

Unit 2. Forest and climate crisis

Influence of Climate Change on the expansion of the Pine Wood Nematode



Source: Ministerio de agricultura, pesca y alimentación.

Description

The pine wood nematode “*Bursaphelenchus xylophilus*” (PNM), which causes pine wilt disease (PWD), is currently the most serious threat facing stands of Spanish and European pine forests. This nematode continues to cause significant environmental and economic losses in countries where it has been introduced.

In 1999, the pine wood nematode (PWN) was detected for the first time in Europe, on *Pinus pinaster* Ait. in the district of Setúbal, in the southwest of Portugal, near Lisbon. Since then, it has spread rapidly across Portugal, causing large-scale damage to Portuguese pine forests. The initial focus in the southwest of Portugal continued to expand to adjacent areas. A 3 km wide cutting strip of all sensitive species was carried out in late 2006 and early 2007 in an attempt to stop the spread of PWN. However, the disease continued to spread to areas outside this strip and in 2008, several new outbreaks were reported in areas not adjacent to those previously infected. All Portugal, the first European country where it was detected, has been declared a demarcated area. In Spain, since 2008, five outbreaks of the disease have been detected in the CCAAs bordering the neighboring country, Extremadura, Galicia and Castilla y León. Two of these focus have been declared eradicated. Recent models predict an increase in natural expansion in these autonomous communities in the next decade, which is why Spain is beginning to be considered an unavoidable risk of infection in the short or medium term. “*Bursaphelenchus xylophilus*” is commonly known as

pine wood nematode (PWN). It is a species of nematode that affects trees of the genus *Pinus* (and eventually other conifers) and causes pine wilt disease (PWD). PWN is believed to be native to North America from where it has spread to other countries. It is widespread in Canada and the United States, appearing in almost all regions where there are pine forests and other conifers.

Apparently, the model and the hypotheses considered by researchers such as De la Fuente (2018), indicate that the current climatic conditions in northern Spain (including Galicia) could limit the expression of EMP and, with it, the severity of forest damage. as well as avoiding further propagation of PWN. However, global warming may progressively change this.

De la Fuente et al (2021), re-modeled the spatiotemporal patterns of the future natural propagation of PWN in the Iberian Peninsula, as dispersed by *Monochamus galloprovincialis*, considering together the distribution and different susceptibility of pine species, the effect of climate change projections on the environmental suitability for the propagation of PWN and the dynamics of the natural expansion of PWN towards the end of the century.

The results of this work indicate that, in the absence of effective containment measures, PWN will naturally invade, through the dispersal flights of the vector beetle *Monochamus galloprovincialis*, all the pine forests of the Iberian Peninsula (Figure 9). However, the model predicts that this dispersal will take a century or more, progressing at an average rate of between 0.83% and 0.90% depending on climate scenarios.

Goals

The objective is to analyze how climate change will help the expansion of the Pine Wood Nematode.

Activities

- Research, monitoring and adaptation to climate change

Impact

The massive attack of the pines of the Iberian peninsula by the Nematode

Social Media

<https://www.mapa.gob.es/es/agricultura/temas/sanidad-vegetal/organismos-nocivos/nematodo-de-la-madera-del-pino/>