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Data Sheets on Quarantine Pests

# *Pissodes strobi*

## IDENTITY

**Name**: *Pissodes strobi* (Peck)
**Synonyms**: *Pissodes sitchensis* Hopkins
*Pissodes engelmanni* Hopkins
**Taxonomic position**: Insecta: Coleoptera: Curculionidae
**Common names**: White pine weevil, Sitka spruce weevil (English)
Charançon du pin blanc, charançon de l'épinette de sitka (French/Canadian)
Weymouthskiefern-Rüsselkäfer, Sitkafichtenrüssler (German)
Gorgojo del pino de Weymouth (Spanish)
Pissode del pino Weymouth (Italian)
**Bayer computer code**: PISOST
**EPPO A1 list**: No. 257
**EU Annex designation**: II/A1 - as *Pissodes* spp. (non-European)

## HOSTS

*P. strobi* is confined to coniferous trees. It mainly attacks Sitka spruce (*Picea sitchensis*) along the Pacific coast of North America and eastern white pine (*Pinus strobus*) in eastern Canada and northeastern USA. Other important hosts are Engelmann spruce (*Picea engelmannii*), white spruce (*P. glauca*) and Norway spruce (*P. abies*), a European species widely planted in Canada. Hamel *et al.* (1994) found that adult *P. strobi* in Quebec preferred *P. abies* for oviposition to the native species *P. glauca* or *Pinus strobus*. In Vancouver Island, the European *Picea omorika* proved as susceptible to *P. strobi* as *P. sitchensis* (Hulme & Dawson, 1992). Other recorded hosts are black spruce (*Picea mariana*), blue spruce (*P. pungens*), red spruce (*P. rubens*), jack pine (*Pinus banksiana*), lodgepole pine (*P. contorta*), table-mountain pine (*P. pungens*), red pine (*P. resinosa)*, pitch pine (*P. rigida)*, the introduced European Scots pine (*P. sylvestris)* and Douglas fir (*Pseudotsuga menziesii*). A comprehensive list of host plants of North American *Pissodes* spp. can be found in Smith & Sugden (1969). This also includes information on breeding sites, which are a useful guide in distinguishing *Pissodes* spp.

## GEOGRAPHICAL DISTRIBUTION

**EPPO region**: Absent.
**North America**: Canada (British Columbia, Manitoba, New Brunswick, Newfoundland, Nova Scotia, Ontario, Quebec, Saskatchewan), Mexico, USA (California, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Maine, Maryland, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New Mexico, New York, Pennsylvania, Rhode Island, South Carolina, Vermont, Virginia, Washington, West Virginia, Wisconsin).
**Distribution map**: See CIE (1975, No. 345).

**EU**: Absent.

## BIOLOGY

Adults, which can live for up to 4 years, overwinter in coniferous litter or in the upper parts of trees. They leave their hibernation sites in March to late April and crawl or fly to the terminal shoot of the host tree (the longest flights recorded are 74 km for males and 85 km for females). They feed on the inner bark and cambium, chewing out cavities of up to 2.5 mm in diameter. The feeding activity is influenced by stimulants. Experiments in Canada showed that certain compounds present in the bark and cuticle of *Picea sitchensis* leaders triggered feeding by *P. strobi* (Alfaro & Borden, 1985).

Maximum adult activity of spring populations occurs on clear, warm days when bark temperatures are 26-31°C and relative humidity is low. In Maine (USA), peak numbers of beetles can be found on trees by mid-May while by early July no adults can be found on the trees (Dixon & Houseweart, 1983). There is no activity above 35°C or below 8°C. However, beetles can survive overnight temperatures of -20°C in the leaders of *P. sitchensis* (Hulme *et al.*, 1986).

Oviposition occurs in the chewed-out cavities at bark temperatures of 25-29°C and relative humidity of 20-55%. The adults emerge from late July to late September, depending on environmental conditions. Males, but not females, become sexually mature before hibernation, although the latter may be inseminated at this time. Males produce an aggregating pheromone. Active feeding of adults continues until hibernation in October and November.

*P. strobi* can produce fertile hybrids with *P. nemorensis* in the laboratory, but in nature these interspecific interactions are prevented by differences in their breeding habits (Phillips & Lanier, 1983).

## DETECTION AND IDENTIFICATION

### Symptoms

In the spring, attack is evidenced by an excessive resin flow from feeding punctures on the vertical terminals or leaders of the tree. The trees are girdled and die. On taller trees, the killed terminal is replaced by one or more branches of the topmost whorl assuming vertical growth, so producing a crooked or forked stem. Successive attacks give rise to trees which are multiple-stemmed and cabbage-shaped. In sawn boards, damage is seen as cross grain, larger knots and compression wood.

### Morphology

**Eggs**

Ovoid, 0.7-0.9 x 0.4-0.6 mm and almost colourless, with a smooth glistening chorion when first laid.

**Larva**

When fully grown, attains 12 mm and has a light-brown head and white body.

**Pupa**

Completely white when first formed, but the mandibles, eyes, rostrum, prothorax and legs become medium-brown before adult emergence.

**Adult**

Weevil, 5-8 x 2-3 mm; female usually 1 mm longer than male; when newly emerged, medium-brown, darkening to almost black after overwintering. Prothorax, elytra and legs are marked with tufts of white and reddish-brown scales grouped to form several small spots on the prothorax and, usually, two irregular bands across the elytra. The rostrum is

slender and curved and is the same length as the prothorax, with the antennae attached about midway along its length.

The morphology of *P. strobi* is very similar to that of *P. nemorensis* (EPPO/CABI, 1996). *P. nemorensis* differs from *P. strobi* in the larger average size, elongate body, longer rostrum and smaller spots on the elytra.

## MEANS OF MOVEMENT AND DISPERSAL

The natural spread of *Pissodes* spp. is determined by the flight performance of the species which seems to be not more than 100 km. International spread would most probably occur via the shipment of living conifer plants, including Christmas trees. *P. strobi* only attacks young growth and is unlikely to be carried by wood.

## PEST SIGNIFICANCE

### Economic impact

*P. strobi* is a damaging pest of spruce in Canada and northern USA, especially the European *Picea abies* and the native *P. glauca.* In British Columbia, *P. sitchensis* is the main species affected. The effect of various factors on losses has been modelled by McMullen *et al.* (1987). *P. strobi* is also a serious pest of *Pinus strobus*, reducing both wood volume and quality. In 1967 in New Hampshire (USA), volume losses caused by weevils were estimated at 40% in the saw-log portion of saw-timber trees (Godwin & Reeks, 1967). In Ontario (Canada) in 1980/1983 , annual growth losses were estimated at 8000 $m^3$, annual volume loss 15400 $m^3$ and an additional 15600 $m^3$ of timber which suffered a 25% loss in value (Gross, 1985). Both planting programmes and management practices have been significantly affected by this weevil. However, studies have shown that trees between 25 and 30 years old are seldom attacked.

### Control

Control of *P. strobi* can be achieved by silvicultural practices. Chemical control has been achieved by using various insecticides. Stem implants containing the systemic insecticides oxydemeton-methyl or acephate have been used successfully on *P. sitchensis* in British Columbia (Fraser & Heppner, 1993). Ethanol/turpentine-baited traps have been used to monitor weevil populations in a *P. sylvestris* Christmas tree plantation in Wisconsin (Rieske & Raffa, 1993). Interest in biological control of this pest has considerably increased; the predator *Lonchea corticis*, in particular, is considered an effective antagonist (Hulme, 1990). Kenis & Mills (1994) have studied the possibilities of introducing parasites of European *Pissodes* spp. into Canada. Control using juvenile hormone analogues is being tried (Dimond & Bradbury, 1992). Resistant provenances of *P. sitchensis* are under evaluation in British Columbia (Alfaro & Ying, 1990). Alfaro *et al.* (1995) describe an integrated pest management (IPM) system relying on accurate hazard rating of plantation sites and continuous monitoring of attack levels.

### Phytosanitary risk

*P. strobi* is an EPPO A1 quarantine pest (OEPP/EPPO, 1980), but no other regional plant protection organization has cited it as a quarantine pest. As a serious pest of the introduced *Picea sitchensis* and the native *P. abies*, two very important timber species in Europe, and with an obvious potential to establish in the conditions of northern Europe which resemble those of Canada, *P. strobi* clearly presents a serious risk for the EPPO region. It seems to have less potential importance on European *Pinus* spp., since *P. strobus* is no longer planted to any significant extent.

## PHYTOSANITARY MEASURES

To prevent the introduction of life stages of *P. strobi*, EPPO recommends that the importation of plants and cut branches of host species of *Picea* and *Pinus* from North America should be prohibited (OEPP/EPPO, 1990). There is also a minor risk from conifer wood, which is effectively covered by the measures recommended by EPPO (OEPP/EPPO, 1990) for non-European Scolytidae (EPPO/CABI, 1992).

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