

The use of sentinel plantings in forest biosecurity; results from mixed eucalypt species trails in South-East Asia and Australia

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INTRODUCTION

Many diseases of *Eucalyptus* species have emerged as pathogens in exotic plantations. Guava rust (*Puccinia psidii*), cryphonectria canker (*Crysothecium cubensis*), coniotherium canker (*Colletogloeopsis zuluensis*) and Kirramyces leaf blight (*Kirramyces destructans*) are all serious pathogens that have not been found in native forests or in plantations in Australia (Burgess & Wingfield 2002; Cortinas *et al.* 2006; Glen *et al.* 2007; Wingfield *et al.* 2001). The susceptibility to these pathogens of *Eucalyptus* spp. commonly used in exotic plantations is known; however the susceptibility of many *Eucalyptus* spp. found only in natural ecosystems in Australia is unknown. There are two main uses of sentinel plantations. Firstly, tree species known to be susceptible to different pathogens can be planted within the natural environment to try and trap pathogens from their surroundings. In Australia, taxa trials planted in different environments act as sentinel plantings. By surveying these taxa trials we have collected and described a number of new eucalypt pathogens and reported the presence in Australia of *Kirramyces destructans*. The second use for sentinel planting is where many tree species are planted in a region known to harbour certain pathogens. In this manner the susceptibility of the different tree species can be determined.

MATERIALS AND METHODS

Taxa trials and adjoining natural vegetations have been surveyed in tropical and sub-tropical Australia. This involves collection of diseased leaf and canker material, isolating the fungus using standard techniques and identification of the fungi using classic taxonomy and molecular phylogeny

We have established sentinel trials of 25 eucalypt species in Vietnam, China and Thailand in regions known to harbour *Kirramyces destructans* and *Colletogloeopsis zuluensis*. To date only the trial in Vietnam has been surveyed for impact of leaf pathogens and insects. In addition, trees have been inoculated with *Colletogloeopsis zuluensis* and lesion formation and lesion length measured. A matching trial has also been planted in northern Australia.

RESULTS AND DISCUSSION

We have focused our sampling in northern Australia on fungi causing disease; on leaves the Mycosphaerellaceae predominated, especially *Kirramyces* species, the dominant pathogens in cankers belong to the Botryosphaeriaceae. Many of the species found have been described on eucalypts either in Australia, but often elsewhere where eucalypts are grown. Several new fungal species have been described. In the trial in Northern Australia only eucalypt species already known to be susceptible to *K. destructans* developed Kirramyces leaf Blight. The other 20 eucalypt species did not develop symptoms

The trials in Vietnam have been monitored with the main finding being an expansion of the host range of the gall wasp *Leptocybe invasa* and the leaf pathogen *Quambalaria eucalypti* and the discovery of a new *Quambalaria* sp (Figure 1). The greatest lesion length after inoculation with *Colletogloeopsis zuluensis* was observed for *Eucalyptus saligna* and *E. pellita*, two species

not previously known to be affected. The trials in China and Thailand will be assessed in July 2009 prior and results available prior to the APPS conference in October

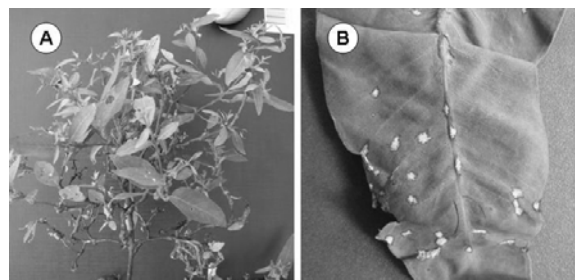


Figure 1. (A) *Leptocybe* damage on young petioles, (B) *Quambalaria* spp. forming white spots on leaves

These sentinel trials, established in Asia, will provide valuable information on the susceptibility to some of the keystone tropical *Eucalyptus* spp. to various exotic pathogens.

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REFERENCES

1. Burgess TI, Wingfield MJ, 2002. Impact of fungi in natural forest ecosystems; A focus on *Eucalyptus*. In: K Sivasithamparam, KW Dixon, RL Barrett (eds), *Microorganisms in Plant Conservation and Biodiversity*, Kluwer Academic Publishers, Dordrecht. pp. 285–306.
2. Cortinas M-N, Burgess TI, Dell B, Xu D, Wingfield MJ, Wingfield BD, 2006. First record of *Colletogloeopsis zuluense* comb. nov., causing a stem canker of *Eucalyptus* spp. in China. *Mycological Research*. **110**: 229–236.
3. Glen M, Alfenas AC, Zauza EAV, Wingfield MJ, Mohammed C, 2007. *Puccinia psidii*: a threat to the Australian environment and economy—a review. *Australasian Plant Pathology*. **36**: 1–16.
4. Wingfield MJ, Slippers B, Roux J, Wingfield BD, 2001. Worldwide movement of exotic forest fungi especially in the tropics and Southern Hemisphere. *Bioscience*. **51**: 134–140.