

Discovery of pine wood nematode in Portugal and in Europe

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Summary – Pine wood nematode, *Bursaphelenchus xylophilus*, was first reported for Portugal (and Europe) in 1999. The importance of this discovery and economic impact are discussed. Details on the ongoing research of the nematode and its vector, *Monochamus galloprovincialis*, are provided, and are mainly on the morphology and molecular biology of the nematode and the bioecology of the vector and its relationship with *B. xylophilus*. Pine products play an important role in the Portuguese economy. The total area of forest trees in Portugal is approximately 3×10^6 ha, of which *Pinus* species occupy roughly 1.25×10^6 ha. Pine products include lumber, resin, pulp and pine seed, all of which are very important economic products in our country. The Lousã mountain contains the largest area of maritime pine, *Pinus pinaster*, in Europe. On several occasions, Portuguese researchers have pointed to the dangers of the possible presence of the pine wood nematode (PWN), *Bursaphelenchus xylophilus*, an A1 quarantine pest, according to EPPO, in Portugal (Macara, 1994).

Detection of PWN in Portugal

The presence of *B. xylophilus*, the pine wood nematode, in Portugal was first reported in May 1999 (Mota *et al.*, 1999) and is the first record of this extremely damaging organism within the European Union. Other *Bursaphelenchus* species have been reported in Europe, associated with

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Fig. 1. *Declining pines near Lisbon, Portugal with symptoms of pine wood nematode infestation.*

wilted pines. For a more detailed description on this subject, see Mota (2002). The discovery was a result of a joint research effort between the University of Évora and the research organisms of the Ministry of Agriculture of Portugal (INIA/EAN and EFN). Following detection, the Portuguese authorities promptly informed the European Union (EU) of the presence of pine wood nematode, in mid-1999. A task force (GANP) was immediately established, followed by a national programme of survey and control of the pine wood nematode (PROLUNP) (Serrão, 2001). From 1999-2001, several EU phytosanitary inspection teams have been able to verify the results of the PROLUNP actions. The nematode has been shown to be contained in the Setúbal peninsula, approximately 30 km south east of Lisbon, where symptoms may be occasionally observed (Fig. 1).

Research

Ongoing research has included morphological and biometrical observations of populations of *B. xylophilus* from the Setúbal peninsula, in-

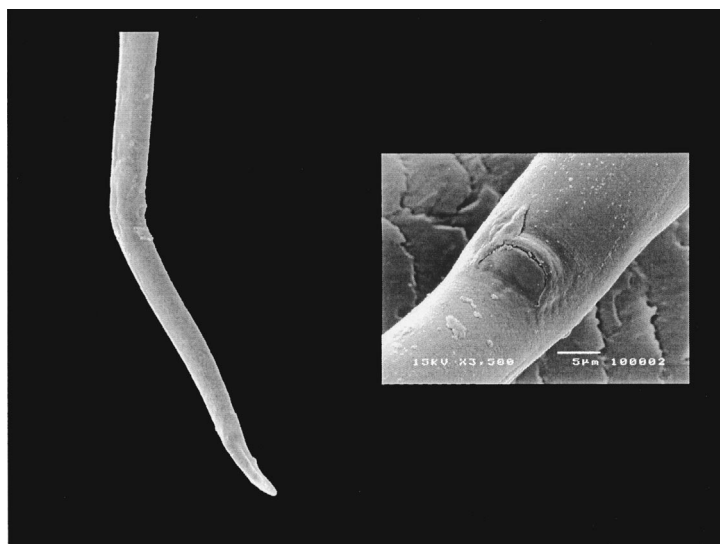
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Fig. 2. Scanning electron micrographs of *Bursaphelenchus xylophilus* female tail and vulval flap (inset).

cluding scanning electron microscopy (SEM) observations of the female tail and vulval flap (Fig. 2) and of male tail and spicules (Fig. 3). Male spicules are of particular interest when observed by SEM, providing greater detail of its typical morphology and diagnostic features. Other *Bursaphelenchus* species occurring in pine wood, as well as the extraction methods involved, have also been studied (Mota, 2002; Penas *et al.*, 2002a, b). Recently, a CD-rom containing relevant information on PWN has been released (Vieira *et al.*, 2001) providing researchers with the original description of all species within the genus *Bursaphelenchus*.

Of major interest is the molecular characterisation of the nematode DNA and, in particular, the ITS region of rDNA (Hoyer *et al.*, 1998; Mota *et al.*, 1999). Ongoing research is focusing on characterisation of rDNA from different populations of *B. xylophilus*, as well as of different *Bursaphelenchus* species occurring in Portugal (Penas *et al.*, 2002b).

Although the nematode has occasionally been found on other beetle genera, *Monochamus* seems to be the only effective vector for spread of PWN. These longhorn beetles also transmit *B. mucronatus*, which is distributed in Europe and very similar to *B. xylophilus*, but less pathogenic. Recently, *M. galloprovincialis* has been proven to be the

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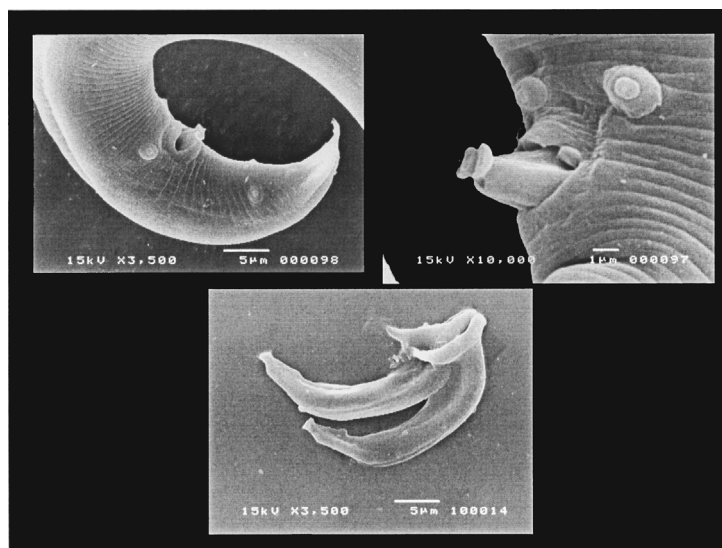


Fig. 3. Scanning electron micrographs of *Bursaphelenchus xylophilus* male tail and spicules.

vector of *B. xylophilus* in Portugal (Sousa *et al.*, 2001). Ongoing research regarding this vector focuses mainly on its bioecology.

Nothing is known so far about the origin of the *B. xylophilus* strain detected in Portugal. However, increased commercial movement in the last few years from Macau (China) to Portugal, in the form of ship containers with large numbers of wooden crates, establishes an interesting testable hypothesis. Other possibilities include wooden crates from North America, as containers of automobile parts. A new research project, involving eight partners from the EU, will soon integrate the efforts of survey and studies from six EU countries.

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