EPPO Datasheet: *Phyllocoptes fructiphilus*

Last updated: 2024-05-15

IDENTITY

Preferred name: *Phyllocoptes fructiphilus*
Authority: Keifer
Taxonomic position: Animalia: Arthropoda: Chelicerata: Arachnida: Acarida: Eriophyidae
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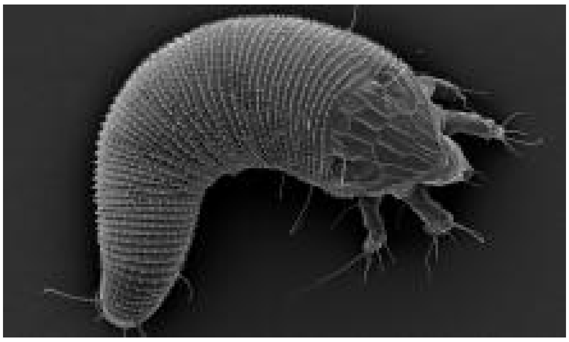
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: Emergency measures (formerly), A1 Quarantine pest (Annex II A)
EPPO Code: PHYCFR



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Notes on taxonomy and nomenclature

Phyllocoptes fructiphilus, known as the rose bud mite, is a species of eriophyoid mite known primarily for its role in the transmission of *Emaravirus rosae* (rose rosette emaravirus, RRV), a significant pathogen in roses and the causal agent of rose rosette disease (RRD). There is also a second vector of RRV, a taxonomically distinct species of the same genus, *P. arcani* (Druciarek *et al.*, 2023).

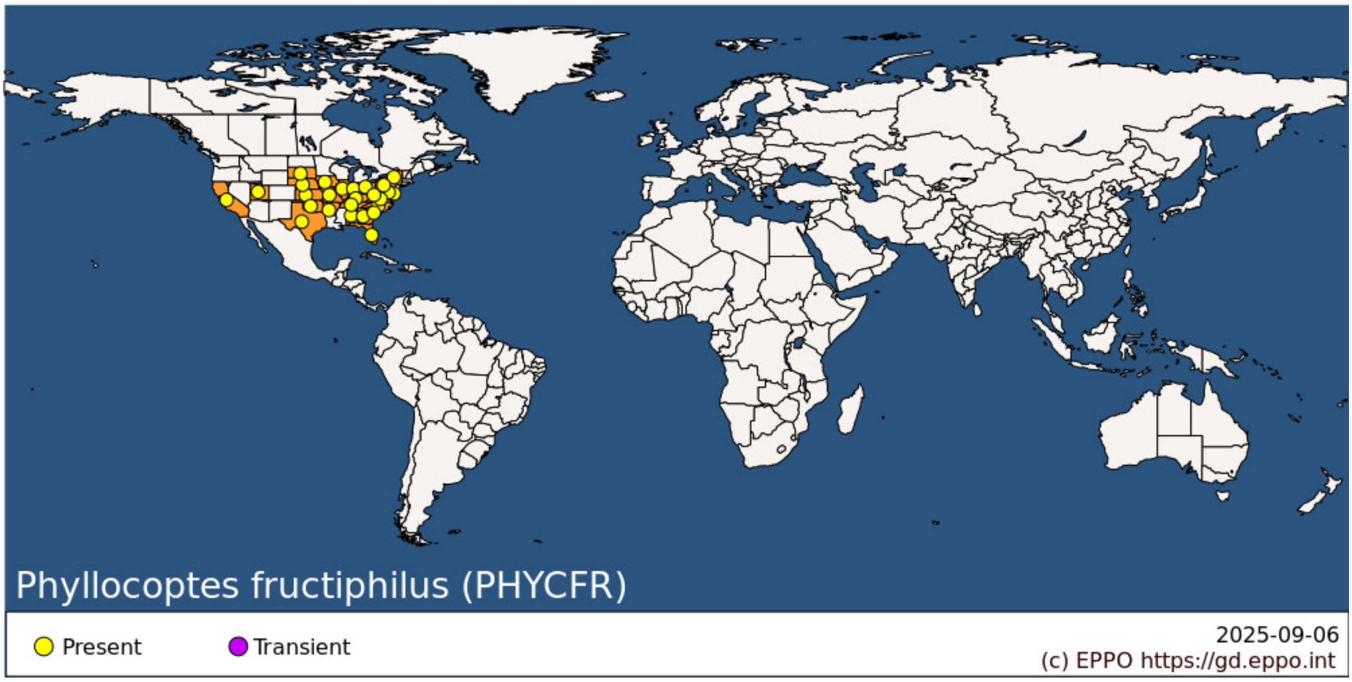
HOSTS

The native host plant for *P. fructiphilus* is *Rosa woodsii*, a rose species common in the western Great Plains and in arctic regions of North America (Amrine, 2014). Other reported host species include: *Rosa arkansana* var. *suffulta*, *Rosa carolina*, *Rosa clinophylla*, *Rosa foliolosa*, *Rosa glauca*, *Rosa multiflora*, *Rosa nitida*, *Rosa palustris*, *Rosa roxburghii*, *Rosa rubiginosa*, *Rosa rugosa*, *Rosa setigera*, and *Rosa virginiana*. No hosts outside of the genus *Rosa* have been reported. Mite reproduction studies on 32 modern rose cultivars have shown they were all suitable hosts (Amrine, 2002; Di Bello *et al.*, 2018; Solo *et al.*, 2019). In the study of Amrine (2002) *P. fructiphilus* was not able to reproduce on two rose species accessions, *R. bracteata* and *R. carolina*.

Host list: *Rosa arkansana var. suffulta*, *Rosa carolina*, *Rosa clinophylla*, *Rosa foliolosa*, *Rosa glauca*, *Rosa multiflora*, *Rosa nitida*, *Rosa palustris*, *Rosa roxburghii*, *Rosa rubiginosa*, *Rosa rugosa*, *Rosa setigera*, *Rosa virginiana*, *Rosa woodsii*, *Rosa*

GEOGRAPHICAL DISTRIBUTION

The distribution of the two RRV vectors, *P. fructiphilus* and *P. arcani*, has not been clearly determined, though they have been identified and reported only in the United States. *P. fructiphilus* is widespread among wild and commercial roses in this country (Amrine, 2002). Because the natural spread of RRV relies on vectors, the distribution of RRV most likely correlates with the distribution of vectoring mites. Reported distribution of *P. fructiphilus* is presented below.



North America: United States of America (Alabama, Arkansas, California, Delaware, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Maryland, Missouri, Nebraska, New York, North Carolina, Ohio, Oklahoma, Pennsylvania, South Carolina, South Dakota, Tennessee, Texas, Utah, Virginia, West Virginia)

BIOLOGY

All mite life stages (eggs, larvae, nymphs, and adults) can be found on plants in open field conditions from spring to autumn. Under experimental conditions the development from egg to adult ranges from 5 to 14 days (Kassar & Amrine, 1990). Population density increases during the spring and summer and usually peaks in autumn (Otero-Colina *et al.*, 2018), especially when new tender shoots start to reemerge on plants after a hot and dry summer (Amrine, 1996; Amrine *et al.*, 1988). Adult females overwinter on rose plants in protected places, mostly under the bud scales and inside bark crevices. When buds break in spring, the females move to newly developing tissues and lay eggs. Under greenhouse conditions mite populations develop continuously. Observations show that *P. fructiphilus* has a life cycle with two, morphologically slightly different forms of females: protogynes and deutogynes, but only one form of males. Protogyne females develop from eggs laid in spring by overwintering females. They live about 30 to 60 days and produce new generations of mites in spring and summer. As the season advances, more offspring develop as deutogyne females, the overwintering form, that hide in protected places and presumably do not reproduce until the next season (Amrine, 2014). Due to arrhenotoky in eriophyoid mites (a form of parthenogenesis in which unfertilized eggs develop into males), even a sole, uninseminated female is able to establish a new population.

DETECTION AND IDENTIFICATION

Phyllocoptes fructiphilus mites are generally found under leaf petioles and stipules, especially when these structures are appressed to the stems and on tender apical shoots. They are most abundant towards the tip of growing shoots (Amrine, 2014). *P. fructiphilus* individuals are yellowish-white to amber in colour with a fusiform body (Keifer, 1940). There are another five *Phyllocoptes* species identified on rose to date (*P. arcani*, *P. adalius*, *P. chorites*, *P. resovius*, and *P. trilobos*) and they all share several morphological features, making species identification based on aspects such as body size or colour impossible (Druciarek *et al.*, 2021). Identifying closely related eriophyoid species morphologically is a task that can only be effectively carried out by skilled acarologists and involves a process of phase contrast microscopic examination (Diakaki *et al.*, 2019). Any stage of *P. fructiphilus* (including eggs) can be barcoded using a protocol described in Druciarek *et al.*, (2019). The following accession numbers are available in the NCBI database (last consulted in 2024-01) for *P. fructiphilus*:

- MZ539472-MZ539527 for COX1 gene of mtDNA;
- MZ520395-MZ520408 for ITS1-5.8S-ITS2 region of rDNA;
- MH626104-MH626116 for 28S region of rDNA.

Symptoms

Generally, direct damage from *P. fructiphilus* feeding on the host plant is not noticeable. However, under certain conditions, dense population of *P. fructiphilus* has the potential to cause harm independently as a pest. In such a case leaf and flower malformation as well as delayed bud development and stunting of the plant might be observed (EPPO, 2018).

Morphology

Egg
Spherical, translucent to milky-yellow in colour, about 30 µm in diameter.

Larva
Body fusiform, yellowish-white in colour, between 70 and 130 µm in length and between 40 and 50 µm in width.

Nymph
Body fusiform, yellowish-white in colour, between 140 and 170 µm in length and between 40 and 60 µm in width.

Adult

Body fusiform, yellowish-white to amber in colour, between 140 and 240 µm in length and between 40 and 60 µm in width.

Detection and inspection methods

Phyllocoptes fructiphilus is a refuge-seeking mite that prefers to congregate in petiole stem interfaces, under septal trichomes, in young folded leaves, and in flower buds, therefore, these preferred niches should be sampled. Early in flower development, the tightness of sepals and petals restricts access, but as buds loosens in later stages, mites can enter the buds and likely stay through the flower's development. They show a preference for feeding at the sepal base, under trichomes, near bulbous, glandular hairs. *P. fructiphilus* individuals might be also present in winter-collected flower buds and in bark crevices, therefore, imported budwood should be thoroughly inspected (EPPO, 2018; Otero-Colina *et al.*, 2018).

PATHWAYS FOR MOVEMENT

Eriophyoid mites use wind currents for passive aerial dispersal to new locations (Sabelis & Bruin, 1996; Zhao & Amrine, 1997). This mode of spread is also characteristic for *P. fructiphilus*, although the maximum distance that mites can spread is not known. The ambulatory dispersal of eriophyoid mites is quite limited, primarily due to their small size. Nevertheless, they are capable of moving from one plant to another when parts of the plants are in direct contact with each other. Human activities, especially transport of infested rose plants contribute to the spread of *P. fructiphilus* (EPPO, 2018).

PEST SIGNIFICANCE

Economic impact

Entry and establishment of vectoring mites in new areas increase the risk of RRV entry and impact. The disease is having a devastating impact on nurseries, gardens and repositories across the United States, posing a significant threat to the industry's future (Vazquez?Iglesias *et al.*, 2020). As a vital element of the landscape industry, garden roses have seen a notable decline in this country. From 2014 to 2019, there was a 32 % reduction in their production, as reported by the USDA in these years (USDA, 2014; USDA, 2019). Additionally, the risk associated with rose rosette led to a near halt in the export of roses (Diakaki *et al.*, 2019; Druciarek *et al.*, 2023). The extent of rose rosette epidemic's impact on the invasive multiflora rose (*R. multiflora*) in the United States is yet to be determined. Classified as a noxious weed in several states, multiflora rose has spread extensively across various regions, causing ecological disturbances, and reducing usable land (Amrine, 2002). An evaluation is necessary to conclusively determine the impact that this pathosystem has put on noxious multiflora rose.

Control

Use of miticides can be considered, although there is a huge knowledge gap on the effectiveness of available products on *P. fructiphilus* (EPPO, 2018). Little is also known regarding natural enemies that could be used to suppress populations of *P. fructiphilus* in protected environments and in the field. Predatory mites, especially of the Phytoseiidae family, are being used to control other eriophyoid species; thus, more research is needed to evaluate their effectiveness against *P. fructiphilus* and *P. arcani*.

Phytosanitary risk

Phyllocoptes fructiphilus poses a significant risk to the EPPO region primarily due to its role as a vector of RRV. The existing phytosanitary measures in EPPO countries are not sufficient to substantially reduce the introduction probability of RRV or its vectors. The small size of eriophyoid mites and tendency to reside in refuges or specialized areas of their plant host make detection challenging. Additionally, the limitations of visual inspections and testing at the production sites, coupled with the challenges in controlling the mite and virus spread, underline the need for more effective management strategies in the EPPO region. This complexity highlights the risk *P. fructiphilus*, *P. arcani* and RRV pose to the rose industry within this region.

PHYTOSANITARY MEASURES

Effective phytosanitary measures should include monitoring and early detection of infestations, destruction of RRV-infected plant material, and control of mite populations. Quarantine regulations and restrictions on the movement of rose plants from areas where rose rosette and vectoring mites were reported are essential. It can be recommended that rose plants for planting and cut flowers should originate from pest-free areas for *P. fructiphilus*, *P. arcani* and RRV and have been packed in conditions preventing mite infestation during transport (EPPO, 2018).

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Datasheet history

This datasheet was first published online in 2024. It is 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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