NEW RECORDS OF *BURSAPHELENCHUS* SPP. IN CYPRUS

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Summary. During a survey in November 1999, at several localities of Cyprus, 48 wood samples including cut wood from conifers showing damage or bad condition were examined for the presence of *Bursaphelenchus* species. *B. leoni* was found in *Pinus nigra* and *P. brutia,* and *B. teratospicularis* and *B. idius* in *P. brutia. B. borealis* and *B. sexdentati* had already being found on *P. brutia* in a survey during 1995, but their presence was not reported. Apart from *B. leoni*, the *Bursaphelenchus* species recorded herewith are new records for Cyprus. The dangerous pine wood nematode (*B. xylophilus*) was not found. The vectors of this nematode, *Monochamus* spp., are known not to occur in Cyprus.

The recent detection of the dangerous quarantine pest *Bursaphelenchus xylophilus* (Steiner and Buhrer, 1934) Nickle, 1970 (pine wood nematode) in Portugal (Mota *et al.*, 1999) has indicated the need to know more about the distribution of *Bursaphelenchus* spp. in coniferous trees in Europe in order to establish the true geographic range of the species and thus be able to react quickly in case of unwanted introduction of the pine wood nematode into other European regions. The surveys on the occurrence of *Bursaphelenchus* species carried out in southern and central Europe in recent years (Braasch *et al.*, 2000) and the monitoring for *B. xylophilus* in the member states of the European Union (EU) in 2000, contributed to knowledge of the distribution of the genus *Bursaphelenchus* in Europe. As many as 28 species are now known to occur in conifers in Europe (Braasch, 2001).

First investigations for the presence of *Bursaphelenchus* spp. were made in Cyprus by Philis and Braasch (1996) and Philis (1996) who revealed the widespread occurrence of *B. leoni* Baujard, 1980 in *Pinus* spp. on the island. This species seems to be vectored by bark beetles (Scolytidae), like most *Bursaphelenchus* species, whereas *B. xylophilus* is vectored by *Monochamus* spp. (Cerambycidae), an insect genus that does not occur in Cyprus. If the pine wood nematode and its vector were introduced to Cyprus, it could result in serious consequences, as *Pinus nigra,* one of the pine species grown in Cyprus (together with *P. brutia, P. pinea,* and *P. halepensis*), is among the most susceptible species to it. Furthermore, the climatic conditions on the island would be favourable for the development of pine wilt. In 1999, more samples from various regions of Cyprus were examined in order to find out more about the *Bursaphelenchus* species inhabiting conifers on the island.

MATERIALS AND METHODS

The places investigated in Cyprus were Nicosia, Larnaca, Paphos, Stavros, Tis Psokas, Tripylos, Aramis (Panayia Bridge), Potamus tou Campou, Foini, Psevdas, Matsimas, Platres, Troodos square, and Pera Pedi. Beside pines [*Pinus brutia* Ten., *P. nigra* ssp. *pallasiana* (D. Don) Holmboe] *Cupressus sempervirens* L., *Cedrus libani* ssp. *brevifolia* Henry and *Juniperus* sp. were sampled in November 1999. A drill was used to take wood samples from trunks and branches of the trees. One sample consisted of at least three bore cores per tree from one to five trees. Samples were stored in plastic bags until examined. Nematodes were extracted by modified Baermann funnel technique over 48 hours.

RESULTS AND DISCUSSION

Only four out of the 48 samples examined yielded *Bursaphelenchus* spp., whereas 34 of them contained several species of other wood and bark inhabiting nematode genera, among them the aphelenchoid species *Ektaphelenchoides pini* (Massey, 1974) Baujard, 1984 from *P. brutia. B. leoni* was found in a *Pinus nigra* tree attacked by *Orthotomicus erosus* Woll. (Scolytidae) and *Arhopalus syriacus* (Reitter, 1895) (Cerambycidae) at Troodos square and in *P. brutia* at Psevdas. *B. leoni* is considered one of the two most frequent *Bursaphelenchus* species in conifers in the Mediterranean region, being found in France (Baujard, 1980), Greece (Skarmoutsos and Skarmoutsos, 1999), Italy (Ambrogioni and Caroppo, 1998) and Portugal (C. Penas, pers. comm.), whereas it occurs much less frequently in southern Germany (Braasch *et al.*, 1999) and Austria (Braasch *et al.*, 2000; Tomiczek, 2000). *B. sexdentati* Rühm, 1960, the other frequently found *Bursaphelenchus* species in southern Europe, was recorded in *P. brutia* at Limassol in 1995, but only later

positively identified. It occurs also in central Europe and is distributed in Greece (Skarmoutsos and Skarmoutsos, 1999), Italy (Ambrogioni and Caroppo, 1998; Caroppo *et al.*, 1998), Spain (EU survey, 2000), the European part of Russia (Voslilite, 1990), Bulgaria (B. Choleva, pers. comm.), Austria (Tomiczek, 2000) and Germany (Rühm, 1960; Braasch *et al.*, 1999).

Two other species found in Cyprus during this survey were *B. teratospicularis* Kakuliya *et* Devdariani, 1965 and *B. idius* Rühm, 1956. *B. teratospicularis*, originally described from Georgia (Kakuliya and Devdariani, 1965) is also a typical Mediterranean species. It occurs in Greece (Skarmoutsos and Skarmoutsos, 1999), Italy (Caroppo *et al.*, 1998), Portugal (C. Penas, pers. comm.), Croatia (Braasch, 2001) and was found only once in Germany (Schönfeld *et al.*, 2001). In Cyprus (Psevdas), it was found together with *B. leoni* in a *P. brutia* tree attacked by *Orthotomicus erosus*. It can easily be recognized by the characteristic shape of its spicules, showing an extremely high condylus. *B. idius,* originally described by Rühm (1956) from *Picea excelsa* in Germany, was found once again in Slovakia on *Picea abies* (Tenkáková and Mituch, 1987; Vilagiova, 1993). The specimens found in *P. brutia* at Platres/Cyprus resemble the drawings made by Rühm (1956) in the shape of spicules (without distinct condylus and rostrum) and having a small mucro-like terminus on the female tail. Females had no vulval flap. The body measurements of *B. idius* from Cyprus are close to those described by Rühm (1956), i. e. males and females are rather long (850-940 µm), have a relatively small stylet (12 µm) and spicules 15-17 µm. The bursa is relatively big and variable in shape and two- or three-pointed. In Germany and Slovakia, the nematode was found on the vector *Pityogenes chalcographus*, whereas the same nematode species from Cyprus was found on *P. brutia,* which was attacked by *Pityogenes pennidens* Reitter.

Another *Bursaphelenchus* species found on *P. brutia* during 1995, south of Nicosia, morphologically resembles a species found in Germany (Braasch *et al.*, 1999) which was identified as *B. borealis* Korenchenko, 1980, although with some reservations due to the lack of type material available for comparison. It was originally described from Russia (Korenchenko,1980) and also found in coniferous wood imported from the Asian part of Russia (Braasch *et al.*, 2001). Dauer juveniles, most probably belonging to the genus *Bursaphelenchus,* were also found on the bark beetle *Orthotomicus erosus*, which is believed to be a vector for several *Bursaphelenchus* species. Attempts to rear these dauer juveniles on *Botrytis cinerea* Pers. cultures for identification were not successful.

Altogether, five *Bursaphelenchus* species are so far known to occur in conifers in Cyprus, and possibly more will be found in the future. It is of great importance that the pine wood nematode (*B. xylophilus*) was not found during the investigations of 1995, 1996 and 1999. Also, *B. mucronatus* Mamiya *et* Enda, 1979, the close relative of *B. xylophilus*, was not found. Since *Monochamus* spp., the vectors of *B. xylophilus* and *B. mucronatus,* are known not to occur in Cyprus, the island is not as much at risk from pine wood nematode introduction via timber imports as other European countries where these longhorn beetles occur. If the vector were introduced together with the nematode and both became established, then the potential impact on coniferous forests could be high, since the climatic conditions are favourable for the development of pine wilt disease. Special quarantine attention should be given to wood imports (sawn coniferous timber and logs) from countries where the pine wood nematode is known to occur. Recently, it became evident that the danger of introducing both the nematode and the vector is particularly linked to wooden packaging material associated with a wide range of imported commodities that would not usually be the target of phytosanitary inspection. This pathway has been identified as high risk for the introduction of exotic pests into several countries. Interception data from Australia and North America indicate that the greatest source of risk for an exotic insect incursion is Asia. It is, therefore, essential for any European country to assess the magnitude of risk associated with import of forest products and to employ effective inspection and treatment methods to manage the risk.

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