Data Sheets on Quarantine Pests

Gnathotrichus sulcatus

IDENTITY

Name: *Gnathotrichus sulcatus* (LeConte)
Synonyms: *Cryphalus sulcatus* LeConte
Gnathotrichus aciculatus Blackman
Taxonomic position: Insecta: Coleoptera: Scolytidae
Common names: Western hemlock wood stainer (English)
Bayer computer code: GNAHSU
EPPO A1 list: No. 269
EU Annex designation: II/A1

HOSTS

Unlike some other *Gnathotrichus* spp. which are fairly specific at least to genus, *G. sulcatus* attacks wood of many conifers, mainly *Abies* (*A. concolor*, *A. magnifica*, *A. religiosa*), *Pseudotsuga menziesii* and *Tsuga heterophylla*; sometimes also *Picea*, *Pinus* (*P. leiophylla*, *P. ponderosa*, *P. pseudostrobus*), *Sequoia*, *Thuja* and other conifers (Furniss & Carolin, 1977).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Absent.
North America: Canada (British Columbia), Mexico, USA (California, Idaho, Oregon, Washington).
EU: Absent.

BIOLOGY

G. sulcatus is an ambrosia beetle, i.e. like other scolytids (bark beetles) it tunnels into the bark, cambium, and/or wood of its hosts, but it lives by cultivating and utilizing symbiotic fungi as a food source within its tunnels (*Ambrosiella sulcati* and *Raffaelea sulcati*). The newly emerged adults need to feed on the fungal fruiting bodies to complete their maturation although the larvae may also utilize some xylem material as food. The male or female beetles transport the fungal spores in special cavities, mycetangia, which in males of *G. sulcatus* are situated within the coxal cavities.

Gnathotrichus are monogamous. The male initiates the boring of a new gallery by constructing a radial entrance tunnel through the bark into the wood. After pairing has occurred, the female is generally responsible for boring egg galleries, the formation of egg niches, and care of eggs and larvae. The male keeps the nuptial chamber and entrance tunnel clean and expels the frass from the entrance hole. Eggs are deposited individually in the large egg niches formed by the female.

The number of larval instars is three in *Gnathotrichus*. The length of the larval period ranges from about 30 to 90 days. The end of the larval mine is usually slightly enlarged and

cleared of frass to form a pupal chamber. The pupal stage requires 6-9 days under ideal conditions. All stages overwinter in infested wood.

The adult beetles require a period of maturation feeding before emerging. They emerge through the parental tunnels. Wood is attacked through the period from April to November. *G. sulcatus* has one generation per year in Canada (Bright, 1976) and probably two in California, USA (Bright & Stark, 1973). For further information on biology, see: Doane & Galliland (1929), Prebble & Graham (1957), Rudinsky & Schneider (1969), McClean & Borden (1975, 1979).

DETECTION AND IDENTIFICATION

Symptoms

The egg galleries of *G. sulcatus* comprise a radial entrance tunnel penetrating the sapwood, from which tangential branches in the horizontal plane follow the growth rings of the wood. The entire gallery system lies at one plane at right angles to the grain (Bright & Stark, 1973). Larval niches are formed at regular intervals above and below the primary and secondary tunnels; the developing larvae enlarge the niches into "cradles", in which pupation occurs.

Morphology

Eggs

Smooth, oval, white, translucent.

Larva

Larvae are white, legless, with lightly sclerotized head, like scolytid larvae generally. See Thomas (1957) for generic characters of *Gnathotrichus* larvae.

Pupa

Exarate; usually whitish; sometimes with paired abdominal urogomphi; elytra rugose or smooth; head and thoracic tubercles sometimes prominent; less well known than the larva.

Adult

Adults of *G. sulcatus* are small cylindrical black beetles (3.5 mm long) of the size and shape of a short piece of pencil lead. Antennae geniculate, funicle five-segmented. Head partly concealed in dorsal view, not prolonged into distinct rostrum, narrower than pronotum, with mouthparts directed downwards. Pronotum weakly to strongly declivous anteriorly and usually with many asperate crenulations in anterior half. Scutellum large and flat. Elytra entire, concealing pygidium, with basal margin straight and without crenulations. Elytra terminate in a rounded or blunt slope (the declivity) which may be sulcate or bisulcate (*Gnathotrichus*). For generic and specific keys to *Gnathotrichus* and other genera, see Wood (1982).

MEANS OF MOVEMENT AND DISPERSAL

The most common mode of introduction into new areas is unseasoned sawn wood and wooden crates with bark on them. *G. sulcatus* has been intercepted in New Zealand in sawn wood imported from British Columbia (Bain, 1974). If wood is barked, there is no possibility of introducing bark beetles and less of introducing ambrosia beetles. Dunnage is also a high-hazard category of material, on which most of the scolytids intercepted in the USA are found. It is particularly difficult to monitor properly.

PEST SIGNIFICANCE

Economic impact

G. sulcatus is an ambrosia beetle which causes damage to conifer logs and forest-sawn wood in western North America. Dying, standing trees or recently cut or fallen logs are selected for attack. Furniss & Carolin (1977) consider it a "distant second in importance" to *Trypodendron lineatum*, a holarctic species. McLean (1985) has noted that its tunnels penetrate more deeply into logs of *P. menziesii* and *T. heterophylla* than those of *T. lineatum*, and refer to a multimillion dollar problem. However, *G. sulcatus* is much less abundant, as indicated by trapping records.

Control

Logs should be moved as soon as possible after felling to avoid infestation. Pheromone-based mass-trapping has been used as a control measure in British Columbia and considered operationally and economically successful (Lindgren & Fraser, 1994).

Phytosanitary risk

G. sulcatus has been included in the EPPO quarantine pest category "non-European Scolytidae" (EPPO/CABI, 1992). However, this mainly reflects the need to identify at least one ambrosia beetle to be included in the category. When the risk from *G. sulcatus* is compared with that from other scolytids (*Dendroctonus* spp. and some *Ips* spp.), it can be seen that there is practically no justification for its specific inclusion in the category. *G. sulcatus* does not attack living trees, and is only a pest of cut wood. It has a rather restricted distribution within North America. Its importance is much less than that of the holarctic *T. lineatum*. So there is no basis to consider that it presents a significant risk to the EPPO region.

PHYTOSANITARY MEASURES

No specific measures for *G. sulcatus* are needed.

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