EPPO Datasheet: *Nepovirus persicae*

Last updated: 2023-11-10

IDENTITY

Preferred name: *Nepovirus persicae*
Taxonomic position: Viruses and viroids: Riboviria: Orthornavirae: Pisuviricota: Pisoniviricetes: Picornavirales: Secoviridae
Other scientific names: *PRMV*, *Peach rosette mosaic nepovirus*, *Peach rosette mosaic virus*
Common names: rosette mosaic of peach
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: A1 Quarantine pest (Annex II A)
EPPO Code: PRMV00

more photos...

Notes on taxonomy and nomenclature

Apart from the disease caused by peach rosette mosaic virus (PRMV), there are a number of diseases of peach that include the 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 virus and prunus necrotic ringspot virus (both in the genus Ilarvirus); in parts of the USA, peach rosette phytoplasma causes the 'peach rosette' symptom. PRMV is, however, a clearly identified species in the genus *Nepovirus* for which complete genomic sequence data is available (NC_034214-15).

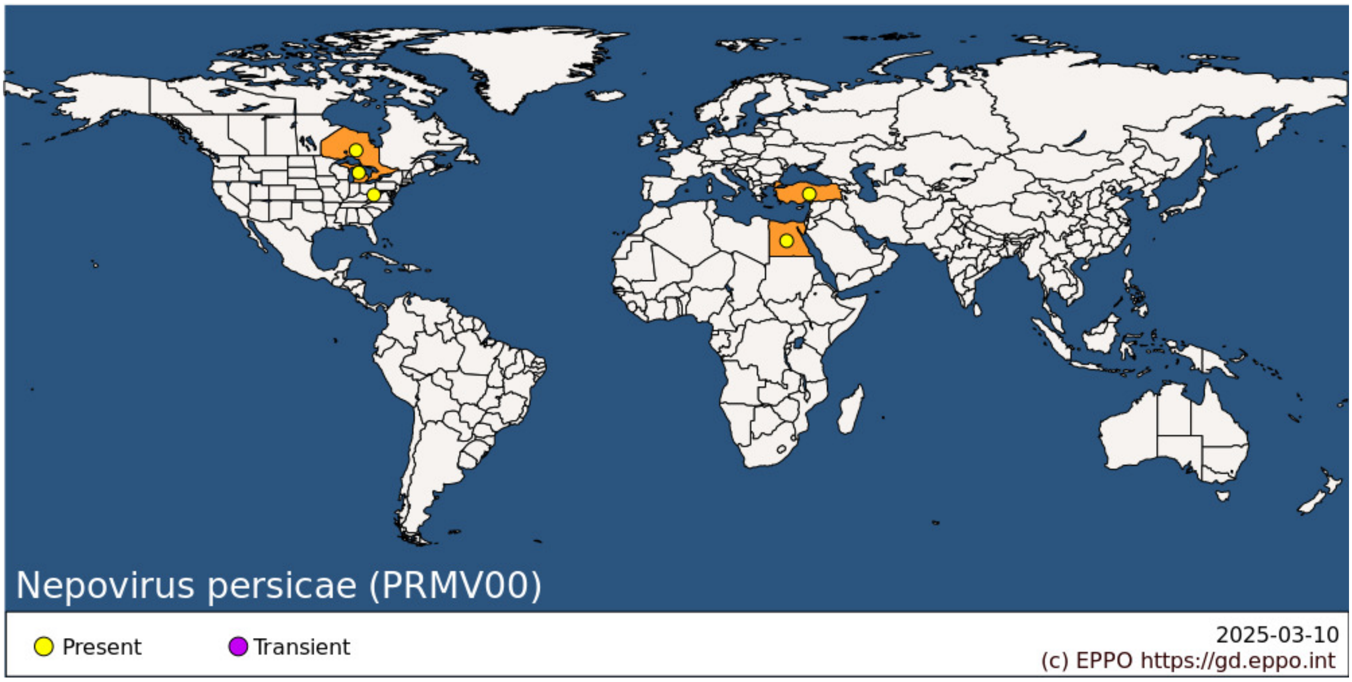
HOSTS

The principal host is the American grape species *Vitis labrusca*. Some cultivars of *V. vinifera*, and some hybrids between North-American *Vitis* spp. (wild species) and French cultivars are also reported to be susceptible (Ramsdell *et al.*, 1995; Ramsdell & Gillett, 1998). PRMV is also an important pathogen of peaches (*Prunus persica*) (Ramsdell & Gillett, 1998; Martelli & Uyemoto, 2011). It has been reported in natural infections in highbush blueberry *Vaccinium corymbosum* (Ramsdell & Gillett, 1981; Martin & Tzanetakis, 2018). European plum (*P. domestica*) and Japanese plum (*P. salicina*) have also been reported as natural hosts (Klos, 1967; Nemeth, 1986) as well as almond (*P. dulcis*) (Azerý & Çýçek, 1997). In wild trees, it has been reported in the past in *Acer rubrum*, *Prunus umbellata* var. *injacunda* and *P. angustifolia* (Kenknight, 1960). In addition, several weed species have been shown to be natural hosts for the virus: *Rumex crispus*, *Solanum carolinense* and *Taraxacum officinale* (Ramsdell & Myers, 1978). The experimental herbaceous host range is reported as rather narrow (Ramsdell & Gillett, 1998).

Host list: *Acer rubrum*, *Prunus angustifolia*, *Prunus domestica*, *Prunus dulcis*, *Prunus persica*, *Prunus salicina*, *Prunus umbellata*, *Rumex crispus*, *Solanum carolinense*, *Taraxacum officinale*, *Vaccinium corymbosum*, *Vitis hybrids* , *Vitis labrusca*, *Vitis vinifera*

GEOGRAPHICAL DISTRIBUTION

PRMV is one of the North American nepoviruses affecting fruit trees. In the USA, it is mainly reported from Michigan, where symptoms were observed as early as 1917 and reported a few years later (Cation, 1933). There are indications of its presence in the Northeast region (New Jersey, New York and Pennsylvania), without specifying which State(s) is(are) involved (Martin & Tzanetakis, 2018) and in West Virginia (https://www.prevalentviruses.org/index.html). It has also been recorded in Ontario (Canada) (Stobbs & VanSchagen, 1996; Eveleigh & Allen, 1982). It has only been recorded in a few countries outside of North America (e.g. on almond in Türkiye and peach in Egypt). A record in highbush blueberry in Poland (Paduch-Cichal *et al.*, 2011) based only on an ELISA detection is considered invalid. No basis has been found for reports of the possible presence of the virus in India or Italy, as mentioned by Németh (1986).



EPPO Region: Türkiye
Africa: Egypt
North America: Canada (Ontario), United States of America (Michigan, West Virginia)

BIOLOGY

PRMV develops systemic infections in its host plants and is therefore transmitted, as is the case for the majority of plant viruses, by vegetative propagation techniques (Ramsdell & Gillett, 1998). PRMV was shown to be seed-borne in *Vitis labrusca* cv. Concord at a rate close to 10% (Ramsdell & Myers, 1978, Childress & Ramsdell, 1985). It was also shown to be seed-borne in *Taraxacum officinale* (Ramsdell & Myers, 1978) and *Chenopodium quinoa* (Dias & Cation, 1976). PRMV is not known to be pollen-transmitted (EFSA, 2013).

Several nematode species have been recorded as vectors of PRMV. These include *Xiphinema americanum* (*sensu lato*) (Klos *et al.*, 1967; Ramsdell & Myers, 1974; Brown, 1993; Ramsdell & Gillett, 1998), *Longidorus diadecturus* (Eveleigh & Allen 1982; Allen *et al.*, 1982; Allen, 1986) and *L. elongatus* (Allen & Ebsary, 1988). The situation is however complex concerning *X. americanum* as this has been recognized as a species complex (EFSA, 2018). Whereas for some other North American nepoviruses some information exists about the identity of vector species within *Xiphinema americanum* (*sensu lato*) (Halbrendt, 1993; Brown *et al.*, 1993; Brown *et al.*, 1995) no such information is available for PRMV (Ramsdell & Gillett, 1998). However, from the geographic distribution of the virus and species of the *X. americanum* species complex in North America, the species involved in PRMV transmission has been suggested to be *X. americanum sensu stricto* (EPPO/CABI, 1996).

DETECTION AND IDENTIFICATION

Symptoms

In grapevine, PRMV causes leaf malformation and mottling, shortening of cane internodes and crooked cane growth as well as delayed bud-break in spring, and late and uneven bloom. Bunches of grapes are small and uneven; vines become unproductive and may die (Ramsdell & Myers, 1978). Taken together these symptoms drastically reduce production of infected vines (Ramsdell & Gillett, 1998).

In peach, PRMV causes delayed foliation, chlorotic mottling, and distortion of leaves and shortening of internodes giving twigs a rosette appearance (Cation, 1933; Ramsdell & Gillett 1998; Martelli & Uyemoto, 2011).

In highbush blueberry (*Vaccinium corymbosum*), leaves become strap-like or crescent shaped (Ramsdell & Gillett 1998), although symptoms are unevenly distributed over affected bushes (Ramsdell & Gillett 1981; Ramsdell & Gillett 1998).

Morphology

PRMV has a divided single-stranded, positive-sense genome composed of two RNA molecules (8 and 5.9 kb in size) that are encapsidated in icosahedral particles of ca. 28 nm diameter typical of nepoviruses (Dias & Cation, 1976; Ramsdell & Gillett, 1998).

Detection and inspection methods

Visual examination may allow the detection of symptoms but is not considered reliable enough since symptoms are not specific and are not always obvious in infected plants. Procedures for inspection of places of production of *Prunus* and *Vitis* plants are provided in Standards PM 3/76 (EPPO, 2021) and PM 3/86 (EPPO, 2018).

PRMV was initially detected using biological indexing by grafting on peach seedlings or by mechanical inoculation on *Chenopodium quinoa* or other indicators. With the characterization of the virus and the development of serological or molecular detection tests, these biological indexing tests have become largely obsolete.

PRMV can be detected by using ELISA tests (Ramsdell & Gillet, 1981) and commercial ELISA-based detection kits are available (Martin & Tzanetakis, 2018).

Reverse transcription PCR (RT-PCR), nested RT-PCR and immunocapture RT-PCR tests are also available for the detection of PRMV (Lee *et al.*, 2016; Ho *et al.*, 2018). High-throughput sequencing, although not currently used as a routine detection method, could also be used for detection of PRMV.

PATHWAYS FOR MOVEMENT

The nematode vector *X. americanum* transmits the virus from infected vines, infected grape seedlings and certain weed hosts, such as *Taraxacum officinale*, to healthy grapevines or peach trees. However, spread from infection foci (usually circular in shape) was only observed at the rate of about 1 m per year radially (EPPO/CABI, 1996). Diseased grape seed may be present in pomace (pulpy grape processing residues) that growers sometimes spread in the vineyard, and which can germinate, becoming a source of spread by the vector (Childress & Ramsdell, 1985). In international trade, PRMV is only liable to be carried in infected propagating material; accompanying soil may harbour infected seeds and the nematode vector. Soil attached to machinery and vehicles was not considered as an important pathway for viruliferous vectors (EFSA, 2018).

PEST SIGNIFICANCE

Economic impact

A 50-fold yield reduction has been measured in *Vitis labrusca* cv. Concord which had been infected for several years. In 1980, at the annual meeting of the International Council for the Study of Viruses and Virus-Like Diseases of the Grapevine, the group as a whole unanimously agreed, upon seeing PRMV-diseased vines, that PRMV caused the worst symptoms in grapevine of any virus disease worldwide.

Impact in peach is also considered significant given the severity of symptoms (Martelli & Uyemoto, 2011).

Control

The most efficient control strategy involves the development and use of PRMV-free propagation material as described in EPPO Standards PM 4/8 *Pathogen-tested material of grapevine varieties and rootstocks* (EPPO, 2008), PM 4/30 *Certification scheme for almond, apricot, peach and plum* (EPPO, 2001) and PM 4/18 *Pathogen-tested material of Vaccinium* (EPPO, 1997). The destruction of infected plants and the limitation of movement of host plants outside areas where the pest is present can also help to reduce the spread of PRMV, together with control of the nematode vector by the use of soil nematicides or possibly by the use of bait plants such as marigold (Klos *et al.*, 1967; Ramsdell *et al.*, 1983). Control of some weedy hosts in which the virus is seed-borne, such as dandelions (*Taraxacum officinale*), has also been advocated to limit this dispersal route (Martelli & Uyemoto, 2011). It has also been suggested to avoid spreading pomaces in vineyards without appropriate prior treatment to prevent germination of seeds within it as the virus is known to be seed-transmitted in grapevine and might thus be introduced in a vineyard with the seeds present in pomaces (Childress & Ramsdell, 1985).

Phytosanitary risk

PRMV is most damaging in grapevine (*Vitis* spp.) and in peach (*Prunus persica*), two widely grown species in the EPPO region that represent major fruit crops. Blueberry (*Vaccinium corymbosum*) is also susceptible and is a crop undergoing significant development. There are no known ecoclimatic constraints for PRMV establishment, except those affecting its hosts.

The situation is more complex concerning the presence of efficient vectors. Of the nematodes able to transmit PRMV, *L. diadecturus* is not known to occur in Europe (EFSA, 2017). Concerning the nematodes of the *X. americanum sensu lato* species complex, they are either absent from Europe or not known to be able to transmit north American nepoviruses with one exception, *X. rivesi*, which is present in a number of countries of the EPPO region. It is however unclear whether European populations of *X. rivesi* are able to transmit PRMV (EFSA, 2018). *L. elongatus* has been reported as a poorly efficient vector of PRMV in Ontario (Allen & Ebsary, 1988) and is widely distributed in the EPPO region. There is however no information on the ability of European populations of *L. elongatus* to transmit PRMV isolates (EFSA, 2019a, 2019b). Overall, there is thus significant uncertainty about the presence in the EPPO region of nematode populations able to transmit PRMV, although this possibility cannot be discounted. It is also possible that if North American vector populations are introduced, they could establish in the EPPO region (EFSA, 2018). It was therefore considered justified by some EPPO countries (e.g. in the EU) to prevent establishment and spread of PRMV.

PHYTOSANITARY MEASURES

Appropriate phytosanitary measures to import plants for planting of susceptible species (*Vitis*, *Prunus*, *Vaccinium*, including seeds at least in the case of grapevine) into the EPPO region could require that these plants are produced in a pest free area or in a pest free place/site of production. An additional measure could require that host plants for planting are shown to be free from PRMV by appropriate diagnostic methods, with additional measures to guarantee that the accompanying soil (if any) is free from viruliferous vectors.

A number of EPPO countries already ban the import of *Prunus*, *Vitis* and *Vaccinium* plants for planting (other than seeds), and soil as such, from areas where the pest is present (EU, 2019). Soil attached to plants may harbour infected seeds and the nematode vector and is considered a possible pathway for entry while soil attached to machinery and vehicles is not considered as an important pathway for viruliferous vectors (EFSA, 2018).

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Datasheet history

This datasheet was first published in the second edition of 'Quarantine Pests for Europe' in 1997, and revised in 2023. It is now maintained in an electronic format in the EPPO Global Database. The sections on 'Identity', 'Hosts', and 'Geographical distribution' are automatically updated from the database. For other sections, the date of last revision is indicated on the right.

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