



Die-back of cold tolerant eucalypts associated with *Phytophthora* spp. in South Africa

By

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Declaration

I, Bruce O'clive Zwelibanzi Maseko, declare that this thesis, which I hereby submit for the degree Philosophiae Doctor at the University of Pretoria, is my own work and has not been submitted by me for a degree at this or any other tertiary institution

SIGNATURE:

DATE:



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Preface

Chapter 1: is a comprehensive review of the literature, which covers the taxonomy of the genus *Phytophthora*, methods used to control and identify *Phytophthora* spp. and an overview of root and collar rot of cold tolerant eucalypts in South Africa.

Chapter 2: deals with extensive surveys conducted in several *Eucalyptus* plantations in the Mpumalanga and KwaZulu-Natal Provinces of South Africa. *P. nicotianae* rather than *P. cinnamomi* was consistently and more frequently isolated from the rhizosphere soil and infected root collars of cold-tolerant *Eucalyptus* spp. However, pathogenicity tests showed that *P. nicotianae* isolates were less pathogenic than isolates of *P. cinnamomi*.

Chapter 3: deals with the role of *Phytophthora* root rot disease in the poor establishment and growth of *E. smithii*. Results obtained in this study indicated that three *Phytophthora* spp., namely *P. nicotianae*, *P. boehmeriae*, and the recently described *P. frigida*, are involved in the poor establishment of *E. smithii* in re-established study sites investigated. None of the above *Phytophthora* spp. were recovered from the virgin grassland site. Nevertheless, 20% seedling mortality was recorded at this *Phytophthora*-free site and seedling mortality did not differ significantly from the other three re-established sites investigated. Seedling mortality and absence of *Phytophthora* spp. on the virgin grassland site suggested that other factors play a role the poor establishment of *E. smithii* seedlings on the study sites investigated.

Chapter 4: deals with the development of reliable and robust screening methods of a large number *E. smithii* seedlings for tolerance to *P. nicotianae* and *P. cinnamomi*. Preliminary data indicated that total phenolics could be use as a potential robust tool for screening large number of seedlings. Three highly tolerant and susceptible *E. smithii* half-sib families were identified using the stem inoculation technique.

Chapter 5: is a taxonomic description of two previously unknown species of *Phytophthora* namely; *P. frigida* and *P. alticola*, associated with root and collar rot disease of cold tolerant eucalypts.