

Phytophthora ramorum

Werres, De Cock & Man in't Veld



Fig. 1. *Phytophthora ramorum*. Dying tanoak (a); foliar necrosis on California bay laurel (b) and *Pittosporum undulatum* (c); lesion on coast live oak (d); sporangium (e); and chlamydospores (f). Photo credits University of California, Berkeley (a), (c), (e) and (f), K. Ireland (b) & (d).

Common Name: *Phytophthora ramorum*

Disease: Sudden Oak Death, Ramorum leaf blight

Classification: K: Stramenopila, P: Oomycetes, O: Pythiales, F: Pythiaceae

Phytophthora ramorum is a recently discovered invasive plant pathogen causing considerable and widespread damage in nurseries and natural woodland ecosystems of the USA and Europe. Spread through the international nursery trade it is capable of completely altering natural ecological landscapes and causing considerable economic losses. It is of particular interest to Australian plant biosecurity as it has the potential to become a major economic and ecological threat in areas with susceptible hosts and conducive climates.

Host Range:

P. ramorum has a wide host range of more than 100 species within 54 genera and 26 families, covering a diversity of trees, shrubs and herbaceous species in key families such as the *Fagaceae*, *Ericaceae*, *Lauraceae*, and *Caprifoliaceae*. New susceptible taxa in wildlands and nursery settings are found regularly. Two Australian host species have been discovered, *Eucalyptus haemastoma*, and *Pittosporum undulatum*.

Impact:

Since recognition of the disease in the mid 1990s, *P. ramorum* has been attributed to extensive mortality in tanoak and several oak tree species as well as foliar necrosis and shoot tip dieback in trees, understory shrubs and herbaceous plants in Californian wildlands. It has also caused considerable damage to gardens and the nursery industries in both the USA and Europe through foliar infections of ornamental species such as *Rhododendron*, *Viburnum* and *Camellia*.

As a result of its spread through the international plant trade a number of quarantine regulations have been imposed at both national and international levels,

restricting the entry of a number of highly profitable nursery species and impacting world trade of nursery plants dramatically.

Key Distinguishing Features:

Bleeding stem cankers and subsequent mortality of tanoak and some mature oak tree species. Cankers cause distinct red-brown to black discolouration of tissue below bark. Foliar necrosis and shoot tip dieback is observed in sporulating hosts and sporangia are disseminated aerially via windswept rain. In culture, *P. ramorum* produces abundant, large chlamydospores and caducous sporangia. It is heterothallic, with the A1 mainly found in Europe and the A2 in USA.

Control:

Eradication is often undertaken in nurseries, but can be problematic in natural ecosystems given its large geographic extent and destructive nature of this method of control. Therefore control efforts have tended to focus on best management practices within nurseries and preventative measures through strict regulation of plant movement to prevent further spread of the disease. Many chemical agents have been ineffective as they often act as fungistatics, masking symptoms used to visually monitor for disease.

Further Reading:

- Californian Oak Mortality Task Force (COMTF) <http://nature.berkeley.edu/comtf/>
- Davidson *et al.* (2005) *Phytopathology* **95**, 587-596.
- Hüberli *et al.* (2006) *Australasian Plant Disease Notes* **1**, 19-21.
- Risk Analysis for *Phytophthora ramorum* (RAPRA) <http://rapra.csl.gov.uk/>

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