EPPO Datasheet: *Naupactus xanthographus*

Last updated: 2022-08-30

IDENTITY

Preferred name: *Naupactus xanthographus*
Authority: (Germar)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Curculionidae: Entiminae
Other scientific names: *Leptocerus xanthographus* Germar, *Pantomorus xanthographus* Durán
Common names: South American fruit tree weevil, grapevine weevil
view more common names online...
EPPO Categorization: A1 list, Alert list (formerly)
view more categorizations online...
EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: NAUPXA



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Notes on taxonomy and nomenclature

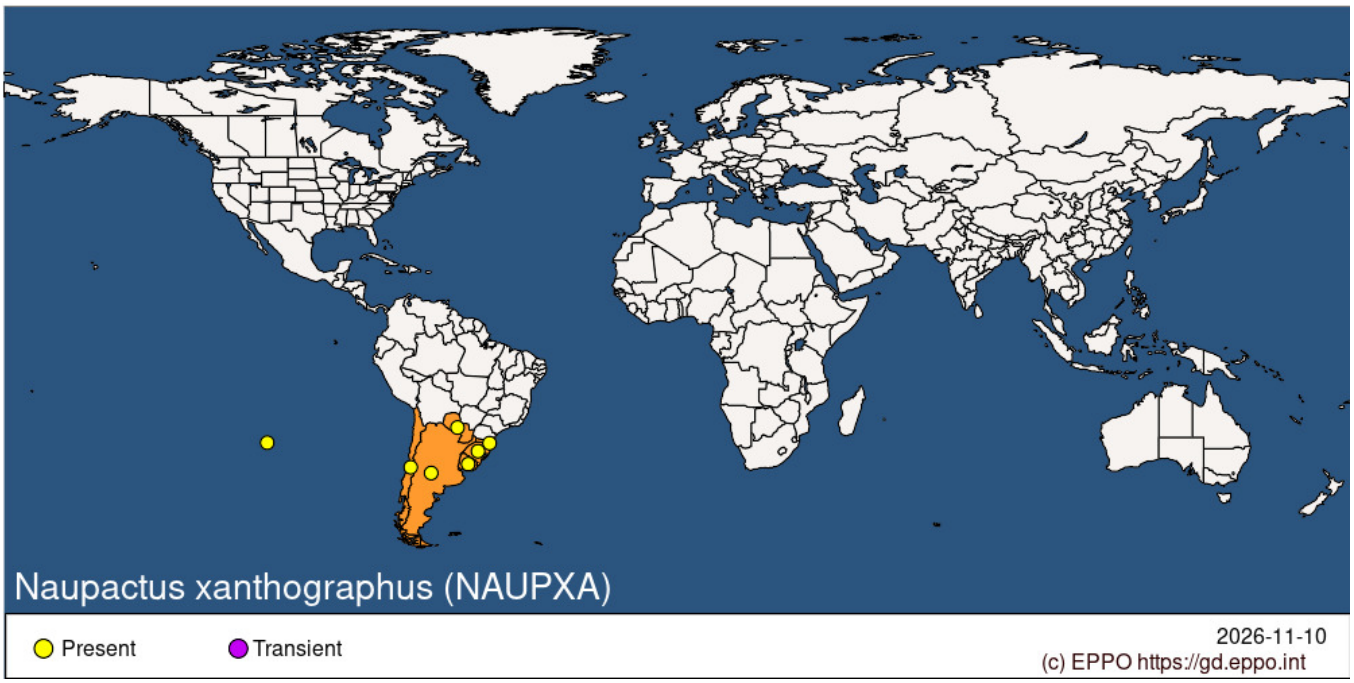
Naupactus (Dejean 1821) is a neotropical genus of broad-nosed weevils containing approximately 200 species distributed from Southern Mexico to Argentina (del Río & Lanteri, 2019). *Naupactus xanthographus* was first described by Germar in 1824, who previously classified the species as *Leptocerus xanthographus* (Elgueta & Marvaldi, 2006).

HOSTS

Naupactus xanthographus has been recorded on many woody plants, but also on some herbaceous hosts, in-cluding field crops such as *Medicago sativa* and weeds. Many cultivated woody fruit trees and bushes are hosts, including several *Citrus* and *Prunus* species. In South America, *Vitis vinifera* is one of its preferred host plants (Lanteri & del Río, 2017). In its native range in South America, *N. xanthographus* has moved onto many new host plants, including recent commercial crops, exotic to that continent, such as blueberries. It is noted that all *Naupactus* species are polyphagous, but that they show host preferences.
Host list: *Acacia*, *Actinidia chinensis*, *Amaranthus deflexus*, *Annona cherimola*, *Asparagus*, *Beta vulgaris*, *Chenopodium album*, *Cichorium intybus*, *Citrus x aurantium var. sinensis*, *Citrus x limon*, *Conium maculatum*, *Datura stramonium*, *Diospyros kaki*, *Eriobotrya japonica*, *Erythrina crista-galli*, *Fragaria*, *Glycine max*, *Helianthus annuus*, *Ilex paraguariensis*, *Juglans regia*, *Ligustrum*, *Malus domestica*, *Medicago sativa*, *Mespilus germanica*, *Olea europaea*, *Persea americana*, *Phaseolus vulgaris*, *Polygonum aviculare*, *Populus nigra*, *Prunus armeniaca*, *Prunus avium*, *Prunus cerasus*, *Prunus domestica*, *Prunus dulcis*, *Prunus persica var. nucipersica*, *Prunus persica*, *Prunus salicina*, *Pyrus communis*, *Raphanus sativus*, *Rubus idaeus*, *Rumex pulcher*, *Salix babylonica*, *Salix viminalis* , *Solanum lycopersicum*, *Solanum tuberosum*, *Sorghum halepense*, *Trifolium*, *Triticum aestivum subsp. aestivum*, *Vaccinium*, *Vitis vinifera*, *Zea mays*

GEOGRAPHICAL DISTRIBUTION

Naupactus xanthographus is native to South America, East of the Andes. The native range includes Southern Brazil, Paraguay, Uruguay and Central-Northeastern Argentina. The species is non-native to Chile, where it was first introduced in the 1920s–1930s (Gonzalez, 1983). It has also been introduced to the Juan Fernandez Islands and Easter Island (Guzmán *et al.*, 2012; Lanteri & del Río, 2017). The species is not known to be established anywhere outside of South America.



South America: Argentina, Brazil (Rio Grande do Sul, Santa Catarina), Chile (Easter Island), Paraguay, Uruguay

BIOLOGY

Naupactus xanthographus reproduces sexually and the female lay eggs in clusters in the upper parts of the plants (normally in protected areas such as crevices, e.g. within cracks of bark) (Luppichini *et al*., 2013). A female can lay between 200 and 600 eggs during her lifetime (R. Ripa, pers. comm. 2019). On grapevine, eggs are usually laid on the upper part of the trunk or on branches in plant parts protected from the sun. Eggs may incidentally be laid in dried rolled leaves, although this has only been observed on citrus leaves (R. Ripa, pers. comm. 2019) or where leaves have been rolled by mechanical damage or other pests (e.g. tortricids in tender leaves in peaches) (Ripa, 1992).

In Chile, eggs are laid in summer and autumn (January to the end of March or the beginning of April) (González, 1989). Egg development time varies depending on the ambient temperatures. In the field, egg development probably takes at least 30 days in the summer (A. Lanteri, pers. comm. 2019). Newly hatched larvae fall to the ground, enter the soil and start to feed on the rootlets of the host plants. The larvae generally live in the soil at depths of 20–60 cm, and rarely below that, although they have been recorded up to 120 cm in certain soil textures (Ripa, 1992; R. Ripa, pers. comm. 2019). The development of the larval stage takes on average 9 months, with five instars in total (R. Ripa, pers. comm. 2019). According to Ripa (1992), in Chile, there are larvae in the soil throughout the year.

Pupation occurs in the soil in a pupal cell which is lined with body secretions. The development of the pupal cell and pupation occur at depths of 20–30 cm below the surface (R. Ripa, pers. comm. 2019; Vicchi, 2014). The pupal stage requires about 30 days before the adult starts to emerge. On emergence, the adult requires at least 30 days in the soil to mature and harden the exoskeleton before it can bore an exit gallery to the surface of the soil (R. Ripa, pers. comm. 2019).

The species is generally univoltine (i.e. has one generation per year), although the life cycle may be prolonged according to climatic conditions. In the literature, the life cycle is reported to take between 12 and 16 months (Luppichini *et al.*, 2013; Lanteri & del Río, 2017 citing González, 1983 and Ripa, 1986; Ripa, 1992). However, in dry areas and during very dry summers, the larval development is longer and will continue until the next spring or summer. In this case the life cycle lasts 16–18 months (A. Lanteri, pers. comm. 2019). Some life stages (larvae, pupae, adults) are present in the soil throughout the year.

There are two main peaks of adult emergence: the first is in late spring (starting in September) and the second in early summer (starting in December); a third may occur in late summer to early autumn (March to April in Chile,

Valparaiso region; Ripa, 1986). According to Caballero (1972), adults can live for 8 months in laboratory conditions. However, other observations under laboratory conditions have observed a maximum survival of 4 months for adults (A. Lanteri, pers. comm. 2019). Adults feed on the aerial parts of host plants (predominantly leaves but also flower buds and leaf buds). Although feeding on fruit has been mentioned in the literature, it is considered highly unlikely because the mouthparts of the adults are not suited to this (EPPO, 2020). Following mating, females can oviposit 30–35 days after emergence from the soil.

Adults are generally seen above ground when temperatures are between 15 and 40°C, but they are more frequent over 25°C. At low temperatures (5–10°C) adults become very slow. Below 1–2°C, they are completely immobile. There are no data on survival below 0°C but it is expected that they may survive for short periods (24–48 h) at temperatures below 0°C (R. Ripa, pers. comm. 2019). Adults stop emerging from the soil in the autumn months, when the temperatures in the soil fall below 13.5°C (in Chile around the month of May until September to October) (Ripa, 1992).

Humidity is very important for survival of eggs and larvae, and is essential for the emergence of adults (they usually emerge after rain or irrigation). In South America, the distribution of *N. xanthographus* is limited by minimum and maximum precipitation levels (1000–2000 mm maximum annual precipitation), except when crops are irrigated. Artificial irrigation is essential for the survival of *N. xanthographus* in Mendoza province (Argentina) and the central area of Chile, where the environment is very dry (A. Lanteri, pers. comm. 2019).

DETECTION AND IDENTIFICATION

Signs and symptoms

Above-ground foliage can show feeding damage where the adults feed from the margins of the leaves and create semicircular indentations. On grapevine, the most obvious damage is caused by adults that feed on leaves as well as buds when no leaves are available and produce ‘notching’ on the leaf margins (González, 1989; Ripa, 1992). Infestation may cause a decrease in size of shoots, leaves or bunches of grapes, as well as signs similar to potassium deficiency (R. Ripa, pers. comm. 2019).

Feeding damage (grooves) caused by larvae may be visible on the thicker roots along with an absence of small roots if the host plant is uprooted. Feeding on the roots may also cause symptoms above ground, i.e. reduced foliage and growth. Plants appear weak and show chlorosis because of the reduced water and nutrient uptake and potassium deficiency. Severe larval damage on the roots produces wilting of the foliage and may kill the plants (González, 1989; Ripa, 1992).

Morphology

Egg

Eggs are oval (ellipsoidal and bluntly rounded at the ends) and yellow, and between 1 and 1.2 mm in length (Luppichini *et al.*, 2013). Eggs are often arranged in clusters of 25–45 eggs in which they adhere to each other with a residue (sticky at egg laying).

Larva

Larvae are legless, white in colour with brown head capsule and mandibles. First-instar larvae measure approximately 1.5 mm and mature larvae can reach up to 20 mm. The last abdominal segment has four thin dark bands. Morphological identification of larvae is difficult and therefore larvae should be reared to adults to allow identification.

Pupae

Pupae are creamy white (or slightly yellowish), changing to brown before eclosion, and are 11–22 mm in length (Loiácono & Diaz, 1992, citing others), although 22 mm could be an outlier and a more normal maximum would be 15 mm (R. Ripa, pers. comm. 2019).

Adults

Adults are brown or grey-brown with white or white/yellow stripes on pronotum and elytra. They can be dark brown when they age. Adults show a high level of sexual dimorphism. The body length of females is 12–16 mm and that of males is smaller, 11–13 mm. Female rostrum is 1–1.5x as long as wide at the apex. Males are more slender than females with their rostrum being 1.25x as long as wide. Morphological characters of *N. xanthographus* adults are given in several publications, with the most recent being Lanteri and del Río (2017). Morphologically, adults of *N. xanthographus* can be confused with other species of the same genus, such as *N. dissimilis*, *N. mimicus* and *N. navicularis* (Lanteri & del Río, 2017), but can be distinguished from *N. leucoloma* and *N. cervinus.*

Detection and inspection methods

Feeding damage by larvae on roots may be detected if the host plant is uprooted, and there may also be above-ground symptoms (see Signs and symptoms).

Feeding damage of adults on the aerial parts of the plants may also be visible. The feeding damage by adults can be mistaken for other weevil species, particularly broad-nosed weevils. On grapevine, adults are particularly injurious to young plants and sprouting of plants in spring. A low abundance of the species (all life stages) is difficult to detect.

As an alternative to morphological identification of adults, molecular methods can be used and are detailed in a number of publications (e.g. del Río *et al.,* 2018). There are over 160 accessions entered in the GenBank database (2019) and barcodes based on Cytochrome oxidase 1 (COI) are available (e.g. see http://boldsystems.org and EPPO-Q-bank https://qbank.eppo.int). A PCR method was developed to differentiate *N. xanthographus* from *N. cervinus* (aiming at distinguishing eggs in traded commodities; Aguirre *et al.*, 2015; see also Aguirre *et al.*, 2021). This may be relevant for detection of introductions in the EPPO region because *N. cervinus* has already been introduced in a number of countries (e.g. Switzerland) and is spreading (Germann, 2016).

PATHWAYS FOR MOVEMENT

Infested fruit, especially grapes, carrying adults in trade and the packaging material associated with infested fruit, is a major pathway for *N. xanthographus*. This weevil has been reported as travelling on fruit (e.g. CABI, 2006; USDA, 2015; USDA, 2008 citing AQAS, 2007; USDA, 2007; Biosecurity Australia, 2005), with numerous interceptions, for example on grapes and apples (for exhaustive information, see EPPO, 2020). Traded host fruit are imported for consumption or processing, and transfer to a host is generally unlikely because the pest will be destroyed during processing or damaged fruit will be identified and discarded by processors, retailers or the final consumer in enclosed conditions. However, the pest may be able to transfer to a suitable host where fruit waste from processing or damaged fruit from repacking is discarded in large quantities in the open, close to orchards. This may happen where imported fruit is stored or repacked close to production facilities.

The EPPO PRA assessed the likelihood of entry in the EPPO region on host plants for planting as high, if these plants have growing media attached. Larvae and pupae can be present in the growing medium and the presence of root material can allow for larval feeding. Bare-rooted host plants for planting were considered to be a moderate risk as eggs may be present on the material and the presence of root material can provide food material for larvae, although because only early life stages may be present they are less likely to survive. For unrooted cuttings and rooted cuttings in small plugs, this was rated a very low risk of entry.

Naupactus xanthographus may spread naturally but since the species is flightless, natural spread is expected to be slow. Additionally, *N. xanthographus* normally climbs on a plant and moves within this plant. It may spread between plants with branch contact or structures connecting plants.

PEST SIGNIFICANCE

Economic impact

In South America, one of the most severely affected host plants is grapevine (*Vitis vinifera*), with damage reported in Chile, Argentina (Mendoza) and Brazil (Rio Grande do Sul) (Caballero, 1972; Ripa, 1986; Klein & Waterhouse, 2000; Lanteri *et al*., 2002). *N. xanthographus* is mentioned in the management recommendations or pest inventories of various fruit and field crops in Argentina and Chile (for details see EPPO, 2020).

In Chile, where *N. xanthographus* is an introduced species, it is regarded as one of the most important pests of grapevine (González, 1989; Ripa, 1992). Additionally, in Chile, attacks on peach and nectarine have also been reported. Caballero (1972) noted that mature peach trees attacked by an average of 100 larvae decline in their production or die after 4–5 years of attack. In Chile, there is no economic damage on Citrus, but Citrus crops support the pest and Citrus fruit have been a means of movement of the pest. In Chile, reductions in grape production of up to 30% have been reported, with damage reaching up to 60% in one region (Ripa, 1992).

In Argentina and Uruguay (where it is native), *N. xanthographus* is usually not very damaging. Some damage has been recorded on alfalfa and garden plants in Argentina, but to a lesser extent than in Chile (Lanteri *et al.*, 2002). In Argentina, it causes damage in combination with other weevil species (Lanteri, pers. comm. 2019).

Naupactus xanthographus has caused export difficulties in countries where it occurs because of the quarantine requirements of importing countries. In Chile, the presence of adult *N. xanthographus* on table grapes for export has resulted in the rejection of the commodity: between 1981/82 and 1982/1983, 43.6% and 38.6% of checked lots were rejected for export, respectively (Ripa, 1992).

Control

Physical barriers on host plants

As the species is flightless, establishment of a toxic barrier on the trunk of individual host can be an effective method of preventing adults reaching the foliage of the host plant. This method involves the placement of a plastic film smeared with an insecticide paste (INIA Pasta 82.4: contains 4% concentration of azinphos-methyl) that causes insect mortality when it walks on it (Ripa, 1992). The insecticide bands must be installed before the emergence of the adults from the soil.

In organic production areas, azadirachtin was found to be as effective as chemical treatments (Pinto & Zaviezo, 2003).

Chemical control

Chemical application (e.g. indoxacarb) on the foliage has been applied in Chile against adults. Effectiveness can be achieved for up to 30 days or more (R. Ripa, pers. comm. 2019).

Cultural control

Polyethylene sheets can be placed under the host plants and the trunks can be tapped (with a rubber mallet) so that adults may fall from the infested plants and be collected in the polyethylene sheets (Ripa, 1992). However, this is mostly used as a monitoring method. Weed control is used to lower infestations by removing food sources for the larvae. New crops should not be established in contaminated fields until the pest has been eradicated. Finally, ploughing to a sufficient depth would damage and disturb life stages in the soil (R. Ripa, pers. comm. 2019).

Phytosanitary risk

Many hosts of *N. xanthographus* have high economic importance in the EPPO region. In particular, the EPPO PRA highlighted that yield losses may be expected in grapevine, which is a high-value crop in the EPPO region. Damage could affect plants in production and young plants. Host fruit trees and vines are perennial plants and the establishment of *N. xanthographus* would have long-term consequences.

Loss of fruit harvest or young plants will depend on the type of crop, as well as on the pests already present and how they are managed. The impact may be major in the first years after *N. xanthographus* has built up damaging

populations, before new control techniques are developed.

If *N. xanthographus* is introduced into the EPPO region, its presence may have a high impact on major fruit exporters. The pest is a quarantine pest for many countries in the Americas and Asia, and there is also a large trade of the main fruit and plant commodities within the EPPO region.

It is not known if *N. xanthographus* would have an impact on species other than host fruit trees and vines, or on host plants in the wild. Such effects are apparently not observed in South America. It may have an impact in gardens or on alfalfa, as reported from Argentina.

PHYTOSANITARY MEASURES

The EPPO PRA (EPPO, 2020) recommended phytosanitary measures for plants for planting (other than seeds, in vitro plants, unrooted cuttings, and rooted cuttings in small plugs) with options such as pest-free areas, pest-free places of production, pest-free production sites and post-entry quarantine. For rooted cuttings in small plugs, clean growing medium should be used along with inspection and the treatment of plants against adults. For fruit of confirmed hosts, recommended phytosanitary measures include pest-free areas, pest-free places of production, pest-free production sites, harvesting during the South American winter (with information on absence of adults), washing of fruit (where feasible for the fruit concerned) or treatment of crop plus visual inspection in the crop and the consignment. In addition, both for plants and fruits, handling and packaging methods should be applied to prevent contamination by adults during storage and transport.

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Datasheet history

This datasheet was first published in the EPPO Bulletin in 2022. 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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