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NEW OR UNUSUAL RECORDS

Gummosis and wilt of *Acacia mearnsii* in South Africa caused by *Ceratocystis fimbriata*

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A dieback of *Acacia mearnsii* trees was observed in the Mkomasi river valley, Natal Province, South Africa. A fungus, tentatively identified as *Ceratocystis fimbriata*, was consistently isolated from affected twigs and branches. Reinoculation of the pathogen resulted in the development of typical wilt and dieback of *A. mearnsii* seedlings and saplings and in a dieback of *Protea cynaroides* plants. This is the first report of this disease in South Africa.

Acacia mearnsii (black wattle) is an important plantation tree in South Africa. An extract from the bark is used in leather tanning and the timber is used for mine props, poles and in the pulp and rayon industries. The tree is also an important invasive weed, particularly along water courses, in many parts of the country (Boucher, 1978).

During April 1990 gummosis and dieback of *A. mearnsii* trees was observed in a small stand of trees in the Mkomasi river valley near Bulwer in Natal Province. The top of one tree had died while branch dieback was observed on several other trees. Gum exuded from red-brown to grey discoloured areas of bark on affected branches and brown streaking was evident in the wood (Figs 1 and 2). All the affected trees had been mechanically damaged to some extent owing to the lopping of branches.

Stem segments from affected, living branches were dipped in 98% ethanol, allowed to dry and the bark removed with a sterile scalpel. Segments of the outer wood (1–2 mm^3) were placed on potato dextrose agar (PDA) and incubated at 24°C. A fungus tentatively identified as *Ceratocystis fimbriata* (Morgan-Jones, 1967; Upadhyay, 1981) was consistently isolated. The perithecia (Fig. 3a) formed in culture were unornamented and 100–230 μm in diameter at the base. The necks were up to 520 μm long with distinct ostiolar hyphae (Fig 3b and d). Ascospores were typically hat-shaped (Fig 3c and d), 4·5–8 × 2·5–4·5 μm. Conidiophores, typical of those of *Chalara* spp., were up to 80 μm long, tapering towards the tip. Conidia were cylindrical, 10–21 × 3–5 μm or barrel shaped, 6–9 × 4–8 μm (Fig 4a and b).

Five seedlings each of *A. mearnsii* and *Protea cynaroides* (approximately 50 cm and 20 cm tall respectively) and 10 saplings of *A. mearnsii* (2–10 cm stem diameter) were inoculated during May 1990 with a single-conidium isolate of *C. fimbriata* (PPRI 4501) from *A. mearnsii*. The potted seedlings were inoculated by inserting a 2 × 2 mm piece of 3-week-old PDA culture under a flap of bark (approximately 3 × 5 mm) on the stem 10 cm above soil level. The saplings, growing on a river

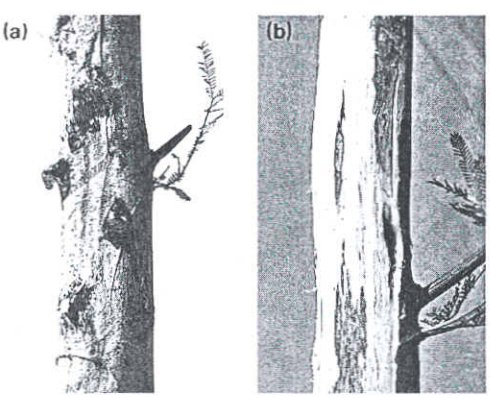

Fig. 1. *Acacia mearnsii* infected by *Ceratocystis fimbriata*. (a) Stem of a young tree showing gum and stem depressions. (b) Stem with the bark removed showing wood discolouration.

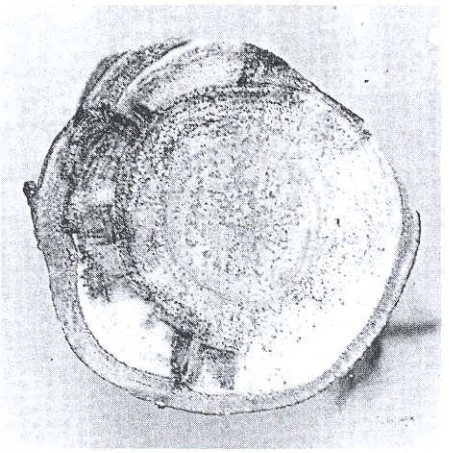

Fig. 2. Transverse section of the stem of a young *Acacia mearnsii* tree infected by *Ceratocystis fimbriata* showing wood discolouration.

bank near Stellenbosch, were inoculated by removing a 5 mm diameter plug of bark from the stem, approximately 1 m above soil level, with a cork borer, and replacing it with a plug of 3-week-old PDA culture of the fungus. Five seedlings of each species and five saplings were inoculated with sterile PDA as controls. Inoculation wounds were bound with parafilm which was removed after 6 days. Inoculated seedlings were kept in a plant tunnel at 15–30 C.

Greyish patches (1–2 cm long) were observed on the bark up to 5 cm above the point of inoculation on all inoculated *A. mearnsii* seedlings 1–2 weeks after inoculation. Additional discoloured patches continued to appear higher up the stem and by 4 weeks the upper portions of the seedlings had wilted and died. Tendrils of gum oozed from the discoloured bark. Disease progress down the stems was slower but by 10 weeks after inoculation all seedlings were dead. Similar greyish patches in the bark appeared at irregular intervals up and down the stems of inoculated saplings. When the bark was stripped from one stem 10 days after inoculation, a streak of discoloured sap-wood was observed extending 16 cm above the point of inoculation. The fungus was readily reisolated from this discoloured sapwood. Copious quantities of gum oozed from discoloured areas. Depressions developed in the stems of affected trees. Eight of the trees had wilted and died above the point of inoculation by 5–7 months after inoculation. Within 18 months all of these trees were dead. A few scattered perithecia were found in cavities under the bark in affected areas of the stems but they were not numerous. A small area of discoloured bark developed around the inoculation wounds on the remaining two saplings but no further symptoms developed. No symptoms developed on the control plants.

Disease development was slower on *P. cynaroides* seedlings. Bark around all the inoculation wounds became discoloured and this spread slowly, eventually encircling the stem and killing the shoot above. Protruding stromata containing neckless perithecia of *C. fimbriata* developed on the dead bark. The fungus was readily reisolated from the lesion edges.

Ceratocystis fimbriata is a well-known plant pathogen in many parts of the world and has a comparatively wide host range including both woody and herbaceous plants (Upadhyay, 1981). Although this is the first report of *C. fimbriata* causing a disease of *A. mearnsii*, it has been recorded recently on *Acacia decurrens* in Brazil (Ribeiro *et al.*, 1988).

Despite the widespread occurrence of *C. fimbriata* in the world (Morgan-Jones, 1967), there is only one previous record of its occurrence in South Africa (Gorter, 1977). This is based on a collection of the fungus on *Protea gigantea* from a glasshouse in the Transvaal. *P. gigantea* is not a recognized *Protea* species and this record probably refers to the king protea, *P. cynaroides*. In addition, a number of herbarium specimens annotated as representing this species are lodged with the National Collection of Fungi, Pretoria (PREM). The earliest of these collections (PREM 43142), from a wooden plank, dates from 1963 and could not be verified owing to insufficient material. Two subsequent collections, PREM 44932 and PREM 48263, from *P. cynaroides* and *Protea grandiceps*, respectively appear to have been correctly identified. Despite these collections and the dieback caused on inoculated seedlings of *P. cynaroides* in this study, the fungus does not appear to be an important pathogen of Proteas and is not recorded in a recent list of diseases of *Protea*, *Leucospermum* and *Leucadendron* in South Africa (Knox-Davies *et al.*, 1987).

The absence of any major disease outbreaks by this potentially devastating pathogen in the commercial plantations of *A. mearnsii* in Natal may indicate the absence of a suitable vector. Spread of the disease in the trees in the Mkomasi Valley may be attributed to the mechanical damage to these trees. As *A. mearnsii* is a major invasive

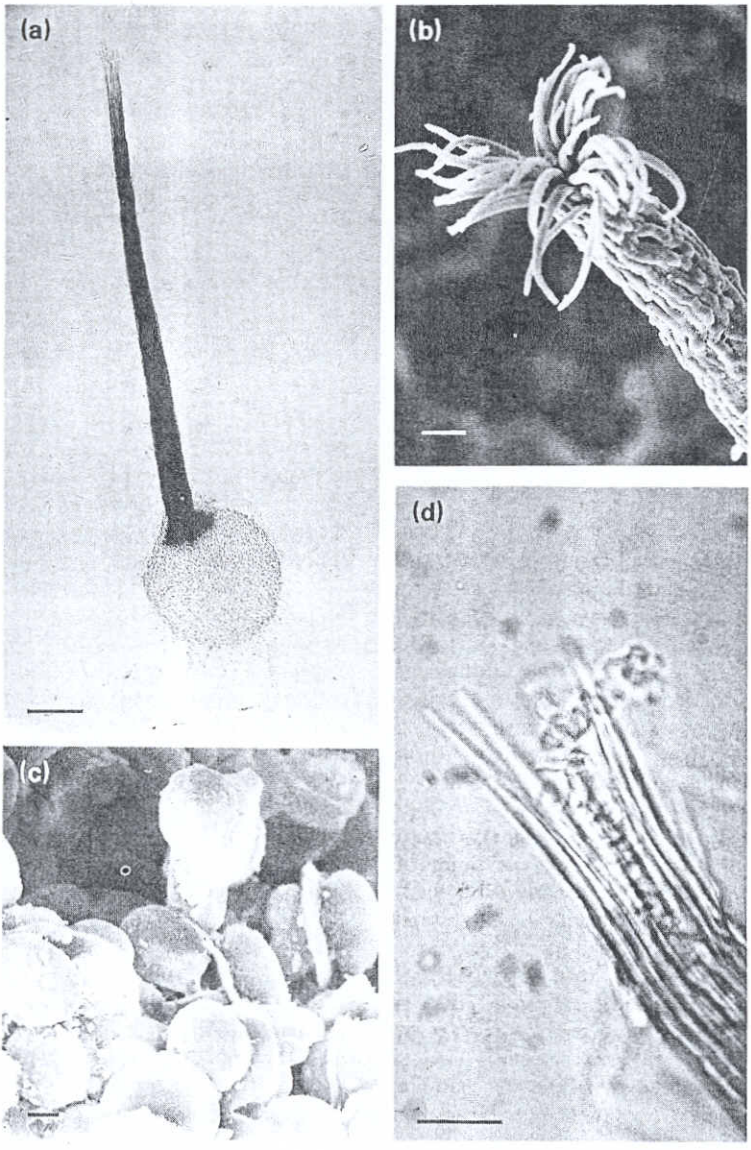

Fig. 3. Perithecia and ascospores of *Ceratocystis fimbriata*. (a) Perithecium with light base and dark neck; scale bar = 55 μm. (b) Divergent ostiolar hyphae; scale bar = 10 μm. (c) Hat-shaped ascospores; scale bar = 1 μm. (d) Hat-shaped ascospores emerging from ostiole; scale bar = 10 μm.

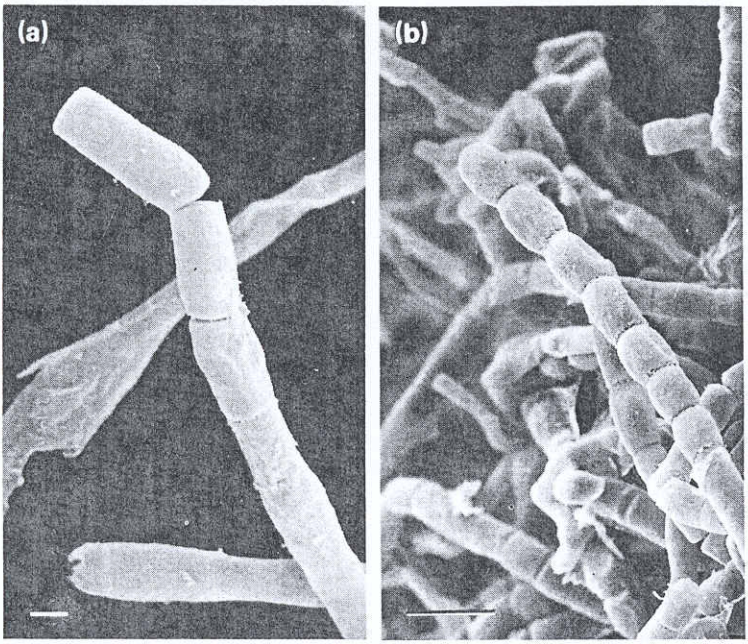

Fig. 4. Conidia and conidiophores of *C. fimbriata*. (a) Cylindrical conidia emerging in chains from the apex of a conidiogenous cell; scale bar = 1 μm. (b) Barrel-shaped conidia in chains at the apex of a conidiogenous cell; scale bar = 10 μm.

weed in the other three provinces of South Africa, the potential of *C. fimbriata* as a biological control agent should be considered.

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