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Microscopic image of pine wood nematode, the causal agent of pine wilt disease. Total length is approximately 1 mm.

# Pine wood nematode

Pine wood nematode  
*Bursaphelenchus xylophilus*  
(Steiner and Buhrer) Nickle  
causes pine wilt disease, a  
destructive disease of pines and  
other conifers. This pest is not  
present in New Zealand. Help us  
keep it from establishing here  
by learning what to look for.



Image: USDA Forest Service - Region 2 - Rocky Mountain Region, USDA Forest Service, Bugwood.org. Licensed under CC BY 3.0 US.

A stand of Japanese red pine (*Pinus densiflora*) showing widespread pine wood nematode infestation.



Pine wood nematode is a threat to New Zealand's forestry industry as it is the cause of pine wilt disease, an often fatal disease of pines and other conifers. Native to parts of North America, it has been unintentionally introduced to Asia (Japan, China, Taiwan, and South Korea) and Europe (Portugal and Spain). Outbreaks of the nematode beyond its native range have caused severe damage to millions of pine trees, and widespread tree death. It is recognised as a global quarantine issue.

## Symptoms to look for

- Rapid wilting, followed by greying, yellowing, or browning of needles.
- Progression of damage from the top of the tree downwards (unlike needle diseases).
- Trees that die very quickly (within a few months of first observed symptoms).
- The presence of large longhorn beetles of the genus *Monochamus* (the insect vectors of pine wood nematode), or their damage on pines or other conifers.

## Hosts

Pine wood nematode mostly attacks species of pine (*Pinus*), although its impact varies considerably depending on the species of host pine. The Asian pine species *Pinus densiflora*, *P. thunbergii*, and *P. tabulaeformis* and the European pine species *Pinus mugo*, *P. nigra*, and *P. sylvestris* are all highly susceptible and suffer severe damage when infested with pine wood nematode, whereas North American pines, such as *Pinus radiata*, appear to have some degree of natural resistance. However, we do not know how *Pinus radiata* grown outside of its native range in New Zealand might respond to attack by the nematode. Pine wood nematode also attacks most other conifer (Pinaceae) species, including Douglas fir (*Pseudotsuga menziesii*), with only some cypress (*Thuja*) and yew (*Taxus*) apparently unsuitable for nematode development.

## Nematode life cycle

Pine wood nematode has a complex life cycle. In dead and dying host trees, the nematode feeds on blue-stain fungi growing within the wood, while in living host trees the

nematode feeds directly on the wood of the tree. This causes massive disruption to the movement of water within the tree via collapse and air cavitation within the water vessels. The nematode spreads naturally from dead to living host trees by insect vectors, longhorn beetles of the genus *Monochamus* (commonly known as timber sawyer beetles), as the adult beetles feed on the new shoots of successive host trees.

Pine wood nematode may be unintentionally spread via infested pine plants or movement of untreated woody material, although strict phytosanitary protocols to mitigate spread have been established in countries where pine wood nematode is known to be present.

## Identification and testing

Identification can be confirmed by microscopic examination of certain characters by a person skilled in the morphological identification of nematodes or by using molecular sequencing techniques.

As required by the Biosecurity Act (1993), if you encounter any insects or tree damage which you suspect could be associated with pine wood nematode, call the Biosecurity New Zealand Pest and Disease hotline – 0800 80 99 66. The Ministry for Primary Industries will coordinate how best to proceed with sampling and identification.



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Adult black pine sawyer (*Monochamus galloprovincialis*) beetle. The exotic pine wood nematode is vectored by this insect in Portugal, where the beetle is native.

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## About Scion

Scion is the Crown research institute that specialises in research, science and technology development for forestry, wood and wood-derived materials, and other bio-material sectors.

Scion's purpose is to create economic value across the entire forestry value chain, and contribute to beneficial environmental and social outcomes for New Zealand.

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