

Phytophthora spp. around the world

Ana Perez-Sierra Workshop on emerging diseases of forests



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Phytophthora diseases

 'Water moulds' - swimming spores, which are released in water and need water to infect

Forest Research

- Phytophthora genus of aggressive plant pathogens. Arguably the most damaging
- Globally we have Phytophthora diseases that are highly damaging to trees and entire ecosystems
- Most infamous: potato blight *P. infestans,* also *P. cinnamomi*
- Some recognised quarantine pathogens – measures to prevent spread required





From nursery to forest





Phytophthora pinifolia on *Pinus radiata* in Chile

Economic losses

Phytophthora cinnamomi on sweet chestnut and thuja

Phytophthora



- They are responsible for important economical losses in agriculture, horticulture and forestry
- They can affect plants in all their different life stages
- They can affect all the parts of the plants
- Some are host-specific and some have a broad range of susceptible hosts
- Some are soil-borne and some are aerial





Phytophthora ramorum

'Hosts jump'



Rhododendron



Japanese larch (Larix kaempferi)

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Forest Research How many Phytophthora spp.?

- 1876 Anton De Bary 1 species (*P. infestans*)
- 1931 C M Tucker \approx 20 species
- 1963 G M Waterhouse \approx 41 species
- 1976 Newhook, Waterhouse, Stamps \approx 50 species
- 1996 Erwin, Ribeiro \approx 54 species
- 2000 \approx 60 species

Before the 1990s the main forest Phytophthoras: 'ink disease' *P. cambivora*, *P. cinnamomi* and *P.lateralis*



Numbers have effectively doubled since 1990s



From Brasier (2009)

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10 Clades (Kroon et al., 2012)



FIGURE 2

Overview of the species and clades that are currently distinguished within the genus *Phytophthora*. The topology of the relationships between clades is depicted according to Blair et al. (13).

The open nd closed circles, boxes, and arrowheads reflect whether the sporangia of the species are papillate (\Box), semi-papillate (\Box), nonpapillate (\Box), non- to semipapillate (\Box), or a mixture of nonpapillate and semipapillate (\Box). Heterothallic species are marked as)(, homothallic species as (), and sterile species (i.e., oogonia unknown or rarely produced) as **‡**. The brackets shown in clades 1, 2, 6, 7, and 8 group the species known to be members of a subclade. Within each clade and/or subclade, species are ordered alphabetically. Further details on the species and their distribution in subclades are listed in Tables 1 to 10. n.i. = nomen invalidum; n.n. = nomen nudum.



- The limited current knowledge of the *Phytophthora* genus is evidenced by the high number of new species that have been identified in recent years
- In addition, the existing high risk of emergence of new species through hybridization indicates that the taxonomic knowledge of the genus is incomplete and some of these species are still evolving increasing the risk of colonization of new forest hosts
- 'Horizon2020: POnTE' we are investigating which Phytophthoras are there, their origin and their possible threat to European forests



Thank you



