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Phytophthora ramorum

Taxonomic status

Scientific name	*Phytophthora ramorum* Werres, de Cock & Man in't Veld
Synonyms	
Taxonomic position	Oomycota: Peronosporales
English name	Sudden oak death, Ramorum die-back
German name	
French name	Mort subite du chêne
Italian name	

Description and identification

Identification character	Many *Phythophthora* spp. occur in Europe, including on oak. Characterization of *Phytophthora* spp. is difficult. Identifications can be performed by traditional isolation and culturing of the pathogen on standard, selective media, but are best carried out by specialists. Symptoms depend on the host tree (see Eppo, 2003; Anon., 2003) but can easily be mistaken for other diseases.
Similar species	A new species, *P. quercina* has been recently described, and associated with oak decline in some European countries, including Austria, France, and Germany (see Fact Sheet on *P. quercina*)

Biology and Ecology

Life cycle	*P. ramorum* is a recently described species. Its biology is still largely unknown, and seems to vary with host plant. The pathogen has been recovered from above-ground plant material, rain -splash, stream water, and soil, but not from below-ground host tissues. Deciduous sporangia, thick-walled chlamydospores are produced in vitro and in vivo. Sexual oospores have been obtained in vivo in Europe but not in North America.
Host plant	*P. ramorum* has already been found in many plants in various families. It severely affects a few oak species in western North America (*Q. agrifolia* Née, *Q. kellogii* Newberry, *Q. parvula* Greene and *Lithocarpus densiflorus* (Hook. & Arn.)). It is also found on many other plant species, causing various levels of damage (see lists in Rizzo, 2002, EPPO, 2003, and Anon., 2003). In Europe, it was originally found only on *Rhododendron* spp. and *Viburnum* spp., causing twig blight and wilting (Werres, 2002; Heiniger and Stadler, 2003), but has now been recorded in the UK on *Q. falcata* Michx., *Q. ilex* L., *Castanea sativa* Mill., *Aesculus hippocastanum* L. and *Fagus sylvatica* L. (Anon., 2004).
Habitat	Given its wide host range, it is probably present in various habitats.
Origin	Unknown

Introduction and dispersal

History of introduction	Unknown. Recently found and identified in western North America (Oregon and California) and, at the same time, in several western European countries.
Pathways of introduction	The pathways of introduction into newly infested regions are unknown, but introductions probably occurred through the movement of infested nursery stock, wood, bark, or soil.
Dispersal	Infection could occur through oospores, sporangia and chlamydospores. Local dispersal could be caused by rain splash, wind (sporanges are deciduous), soil and plant transportation, hiking boots, etc.

Current status

Actual and potential distribution in CH	Recorded for the first time in Switzerland in September 2003, in a nursery in central Switzerland, on *Viburnum* × *bodnantense* (Heiniger and Stadler, 2003). Most of the country is at risk.
Countries with introduced species	Found locally in UK, Netherlands, Germany, Spain, Belgium, Italy, Poland, Sweden and Switzerland.

Impacts

Damage on plant	The damage greatly depends on the host plant. Detailed symptoms are described in EPPO (2003) and Anon. (2003). The most susceptible hosts (e.g. oak species in the western USA) develop serious cankers on the stems. Cankered trees may survive for one to several years, but then crown dieback starts and the tree dies rapidly. Infected trees are also more susceptible to secondary attack by insects and diseases. In Europe, the fungus causes twig blight in *Rhododendron*, and wilting disease in *Viburnum*.
Environmental impact	In the USA, the fungus has already killed thousands of trees, and a serious negative impact can be expected on the biological diversity of forests together with major environmental problems (e.g. enhanced fire risk and damage to water catchments, erosion, etc.). In Europe, the disease has been found only on *Rhododendron* and *Viburnum* in nurseries. Its potential threat to native plants and their ecosystems is unknown, but should not be neglected, since many host genera (e.g. *Quercus*, *Rhododendron*, *Viburnum*, *Vaccinium*) are important parts of European ecosystems.
Economic impact	Most plant/tree species affected by the disease, including those attacked in Europe, are commercially grown as nursery stock. Oak species are also important timber trees. The nursery trade is also affected because of quarantine regulation. In the USA, the economic impact is expected to be huge. In Europe, too little is known regarding *P. ramorum*'s potential occurrence to evaluate properly its possible economic impact, but the damage on *Rhododendron* and *Viburnum* causes concern in nurseries (Werres, 2002; Heiniger and Stadler, 2003).
Management options	There are no current management options for *P. ramorum*. In general, *Phytophthora* spp. are difficult to control. Studies are presently being carried out in the USA to test the susceptibility of *P. ramorum* to fungicides, high temperature and composting treatments.
Information gaps	Very little is known about this pest. More data are needed on its taxonomic identity, biology, host range, geographical distribution and epidemiology, particularly in Europe.

References

Literature

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