

Pinewood nematode and its beetle vectors

Description

The Pinewood nematode (*Bursaphelenchus xylophilus*) is native to North America but are found in Portugal and parts of Asia (including Japan). The nematode has caused widespread losses to pines and other conifers overseas.

Nematodes are transmitted by a range of wood boring beetles, but *Bursaphelenchus xylophilus* is primarily spread by large (up to three cm long and approximately one cm wide) mottled, brown–grey coloured beetles with long antennae that belong to the *Monochamus* genus. All of the known vectors are exotic species, including the Japanese Pine sawyer beetle (*Monochamus alternatus*) and the Pine sawyer beetles, *M. galloprovincialis* and *M. carolinensis*.

Pinewood nematodes can be mycophagous (fungus eating) or phytophagous (plant eating). The nematode is mycophagous when it infects weakened or dying trees, which become infected when the nematodes are spread by ovipositing *Monochamus* beetles. Nematodes feed on Blue stain fungi (*Ceratozystis* spp.) within the wood before moving to pupal chambers and attaching to the emerging beetles under the elytra (hardened forewing). The nematode can also be phytophagous when it is introduced to a susceptible host through wounds made by feeding adult *Monochamus* beetles on the small soft branches. The nematodes multiply in the resin canals before moving through the tree. The resin canals of the tree become blocked, resulting in wilting of the affected branches within a few weeks of infection, causing rapid tree death (often only 30–40 days after infection).

Primary hosts

Pinewood nematodes mostly affect *Pinus* but will also attack Spruce (*Picea*), Douglas fir (*Pseudotsuga menziseii*), Larch (*Larix*) and Fir (*Abies*). Only a small number of Pines – including Maritime pine (*P. pinaster*), Black pine (*P. nigra*) and Scots pine (*P. sylvestris*) – are known to be killed by this nematode as mature trees.

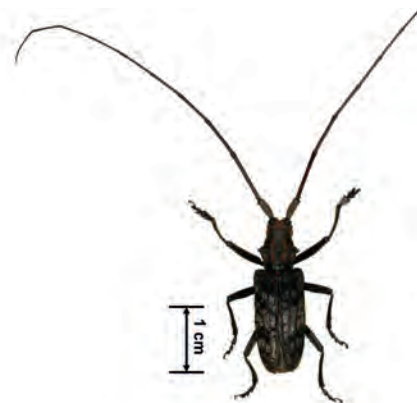
Pine sawyer beetles (*Monochamus* spp.) attack a range of conifers including Pine (*Pinus*), Spruce (*Picea*), Larch (*Larix*) and Fir (*Abies*). Pines are the preferred hosts.



Pinewood nematode damage



Pinewood nematode infected Black pine (*P. nigra*)



Japanese pine sawyer beetle, a vector of the Pinewood nematode

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Symptoms

When the nematodes infect susceptible trees via wounds caused by feeding beetles, they multiply in the resin canals and cause xylem blockages. This causes yellowing and wilting symptoms of the infected branches, followed by rapid tree death.

Adult *Monochamus* beetles may be seen feeding on the young shoots of various conifers. The larvae are borers and can be detected by the presence of exit holes on weakened or dying trees.

Trees that have low susceptibility can still become infested but may not show symptoms for many years.

What it can be confused with

The long antennae of *Monochamus* beetles makes them fairly distinctive from other beetles likely to be found in pine plantations. When the nematodes infect a susceptible tree they cause yellowing and wilting symptoms that could also be caused by other disorders (e.g. *Sirex* wood wasp, *Diplodia* canker or Five-spined bark beetle (*Ips grandicollis*)), but the rapid onset of symptoms (as short as four weeks) and tree death is unlike other endemic pests or diseases.

Plant part affected

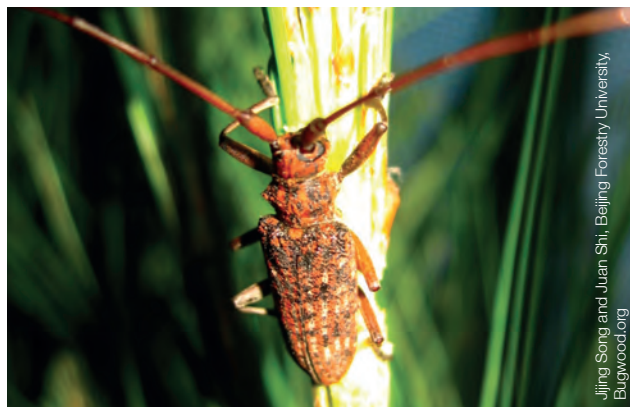
When the Pinewood nematode infects susceptible trees via *Monochamus* beetle feeding wounds, the nematodes cause xylem blockages, resulting in the yellowing and wilting of the affected branches and rapid tree death.

Beetles feed on the young shoots of host plants and breed in weakened or dying trees.

If you see anything unusual, call the Exotic Plant Pest Hotline



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Feeding Japanese pine sawyer beetle, a vector of the Pinewood nematode

Age of plant

Monochamus beetles prefer to oviposit in weakened or dying trees. However, most damage is caused when the nematodes infect healthy trees via *Monochamus* beetle feeding wounds, which can be seen on trees of any age.

Time of year pest is most likely to be seen

Symptoms of the Pinewood nematode typically develop shortly after *Monochamus* beetles have fed and transmitted the nematode. Adult *Monochamus* beetles emerge in early summer, so symptoms and adult beetles are most likely to be seen at that time. The disease caused by the nematode is also exacerbated by hot, dry weather throughout summer.

Further information

CABI and EPPO Data Sheets on Quarantine Pests: *Bursaphelenchus xylophilus*. Available from www.eppo.int/QUARANTINE/nematodes/Bursaphelenchus_xylophilus/BURSXY_ds.pdf

Department of Agriculture, Japanese sawyer beetle (*Monochamus alternatus*). Available from www.agriculture.gov.au/animal-plant-health/pests-diseases-weeds/plant/detection-exotic-beetles/japanese-sawyer-beetle

Donald PA, Stamps WT and Linit MJ (2003) Pine wilt disease. The Plant Health Instructor. DOI:10.1094/PHI-I-2003-0130-01. Available from www.apsnet.org/edcenter/intropp/lessons/nematodes/pages/pinewilt.aspx.

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