**The pinewood nematode: a major invasive pest of European pine forests**

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The pinewood nematode (PWN), *Bursaphelenchus xylophilus*, is responsible for pine wilt disease (PWD), a serious disease of forest tree species, in particular among the genus *Pinus*. It has been designated as a quarantine species in Europe (Directive 77/93 EEC). The first external symptoms are the yellowing and wilting of the needles, leading to death of the tree in case of heavy attack. The nematode is native to North America, but this species is not considered as a primary pathogen of native forests in the USA and Canada. On the contrary, in countries where the PWN has been introduced, PWD has rapidly become an important disease. In Japan, *B. xylophilus* was identified as the causal agent of dramatic pine mortality in the late 1960s, and is currently the number one forest pest, with an annual loss of pine trees estimated at one million cubic meters. Asian countries other than Japan began to report the presence of the PWN in the mid- to late-1980s. In 1999, the PWN was reported for the first time in Europe, in declining maritime pine (*P. pinaster*) in the Setubal region of Portugal. Although a national phytosanitary strategy of eradication was implemented by the Portuguese authorities, new outbreaks have been reported since 2008 in the Iberian Peninsula (center of Portugal, and center and North of Spain) and in Madeira island. The tree species that are the most susceptible to PWN are mainly *Pinus* spp., although the host list also includes species of *Abies*, *Chamaecyparis*, *Cedrus*, *Larix*, *Picea* and *Pseudotsuga.* In particular, the European species *P. pinaster*, *P. sylvestris* and *P. nigra* are known to be killed by the PWN as mature trees in the field. Very recently, the EU collaborative project REPHRAME (KBBE.2010.1.4-09) has been launched, its objectives being the development of improved methods for detection, control and eradication of PWN in support of EU Plant Health policy. Although an Asian origin is suspected for the first introduction in Portugal, the invasion routes of the PWN in Europe remain largely unknown. In the framework of REPHRAME, we will use a set of microsatellite markers identified from the nematode genome to locally characterise the populations and their genetic relationships, based on direct field sampling but also on retrospective analysis of the variability in the existing distribution of PWN in Portugal and Spain. The data will be matched and compared with results from other molecular analysis already performed. These studies will help solve basic questions such as the comparison of the different introduction and dissemination scenarios for the PWN European populations.

Keywords: *Bursaphelenchus xylophilus*, invasive species, microsatellites, pathway analysis, pine wilt disease, *Pinus* spp.