

# *Bursaphelenchus xylophilus*



Taxon	Family / Order / Class / Phylum
<i>Bursaphelenchus xylophilus</i> (Steiner & Buhrer, 1934) Nickle, 1970	Parasitaphelenchidae / Aphelenchida / Secernentea / Nematoda

## COMMON NAMES (English only)

Pine wood nematode

Pinewood nematode

## SYNONYMS

*Aphelenchoides xylophilus* Steiner & Buhrer, 1934

*Bursaphelenchus lignicolus* Mamiya & Kiyohara, 1972

## SHORT DESCRIPTION

Small, 0.5-1.3 mm long, slender nematode, infesting wood and causing pine wilt disease. The nematode is known to be vectored by insects, especially long-horned beetles of the genus *Monochamus* (Coleoptera: Cerambycidae). Feeds on fungal hyphae (usually *Ceratocystis* spp.) within the wood.

## BIOLOGY/ECOLOGY

### Dispersal mechanisms

Can move actively from one piece of wood to another but incapable of moving from one tree to another; natural, short-range dispersal through *Monochamus* insect vectors (*M. galloprovincialis* in Portugal). Transcontinental dispersal is man-mediated via infested wood transported with the insect vector, but introduction is also possible without the vector.

### Reproduction

There are two different modes of life cycle. In the propagative mode, nematode larvae penetrate into fresh logs or dying trees through the oviposition scars cut in the bark by the insect vector. They leave the insect, enter the tree, then moult to adult and begin to lay eggs. In the laboratory, pinewood nematode reproduces in 12 days at 15°C, 6 days at 20°C and 3 days at 30°C. Egg-laying starts on the 4th day after hatching, and the eggs hatch in 26-32 hours at 25°C. In the dispersal mode, 3rd instar larvae present in the wood gather in insect pupal chambers, then moult in a special larval stage, "dauerlarvae", which enter the callow adult insect through thoracic spiracles to settle, usually in the tracheae. As many as 100,000 dauerlarvae may enter an adult insect vector.

### Known predators/herbivores

### Resistant stages (seeds, spores etc.)

Non-feeding third larval dispersal stage is adapted to surviving unfavourable conditions.

## HABITAT

### Native (EUNIS code)

G3: Coniferous woodland

### Habitat occupied in invaded range (EUNIS code)

G3: Coniferous woodland, G4: Mixed deciduous and coniferous woodland



**Propagative pine wood nematode**

Photo: Dr. SUN Jiang-hua, Institute of Zoology, Beijing

### Habitat requirements

The temperature threshold for development is 9.5°C.

### DISTRIBUTION

#### Native (EUNIS code)

North America including USA, Canada and Mexico.

#### Known Introduced Range

Asia (China, Japan, Korea Republic, Taiwan); Europe: observed only in a small area of maritime pine in Portugal (Setubal) since 1999.

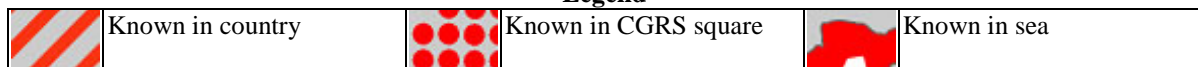
#### Trend

The Portuguese population has not expanded yet but the nematode has been intercepted in a number of occasions by quarantine services in Europe during recent years

### MAP (European distribution)



#### Legend



### INTRODUCTION PATHWAY

Trade of wood and derivatives (sawn wood, round wood, wood chips, wood packing material).

### IMPACT

#### Ecosystem Impact

Most species of conifers endemic to North America are resistant to the wilt disease, but many exotic species are highly susceptible. *Pinus* spp. are the most susceptible species, but the nematode host list includes species of *Abies*, *Chamaecyparis*, *Cedrus*, *Larix*, *Picea* and *Pseudotsuga* as well. The introduction of the nematode into Japan had devastating effects on the native pines in that country. Therefore, it constitutes a real threat for European coniferous forests.

#### Health and Social Impact

#### Economic Impact

The risk associated with introductions of the pinewood nematode from infested countries has led to embargoes on untreated wood chips and timber. An annual loss of US\$100 million has been estimated for green lumber exports from the United States to Europe during the 1990s.

## **MANAGEMENT**

### **Prevention**

Any kind of wood material for exportation must have been heat-treated to a core temperature of 56°C for 30 minutes in order to kill the nematodes. Cultural practices consist of removing dead or dying trees from the forest to prevent their use as a source of further infection. The reduction of conifer oleoresin production is a symptom of nematode presence. Several techniques allow nematodes to be extracted from wood, then to be identified using morphological and molecular methods.

### **Mechanical**

Unknown.

### **Chemical**

Unknown.

### **Biological**

Unknown.

## **REFERENCES**

OEPP/EPPPO (1986) Data sheets on quarantine organisms No. 158, *Bursaphelenchus xylophilus*. *Bulletin OEPP/EPPPO Bulletin* 16:55-60

Penas AC, Correia P, Bravo MA, Mota M, Tenreiro R (2004) Species of *Bursaphelenchus* Fuchs, 1937 (Nematoda: Parasitaphelenchidae) associated with maritime pine in Portugal. *Nematology* 6: 437-453

Wingfield M.J. (1983) Transmission of pine wood nematode to cut timber and girdled trees. *Plant Disease* 67:35-37

## **OTHER REFERENCES**

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Date Last Modified: November 1<sup>st</sup>, 2006