

Data Sheets on Quarantine Pests

*Pissodes nemorensis***IDENTITY****Name:** *Pissodes nemorensis* Germar**Synonyms:** *Pissodes approximatus* Hopkins
Pissodes canadensis Hopkins
Pissodes deodarae Hopkins**Taxonomic position:** Insecta: Coleoptera: Curculionidae**Common names:** Northern pine weevil, deodar weevil (English)**Notes on taxonomy and nomenclature:** *P. nemorensis* and *P. approximatus* were previously considered as distinct species (e.g. OEPP/EPPO, 1980), but more recent research has indicated that they are synonymous and represent one widely distributed species which shows some intraspecific variation in life history and morphology (Phillips *et al.*, 1987).**Bayer computer code:** PISONE**EPPO A1 list:** No. 44**EU Annex designation:** II/A1 - as *Pissodes* spp. (non-European)**HOSTS**

P. nemorensis is confined to coniferous trees and has a very wide host range which includes the widespread species in Canada and northern USA black spruce (*Picea mariana*), white spruce (*P. glauca*) and jack pine (*Pinus banksiana*), the more local southeastern species shortleaf pine (*P. echinata*), slash pine (*P. elliottii*), spruce pine (*P. glabra*), longleaf pine (*P. palustris*), pond pine (*P. serotina*) and loblolly pine (*P. taeda*), and the eastern species table-mountain pine (*P. pungens*), red pine (*P. resinosa*), pitch pine (*P. rigida*), eastern white pine (*P. strobus*) and Virginia pine *P. virginiana*. Blue spruce (*Picea pungens*) and lodgepole pine (*Pinus contorta*) are western species which do not overlap with *P. nemorensis* in their natural range, but have been attacked when planted in eastern USA. The exotic species Atlas cedar (*Cedrus atlantica*), deodar (*C. deodara*), cedar of Lebanon (*C. libani*), Norway spruce (*Picea abies*), Caribbean pine (*P. caribaea*) and Scots pine (*P. sylvestris*) are attacked in North America. The western North American Monterey pine (*Pinus radiata*) is the main host in South Africa (Zwolinski *et al.*, 1995). 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

P. nemorensis occurs mainly in the north, centre and east of North America, and in particular is not present in western states or provinces, where other *Pissodes* spp. are present.

EPPO region: Absent.

Africa: South Africa.

North America: Canada (Ontario, Quebec), USA (Florida, Illinois, Louisiana, Missouri, New York, Ohio, Oklahoma, Virginia).

EU: Absent.

BIOLOGY

Due to its wide distribution in North America, the temperature requirements and life cycle of *P. nemorensis* vary somewhat in the different climatic regions of the continent. In southern Ontario (Canada), the weevil may overwinter in the larval or pupal stages in trees, but more usually as the adult in litter and top-soil overlying roots or in bark crevices of stumps and logs (Finnegan, 1958). In Florida (USA), adults become reproductively mature during September and the mating and oviposition takes place in the autumn and winter (Fontaine *et al.*, 1983). The oviposition period is long, which results in generations of both 1 and 2 years' duration. Females may lay 180 eggs with an average of two eggs per day and they die after an average lifespan of 130 days (Fontaine & Foltz, 1985). Females lay one or two eggs into each feeding pit of the pine shoots and show a preference for older shoots with a larger diameter (Fontaine & Foltz, 1985). The optimal temperature for oviposition is 25°C (Fontaine *et al.*, 1983). The development from egg to adult, passing through five larval instars, depends on date of oviposition and temperature; it ranges from 7 to 25 weeks with the fastest development of 58 days at a temperature of 25°C (Atkinson *et al.*, 1988).

In north-eastern North America, overwintered adults emerge from infested material in May, feeding on inner bark and seedling stems. Eggs are deposited, from the end of May until July, in chewed-out cavities in the cambial region of the bole in which the weevil feeds; root collars are also recorded as breeding sites for this species (Smith & Sugden, 1969). Eggs hatch in about 8 days. The larvae pass through four instars in 36 days and then prepare a pupation site, called a "chip cocoon"; pupation lasts 3-4 days. Emerging adults chew their way out of the cocoon from mid-August to September and feed before hibernating.

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

DETECTION AND IDENTIFICATION

Symptoms

Nursery plants less than 30 cm high are killed by heavy infestations of larvae, which may bore to the centre of the stem. On older twigs, there is an associated resin flow. Removal of bark will reveal the pupal chip cocoons, cavities covered with long wood fibre usually found in the surface of the wood of the basal portion of the leader. Whole trees may be attacked, from the roots up to branches of more than 1.25 cm in diameter.

If adults feed on the phloem tissue, trees of up to 8 m change their colour to a reddish-brown and heavily infested trees may die or the crown may appear burnt. Needles fall prematurely and the shape of the tree resembles that associated with an infestation by *Ips* spp.

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. nemorensis* is very similar to that of *P. strobi*. *P. nemorensis* differs from *P. strobi* in larger average size, elongate body, longer rostrum and smaller spots on the elytra.

Detection and inspection methods

P. nemorensis forms chip cocoons on or in the surface of wood, below the bark, and is therefore difficult to detect, because the pupae are concealed by chips.

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. While some species of *Pissodes* (e.g. *P. strobi* and *P. terminalis*) only attack young growth and are unlikely to be carried by wood, *P. nemorensis* may attack all parts of the tree, so that there is a possibility of chip cocoons being present on or in wood, below any remaining bark.

PEST SIGNIFICANCE**Economic impact**

P. nemorensis is of little importance in natural pine stands, due to the lack of suitable breeding materials. However, in Christmas tree plantations, the numerous stumps are ideal for the beetle. As re-forestation increases, the importance of the weevil is expected to increase. Nursery plants are often badly damaged as adults feed on the bark of seedlings. Besides the direct damage it causes, *P. nemorensis* acts as a vector of *Leptographium procerum*, causing procerum root disease, the most serious problem of growers producing *P. strobus* as Christmas trees in Virginia (Nevill & Alexander, 1992a, b).

Control

Intensive sanitation over wide areas is effective in maintaining low weevil populations. For chemical control, carbofuran has been reported to be efficient in Christmas tree plantations (Appleby *et al.*, 1988).

Ethanol-turpentine baited flight traps can be used to monitor populations (Rieske & Raffa, 1993). For more information, see Finnegan & Godwin (1967).

Phytosanitary risk

P. nemorensis is an EPPO A1 quarantine pest (OEPP/EPPO, 1980), but no other regional plant protection organization has cited it as a quarantine pest. In its natural range, *P. nemorensis* is a serious pest especially in conifer nurseries and in Christmas tree plantations. It includes among its hosts the very important European species *Pinus sylvestris*, and also several North American species which are more or less widely planted in Europe (*Picea glauca*, *P. pungens*, *Pinus contorta*, *P. radiata*). The conditions of eastern North America are broadly similar to those of Europe, and one could certainly expect *P.*

nemorensis to establish there. In North America, *P. nemorensis* seems to attack the locally dominant conifers fairly indiscriminately, and to move onto introduced species. *P. nemorensis* has already been introduced into South Africa. For these reasons, introduction of *P. nemorensis* into the EPPO region could have severe economic and ecological impacts.

PHYTOSANITARY MEASURES

To prevent the introduction of life stages of *P. nemorensis*, 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 a definite risk that *P. nemorensis* should enter on conifer wood, which is effectively covered by the measures recommended by EPPO (OEPP/EPPO, 1990) for non-European Scolytidae (EPPO/CABI, 1992).

BIBLIOGRAPHY

- Appleby, J.E.; Miller, F.; Randell, R. (1988) Insecticide sprays for control of the northern pine weevil in southern Illinois. *Journal of Arboriculture* **14**, 26-28.
- Atkinson, T.H.; Foltz, J.L.; Connor, M.D. (1988) Bionomics of *Pissodes nemorensis* in northern Florida. *Annals of the Entomological Society of America* **81**, 255-261.
- EPPO/CABI (1992) Scolytidae (non-European). In: *Quarantine pests for Europe* (Ed. by Smith, I.M.; McNamara, D.G.; Scott, P.R.; Harris, K.M.). CAB International, Wallingford, UK.
- Finnegan, R.J. (1958) The pine weevil *Pissodes approximatus* in southern Ontario. *Canadian Entomologist* **90**, 348-354.
- Finnegan, R.J.; Godwin, P.A. (1967) Northern pine weevil. In: *Important forest insects and diseases of mutual concern to Canada, the USA and Mexico* (Ed. by Davidson, A.G.; Prentice, R.M.), pp. 145-147. *Department of Forestry and Rural Development, Canada, Publication No. 1180*.
- Fontaine, M.S.; Foltz, J.L.; Nation, J.L. (1983) Reproductive anatomy and seasonal development of the deodar weevil *Pissodes nemorensis* in north Florida. *Environmental Entomology* **12**, 687-691.
- Fontaine, M.S.; Foltz, J.L. (1985) Adult survivorship, fecundity, and factors affecting laboratory oviposition of *Pissodes nemorensis*. *Canadian Entomologist* **117**, 1575-1578.
- Nevill, R.J.; Alexander, S.A. (1992a) Transmission of *Leptographium procerum* to eastern white pine by *Hylobius pales* and *Pissodes nemorensis* (Coleoptera; Curculionidae). *Plant Disease* **76**, 307-310.
- Nevill, R.J.; Alexander, S.A. (1992b) Distribution of *Hylobius pales* and *Pissodes nemorensis* (Coleoptera: Curculionidae) within Christmas tree plantations with procerum root disease. *Environmental Entomology* **21**, 1077-1085.
- OEPP/EPPO (1980) Data sheets on quarantine organisms No. 44, *Pissodes* spp. (non-European). *Bulletin OEPP/EPPO Bulletin* **10** (1).
- OEPP/EPPO (1990) Specific quarantine requirements. *EPPO Technical Documents* No. 1008.
- Phillips, T.W.; Lanier, G.N. (1983) Biosystematics of *Pissodes*: feeding preference and breeding site specificity of *P. strobi* and *P. approximatus*. *Canadian Entomologist* **115**, 1627-1636.
- Phillips, T.W.; Teale, S.A.; Lanier, G.N. (1987) Biosystematics of *Pissodes*: seasonality, morphology and synonymy of *P. approximatus* and *P. nemorensis*. *Canadian Entomologist* **119**, 465-480.
- Rieske, L.K.; Raffa, K.F. (1993) Use of ethanol- and turpentine-baited flight traps to monitor *Pissodes* weevils (Coleoptera: Curculionidae) in Christmas tree plantations. *Great Lakes Entomologist* **26**, 155-160.
- Smith, S.G.; Sugden, B.A. (1969) Host trees and breeding sites of native North American *Pissodes* bark weevils, with a note on synonymy. *Annals of the Entomological Society of America* **62**, 146-148.
- Zwolinski, J.B.; Swart, W.J.; Wingfield, M.J. (1995) Association of *Sphaeropsis sapinea* with insect infestation following hail damage of *Pinus radiata*. *Forest Ecology and Management* **72**, 293-298.