Monochamus sutor (Linnaeus)

Coleoptera: Cerambycidae

Small white-marmorated longhorned beetle

Host(s)	CAPS-Approved Survey Method
Major hosts *Abies* spp. (Fir), *Abies alba* (Silver fir), *Abies holophylla* (Manchurian fir), *Abies nephrolepis* (Khingan fir), *Abies sibirica* (Siberian fir), *Larix* spp. (Larch), *Larix gmelinii* (Dahurian larch), *Larix sibirica* (Siberian larch), *Picea* spp. (Spruce), *Picea abies* (Norway spruce), *Picea jezoensis* (Yeddo spruce), *Picea koraiensis* (Korean spruce), *Picea obovata* (Siberian spruce), *Pinus sibirica* (Siberian stone pine), *Pinus sylvestris* (Scots pine) **Other hosts** *Betula platyphylla* (Asian white birch), *Pinus* spp. (Pine), *Pinus mugo* (Mugo pine), *Pinus nigra* (Austrian pine), (USDA Forest Service, 1991; Bakke and Kvamme, 1992; Zhang et al., 1993; Schroeder et al., 1999, Ciesla, 2004; Cesari et al., 2005; Davis et al., 2006)	Visual

Reason for Inclusion in Manual

Monochamus sutor was added to the manual in 2010. *Monochamus sutor* is a target pest on the FY2011 AHP Prioritized Pest List.

Pest Description

Eggs:

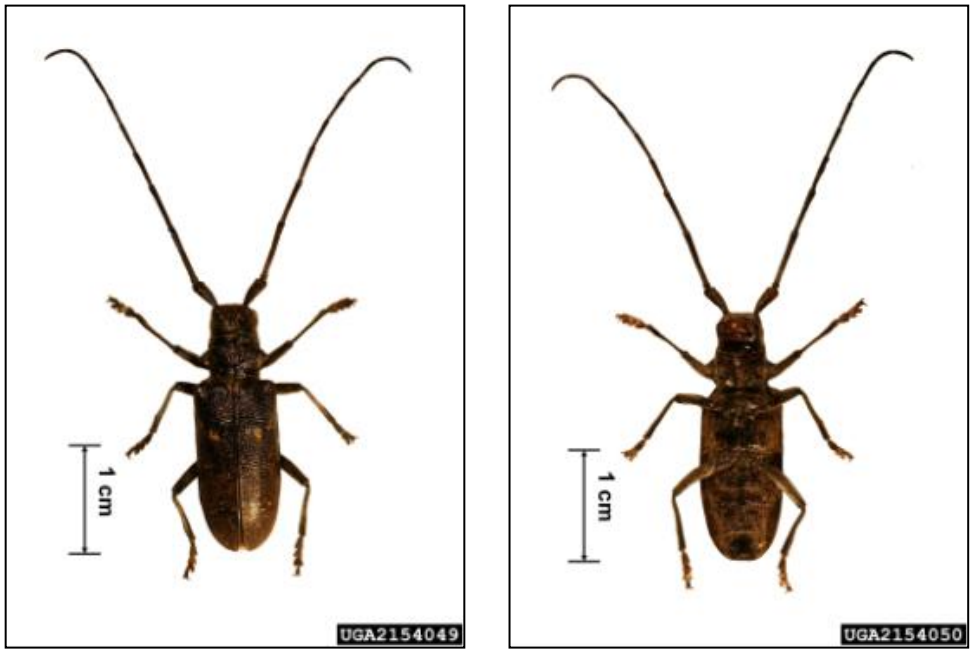
Eggs of *M. sutor* are white and matte which turn brownish over time (Cherepanov, 1990). They are elongate, slightly curved and rounded at the ends (Cherepanov, 1990). The chorion has a

fine, faint reticulate sculpture (Cherepanov, 1990). Eggs are 3.8 mm by 0.8 mm (approx. $^{1}/_{16}$ in) (Cherepanov, 1990).

Larvae:
Larvae of *M. sutor* are white, opaque and legless grubs (CABI, 2010). Mature larvae average 35 to 40 mm (approx. 1 $^{3}/_{8}$ to 1 $^{9}/_{16}$ in) in length. The head capsule is amber with black, chewing mouthparts that are well developed (CABI, 2010). Body length is 40 to 50 mm (approx. 1 $^{9}/_{16}$ to 1 $^{15}/_{16}$ in) while head width is 4.1-4.7 mm (approx. $^{3}/_{16}$ in) (Cherepanov, 1990).

Pupae:
The pupae of *M. sutor* are white, opaque, cylindrical, moderately elongate and exarate (CABI, 2010). The abdomen is elongated and tapers gradually to a posterior tip (CABI, 2010).

Adults:
"The overall body length of the adult is 15-26 mm (approx. $^{9}/_{16}$ to 1 in). The body is moderately elongate with head not broader than the pronotum. Head and pronotum have a deep median longitudinal groove with deep uneven punctuation and dense or sparse grey or brownish hairs. The antennae are 2.5 times the length of the body on males and less than 1.5 times the length of the body for females. The eyes are deeply faceted, broadly emarginated, with the upper ocular lobes close to each other. The distance between the ocular lobes is less than the interspace between the antennal bases. The scutellum is whitish-yellow and the prothorax has a pair of projections. The elytra have several irregular, faint, bronze or gold coloured markings. Females are slightly larger than males" (CABI, 2010).



Dorsal and ventral view of *Monochamus sutor* adult (Christopher Pierce, USDA-APHIS-PPQ, Bugwood.org)

"[Adults] are 15-24 mm [approx. $^{9}/_{16}$ to $^{15}/_{16}$ in] long with a black body color with a metallic sheen. The scutellum is a whitish-yellow color and the prothorax has a pair of projections. The elytra have several irregular, faint, bronze or gold colored markings. The antennae are more than twice the body length on the males and about 1.5 times the body length on females. Females are slightly larger than males" (Ciesla, 2004).

Biology and Ecology

This species has a similar life history to other *Monochamus* species (Ciesla, 2004). In Siberia, *Monochamus sutor* has a two-year life cycle and is active from June to September (USDA, 1991). One generation can take 1–3 years. Most of the life cycle occurs in the host tree with the exception of adult dispersal and maturation feeding (Kolk and Starzyk, 1996).

From mid-June to July, females deposit eggs (Novak et al., 1976). Females can lay at least 50 eggs in niches in the excavated phloem (USDA, 1991). One to six eggs per niche can be observed (USDA, 1991).

Once larvae hatch, they feed on the phloem and sapwood for the first year. Frass is expelled through the holes in the bark (Novak et al., 1976). Larvae overwinter primarily as second instars and resume feeding the following spring (USDA, 1991). The larvae continue to feed, boring deeper into the wood; the mature larvae then construct pupal cells (40 to 50 mm by 13 mm or 1.5 to 2 in by 0.5 in) and in Siberia, overwinter for a second time (Kolk and Starzyk, 1996; USDA, 1991). This pest has five larval instars total (USDA, 1991).

Pupation and emergence occurs in the spring (Davis et al., 2008; USDA, 1991). Emergence holes are oval and range from 6 to 7 mm (approx. $^{1}/_{4}$ in) in diameter (Kolk and Starzyk, 1996).

Adults maturation feed primarily on the bark and phloem of twigs in the crowns of conifers (USDA, 1991). They stay in the crowns for 10 to 15 days coming down to deposit eggs (Novak et al., 1976). These species maturation feed on healthy hosts although oviposition usually occurs on stressed trees (Hanks, 1999). It takes 7 to 10 days after emergence for *Monochamus* adults to become sexually mature (USDA, 1991). Adults use volatile compounds to locate stressed, dying or recently dead host material to mate and oviposit (USDA, 1991).

Adults are strong fliers and may be aided by wind to disperse several kilometers although most do not disperse that far (Davis et al., 2008; Ciesla, 2004).

Countries of Origin

Monochamus sutor occurs throughout much of Europe and Asia, spanning from the Pacific to Atlantic Oceans and the Mediterranean Sea to the conifer forests in the north (Kolk and Starzyk, 1996).

Current Distribution

M. sutor is currently distributed in the following countries: Albania, Andorra, Austria, Belarus, Belgium, Bosnia and Herzegovina, Bulgaria, China, Croatia, Czech Republic, Denmark, Estonia, Finland, France, Georgia, Germany, Hungary, Italy, Japan, Kazakhstan, Korea, Latvia, Liechtenstein, Lithuania, Mongolia, Montenegro, Netherlands, Poland, Romania, Russia, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Ukraine, and the United Kingdom (USDA-APHIS, 2010).

Distribution in United States

M. sutor is not known to occur in the United States.

Pathway

Solid wood packing material may serve as a pathway for the spread of this insect. Plant parts that may conceal the pest include bark (eggs); stems, shoots, trunks and branches (eggs, larvae, pupae, adults); and wood (larvae, pupae, adults).

Pathogens Vectored

This genus has been recognized as the main vector of *Bursaphelenchus xylophilus* a phytoparasitic nematode (Kobayashi et al., 1984). This pathogen is native to North America and does not damage native conifers (Ciesla, 2004). However, it has caused extensive mortality to several indigenous pines abroad, especially in Japan where it was accidently introduced and spread through *M. alternatus* (Evans et al., 1996).

Monochamus species may also vector the nematodes *B. mucronatus* and *B. kolymensis*. Although it is not known to cause extensive mortality on hosts (*Abies*, *Larix* and *Pinus* spp.) in its native range of Siberia, it has the potential to become pathogenic to North American conifers if introduced with an exotic *Monochamus* species (USDA Forest Service, 1991; Ciesla, 2004).

Damage

Symptoms caused by *M. sutor* are similar to other *Monochamus* spp. Adults cause round emergence holes, oviposition scars on the bark and damage on the bark of shoots by maturation feeding (Davis et al., 2008). Galleries are packed with a mixture of frass and shredded wood. This mixture can be expelled through small slits in the bark produced by larvae (Davis et al., 2008). Oval shaped pupal chambers can be found in the xylem where they can be plugged with wood shavings (Davis et al., 2008).

Larval gallery of *Monochamus sutor* on spruce. (Stanislaw Kinelski, Bugwood.org)

Needle wilting of Austrian pine caused by *Bursaphelenchus xylophilus*. (USDA-APHIS - North Central Research Station Archive, USDA-APHIS, Bugwood.org)

Monochamus sutor larva entrance hole (right) and adult exit hole (left) for (Stanislaw Kinelski, Bugwood.org)

Survey

CAPS-Approved Method

The CAPS-Approved survey method is visual inspection. There are no known attractants for *M. sutor*.

Time of year to survey

In Europe, adults fly from mid-June to September (Kolk and Starzyk, 1996).

Identification

CAPS-Approved Method

Morphological. Positive identification of adults can be achieved through examination of morphological characters by a well-trained taxonomist with expertise on the Cerambycidae family.

A key to differentiate adults, larvae and pupae of certain *Monochamus* spp. (including *M. saltuarius* and *M. sutor*) can be found in Cherepanov (1990).

Mistaken Identities

M. sutor is similar to *M. scutellatus*, a species native to North America (Ciesla, 2004).

Resources and High Resolution Images

Pine Commodity-based Survey Reference:
http://caps.ceris.purdue.edu/survey_manuals

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