

# Development of Molecular Diagnostic Tools for the Detection of *Phytophthora cinnamomi* From Cryptic Soil Samples in Southern Australia<sup>1</sup>

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## Abstract

*Phytophthora cinnamomi* is responsible for the widespread destruction of native forest and heathlands across southern Australia. In these ecosystems, *P. cinnamomi* is responsible for the death of a broad range of susceptible species including members of the Proteaceae, Epacridaceae, Papilionaceae and Myrtaceae, and results in significant changes in species composition, community structure and ecosystem function. Management of the pathogen in native ecosystems is centred on pathogen containment and relies on the identification of dieback boundaries and detection of the pathogen directly from soil. Once an infestation is defined, preventative measures may be taken to ensure infested soil and plant material are not spread during land management activities. Ongoing monitoring of the pathogen then forms an integral component of sustainable ecosystem management.

Efficient management of *P. cinnamomi* is impeded by the inability to consistently detect the pathogen from infested soil samples. This is especially the case for cryptic sites in which there is no apparent expression of plant symptoms. Such situations commonly occur where sites are excavated during mining activities or are disturbed by fire. In the absence of a better alternative, land managers still use baiting analysis of soil samples in formulating management plans for *P. cinnamomi* containment. This is despite the fact that recoveries are often low and there is a high risk of false negatives. This in turn limits the confidence placed on the results of baiting analysis. DNA based detection offers improved sensitivity and higher sample throughput for the detection of *P. cinnamomi* than baiting assays. Through our research, comparative analysis using PCR based methods in parallel to baiting assays has shown a significant increase in the detection of *P. cinnamomi* by nested PCR. However, although the benefits of DNA based diagnostic tools have good promise for future disease management, low and variable target populations mean that sampling strategy and confidence levels remain the key issues in delivering a reliable and consistent diagnostic service.

This presentation will examine the challenges encountered during the development and validation of nested and real time PCR protocols for the detection of *P. cinnamomi* from soil collected from native ecosystems throughout southern Australia. The implications for using molecular diagnostic assays as management and research tools for *P. cinnamomi* will be discussed.

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