Cryptic speciation and host specificity among *Mycosphaerella* spp. occurring on Australian *Acacia* species grown as exotics in the tropics

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Abstract: Species of *Mycosphaerella* and their anamorphs represent serious pathogens of two phyllodenous species of *Acacia*, *A. mangium* and *A. crassicarpa*. In recent years, these fungi have been collected during surveys in South America and South-East Asia, where these trees are widely planted as exotics. In this study, the *Mycosphaerella* spp. and their anamorphs were identified based on morphological and cultural characteristics. Identifications were confirmed using comparisons of DNA sequences for the internal transcribed spacers (ITS1 & ITS2), the 5.8S rRNA gene, elongation factor 1-α, histone 3, actin and calmodulin gene regions. The data revealed six new taxa, of which three are named in this study, along with their anamorphs. *Cercospora acaciae-mangii*, which is morphologically part of the *C. apii sensu lato* species complex, is distinguished based on its distinct phylogeny. *Mycosphaerella acaciigena*, collected in Venezuela, is distinguished from *M. konae* and *M. heimii*, and described as new. *Mycosphaerella thailandica*, a new species occurring on *Acacia* and *Musa*, is shown to be a sibling species to *M. colombiensis*, a foliar pathogen of *Eucalyptus*. *Mycosphaerella citri*, an important leaf and fruit pathogen of *Citrus* (*Rutaceae*), is shown to also occur on *Musa* (*Musaceae*) and *Acacia* (*Leguminosae*).

Taxonomic novelties: *Cercospora acaciae-mangii* Crous, Pongpanich & M.J. Wingf. sp. nov., *Mycosphaerella acaciigena* Crous & M.J. Wingf. sp. nov. (anamorph *Pseudocercospora acaciigena* Crous & M.J. Wingf. sp. nov.), *Mycosphaerella thailandica* Crous, Himaman & M.J. Wingf. sp. nov. (anamorph *Pseudocercospora thailandica* Crous, Himaman & M.J. Wingf. sp. nov.).
Key words: *Acacia*, *Ascomycetes*, *Cercospora*, *Mycosphaerella*, *Pseudocercospora*, *Stenella*, systematics.

INTRODUCTION

Plantations of exotic tree species in the tropics and Southern Hemisphere sustain important industries producing solid wood products and pulp. In many situations, they provide an alternative to logging of native forest trees and they contribute substantially to the economies of many developing countries. The most extensively planted trees in these plantations are species of *Pinus* L., *Eucalyptus* L'Herit. and *Acacia* L. Australian *Acacia* species have been planted as exotics in the tropics and Southern Hemisphere for many years. Until relatively recently, however, these have been less extensively planted than *Pinus* or *Eucalyptus* spp. In areas with temperate climates, *Acacia* spp. with pinnate leaves such as *Acacia mearnsii* De Wild. and *A. dealbata* Link are planted, although on a limited scale. More recently, phyllodenous *Acacia* spp. such as *Acacia mangium* Willd., *A. crassicarpa* A. Cunn. ex Benth. and *A. auriculiformis* A. Cunn. ex Benth. have been planted extensively in plantations in the tropics (Old *et al*. 2000).

The success of exotic plantation forestry can, to some extent, be attributed to the separation of trees from their natural enemies (Wingfield *et al*. 2001). In terms of *Acacia* spp., virtually nothing is known regarding the diseases that affect these trees, particularly where they are planted as exotics. A preliminary synthesis of the diseases of phyllodenous *Acacia* spp. was made by Old *et al*. (2000), and from this study it was clear that many pathogens were poorly defined and required rigorous taxonomic study.

Leaf and shoot pathogens belonging to the genus *Mycosphaerella* Johanson, have had a very distinct impact on plantations in the tropics and Southern Hemisphere. The pine pathogen *Dothistroma septosporum* (Dorog.) M. Morelet (teleomorph *M. pini* E. Rostrup) that has devastated plantings of *P. radiata* D. Don in many Southern Hemisphere countries is one example (Stone *et al*. 2003). Likewise, species of *Mycosphaerella* have had a very marked impact on *Eucalyptus* species planted in this area. For example, Mycosphaerella leaf blight resulted in the abandonment of *E. globulus* Labill. as a plantation species in South Africa (Purnell & Lundquist 1986), and this and