

The use of sentinel planting in biosecurity

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Summary

Taxa trials of various *Eucalyptus* species in tropical northern Australia act as sentinel planting, trapping normally cryptic endemic fungi from natural ecosystems. Over the past 6 years we have surveyed many such trials in northern Australia resulting in new host records and distributions and new species descriptions. Sentinel trials of endemic tropical *Eucalyptus* species planted in Asia in regions known to harbour devastating pathogens absent from Australia have been established and are providing valuable information on host species susceptibility to these pathogens.

Introduction

Many diseases of *Eucalyptus* species have emerged as pathogens in exotic plantations. Guava rust (*Puccinia psidii*), cryptonecrotia canker (*Crysoporthe 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, Gryzenhout *et al.* 2004, Wingfield *et al.* 1996, 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.

Material 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 *Eucalyptus* 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 recently been inoculated with *Colletogloeopsis zuluensis* and lesion formation and lesion length will be measured.

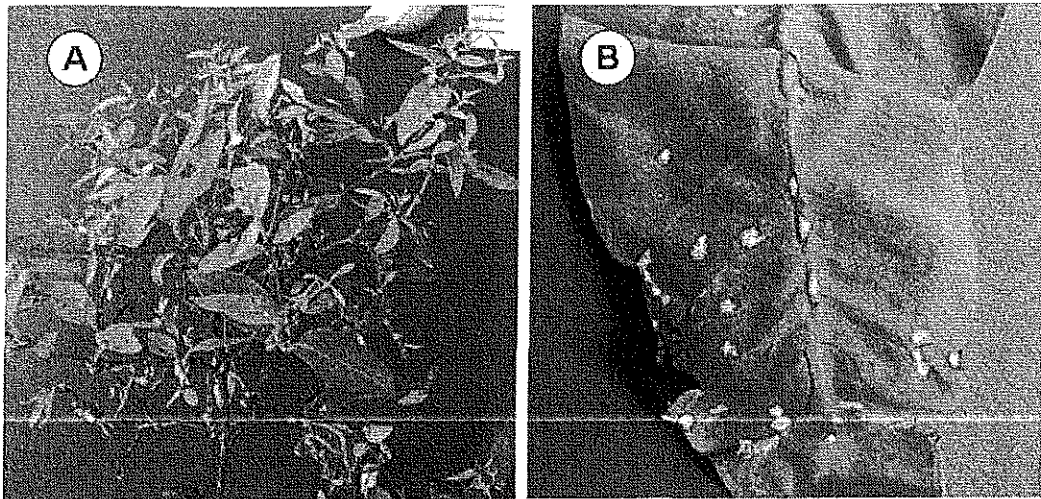


Figure 1: (A) *Leptocybe* damage on young petioles, (B) *Quambalaria* spp. forming white spots on leaves

Results and Discussion

We have focussed 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.

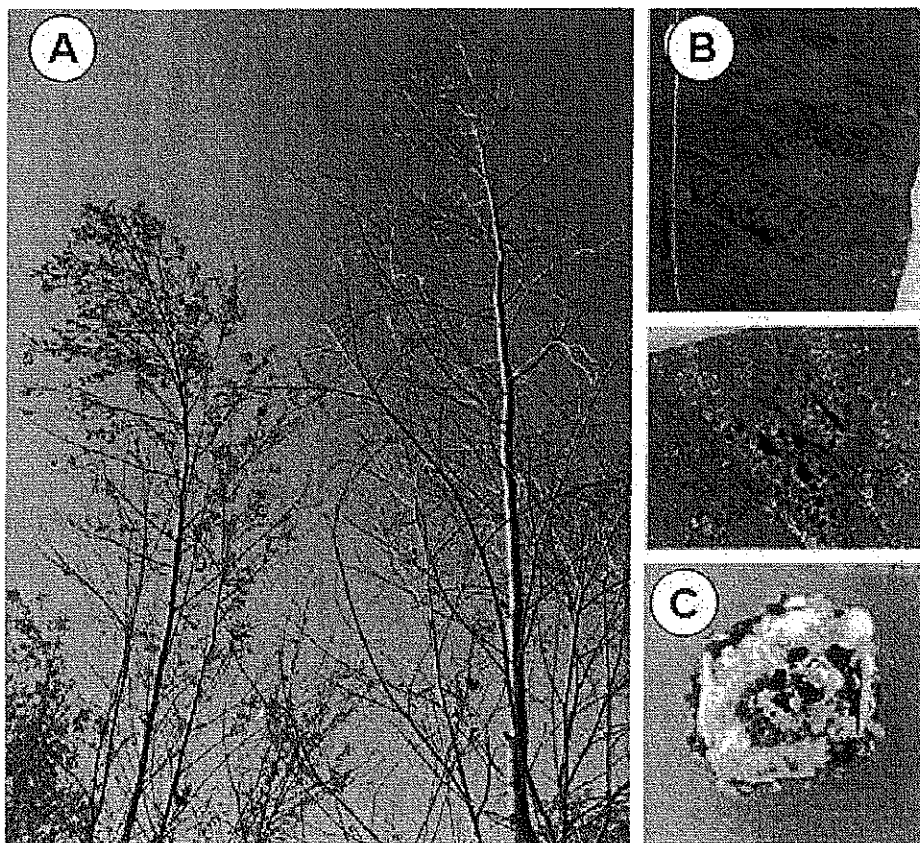


Figure 2: (A) impact of *Kirramyces viscidus* in the Atherton Tablelands, northern Queensland (B) symptoms on leaves (C) colony on MEA

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

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