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# Association *Scolytus intricatus – Bursaphelenchus eremus* on Oak in Italy

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**Abstract:** Recent zoological research carried out in several regions of northern and central Italy has revealed a remarkable occurrence of Nematodes inside the tissues of trunks and branches of various oak species, i.e., *Quercus cerris*, *Q. robur* and *Q. suber*. Taxonomic studies of samples collected from the natural Parks of Ticino Valley, Stupinigi, Groane and Sesia (Lombardia and Piemonte regions) and from Montefalcone and Maremma areas (Tuscany) have always led to detection of the presence of *Bursaphelenchus eremus* Rühm (Goodey) which had so far only been recorded from Germany, the Czech Republic and Georgia. Plenty of individuals of the nematode were always found inside the samples and a high reproduction rate of that species was confirmed in the laboratory. The nematode was seen to be massively transported by the scolytid insect *Scolytus intricatus* Ratz. so that where high population levels of that bark beetle are present, the nematode/beetle association can become very harmful to the host oaks.
**Key words**: *Scolitus intricatus*; *Bursaphelenchus eremus*; nematode/beetle association

**Associação *Scolytus intricatus – Bursaplelenchus eremus* em Carvalhos em Itália**

**Sumário.** Pesquisas recentes efetuadas em várias localidades do Norte e Centro de Itália detetaram populações de nemátodes no interior dos troncos e ramos de várias espécies de carvalhos, tais como *Quercus cerris*, *Q. robur* e *Q. suber*. A análise de amostras recolhidas dos Parques naturais do Vale de Ticino, Stupinigi, Groane e Sesia (região da Lombardia e Piemonte) e das áreas de Montefalcone e Maremma (Toscânia) permitiram detetar a presença sistemática de *Bursaphelenchus eremus* Rühm (Goodey). Anteriormente apenas tinha sido detetado na Alemanha, República Checa e Georgia. Vários exemplares deste nemátode foram detetados nas diferentes amostras recolhidas, tendo-se observado uma elevada taxa de reprodução desta espécie quando mantida em laboratório. Constatou-se que o nemátode é transportado pelo inseto escolitídeo *Scolytus intricatus* Ratz., pelo que a ocorrência de níveis populacionais elevados deste inseto e do nemátode associado pode contribuir para o declínio dos carvalhos hospedeiros.
**Palavras-chave**: *Scolitus intricatus*; *Bursaphelenchus eremus*; associação nemátode/inseto

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## Introduction

Forest decline is one of the most serious phytopathological problems in the new millennium, considering the size of the geographical area affected, the number of woody species involved and the impact on the health of forest ecosystems (MANION and LACHANCE, 1992). *Quercus* is the plant genus most seriusly damaged by this phenomenon, both in central and western European countries as well as in many Mediterranean areas, including Italy (RAGAZZI *et al*., 2000). The decline phenomenon is characterised by a complex symptomatology and is worsened by the concomitant or contributing action of various weakness parasites which increase the pathological status of already declining trees, leading to death (ANSELMI *et al*., 2004).

Recent zoological research initiatives, carried out in several regions of Northern and Central Italy in broadleaf woods displaying symptoms of decline, have revealed a remarkable occurrence of nematodes inside the tissues of trunks and branches of various oak species, i.e., *Quercus cerris* L., *Q. robur* L. and *Q. suber* L. This work reports on the occurrence, in sampled areas located in Central and Northern Italy, of *Bursaphelenchus eremus* Rühm (Goodey). It is a forest nematode inhabiting broad-leaved trees belonging chiefly to the families Fagaceae, Salicaceae and Ulmaceae (RYSS *et al*., 2005). *B. eremus* was often found in association with the bark beetle *Scolytus intricatus* Ratzeburg (Figure 1). Dauer juveniles were also recovered from collected bark beetles.

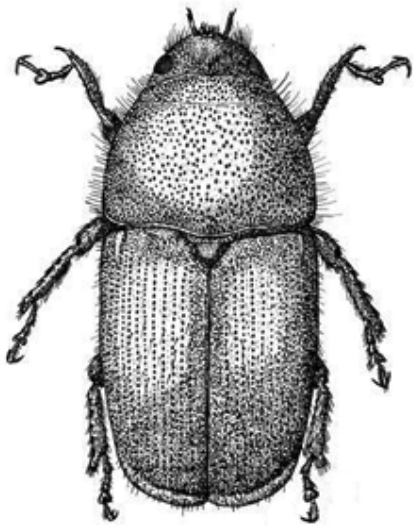

**Figure 1** - Adult of *Scolytus intricatus* Ratzeburg

## Materials and methods

Studies were conducted in the natural Parks of Ticino Valley, Stupinigi, Groane and Sesia (Lombardy and Piemonte Regions) on *Quercus robur* and in Montefalcone and Maremma areas (Tuscany) on *Q. cerris* and *Q. suber*, between May 2004 and May 2006 (CARLETTI *et al*., 2005; CARLETTI *et al*., 2007).

Samples were taken from either stored logs and felled trees (as part of logging operations) or fully grown damaged trees. In the forest, disks were sawed at different positions along the length of the trunks, as well as logs with bark. All the woody samples showed signs of insect activity and the presence of fungal growth.

In the laboratory, the bark was removed to reveal insect gallery systems and to collect emerging insects to be observed and identified. Sawdust from several parts of the disks and logs was produced with a drill. Nematodes were extracted from the wood by the Baermann funnel technique over 48 h at 24°C. When possible, a proportion of the juveniles was inoculated with a strain of non-sporulating *Botritis cinerea* 5% (v/v) grown on glycerol-supplemented malt extract agar and incubated at 24-26°C. Five multiple-specimen isolated cultures were successfully established.

Insects isolated from the broad-leaved trees and identified as *S. intricatus* were dissected in Petri dishes with water to collect the emerged dauer juveniles, always packed beneath the elytra and/or wings.

Photomicrographs were taken with an inverse Nikon microscope (Figures 2-3).

**Results and conclusions**

Plenty of individuals of *B. eremus* were recovered from damaged and recently dead oak trees. The dauer juveniles of the nematode are specialised dispersal juveniles resistant to adverse conditions; they were seen to be transported massively by the scolytid *S. intricatus*, resulting as its vector insect.

The pathogenicity of *B. eremus* has not been investigated but a high reproduction rate of this species was confirmed in the laboratory.

The nematode appears to have a very large distribution and high population densities whenever there are high population levels of the bark beetle.

Futher investigations are necessary to determine the exact role of the presence of this nematode/beetle association and its importance to the decline of oak forests.

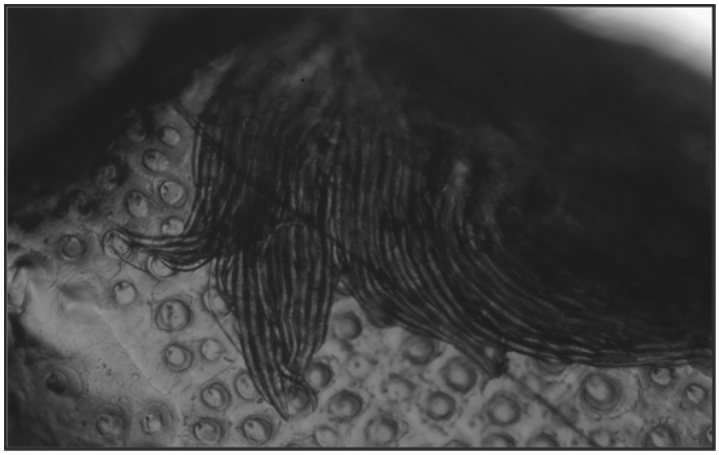

**Figure 2 -** Dauer juveniles of *B. eremus* packed beneath the elytra of *S. intricatus*

**Figure 3 -** Dauer juvenile of *B. eremus* on a wing of *S. intricatus*

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