EPPO Datasheet: *Oemona hirta*

Last updated: 2021-07-29

IDENTITY

Preferred name: *Oemona hirta*
Authority: (Fabricius)
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Cerambycidae
Other scientific names: *Isodera villosa* (Fabricius), *Oemona humilis* Newman, *Oemona villosa* (Fabricius), *Saperda hirta* Fabricius, *Saperda villosa* Fabricius
Common names: lemon tree borer
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EU Categorization: Quarantine pest ((EU) 2019/2072 Annex II A)
EPPO Code: OEMOHI



more photos...

Notes on taxonomy and nomenclature

Lu & Wang (2005) revised the genus *Oemona*, which has 4 species: *O. hirta*, *O. plicicollis*, *O. separata* and *O. simplicicollis*. They provided an identification key to species and detailed descriptions. They also performed a phylogenetic analysis of all species, suggesting that *O. hirta* and *O. plicicollis* are sister species and most similar morphologically.

HOSTS

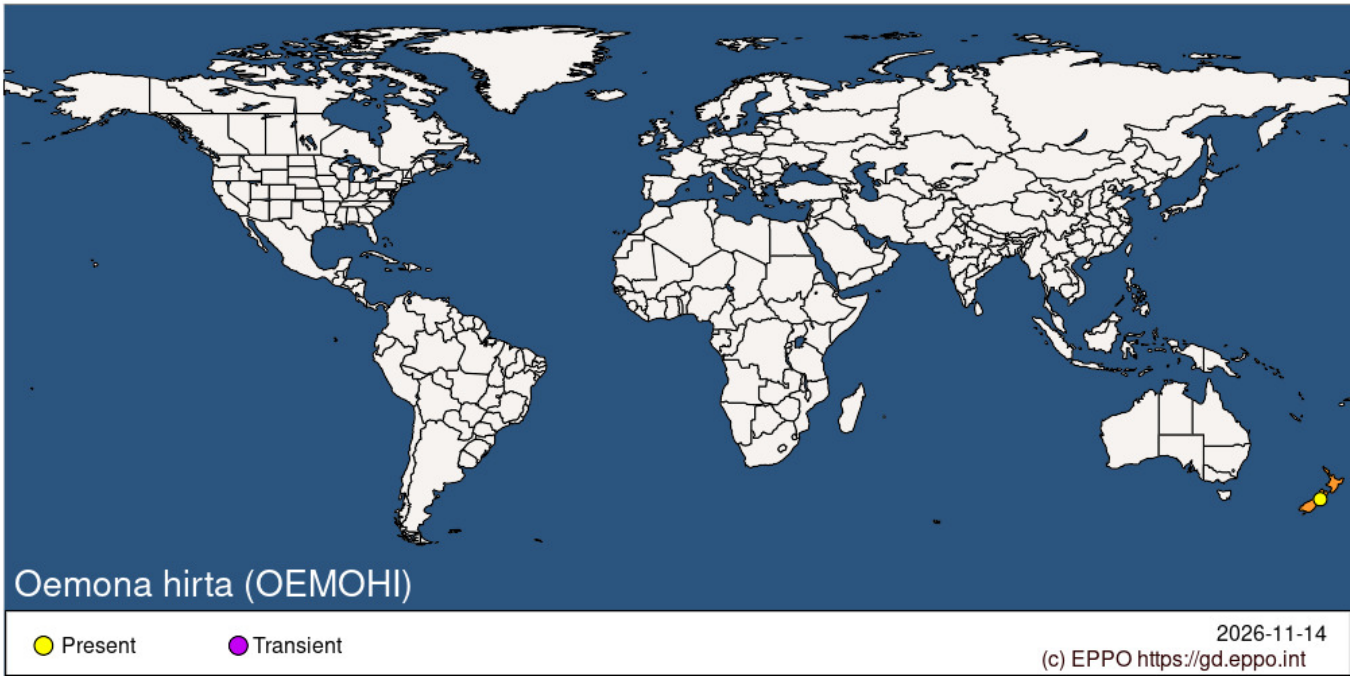
O. hirta is a highly polyphagous longhorn beetle. Its larvae feed on over 200 species of trees and shrubs from 63 (Lu & Wang, 2005; Wang, 2017) to 81 (EPPO, 2014) families. Its original hosts were native New Zealand plants, but it expanded its host range to many species exotic to New Zealand, ranging from major fruit, nut, forest and ornamental trees to shrubs and grapevines.

Host list: *Acacia dealbata*, *Acacia decurrens*, *Acacia floribunda*, *Acacia longifolia*, *Acacia melanoxylon*, *Acacia pycnantha*, *Acer pseudoplatanus*, *Acer sp.*, *Aesculus hippocastanum*, *Agathis australis*, *Albizia julibrissin*, *Alectryon excelsus*, *Alnus glutinosa*, *Alnus incana*, *Aristotelia serrata*, *Asparagus setaceus*, *Avicennia marina*, *Avicennia resinifera*, *Azara sp.*, *Betula nigra*, *Betula pendula*, *Betula sp.*, *Brachyglottis greyi*, *Brachyglottis repanda*, *Brachyglottis rotundifolia*, *Buddleja davidii*, *Camellia sp.*, *Carmichaelia australis*, *Casimiroa edulis*, *Cassinia leptophylla*, *Cassinia retorta*, *Castanea sativa*, *Casuarina cunninghamiana*, *Casuarina sp.*, *Celtis australis*, *Cestrum elegans*, *Chamaecyparis sp.*, *Chamaecytisus prolifer subsp. palmensis*, *Chamaecytisus prolifer*, *Choisya ternata*, *Cinnamomum camphora*, *Citrus reticulata*, *Citrus x aurantium var. sinensis*, *Citrus x limon var. meyerii*, *Citrus x limon*, *Citrus x tangelo*, *Citrus*, *Clerodendrum trichotomum*, *Clianthus sp.*, *Coprosma robusta*, *Coriaria sp.*, *Cornus nuttallii*, *Corokia buddleioides*, *Corylus maxima*, *Corymbia ficifolia*, *Corynocarpus laevigatus*, *Cryptomeria japonica* , *Cupressus sp.*, *Cytisus scoparius*, *Dahlia excelsa*, *Dahlia imperialis*, *Dais cotinifolia*, *Diospyros kaki*, *Dodonaea viscosa*, *Entelea arborescens*, *Eriobotrya japonica*, *Erythrina afra*, *Erythrina corallodendron*, *Erythrina variegata*, *Eucalyptus botryoides*, *Eucalyptus camaldulensis*, *Eucalyptus fastigata*, *Eucalyptus globulus*, *Eucalyptus macarthurii* , *Eucalyptus nitens*, *Eucalyptus regnans*, *Euonymus japonicus*, *Fagus sylvatica*, *Ficus carica*, *Fraxinus excelsior*, *Fraxinus sp.*, *Freycinetia banksii*, *Freycinetia sp.*, *Gahnia sp.*, *Gahnia xanthocarpa*, *Geniostoma ligustrifolium*, *Gleditsia triacanthos*, *Grevillea robusta*, *Hakea salicifolia*, *Hakea sp.*, *Hedycarya arborea*, *Hedycarya sp.*, *Hesperocyparis macrocarpa*, *Hibiscus rosa-sinensis*, *Hoheria sp.*, *Idesia polycarpa*, *Idesia sp.*, *Juglans ailanthifolia*, *Juglans nigra*, *Juglans regia*, *Knightia excelsa*, *Koelreuteria paniculata*, *Kunzea ericoides*, *Laburnum anagyroides*, *Leptospermum scoparium*, *Leptospermum sp.*, *Ligustrum sp.*, *Liriodendron tulipifera*, *Lophostemon confertus*, *Macadamia tetraphylla*, *Malus domestica*, *Malus sylvestris*, *Melaleuca citrina*, *Melaleuca sparsa*, *Melicytus ramiflorus*, *Melicytus sp.*, *Metrosideros excelsa*, *Muehlenbeckia sp.*, *Myoporum laetum*, *Nerium oleander*, *Nothofagus solandri*

, Nothofagus truncata, Nyssa sylvatica, Olearia laxiflora, Olearia solandri, Olearia traversii, Osteospermum moniliferum, Paraserianthes lophantha, Parsonsia sp., Paulownia tomentosa, Pennantia corymbosa, Pericopsis elata , Persea americana, Phyllostachys sp., Phytolacca octandra, Pinus contorta, Pinus radiata, Piper excelsum, Pittosporum crassifolium, Pittosporum eugenioides, Pittosporum ralphii, Pittosporum sp., Pittosporum tenuifolium, Pittosporum turneri, Platanus orientalis, Platanus x hispanica, Pomaderris apetala, Populus alba, Populus nigra var. italica, Populus nigra, Populus trichocarpa, Populus yunnanensis, Prunus armeniaca, Prunus avium, Prunus domestica, Prunus dulcis, Prunus persica var. nucipersica, Prunus persica, Pseudopanax laetus, Psoralea pinnata, Punica granatum, Punica sp., Pyrus communis, Pyrus pyrifolia, Quercus coccinea, Quercus ilex, Quercus palustris, Quercus robur, Quercus rubra, Quercus sp., Ribes uva-crispa, Ripogonum scandens, Ripogonum sp., Rosa sp., Salix alba, Salix babylonica, Salix caprea, Salix x reichardtii, Sambucus nigra, Schefflera digitata, Schefflera sp., Senecio reinholdi, Solanum aviculare, Solanum betaceum, Solanum mauritianum, Solanum sp., Sophora sp., Sophora tetraptera, Sorbus aucuparia, Styphnolobium japonicum, Syringa vulgaris, Syzygium floribundum, Syzygium smithii, Tabebuia sp., Tamarix ramosissima, Telopea oreades, Tilia cordata, Toxicodendron succedaneum, Ulex europaeus, Ulmus glabra, Ulmus minor, Ulmus parvifolia, Ulmus procera, Ulmus sp., Vaccinium, Vella sp., Verbascum thapsus, Vernicia fordii, Veronica salicifolia, Virgilia sp., Vitex lucens, Vitis vinifera, Weinmannia racemosa, Wisteria sp., Zelkova sp.

GEOGRAPHICAL DISTRIBUTION

O. hirta is distributed throughout New Zealand but more common in the North Island and northern South Island (Lu & Wang, 2005).



Oceania: New Zealand

BIOLOGY

Aspects of biology of *O. hirta* have been described by various authors (Dumbleton, 1937; Duffy, 1963; Clearwater, 1981; EPPO, 2014; Wang *et al.*, 1998, 2002; Wang, 2017; Wang & Davis, 2005; CABI, 2020). In most parts of New Zealand, this beetle requires at least 2 years to complete its life cycle and overwinters as larvae. Adults emerge between early September and early February with a peak occurring between October and December. They can live for 1 to 2 months, and females can lay about 50 eggs in their lifetime. Premating and preoviposition periods are 3 to 4 days and 5 to 7 days, respectively. Adults mainly feed on pollen and nectar of various plants and occasionally on leaves but do not cause economic damage to plants. They can fly and crawl toward fermented plant material but do not appear to be attracted to light. Mating, oviposition, and adult feeding occur at night. Females lay eggs singly at leaf and branch junctions, in bark cracks and fresh pruning wounds. The incubation period is 9 to 13 days depending

on temperature. Newly hatched larvae bore directly into sapwood and then into hardwood of living trees, shrubs, and vines. Larvae often make tunnels longitudinally inside the main stems or branches with a series of frass ejection holes every 8 to 12 cm. Occasionally larvae can enter the roots or bore around a branch, causing girdling. The larval stage takes more than one year and thus larvae can be found all year round in the field. At 23°C in the laboratory, larvae can complete their growth and development in 150 to 300 days depending on rearing methods. Before pupation occurs, the larva tears off thin pieces of wood and packs them into 2 tight plugs about 1.77 cm long and 2.5 cm apart, between which it then pupates. The pupal period is about 3 weeks. Pupae can be found between May and November. This beetle can be reared on artificial and natural diets in the laboratory (Wang *et al.*, 2002).

DETECTION AND IDENTIFICATION

Symptoms

The first symptom of larval infestation is often the wilting of foliage and dieback and the presence of excretion holes (about 1–3 mm in diameter) with frass visible at the hole openings and on leaves, branches and stems or ground surface. As the larvae grow and bore through stems or branches, the plant is weakened and easy to break. The infestation can also make the host susceptible to fungal infection from frass holes or weakened plants. In severe infestations, the plants may die.

Morphology

Eggs

Eggs 2-2.2 mm long; whitish and elongate with a fine waxy surface pattern.

Larva

Mature larvae 25-40 mm long; cylindrical and creamy white with an enlarged head bearing a pair of dark brown to black mandibles; each segment with a swollen transverse ridge.

Pupa

Pupae 20-25 mm long; with short black abdominal spines; showing adult features with antennae and bent legs folding adjacent to body.

Adult

Lu & Wang (2005) and Wang (2017) made detailed description of adults. Briefly, body 11–31 mm long with females being larger than males; reddish brown to blackish brown with elytra brown to reddish brown; pronotal disc with distinct, long, transverse rugae and pale yellow hairs; elytral surface covered with pale yellow hairs and coarse and rugose punctures; antennae slightly longer than body in males and about as long as body in females.

Detection and inspection methods

Eggs are small and laid in cracks or cuts, thus not easily seen. Adults are nocturnal but not attracted to light. They hide under leaves or in crevices during the day. So far, there is no report on the presence of sex or aggregation pheromones for this species and no reliable measures have been developed for adult detection. Therefore, the most reliable methods for detection and inspection are careful examination of plants of interest for the presence of larval infestation. Neonate larvae bore into the stems and branches immediately after hatching and early infestation (a few weeks after egg hatching) may cause wilting of foliage and dieback of twigs and branches. Frass is present at or around excretion holes and on leaves, branches, and stems of infested plants.

PATHWAYS FOR MOVEMENT

In areas where *O. hirta* has established (currently only in New Zealand), adults can fly from one site to another but

the distance they fly is unknown. According to EPPO (2014), the only evidence for long distance movement is through importation of infested plants for planting of *Wisteria* sp. from New Zealand. *O. hirta* larvae were intercepted in live *Wisteria* plants in the United Kingdom (Ostojá-Starzewski *et al*., 2010). Larvae of all ages and pupae may be present in live or freshly cut twigs, branches, and stems. However, they may not survive after these plant parts were cut and left dry for three months or more (Wang *et al*., 2002). There is a large trade of plants for planting between countries, thus if established, the main risk of spread would be by the movement of infested plants for planting (including cuttings) between nurseries.

PEST SIGNIFICANCE

Economic impact

O. hirta is one the most common insects in New Zealand (Lu & Wang, 2005). It attacks a wide range of trees planted for fruit such as citrus, apple and persimmon, windbreaks such as poplar, and ornamentals such as oak, with citrus trees appearing to be its most favourable hosts (Taylor, 1957; Clearwater, 1981; Clearwater & Muggleston, 1985; Rohitha *et al*., 1992; Wang *et al*., 1998; Lu & Wang, 2005, CABI, 2020). It attacks almost all commercially grown citrus species in New Zealand but its major damage to citrus occurs in the North Island, particularly in Northland and Gisborne regions (Wang & Shi, 1999). For example, the borer infested over 30% of 14 500 mixed citrus trees in a Gisborne orchard in 1997 (Wang & Shi, 1999). Dieback of the infested twigs and small branches of trees may occur in the first year of infestation. In the second year, the larvae move downward and damage the main branches and trunk, weakening the tree and reducing yield and long-term productivity of fruit trees (Taylor, 1957; Wang & Shi, 1999). *O. hirta* can also cause serious damage to grapevines. For example, in the Mission Vineyard of Hawkes Bay grapevines were almost 100% infested in 1996 and two blocks of vines were pulled out in 1998 (Wang & Shi, 1999).

Control

Pruning to remove the infested twigs and branches and then covering the pruning cut surface with a paint containing insecticides are probably the most effective control measures for this pest (Clearwater & Muggleston, 1985). Clearwater & Wouts (1980) injected a suspension of the nematode *Steinernema feltiae* Filipjev into frass holes and achieved more than 90% larval mortality, suggesting that this nematode has potential as an effective borer control agent. Ostojá-Starzewski *et al.* (2010) suggest that insecticide sprays may be effective against adults as long as they are in contact with the treatment or feed on treated foliage, but this has not been confirmed in practice. CABI (2020) suggests that destroying the infested plant is probably the only fully effective way of controlling the larvae. In addition, two ichneumonid species [*Xanthocryptus novozealandicus* (Dalla Torre) and *Campoplex* sp.] and one braconid species (*Apsicolpus hudsoni* Turner) are recorded attacking larvae of this beetle, but the parasitism rate is not high enough to achieve meaningful control (Wang & Shi, 1999).

Phytosanitary risk

According to EPPO (2014), large parts of EPPO member countries are climatically suitable for *O. hirta* and have suitable host plants for this borer. However, the pest biology, such as lengthy life cycle, no asexual reproduction, and no evidence of long-range sex pheromone, will not favour rapid buildup of populations.

PHYTOSANITARY MEASURES

In 2013, *Oemona hirta* was added to the EPPO A1 List of pests recommended for regulation as a quarantine pest, and endangered EPPO member countries are thus recommended to regulate it as a quarantine pest. Larvae on plants for planting can survive transport and continue feeding on their host. Inspections of these plants may be performed to look for the presence of larvae, such as excretion holes, frass and galleries at cross-sections, upon the plants' arrival and during the growing season in nurseries. Infested plants should be destroyed. The larvae have been shown to survive in cut twigs and branches for a couple of months so they may be able to survive in fresh cuttings for the duration of transport (Wang *et al.*, 2002). Although larvae and pupae might survive on unprocessed round wood with bark, no interceptions have been recorded in EPPO member countries.

REFERENCES

CABI (2020) Invasive species compendium datasheet – *Oemona hirta* (lemon tree borer). https://www.cabi.org/isc/datasheet/37124

EPPO (2014) Revised *Pest risk analysis for Oemona hirta*. EPPO, Paris. Available at http://www.eppo.int/QUARANTINE/Pest_Risk_Analysis/PRA_intro.htm

Clearwater JR (1981) Lemon tree borer, *Oemona hirta* (Fabricius), life cycle. New Zealand Department of Scientific and Industrial Research Information. Series 105/33.

Clearwater JR & Muggleston SJ (1985) Protection of pruning wounds: favoured oviposition sites for the lemon tree borer. *Proceedings of New Zealand Weed and Pest Control Conference* **38**,199–202.

Clearwater JR & Wouts WM (1980) Preliminary trials on the control of lemon tree borer with nematodes. *Proceedings of New Zealand Weed and Pest Control Conference* **33**, 133–135.

Duffy EAJ (1963) A monograph of the immature stages of Australasian timber beetles (Cerambycidae). British Museum (Natural History), London.

Dumbleton LJ (1937) Borers in fruit trees. *New Zealand Journal of Agriculture* **55**, 295-298.

Lu W & Wang Q (2005) Systematics of the New Zealand longicorn beetle genus *Oemona* Newman with discussion of the taxonomic position of the Australian species, *O. simplex* White (Coleoptera: Cerambycidae: Cerambycinae). *Zootaxa* **971**, 1–31.

Ostojá-Starzewski J, MacLeod A & Eyre D (2010) Plant pest factsheet: lemon tree borer, *Oemona hirta*. York, UK: Food and Environment Research Agency (FERA).3 pp. https://planthealthportal.defra.gov.uk/assets/factsheets/lemonTreeBorer.pdf

Rohitha BH, Hartley T & Franklin SJ (1992) Lemon tree borer damage on persimmon. *Proceedings of New Zealand Plant Protection Conference* **45**, 141-142.

Taylor HS (1957) Citrus borer. New Zealand Journal of Agriculture **94**, 357-358.

Wang Q (2017) Cerambycid pests in agricultural and horticultural crops, pp 409-562. *In* Q. Wang (ed.) *Cerambycidae of the World: Biology and Pest Management.* CRC Press (Taylor & Francis Group), USA.

Wang Q & Davis LK (2005) Mating behavior of *Oemona hirta* (F.) (Coleoptera: Cerambycidae: Cerambycinae) in laboratory conditions. *Journal of Insect Behavior* **18**, 187–191.

Wang Q & Shi G (1999) Parasitic natural enemies of lemon tree borer. *Proceedings of New Zealand Plant Protection Conference* **52**, 60–64.

Wang Q, Shi G & Davis LK (1998) Reproductive potential and daily reproductive rhythms of *Oemona hirta* (Coleoptera: Cerambycidae). *Journal of Economic Entomology* **91,** 1360–1365.

Wang Q, Davis LK, Rogers DJ, Song DP, Shi G & Chen X (2002) Development, survival, body weight, longevity, and reproductive potential of *Oemena hirta* (Coleoptera: Cerambycidae) under different rearing conditions. *Journal of Economic Entomology* **95,** 563–569.

ACKNOWLEDGEMENTS

This datasheet was prepared in 2021 by Qiao Wang, School of Agriculture and Environment, Massey University, New Zealand. His valuable contribution is gratefully acknowledged.

How to cite this datasheet?

EPPO (2026) *Oemona hirta*. EPPO datasheets on pests recommended for regulation. Available online. https://gd.eppo.int

Datasheet history

This datasheet was first published online in 2021. 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.

Co-funded by the European Union