

IUFRO Fourth Meeting of Working Party 7.02.09, Phytophthoras in Forest and Natural Ecosystems: Meeting Summary¹

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On behalf of the Fourth Phytophthoras in Forest and Natural Ecosystems local organizing committee and co-chairs Everett Hansen, Clive Brasier, and Giles Hardy, I thank you for your contributions to this Working Party meeting. The past week has stimulated much thought and discussion, thanks to the 100 participants from 15 countries, 48 papers and 31 posters, two field trips, and two evening overview sessions.

The following questions, explored throughout the week, highlight some of the critical issues raised.

1. What is the relationship between Phytophthoras in nurseries and forest Phytophthora diseases? What are the implications of the detection of *P. kernoviae*, *P. pseudosyringe*, *P. nemorosa*, and other forest Phytophthora species in nurseries and orchards? Many forest Phytophthoras have been detected on rhododendron nursery plants. Which species could use rhododendron nursery plants as a pathway into forests? How can we identify the potentially damaging species before they escape?
2. How can *Phytophthora* species be detected earlier in forests? Can we detect them before they reach outbreak levels, while they are still eradicable?
3. How do we define *Phytophthora* species? How important is the division of Phytophthoras into species? Rather than focusing on differences between species, could we learn more by focusing on the common biology of most *Phytophthora* species?
4. *Phytophthora europaea* has been recovered from oak forests in Europe, isolated from California bay laurel leaves and streams in California, and from Christmas tree plantation soils in Michigan (Balci and others 2007). Can other *Phytophthora* species adapt to such varied niches in different ecosystems?
5. Ioos' revision of the phylogeny of *Phytophthora alni* based on his genetic analysis (this volume) raises many questions. How well can *Phytophthora* species hybridize? Are there other "species clusters" that we are not yet aware of? If not, why not?

¹ A version of this paper was presented at the Fourth Meeting of IUFRO Working Party S07.02.09, Phytophthoras in Forests and Natural Ecosystems, August 26-31, 2007, Monterey, California.

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6. How can we integrate *Phytophthora* genetic investigations with natural history or management studies? The gap between molecular biologists and field ecologists seems to be growing. How can we bring these specializations together?
7. How important is designation and support of a forest *Phytophthora* model species? Which forest *Phytophthora* species would make the ideal model species? What selection criteria should be used?
8. What roles do chlamydospores and sporangia play in *Phytophthora* survival and dispersal? Could chlamydospores be more important in dispersal than previously thought?
9. In laboratory inoculations, Vetraino and Denman each report (this volume) an inverse relationship between *P. ramorum* lesion size and sporulation, with smaller lesions generating greater spore production. What are the implications of this finding for regulatory inspections? Could inconspicuous lesions yield significant inoculum for new infections?
10. Removing infected trees and creating a buffer zone around the infested area is currently the only method used to attempt *Phytophthora* eradication from forest environments. In areas where tree removal is undesirable for environmental or social reasons, what other treatments could be used?
11. *Phytophthora* species seem ubiquitous in water courses. Are water courses *Phytophthora* species' primary habitat? What roles do *Phytophthora* species play in rivers and streams? Genetic analysis confirms that the genus *Phytophthora* is most closely related to brown algae and diatoms, and is evolutionarily distant from Fungi. Does this classification have implications for our understanding or management of *Phytophthora* species?
12. Ramsfield and others (this volume) report that *P. kernoviae* may be native to the Southern Hemisphere. What actions should a country take when they determine a damaging *Phytophthora* is resident in their soil?
13. How do we engage scientists in other disciplines, the public, policy-makers, politicians, and others to raise awareness and funding to prevent further adverse impacts caused by forest *Phytophthora* species?

Literature Cited

Balci, Y.; Balci, S.; Eggers, J.; MacDonald, W. L.; Juzwik, J.; Long, R.P.; Gottschalk, K.W. 2007. *Phytophthora* spp. associated with forest soils in eastern and north-central U.S. oak ecosystems. Plant Dis. 91:705-710.