

Tracking *Phytophthora* in natural ecosystems

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Summary

We have developed novel molecular diagnostics and water and soil sampling and DNA extraction protocols that have proven powerful tools to track plant pathogenic *Phytophthora* species.

Application of these methods to a series of Scottish ecosystems has revealed a great diversity of species. This is opening up new opportunities to explore their role in nature and identify new threats emerging from, for example, climate change or invasive species.



Sporangia of three different *Phytophthora* species with motile zoospores evident in one sample.



Tarry exudates on the bark of this *Alnus* are a sign of *Phytophthora* infection that will eventually kill the tree.

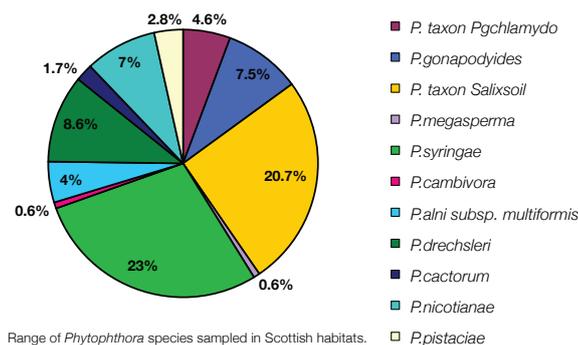


Background

There are around 100 species of plant pathogenic *Phytophthora*, many of which are highly destructive and cause serious losses to agriculture, horticulture and forestry as well as damaging plants in natural habitats. The presence of *P. ramorum* and *P. kernoviae* in Scotland is of current concern yet our understanding of the diversity and behaviour of most *Phytophthora* species in natural ecosystems is limited.

Outcomes

- The PCR-based method enables the sensitive and specific detection of *Phytophthora* rDNA sequences.
- A filtration protocol that traps the motile *Phytophthora* zoospores in water samples and a soil DNA-extraction protocol have proved powerful tools for processing environmental samples.
- Sequence analysis has revealed a wide range of species in undisturbed Scottish habitats and planted woodland. Sequences with no match to international databases indicate the presence of undescribed species.
- The methods have great potential for monitoring the spread of *P. ramorum* and *P. kernoviae*



Range of *Phytophthora* species sampled in Scottish habitats.



In-line filtration has proved ideal for sampling zoospores in the field.