EPPO Datasheet: *Monochamus obtusus*

Last updated: 2022-09-19

IDENTITY

Preferred name: *Monochamus obtusus*
Authority: Casey
Taxonomic position: Animalia: Arthropoda: Hexapoda: Insecta: Coleoptera: Cerambycidae
Common names: obtuse sawyer
view more common names online...
EPPO Categorization: A1 list
view more categorizations online...
EPPO Code: MONCOB

Notes on taxonomy and nomenclature

Two subspecies of *Monochamus obtusus* are described by Linsley and Chemsak (1984): *M. obtusus obtusus* Casey (with a range from Idaho and Washington to Central California, USA) and *M. obtusus fulvomaculatus* Linsley (found in the Hamilton Range of Central California at higher elevations). Monné and Nearns (2020) also list both of these as distinct sub-species. In the Titan database of cerambycids, only *M. obtusus fulvomaculatus* is listed as a valid sub species (IRD, 2021).

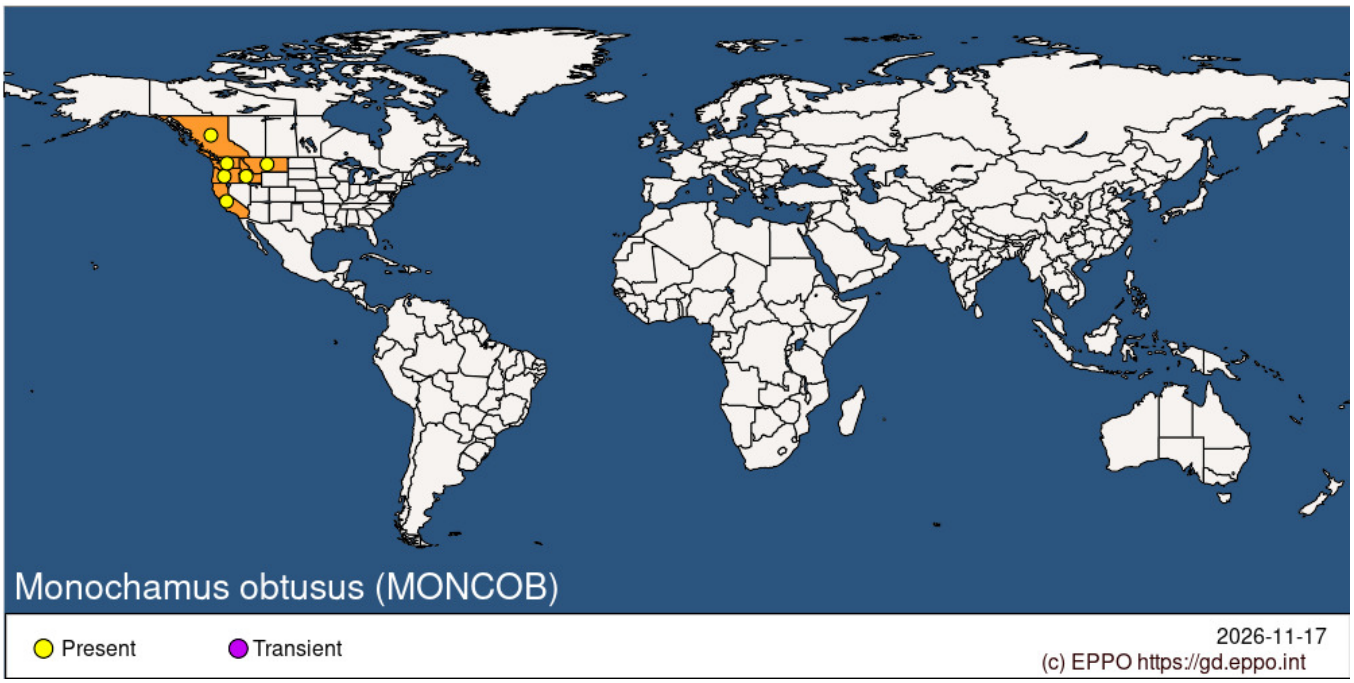
HOSTS

M. obtusus has been recorded on nine species of conifers from three genera. None of the *Abies* or *Pinus* known to be host species are important in Europe but there are important host trees in these genera in Europe such as *Abies alba* (silver fir) and *Pinus nigra* (black pine) which is found across Europe and Turkey.

Host list: *Abies concolor*, *Abies grandis*, *Abies*, *Pinus contorta var. murrayana*, *Pinus contorta*, *Pinus coulteri*, *Pinus lambertiana*, *Pinus ponderosa*, *Pinus sabiniana*, *Pinus*, *Pseudotsuga menziesii*

GEOGRAPHICAL DISTRIBUTION

M. obtusus is found in Pacific Coast States, British Columbia and Idaho (Keen, 1952),



North America: Canada (British Columbia), United States of America (California, Idaho, Montana, Oregon, Washington)

BIOLOGY

M. obtusus fulvomaculatus has a flight period between June and August (Linsley & Chemsak, 1984).

The following paragraph is generic to *Monochamus* spp. and the source is Akbulut *et al.* (2017). The larvae of *Monochamus* spp. are commonly known as 'sawyers' because of the loud noise they make as they tunnel within the wood of host trees. Female beetles make oviposition slits in the bark using their mandibles and lay eggs in these slits. The egg incubation period is temperature dependent but can range from six to twelve days. The early instars develop within the subcortical zone of host trees whereas late instars construct galleries in the sapwood. The entrance hole into the sap wood is oval shaped. Pupation takes place at the upper end of the gallery and the larvae plug the end of the gallery with wood shavings before pupation.

After emergence, *Monochamus* spp. adults need to feed on the living bark of young twigs for sexual maturation. This phase is obligatory before oviposition. There is a wide between- and within-species variation in adult longevity, from ca. 1 month to ca. 5 months (EFSA, 2018). Generally, the life cycle is 2 years although in some years it is only one. Because of the overlapping generations, the adults are found each year and may be more abundant in some years depending on the availability of host material and habitat conditions.

Miller (1986) studied the impact of excluding *Monochamus* spp. from freshly cut bolts (sections of a logs) of *Pinus taeda* on other insects. The presence of *Monochamus* spp. significantly reduced the number of emerging *Ips calligraphus* (Coleoptera: Curculionidae), *Platysoma cylindricum* (Coleoptera: Histeridae) and *Medetera bistriata* (Diptera: Dolichopodidae). This demonstrates that reducing *Monochamus* spp. populations could lead to increased populations of other damaging species.

M. obtusus is considered to be a vector of pinewood nematode (*Bursaphelenchus xylophilus*) (EFSA, 2018), but the evidence of it being a vector is limited (Akbulut & Stamps, 2012).

DETECTION AND IDENTIFICATION

Symptoms

The following signs and symptoms may be seen in wood infested with *Monochamus* spp. (Wilson, 1975):

1. Slits chewed by adult female for egg laying in the bark, although only a minority of these may have eggs in them,
2. Scoring in the xylem and phloem caused by larval feeding,
3. Frass – the waste expelled by feeding larvae from trees,
4. Oval shaped holes made by larvae as they bore deeper into sap wood,
5. Circular exit holes created by adults.

Morphology

The description of juvenile stages below is generic to *Monochamus* species.

Eggs

Monochamus spp. eggs are white, elongate, cylindrical and slightly flattened, with rounded ends (Akbulut *et al.*, 2017). They are about 3 mm long and 1 mm in diameter.

Larvae

Monochamus spp. young larvae are soft-bodied, elongate, and dirty white in colour, with a light yellow thorax and an amber brown head. The final instar larvae have 10 abdominal segments, and the length of mature larvae is between 25 and 50 mm (Akbulut *et al.*, 2017). *Monochamus* spp. larvae can also be identified using DNA barcoding, but it has not been validated for all species (EFSA, 2018).

Pupae

Monochamus spp. pupae resemble the adults with reduced wings, legs, antennae and mouthparts clearly visible. They are about 1.5-3 cm long.

Adults

M. obtusus is a small brown beetle with grey markings. The antennae are over twice the length of the body, and the prothorax has a toothlike projection on each side.

Linsley and Chemsak (1984) provide a description of *M. obtusus* adults:

‘Male: Form moderate sized, cylindrical, vaguely tapering posteriorly; integument deep to pale reddish-brown, abdomen black, submetallic; pubescence mottled, grayish and pale and dark brownish. Head with front shallowly convex, shallowly, usually densely punctate, irregularly to very densely pubescent; genae short, slightly convergent toward apex; antennae extending about five segments beyond elytra, segments minutely asperate, moderately densely clothed with very short, depressed, dark hairs, scape moderately clothed with gray, recumbent pubescence, segments three to ten with apical sensory areas. Pronotum as broad as or broader than long, lateral tubercles moderate in size, apices narrowly rounded; apical and basal impressions transversely rugose; disk with an irregular, glabrous, median callus; middle rugose around callus, sides confluently punctate; pubescence irregular, mottle, fulvous at sides; prosternum rugulose, very densely to irregularly pubescent; meso- and metasternum irregularly to densely clothed with recumbent gray pubescence, suberect, yellowish hairs numerous. Elytra about twice as long as broad, sides slightly explanate behind humeri; base with numerous, rounded asperites; punctures behind asperites irregular, dense, becoming obsolete to apex; pubescence consisting of light to dark brown patches with gray pubescence sparse to dense around brown patches, brown patches more extensive over apical one-half; apices rounded. Scutellum white pubescent at sides, apex broadly V-shaped. Legs very densely to moderately densely pubescent, pubescence interrupted by small dots. Abdomen confluently punctate at sides; pubescence irregular to very dense, often covering surface; last sternite truncate at apex, apical hair tufts very sparse. Length, 14-24 mm.

Female: Form similar. Antennae extending three segments beyond elytra; segments broadly white annulate basally; abdomen with last sternite truncate at apex, hair tufts dense. Length, 17-24 mm.’

Detection and inspection methods

There is no specific information for *M. obtusus,* but *Monochamus* spp. are attracted to weakened, dying or dead host trees. Therefore, such trees, which often have partly or completely discoloured needles, should be the focus of surveillance for *Monochamus* spp. Close inspection may allow the detection of oviposition slits in the bark of dead or dying trees, oval-shaped larval entrance holes in the sapwood under the dead bark, or round adult exit holes in the sapwood. Larvae can also be extracted from the bark or sapwood, and adults can be found walking or resting on cut or dead wood during the summer (EFSA, 2018). The most efficient detection method is trapping (see below). Blatt *et al.* (2019) caught *M. marmorator, M. notatus* and *M. scutellatus* in traps in plantations of healthy Christmas trees (*Abies balsamea*) showing that there are exceptions to the general association between *Monochamus* spp. and weakened or dead trees.

Safranyik and Raske (1970) devised a sequential sampling plan to determine the damage caused by *Monochamus* spp. larvae to timber. The plan was based on a study in Alberta in which lodgepole pine (*Pinus contorta*) logs were sampled for *M. scutellatus, M. maculosus* and *M. notatus.* The method involved counting larval entrance holes into the logs any time after September following the summer of attack. At densities of greater than 2.5 holes / ft^2 (approx. 30cm x 30cm), there was a 30% loss in value of the timber.

Traps

In a field and laboratory study, Fierke *et al.* (2012) provided evidence that monochamol is a male produced pheromone component of *M. scutellatus*. Field data also suggested that it is likely to be a pheromone for *M. obtusus* and support for the hypothesis that it is a pheromone for the genus *Monochamus*.

In a large study at 16 sites across North America, Miller *et al.* (2013) demonstrated that multiple-funnel traps baited with a blend of ipsenol, ipsdienol, ethanol and ?-pinene were attractive to the *M. titillator / M. carolinensis* complex, *M. scutellatus, M. clamator, M. obtusus* and *M. maculosus* (synonym = *M. mutator*). This mixture of four compounds, was more effective than unbaited traps or traps with a mixture of ipsenol and ipsdienol or traps with a mixture of ethanol and ?-pinene. Ethanol is produced by stressed conifer trees and ?-pinene is a constituent of the oleoresin of most pine species. Ipsenol and ipsdienol occur naturally in pine forests (Miller *et al.* 2013).

Ryall *et al.* (2015) provided evidence that monochamol is attractive to *M. scutellatus, M. notatus* and *M. carolinensis* which supported evidence from previous studies (e.g Fierke *et al*. (2012); Allison *et al.* (2012)), they also provided the first evidence that monochamol is attractive to *M. maculosus* and *M. marmorator.* The studies also demonstrated a synergism between monochamol and host volatiles. Allison *et al*. (2012) showed that monochamol is attractive to *M. titillator* as well as to traps baited with (2R*,3R*)-2,3-hexanediol plus -pinene (but not to traps baited with (2R*,3R*)-2,3-hexanediol alone). There is evidence showing that monochamol is attractive to 12 *Monochamus* species and so it has excellent potential for surveys of beetles of the genus (Ryall *et al.* 2015).

Miller *et al.* (2016) tested the efficacy of different combinations of ?-pinene, monochamol and ipsenol for catching *Monochamus* spp. in two Canadian provinces and eight states in the USA. The study provided evidence of the beneficial effect of including both monochamol an ipsenol in lures. Monochamol did not increase catches of other Cerambycidae, bark beetles, other weevils or bark beetle predators.

Boone *et al.* (2019) tested the efficacy of teflon-coated cross-vane traps with four lures monochamol: 2 mg/day; ipsenol: 2.5 mg/day, 2-methyl-3-buten-1-ol: 10 mg/day; and ?-pinene: 500 mg/day. Large numbers of *M. carolinensis , M. maculosus, M. notatus, M. scutellatus, M. clamator*, and *M. titillator* were trapped in North America, while large numbers of *M. alternatus* were trapped in China. This result demonstrated that such traps could be used for the detection of non-native *Monochamus* spp. in Europe.

PATHWAYS FOR MOVEMENT

There is no specific information on the pathways for *M. obtusus* and so the following information is generic to the genus. *Monochamus* spp. are able to naturally disperse by flight. A number of dispersal studies have been carried out with *Monochamus spp. Monochamus alternatus* adult were able to disperse 3.3 km from infested logs to diseased

trees (Kobayashi *et al.*, 1984). In a mark-recapture experiment in Spain, *Monochamus galloprovincialis* (Olivier) flew a maximum of 22.1 km with around 2% of beetles flying further than 3 km (Mas *et al.*, 2013).

Pinewood nematode, which is vectored by *Monochamus* spp. has been found to be able to spread at a mean rate of 5.3 km per year in Portugal (de la Fuente *et al.*, 2018), 6 km / year in Japan (Togashi & Shigesada, 2006) and an estimated 7.5 km / year in China (Robinet *et al.*, 2009). However, long distance man assisted spread of pine wood nematode can occur over much larger distances with a mean annual dispersal of 111-339 km estimated in China (Robinet *et al.*, 2009). *Monochamus* spp. can be spread in coniferous wood and coniferous wood packaging material, dunnage, particle wood and waste conifer wood, hitchhiking and in finished wood products (EFSA, 2018, Ostojá-Starzewski, 2014). Between 1998 and 2018 there were 124 interception records of *Monochamus* sp. on wood packaging material in the EU (EFSA, 2018). Between 1984 and 2008, there were 42 interceptions of *Monochamus* spp. on wood packaging material in the USA which were identified to species level: *M. alternatus* (17), *M. carolinensis* (Oliver) (2), *M. clamator* (Leconte) (1), *M. galloprovincialis* (Oliver) (5), *M. sartor* (Fabricius) (5), *M. scutellatus* (Say) (2), *M. sutor* (Linnaeus) (9) and *M. teserula* White (1) (Eyre & Haack, 2017). *Monochamus* spp. females lay their eggs in various parts of their trees, including smaller branches down to 2 cm in diameter. Plants for planting are considered to be an unlikely pathway for the spread of *Monochamus* spp. because they tend to attack weakened or dead trees and weakened trees are unlikely to be traded (EFSA 2018). However, the trapping of *Monochamus* spp. in plantations of healthy Christmas trees (*Abies balsamea*) suggests there would be some risk in importing host trees from North America into the EPPO region (Blatt *et al.*, 2019).

PEST SIGNIFICANCE

Economic impact

M. obtusus has been reported to be a destructive pest (Keen, 1952), but there is little specific information on its status. *Monochamus* are not generally considered to be plant pests in their own right because they do not tend to attack healthy trees however, they can and damage and can facilitate the introduction and spread of pine wood nematode in Europe (EFSA, 2018). *Monochamus* spp. rarely, if ever, attack vigorously growing trees (Gibson, 2010). However, the impact from *Monochamus* spp. in the USA is high, largely due to the export restrictions of forestry products associated with pine wood nematode, *Bursaphelenchus xylophilus* (Miller *et al.*, 2013). In the USA, *Monochamus* spp. larvae, are also responsible for extensive damage to fire damaged, dying, recently killed, and felled conifers of various species—but especially pines, spruce, true firs, and Douglas-fir. The larvae damage infested trees and logs through a series of extensive mines that introduce decay-causing fungi (Baker, 1972, Gibson, 2010). Wood chips harvested from wood infested by *Monochamus* species can be too small for use at pulp mills (Wilson, 1962).

Control

There is no specific information about the control of *M. obtusus*, but the control methods that are used against other *Monochamus* spp. are likely to be effective. Wilson (1962) studied attacks by wood boring insects on stacks of felled balsam fir, *Abies balsamea* in Minnesota. *M. scutellatus* was the most frequently observed cerambycid beetle, accounting for c. 90-95% of all beetles observed. *M. notatus* and *M. marmorator* were also occasionally observed. Piles of wood placed in full shade suffered less damage than wood exposed to the sun. Also, standard piles with less wood exposed to beetle damage suffered less damage than piles stacked in ‘pens’ with wood stacked in open perpendicular layers. The average volume of wood lost from standard piles of wood over two years in the sun ranged from 0.47% of interior logs to 2.64% for exterior logs and for piles in the shade from 0.37% for interior logs to 0.59 % for exterior logs. Damage to felled wood can be reduced by: i) transporting wood as soon as possible after felling; ii) placing wood in the shade of other trees; ii) covering wood in a layer of 45 cm of slash iv) stacking wood in standard piles to reduce the area exposed to beetle attacks; v) removing bark from felled wood; vi) immersing logs in water; vii) applying insecticides to exposed wood (Wilson, 1962, Wilson, 1975). *Monochamus* damage can be prevented by not exposing wood during the July-September egg laying period and minimized by processing any infested wood as soon as possible (Gibson, 2010).

Phytosanitary risk

The introduction of non-native *Monochamus* spp. into Europe could introduce pine wood nematode to new locations

and hosts and enhance the rate of spread of the pest. Pinewood nematode has causes severe damage to forests in East Asia and in Europe and the impacts are likely to increase and *M. obtusus* is considered to be a vector (EFSA, 2018).

PHYTOSANITARY MEASURES

The EU has emergency measures to prevent the spread of pinewood nematode within the union (EU, 2012). These measures include demarcating areas, destruction of contaminated material, heat treatment of wood and wood products, hygiene protocols for forestry vehicles and transport conditions for plants, wood and bark (EFSA, 2018). Debarking of harvested wood can reduce risks from *Monochamus* spp. (EFSA, 2018).

Recommended phytosanitary measures to reduce the risk of the introduction and spread of non-European *Monochamus spp.* and pinewood nematode are set out in the EPPO commodity standard for Coniferae, PM 8/2 (3). For example, there are recommendations by host species to reduce the risk of introducing pine wood nematode or its *Monochamus* sp. vectors on wood, such as pest free areas, treatment of wood and conditions for the transport of the wood (EPPO, 2018).

The treatment of wood according to ISPM 15 will reduce the risk of the introduction of xylophagous pests such as *Monochamus* spp. and pinewood nematode being introduced to previously uninfested areas in wood packaging material, although treatments are not always applied effectively (Haack *et al.*, 2014).

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Datasheet history

This datasheet was first published online in 2022. 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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