vines were killed (Stobbs and Van Schagen, 1995). Damage on blueberries were only observed when bushes were interplanted with infected Concord grapes (Ramsdell and Gillet, 1981).

Worldwide Distribution: Africa: *Egypt*. America: *Canada, United States of America* (Michigan, New York), Europe: *Turkey*. (EPPO, 2023).

Official Control: EPPO A1 list for Bahrain, Brazil, Chile, Eurasian Economic Union, European Plant Protection Organization, European Union, Georgia, Jordan, Kazakhstan, Russia, Switzerland, Turkey, Ukraine, United Kingdom, A2 list for Egypt and a quarantine pest in Canada, China, Israel, Mexico, Moldova, Morocco, and Tunisia (EPPO Database, 2023). USDA PCIT's Harmful organism list for Albania, Argentina, Brazil, Canada, Chile, China, Colombia, Ecuador, Eurasian Customs Union, European Union, Georgia, Guatemala, Holy See (Vatican City State), Honduras, India, Indonesia, Israel, Japan, Mexico, Monaco, Morocco, Oman, Nicaragua, Peru, Republic of Korea, Republic of North Macedonia, San Marino, Serbia, South Africa, Taiwan, Tunisia, Turkey, Ukraine, United Arab Emirates, Uruguay (PCIT, 2023).

California Distribution: none

California Interceptions: none

The risk Peach rosette mosaic virus would pose to California is evaluated below.

Consequences of Introduction:

1) **Climate/Host Interaction:**

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.

Risk is Medium (2) – PRMV is likely to survive wherever its hosts can grow, and for the time between molts in its nematode vectors.

2) Known Pest Host Range:

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.

Risk is low (1) – The host range includes some stone fruit and grapevines, plus blueberries.

3) Pest Reproductive Potential:

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.

Risk is High (3) – PRMV reproduces inside its hosts and is spread by the nematode vectors which move slowly through undisturbed soils.

4) Economic Impact:

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

Economic Impact: A, C, E, G

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.**

Risk is high (3) –This virus hurts fruit production, it is a quarantine pest in many countries, and it is vectored by a plant-feeding nematode.

5) **Environmental Impact:**

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

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.

Risk is Medium (2) – This pathogen could significantly impact cultural practices or home garden plantings.

Consequences of Introduction to California for*:* Medium

Add up the total score and include it here. **10**
-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* ***= 10***

Uncertainty:

None

Conclusion and Rating Justification:

Based on the evidence provided above the proposed rating for **Peach rosette mosaic virus is B.**

References:

Allen, W.R., and Ebsary, B.A. 1988. Transmission of raspberry ringspot, tomato black ring, and peach rosette mosaic viruses by an Ontario population of *Longidorus elongatus*. Canadian Journal of Plant Pathology, 10(1):1-5

Brown, D. J. F., Halbrendt, J. M., Robbins, R. T., Vrain, T. C. 1993. Transmission of nepoviruses by *Xiphinema americanum*-group nematodes. Journal of Nematology, 25(3):349-354

EPPO Global Database. 2023 Peach rosette mosaic virus. https://gd.eppo.int/taxon/PRMV00

Jaffee, B. A.; Harrison, M. B.; Shaffer, R. L.; Strang, M. B. 1987. Seasonal population fluctuations of *Xiphinema americanum* and *Xiphinema rivesi* in New York and Pennsylvania orchards. Journal of Nematology 19: 369–378.

Paduch-Cichal E, Kalinowska E, Chodorska M, Sala-Rejczak K, Nowak B, 2011. Detection and identification of viruses of highbush blueberry and cranberry using serological elisa test and PCR technique. Acta Scientiarum Polonorum - Hortorum Cultus, 10(4):201-215.

Ramsdell, D.C., and Myers, R.L., 1974. Peach rosette mosaic virus, symptomatology and nematodes associated with grapevine 'degeneration' in Michigan. Phytopathology, 64(9):1174-1178

Ramsdell, D.C, Gillett, J.M., Bird, G.W. 1995. Susceptibility of American grapevine scion cultivars and French hybrid rootstock and scion cultivars to infection by peach rosette mosaic nepovirus. Plant Disease, 79(2):154-157

Ramsdell, D.C., and Gillett, J.M. 1981. Peach rosette mosaic virus in highbush blueberry. Plant Disease, 65(9):757-758

Ramsdell, D.C. and Gillett, J.M. 1985. Relative susceptibility of American, French hybrid and European grape cultivars to infection by peach rosette mosaic virus. Phytopathologia Mediterranea, 24(1/2):41-43

Ramsdell, D.C., Gillett, J.M., and Bird, G.W. 1995. Susceptibility of American grapevine scion cultivars and French hybrid rootstock and scion cultivars to infection by peach rosette mosaic nepovirus. Plant Disease, 79(2):154-157

Stobbs, L.W. and Van Schagen, J.G., 1996. Occurrence of peach rosette mosaic virus on grapevine in Southern Ontario. Plant Disease, 80(1).

USDA Phytosanitary Certificate Issuance and Tracking System, Phytosanitary Export Database (PExD) Harmful Organisms Database Report Peach rosette mosaic virus. Accessed 5/5/23

Wang, S., Gergerich, R. C., Wickizer, S. L., and Kim, K. S. 2002. Localization of transmissible and nontransmissible viruses in the vector nematode Xiphinema americanum. Phytopathology 92:646-653.

Responsible Party:

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***Comment Period: 07/05/2023 through 08/19/2023**

***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: B
