Kirramyces destructans sp. nov., a serious leaf pathogen of Eucalyptus in Indonesia

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Received 28 May 1996; revised 23 August 1996

A number of Kirramyces J. Walker et al. species, formerly accommodated in the genus Phaeoseptoria Speg., are pathogens of Eucalyptus L’Hér. spp. A new species, K. destructans M.J. Wingf. & Crous sp. nov., associated with a leaf blight disease in northern Sumatra, Indonesia, is described. This disease is most common on leaves of E. grandis Hill: Maid., but has also been observed on other Eucalyptus spp.

Keywords: Eucalyptus, Kirramyces destructans, systematics.

Introduction

Species of Eucalyptus L’Hér. are being propagated extensively as exotics in plantations in many parts of the world and form the basis of important paper and pulp, as well as timber industries. These trees are largely separated from their natural enemies and are also exposed to new pests and diseases, native to the countries where they are now propagated (Ferreira 1989; Wingfield 1990; Sankaran et al. 1995). Serious disease problems have already emerged in some areas, and it is reasonable to expect that this is a trend that will continue in the future (Wingfield 1990).

A remarkably wide range of fungi is known to infect Eucalyptus leaves (Gibson 1975; Sankaran et al. 1995). Only a small number of these, however, are pathogens that have a serious impact on tree growth. Amongst the more important ones are various species of Mycosphaerella Johnson (Park & Keane 1982, 1984; Crous & Wingfield 1996), Cylindrocladium Morgan (Crous & Wingfield 1994), and Eucalyptus rust caused by Puccinia psidii G. Winter, which also infects shoots and small branches (Ferreira 1989).

The genus Kirramyces J. Walker et al. was established for folliculous pathogenic coelomycetes in the Phaeoseptoria-like complex (Walker et al. 1992). Species with pigmented, distoseptate conidia and smooth, anellidic conidiogenous cells were placed in Sonderhenia Swart & J. Walker. Others, with pigmented, euseptate, verruculose, cylindrically to oblate conidia, and pigmented, verruculose, percurrently proliferating conidiogenous cells, were accommodated in Kirramyces. Presently, three species of Kirramyces have been described from Eucalyptus (Walker et al. 1992), one from Protea L. (Sutton 1993), one from Phormium J.R. Forster & G. Forster (Palme 1996) and one from Hebe Comm ex Juss. (Wu et al. 1996).

Walker et al. (1992) noted that there are several additional species of Kirramyces on Eucalyptus that await taxonomic treatment. Of the species presently known from Eucalyptus, our Indonesian collection must be compared with K. epipheoides (Cook & Massiee) J. Walker et al., K. eucalypti (Cook & Massiee) J. Walker et al. and K. liliicune J. Walker et al. Of these taxa, Kirramyces destructans is most similar to K. eucalypti (conidia 25–48 × 2–3 μm, 0–2-septate) and K. liliicune (conidia 35–50 × 16–7 μm, 1–3-septate). In conidial shape, it is distinct from K. liliicune, but similar to K. eucalypti. It can, however, be distinguished from both species by having longer, variously curved, (1–)3-septate conidia, (30–)50–65–(70) × 2.5–(3) μm. The Indonesian collection from Eucalyptus is, therefore, newly described as follows:

Kirramyces destructans Wingfield & Crous sp. nov., Figures 1–4

Maculae folii irregulares vel subcircularis, 10–20 mm diam., aut urentes areas magnas laminae, pallide brunneae ambobus in superficiebus, limbus diffusus, margo rufobrunneus si praesens est. Indicia variant ab uridine surelli usque ad maculas folii magnas subcircularis vel folii uredine. Mycelium internum, pallide brunneum, septatum, ramosum, laeve, 2–3.5 μm diam. Conidiomata pycnidioideae, hypogena, substomatata, sparsa, atra, globosa vel subglobosa, unicellularia, 50–150 μm alta, 50–130 μm diam.; paries texturae angularis constans ex 2–3 stratis cellarii brunnearii. Ositolum singular, centrale, exigue papillatescente in pycnidioiis maturis. Conidiophora reducet us cells conidiogenes. Cellae conidiogenae discrete, pallide brunneae, doliformes vel subcylindricae, verruculoseae, 1–3 proliferationibus percurrentibus, 4–6 × 5–7.5 μm. Conidia holoblastica, solitaria, sicca, exsudantia in cirris longis, formationis massa atras in folii superificie, cylindrica, apex obs. vel exige angusta; sepsi apicali usque apicem subaequata ut inventum in K. eucalypti; basis truncata, 1.5–2 μm lata, raro segmento minuto marginali; varie curvata, varie recta, crassitunicata, pallide brunnea, verruculosa, guttulata, (1–)3-euseptata, (30–)50–65–(70) × 2.5–(3) μm.

Leaf spots irregular to subcircular, 10–20 mm diam., or blighting large areas of the lamina, light brown on both surfaces, border diffuse, margin red-brown when present. Symptoms vary from shoot blight to large subcircular leaf spots or leaf blight. Mycelium internal, pale brown, septate, branched, smooth, 2–3.5 μm diam. Conidiomata pycnidioideae, hypogena, substomatata, scattered, black, globosa vel subglobosa, unicellularia, 50–150 μm high, 50–130 μm diam.; wall of textura angularis, consisting of 2–3 layers of brown cells. Ostiole single, central, becoming slightly papillate in mature pycnidia. Conidiophores reduced to conidiogenous cells. Conidiogenous cells discrete, pale brown, doliform to subcylindricum, verruculose, with 1–3 enteroblastic, percurrent proliferations, 4–6 × 5–7.5 μm. Conidia holoblastic, solitary, dry, exuding in long cirri, forming black masses on the leaf surface, cylindrica, apex obtuse, or tapering slightly from its apical septum to a subacute apex as found in K. eucalypti; base truncata, 1.5–2 μm wide, minute marginal frill mostly absent; variously curved, rarely straight, thick-walled, light brown, verruculose, guttulata, (1–)3-euseptata, (30–)50–65–(70) × 2.5–(3) μm.
Figures 1-3  Leaf symptoms associated with Kirrmymes destructans. 1. A young E. grandis tree with severe defoliation. 2. Initial water-soaked symptoms on the abaxial leaf surface. 3. Chlorosis visible on the adaxial leaf surface of newly infected leaves.


Kirrymece destructans, which has been collected from a few unidentified Eucalyptus spp., appears to be a particularly virulent pathogen of young (1-3-year-old) E. grandis Hill ex Maid. trees in Northern Sumatra. Infections occur on young leaves and even in unopened shoots. Infected leaves are often malformed, and on older leaves, the veins commonly display a purple discoloration. On heavily infected leaves, most stomata are individually infected, and under moist conditions, masses of black conidia are found on the undersurface of these leaves.

The leaf blight disease associated with K. destructans has not been recorded outside Sumatra. In their description of the genus Kirrmymes, Walker et al. (1992) noted that they were aware of a number of undescribed taxa on Eucalyptus, but suggested that additional surveys were required to clarify this situation. It would be interesting to compare K. destructans with new collections from Australia.

Kirrymece epicoccoides is a well-known pathogen of Eucalyptus and has been recorded from most parts of the world where these trees are propagated (Crous et al. 1988; Walker et al. 1992; Sankaran et al. 1995). This fungus is generally of minor importance in that it occurs on older leaves or leaves on stressed trees (Nichol et al. 1992a, b). In this regard, K. destructans is apparently unusual in that it is a destructive pathogen of actively growing tissue. K. epicoccoides is common on trees damaged by K. destructans and can even be found on the same leaves. The discrete purple-coloured lesions associated with K. epicoccoides are, however, quite distinct from those associated with K. destructans, and the presence of these two related fungi can usually be determined prior to light microscopy.

Diseased leaves, buds and young shoots collected in Indonesia suggest that K. destructans is a highly virulent pathogen. However, as no inoculations have been done with this pathogen to date, very little is known of its biology and potential importance to the forestry industry. There is clearly an urgent need for detailed studies of the biology of this fungus, including determination of host range and conditions favouring infection.
Figure 4 Kirramyces destructans. A. Conidia and percurrently proliferating conidiogenous cells. B. Outer wall layer of a pycnidium. C. Vertical section through a pycnidium. (Scale bar: 10 μm.)

Acknowledgements
The authors gratefully acknowledge the assistance of Dr Mark Lewty and Sector Managers of Iodaryon for assistance with disease surveys and the financial support that made this study possible. The South African Foundation for Research Development (FRD) is also thanked for financial support.

References