EPPO Datasheet: *Pseudopityophthorus pruinosus*

Last updated: 2021-10-06

IDENTITY

Preferred name: *Pseudopityophthorus pruinosus*
Authority: (Eichhoff)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Curculionidae: Scolytinae
Other scientific names: *Pityophthorus pruinosus* Eichhoff, *Pityophthorus querciperda* Schwarz, *Pityophthorus tomentosus* Eichhoff, *Pseudopityophthorus convexus* Bright, *Pseudopityophthorus pulvereus* Blackman, *Pseudopityophthorus tropicalis* Wood
Common names: oak bark beetle
view more common names online...
EPPO Categorization: A1 list
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EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: PSDPPR

Notes on taxonomy and nomenclature

Since 2015 the family Scolytidae was moved to become a subfamily (Scolytinae) within the family Curculionidae.

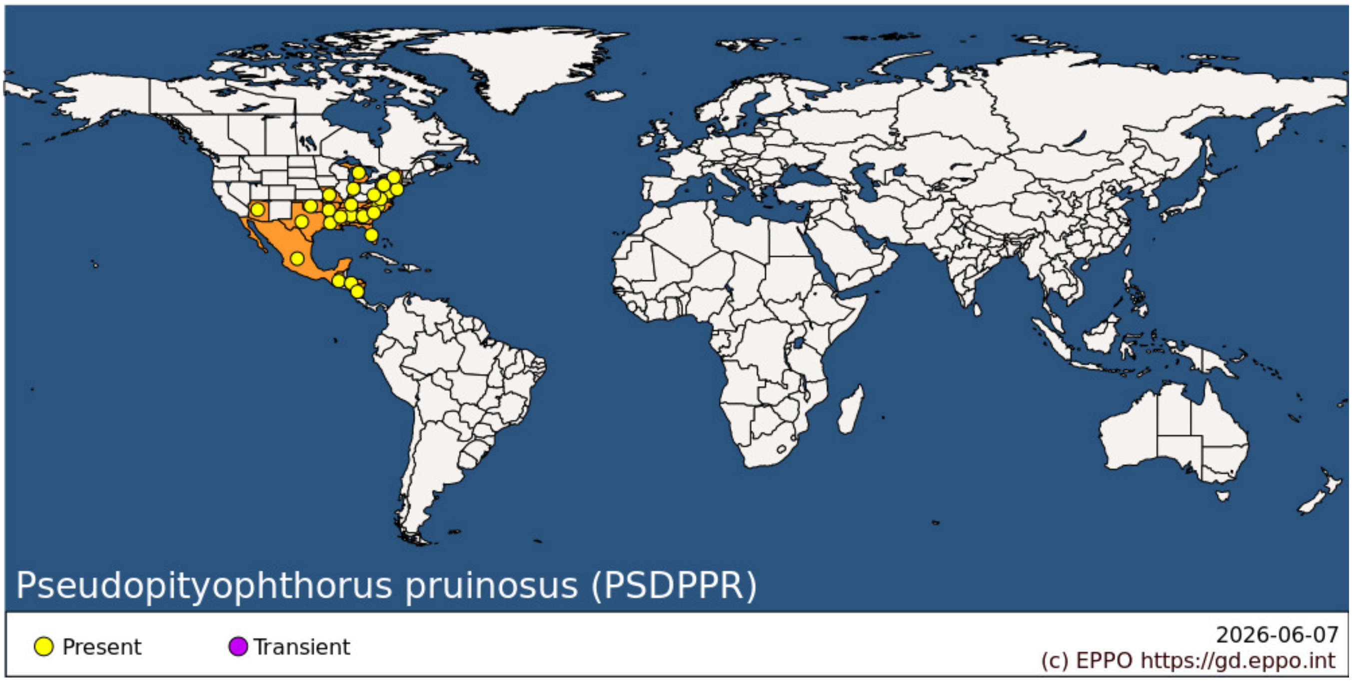
HOSTS

All *Pseudopityophthorus* species (except *P. fagi*) can be found in *Quercus* hosts, although several are capable of breeding in other hosts (Wood, 1982). *Pseudopityophthorus pruinosus*is mainly found on North American oak species (*Quercus* spp.) such as *Q. hondurensis*, *Q. hypoleucoides*, *Q. marilandica*, *Q. nigra* and *Q. sapotifolia* (Wood, 1982; Wood and Bright, 1992). Atkinson (2018) also reports *Q. buckleyi*, *Q. coccinea*, *Q. elliptica*, *Q. falcata* , *Q. laevis*, *Q. laurifolia*, *Q. laurina*, *Q. palustris*, *Q. stellata*, *Q. texana*, *Q. velutina*, and *Q. virginiana* as hosts. White and red oaks (respectively *Q. alba* and *Q. rubra*) are also considered potential hosts (EFSA, 2019). Finally, rare, and apparently non persistent infestations of *P. pruinosus* were found also on *Alnus* spp., *Castanea floridana*, *Fagus grandifolia*, *Persea* spp., *Prunus angustifolia* and *P. serotina* (Atkinson, 2018; EFSA, 2019).

Host list: *Alnus sp.*, *Castanea pumila*, *Fagus grandifolia*, *Persea sp.*, *Prunus angustifolia*, *Prunus serotina*, *Quercus alba*, *Quercus buckleyi*, *Quercus coccinea*, *Quercus elliptica*, *Quercus falcata*, *Quercus hypoleucoides*, *Quercus laevis*, *Quercus laurifolia*, *Quercus laurina*, *Quercus marilandica*, *Quercus nigra*, *Quercus palustris*, *Quercus rubra*, *Quercus sapotifolia*, *Quercus stellata*, *Quercus texana*, *Quercus velutina*, *Quercus virginiana*

GEOGRAPHICAL DISTRIBUTION

Pseudopityophthorus pruinosus is native to and widely spread in Central America, including Mexico, Guatemala, Honduras, Nicaragua and in the USA (Wood, 1982; Wood and Bright, 1992; Bright, 2021).



North America: Mexico, United States of America (Alabama, Arizona, Arkansas, District of Columbia, Florida, Georgia, Indiana, Louisiana, Maryland, Michigan, Mississippi, Missouri, New Jersey, New York, North Carolina, Oklahoma, Pennsylvania, South Carolina, Tennessee, Texas, Virginia, West Virginia)
Central America and Caribbean: Guatemala, Honduras, Nicaragua

BIOLOGY

Biology of *Pseudopityophthorus* is similar in all species of the genus. Overwintering adults emerge from the middle of April to the end of May. Before mating, young adult beetles need to carry out maturation feeding which usually occurs on different parts of healthy and vigorous oaks, such as twig crotches, leaf petioles, bud axils, and immature acorns. After maturation feeding, which takes a few days, adults attack the branches or trunks of dead or weakened oaks; cut or broken branches, limbs and boles are also selected for attack (EFSA, 2019). Adults are very commonly found in cut and broken limbs and branches (Wood, 1982). The species is polygamous. The male penetrates into the bark and then bores a longitudinal nuptial chamber, approximately 1 cm long, in the phloem and cambium. There it is usually joined by two females (occasionally just one) that bore straight, transverse egg galleries approximately 2-5 cm long perpendicular to the wood fibres, starting in the middle of the nuptial chamber and thus producing a reproduction system which is cross-shaped. The females lay eggs in niches along the egg galleries, and once emerged, each larva bores a longitudinal gallery perpendicular to the egg gallery from which they originated. The average number of eggs per gallery is 41 (Rexrode, 1969). The larvae bores galleries entirely in the phloem, although they usually can be seen on the inner surface of peeled bark. Over half of the parent adults re-emerged after egg gallery construction and oviposition. The re-emerging parent adults can attack, lay eggs, and re-emerge three times (Rexrode, 1969). After five larval instars, pupation occurs in the phloem and cambium. In most of the species' range, there are two generations per year. Usually, all life stages of the second generation (i.e. eggs, larvae and adults) successfully overwinter, except the pupal stage which is highly vulnerable to low winter temperatures (Wood, 1982; EFSA, 2019).

DETECTION AND IDENTIFICATION

Symptoms

In the crown. Symptoms of primary infestation of the affected trees are crown yellowing and leaf wilting, followed by progressive twig and branch dieback and crown thinning which quickly spreads over the whole crown. As the upper branches die, the crown of the tree can be seen to die back and the trees will often sprout new branches from the trunk.

Under the bark. The mating system is usually composed of 2 short and thin (1 mm wide) transverse egg galleries. Egg galleries extend on both sides of the nuptial chamber for about 2-5 cm forming an apparent transverse biramous system. The numerous egg niches are very close together. Larval galleries are also numerous and closely spaced; they are very thin, long, and regular. The whole mating system develops under the bark without marking the wood surface, although larvae can be seen on the inner surface of peeled bark. Cambial brown discoloration occurs after intensive bark colonization. Galleries are normally found in branches between 1.3 and 10 cm in diameter, although infestation of trunks of up to 40 cm in diameter is also reported (Solomon, 1995).

External symptoms on the branches. At the beginning of the bark colonisation, branches often show no outward appearance of damage. The only visible symptom on the bark is the occurrence of a large number of small circular entrance holes, which are often hidden in the cracks of the bark, making early detection difficult.

Morphology

The oak bark beetle is minute, only 1.5-2.4 mm long, with adult males slightly larger than females. This species is distinguished from other *Pseudopityophthorus* species by the larger elytral punctures, the stouter, almost scale-like elytral setae of uniform length, a row of declivital scales on interstriae 1 and 3 sometimes being erect and very slightly longer, and by the male frons being plano-convex, with the vestiture usually slightly longer and more abundant (Wood, 1982).

Eggs: small, pale, white, oblong eggs, less than 1 mm long.

Larva: white, C-shaped, legless and typical of bark beetles, with a reddish-brown head capsule.

Pupa: white, exarate with free and distinguishable body parts neither glued to the body nor encapsulated within a cocoon.

Adults: Teneral adults are yellowish-brown and soft before they darken to a dark-brown colour and their elytra harden. Mature males are very small, about 2.8 times as long as wide. Frons weakly convex except distinctly, transversely impressed; finely punctured on marginal areas; margins ornamented by a dense brush of long, yellow hair, longest setae arising on vertex exceeding margins. Pronotum with posterior areas smooth, shiny, not at all reticulate, impressed points rather abundant, conspicuous, punctures small, slightly larger than in *P. minutissimus,* a species very similar to *P. pruinosus*. Elytra as in *P. minutissimus* except declivity more broadly convex, slightly flattened, discal punctures coarser, closer, interstriae a little wider than punctures, setae very slightly longer, much stouter, laterally compressed; punctures on declivity smaller and setae stouter than on disc, some individuals with setae on interstriae 1 and 3 slightly longer and erect. Females are similar to males except for frons with vestiture rather sparse, much shorter, confined to a smaller area (Wood, 1982).

Detection and inspection methods

Early detection of *P. pruinosus* may be carried out in EPPO countries through a specific and intensive survey programme, which should be set up especially in those countries which import large quantities of oak wood from North and Central America. In particular, surveys should be carried out at points of entry (e.g. ports) and facilities (e.g. sawmills and nurseries) which receive *Quercus* wood and plants, and in areas where *Quercus* trees are growing close to such facilities. The survey should be based on the following points:

Interception of adults using traps. An aggregation pheromone specific to *P. pruinosus* is not yet available. However, as is the case for *P. minutissimus*, traps for interception and early detection of *P. pruinosus* can be baited with alpha-copaene (Kendra *et al*., 2011) or ethyl alcohol (Roling and Kearby 1975; Montgomery and Wargo, 1983). Traps should be in place from the beginning of May until the end of August, which represents the period of the flight activity of *Pseudopityophthorus* adults (Ambourn *et al.,* 2006). *Pseudopityophthorus* may also be trapped using window traps placed in the canopies of oaks which were recently killed by the pest (Ambourn *et al.*, 2006).

Detection of infested plants. A specific survey aiming to detect infested plants should be carried out by looking for symptoms of infestation in oak trees. Detection of infestation symptoms is very difficult in the early stages of the infestation, and surveys need to be performed during the vegetative season, by looking at the upper part of the canopy which may show crown symptoms. Although these symptoms are not specific to this pest, they are important features for a possible early detection.

Material inspection. Careful inspections of potentially infested material and the most relevant oak commodities (i.e. round wood, firewood, bark, plants for planting) should be carried out in the EPPO region to prevent introduction and dispersal. As beetle colonisation often shows no outward damage, inspectors should remove bark to check for the presence of phloem degradation and occurrence of insect galleries and feeding larvae.

PATHWAYS FOR MOVEMENT

International trade of infested oak wood is the main pathway for international spread. If the wood carries bark, oak bark beetles are more likely to be present.

Non-squared fresh wood, non-debarked timber (including logs, firewood, sawn wood), and fresh wood packaging material (with bark) of *Quercus* spp. from the USA and Canada are the main pathways for movement of oak bark beetle across countries and continents (EFSA, 2019). Plants for planting of host plants, cut branches of host plants, as well as chips and wood waste are listed as possible pathways (EFSA, 2019).

As for *P. minutissimus*, *P. pruinosus* is often reported to be found on branches with diameters of 1.3 to 10 cm, the movement of young nursery plants has been considered as a possible pathway, although the pest is in practice reported from forest trees rather than from nursery plants. In addition, colonization of small plants for planting has never been clearly demonstrated. There have been no reports of oak bark beetles infesting nursery stock, and no recent publication on this is available. Moreover, infested small branches tend to be those occurring on the upper part of the crown of large trees.

Natural spread of adults also occurs. Adults of *P. pruinosus* are able to fly actively, although their flight capacity is unknown (EFSA, 2019). But, as with other small bark beetle species, passive flight through wind-aided dispersal may allow the adults to cover longer distances.

PEST SIGNIFICANCE

Economic impact

Pseudopityophthorus pruinosus mainly attacks dying or dead trees. Therefore, any direct damage only has a minimal impact on host plants. However, the oak bark beetle is considered an important vector of the oak wilt disease caused by the fungus *Bretziella fagacearum* (=*Ceratocystis fagacearum*) (Haack *et al*., 1983; Juzwik *et al*., 2011; EPPO, 2019; 2021; EFSA, 2018) and this can be transmitted to healthy trees during maturation feeding. Oak wilt disease is also killing many *Q. fusiformis* in Michigan, Minnesota, Texas, and Wisconsin each year (EPPO, 2021). Nevertheless, through most of their range, neither *P. pruinosus* nor oak wilt disease are a serious problem for the local forest economy. These woods or forests are of little importance as sources of logs and sawn wood but have high amenity value, especially near bigger towns and cities.

Control

No specific control methods (chemical, cultural, biological, resistant varieties) are currently available against *P. pruinosus*. As the main damage is caused by the pathogen (*B. fagacearum*) associated with the beetle, and because both beetle and the pathogen are favoured by tree pruning, control measures rely principally on the avoidance of pruning during spring, the period of peak susceptibility to the insect and the pathogen. Moreover, chemical and mechanical means focus on stopping the spread of disease through grafted root systems (EPPO, 2021).

Phytosanitary risk

As for *P. minutissimus*, a species ecologically very similar to *P. pruinosus*, the major impact of *P. pruinosus* is related to its possible role as a vector of the oak wilt disease caused by the pathogen *B. fagacearum*. *P. pruinosus* reproduces in diseased trees, adults emerge to feed on twigs of healthy trees infecting them, and then breed again in another diseased or dying tree (EFSA 2019). Fresh wounds produced by maturation feeding of callow adults can be found from early spring onwards. Although not available for *P. pruinosus*, data concerning the percentage of young adults of *P. minutissimus* carrying the fungus is very variable. As many as 30% of beetles emerging from trees infected with oak wilt may carry the fungus, especially in spring, but the percentage is more commonly between 0.4 and 2.5% (Ambourn *et al.*, 2006). These data recorded for the similar species (*P. minutissimus*) support the hypothesis that the relative importance of *P. pruinosus* in the overland transmission of the pathogen in oak species may be minor.

PHYTOSANITARY MEASURES

EPPO Standards (EPPO 2017; 2019) include detailed lists of recommended phytosanitary measures and the requirements for oak needed to contain oak pests and diseases. The measures are based mainly on the movement restriction of potentially infested products, or the treatment and destruction of those already infested (EPPO, 2017; 2019).

Movement restriction. Import of untreated oak wood and plants for planting of *Quercus* from North and Central America should be prohibited to prevent insect and disease spread (EPPO, 2017; 2019).

Wood treatment. For oak wood from North and Central America, the import into European Union Member States is allowed only following the application of ISPM 15 (IPPC, 2018) protocols which includes the removal of all bark and the natural rounded surface, kiln drying (Englerth *et al*., 1956) or fumigation (Jones, 1973; Liese and Rütze, 1985). Fumigation is principally relevant for red oak logs with bark, intended for the veneer industry (EPPO, 2021).

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Datasheet history

This datasheet was first published as '*Ceratocystis fagacearum* and its vectors' in 'Quarantine Pests for Europe' in 1992 and revised in 1997 in the second edition of the book. It was extensively revised in 2021 and 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.

CABI/EPPO (1992/1997) *Quarantine Pests for Europe (1st and 2nd edition)*. CABI, Wallingford (GB).

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