Prepared by CABI and EPPO for the EU
under Contract 90/399003

Data Sheets on Quarantine Pests

Dendroctonus micans

IDENTITY

Name: *Dendroctonus micans* (Kugelann)
Synonyms: *Bostrichus micans* Kugelann
Hylesinus lingiperda Gyllenhal
Hylesinus micans Ratzeburg
Taxonomic position: Insecta: Coleoptera: Scolytidae
Common names: Great spruce bark beetle (English)
Hylésine géant (French)
Riesenbastkäfer (German)
Kjempebarkbille (Danish, Norwegian)
Jättebastborre (Swedish)
Bayer computer code: DENCMI
EU Annex designation: II/B

HOSTS

Throughout its range, *D. micans* breeds in a number of indigenous or introduced conifers. The usual hosts are *Picea* spp., mainly *P. abies*, *P. sitchensis* and *P. orientalis*, but also on occasion *P. breweriana*, *P. engelmannii*, *P. glauca*, *P. jezoensis*, *P. mariana*, *P. obovata*, *P. omorika* and *P. pungens* (Grégoire, 1988). *Pinus sylvestris* is the host in northern Scandinavia and also in the Baltic and in Siberia. Sporadic attacks have been observed on other *Pinus* spp. and on some *Abies* spp., *Larix decidua* and *Pseudotsuga menziesii*. *Picea abies* is preferred to *P. sitchensis* when the two species coexist (Bevan & King, 1983; Bejer, 1984).

GEOGRAPHICAL DISTRIBUTION

EPPO region: Austria, Belgium, Bosnia and Herzegovina, Bulgaria, Czech Republic, Denmark, Estonia, Finland, France, Germany, Hungary, Italy, Luxembourg, Netherlands, Norway, Poland, Romania (potential EPPO country), Russia (European, Siberia, Far East), Slovakia, Sweden, Switzerland, Turkey, UK, Ukraine, Yugoslavia.
Asia: China, Georgia, Japan (Hokkaido only), Russia (Far East), Turkey.
EU: Present.

The present range of the beetle stretches from Siberia, the island of Sakhalin and Japan (Hokkaido), to central France, with a localized infested area in the UK. The northern limit is that of the coniferous forest. The southern border passes through Mount Ventoux and the southern slopes of the Massif Central in France, Switzerland, the Austrian Alps, northern and central Romania, and farther eastwards, following the southern limit of *Picea abies* to the Pacific coast. The insect is also present in some areas farther south, such as the parks around Kiev (Ukraine), Georgia and north-eastern Turkey (Grégoire, 1988).
Distribution map: See CIE (1983, No. 449).

BIOLOGY

The young beetles mate in their birth chambers with their sisters and brothers and continue to feed under the bark until emergence. Dispersal of young females may occur in several ways. Some individuals do not emerge but simply bore new galleries at the edge of their own birth chamber. Others emerge but remain on the same tree and establish galleries there. Some fly to colonize new trees. The threshold temperature for flight lies between 20 and 23°C (Evans *et al*., 1984) and flight can occur during most of the summer. Both larvae and adults can overwinter. The super-cooling point for adults is -20°C (Voolma, 1980). Mature and fertilized females bore their own solitary galleries in living trees. Egg-gallery formation and oviposition occurs from April-May to August-November depending on latitude and altitude. The larvae feed side by side, leaving the feeding front only to defecate or moult. Frass is tightly packed to the rear, enclosing dead and diseased individuals. Gregarious larval groups appear to be maintained by aggregation pheromone produced by larvae during feeding (Grégoire *et al*., 1982). Under laboratory conditions at 19-23°C, larvae take 50-60 days to mature through five instars (Grégoire & Merlin, 1984). In the field this may take more than a year. The length of the life cycle varies with climate. In Turkey and Georgia (USSR), it may take 12-15 months to go through a generation, whereas in Scandinavia it may take 2-3 years (Grégoire, 1988).

DETECTION AND IDENTIFICATION

Symptoms

Tubes of dried resin are characteristic for infested trees. Streams of white, dried resin flows may also be visible on the trunk. Trees may remain alive for months, or even years, when the density of galleries is low. A tree suffering repeated attack is encrusted with resin and has broken, peeling and often blackened bark (Bevan & King, 1983). The bark of infested trees can be easily removed to reveal the galleries beneath.

Morphology

The egg gallery is unique for European species. It is a broad tube packed with frass and resin in which eggs are laid. The white, c-shaped, legless larvae feed as a clutch and excavate a very large chamber which is packed in a characteristic way with islands of frass (Bevan, 1987).

The adult is 6-8 mm long. The body is uniformly dull dark-brown when fully pigmented. It can be distinguished from North and Central American species of *Dendroctonus* by use of the key of Wood (1963).

MEANS OF MOVEMENT AND DISPERSAL

The beetles fly only limited distances. Females are mated when they emerge from the brood gallery and the presence of both sexes in a new gallery is therefore unnecessary; a single female is thus capable of starting a new infestation.

In international trade the transport of adult beetles and, in particular, larvae under the bark of round wood is the means whereby *D. micans* may be introduced to new areas. The timber trade has undoubtedly been the most important reason for the spread of the beetle to new areas in the last century (Kobakhidze, 1967; Bevan & King, 1983). Another reason has been the opening up of new areas for colonization by the extensive plantation of *Picea* outside its natural range in Europe (Grégoire, 1988).

PEST SIGNIFICANCE

Economic impact

Within its natural range, *D. micans* is widespread but rare, and few trees are killed. During outbreaks, however, the species is able to destroy entire stands. The trees are killed mostly by girdling, when several broods develop in the same tree.

In the central parts of its range the beetle is currently causing only minor damage, but at the edge of its range, outbreaks covering an estimated 200 000 ha of *Picea* are occurring in Georgia, north-eastern Turkey, central France, and the UK. This phenomenon may be connected to the fact that these areas are at the extremes of the natural range of *Picea* and the trees may be under stress. In the Massif Central of France, trees under 30 years of age are never attacked, trees between 55 and 85 years being preferred (Granet & Perrot, 1977). In the UK, however, *Picea sitchensis* and *P. abies* of all age classes are attacked (Evans *et al.*, 1984), whereas in Turkey any tree of *P. orientalis* older than 15 years and with a stem diameter greater than 7 cm can be infested (Benz, 1984). Extensive damage to young trees was reported on *Pinus sylvestris* in Estonia (Voolma, 1978) and Siberia (Kolomiets & Bogdanova, 1976). The beetles normally colonize only green standing trees. Trees attacked by other insects are only utilized when population levels of *D. micans* are very high (Shavliashvili & Zharkov, 1985), but trees wounded by felling, logging, or damaged by frost, snow, wind, lightning or game, are often attacked at the wounds themselves (Chararas, 1960). Although attacks are often observed on good sites, outbreaks usually occur on soil with poor mineral resources or in stands with inadequate water.

Control

Sanitation felling is still widely used in France and Britain (Evans *et al.*, 1984). Chemical treatment has been applied, either by cleaning infested areas on the trunk and covering them with protectants, or by spraying gamma-HCH directly on infested bark areas (Rühm, 1958; Rudnev & Khramtsov, 1963; Bejer-Petersen, 1967). Biological control with the predator *Rhizophagus grandis* began in Georgia in 1963. Several thousands of the predators were produced and released (Tvaradze, 1984). However, biological control was effective only after populations had been reduced by insecticide treatment. In 1983 the Forestry Commission of the UK began mass production of the same predator and released the insect at the edge of infested areas (King & Evans, 1984). A similar release strategy has been implemented by a Belgian-French group in areas surrounding the outbreak zone in central France (Grégoire *et al.*, 1985).

Phytosanitary risk

D. micans is not listed as a quarantine pest by any regional plant protection organization. The only EPPO country which might be at risk is Ireland. Elsewhere in the EPPO region, *D. micans* is widespread, and corresponds to the natural range of spruce. For most of this area it can be considered to be a secondary pest, only causing damage where trees are already under stress. Because of its climatic requirements, it is not likely to survive in countries in the southern part of the region.

PHYTOSANITARY MEASURES

As *D. micans* lives between the bark and the outer wood of the tree, the removal of bark from all types of wood ensures the absence of the pest. However, caution should be exercised with regard to round wood subjected to the standard debarking process, because small areas of bark remain and can harbour the pest.

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