

DISEASED *EUPHORBIA* TREES IN SOUTH AFRICA HARBOURS UNEXPLORED FUNGAL AND INSECT BIODIVERSITY, INCLUDING SEVERAL NOVEL SPECIES

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In the last 15 years, there have been alarming reports of large-scale decline and death of *Euphorbia ingens* trees in South Africa. Mortality of these trees has been particularly severe in the Limpopo Province. Symptoms associated with the death of trees include greying and spots on the succulent branches (Figure 1) and infestation by branch and stem boring insects. Earlier investigations into the cause of the disease yielded various fungal and insect groups, including several unknown species. In 2009 researchers from the DST/NRF Centre of Excellence in Tree Health Biotechnology at the University of Pretoria undertook a more detailed study of the possible causes of mortality of these iconic trees as part of an MSc project.



Figure 1: Disease symptoms on *Euphorbia ingens* trees. (A) *Euphorbia ingens* tree with gray discoloration. (B) Dying *E. ingens* tree with rotten branches. (C) Various spots and lesions on a succulent branch from an *E. ingens* tree.

During investigations into the death of *E. ingens*, as well as *E. tetragona* in the Eastern Cape, several fungal groups were obtained. These included fungi in the Botryosphaeriaceae, Cordycipitaceae, Microascales, Nectriaceae, Ophiostomataceae and the Teratosphaeriaceae. Two known species were identified from the Botryosphaeriaceae and two novel species were identified from the Microascales.

From the Botryosphaeriaceae two species of *Lasiodiplodia*, *L. theobromae* and *L. mahajangana* were identified and are associated with die-back symptoms on *E. ingens*. *L. theobromae* was isolated from *Cossonus* Clairville (Coleoptera: Curculionidae, Cossoninae) and *Cyrtogenius africanus* Wood (Coleoptera: Curculionidae, Scolytinae) beetles while *L.*

mahajangana was isolated from blue stain in the wood. They are both well-known from trees in Southern Africa but have not previously been reported on *E. ingens*. Since environmental and other stress factors play an important role in the disease caused by fungi in the Botryosphaeriaceae, the symptoms observed on dying *E. ingens* trees in South Africa could, at least in part, be attributed to *L. theobromae* and *L. mahajangana*. Further and more extensive surveys will be required to fully understand the diversity and distribution of Botryosphaeriaceae on native *Euphorbia* trees and to establish the possible triggers enabling these fungi to attack and thrive on these trees.

From the Microscales two novel species of *Gondwanamyces* were identified and described, *G. serotectus* (*E. ingens*, Figure 2) and *G. ubusi*. These isolates were obtained from *Cossonus* beetles as well as from discolored plant material found in the brown internal parts of succulent branches on diseased trees. This study provides new insights into the distribution, species diversity and host range of the genus *Gondwanamyces*. Previously, only two species of *Gondwanamyces* were known from South Africa, *G. proteae* and *G. capensis*, both from the Western Cape Province. These species were restricted to insect-colonized flowers of *Proteae* species.

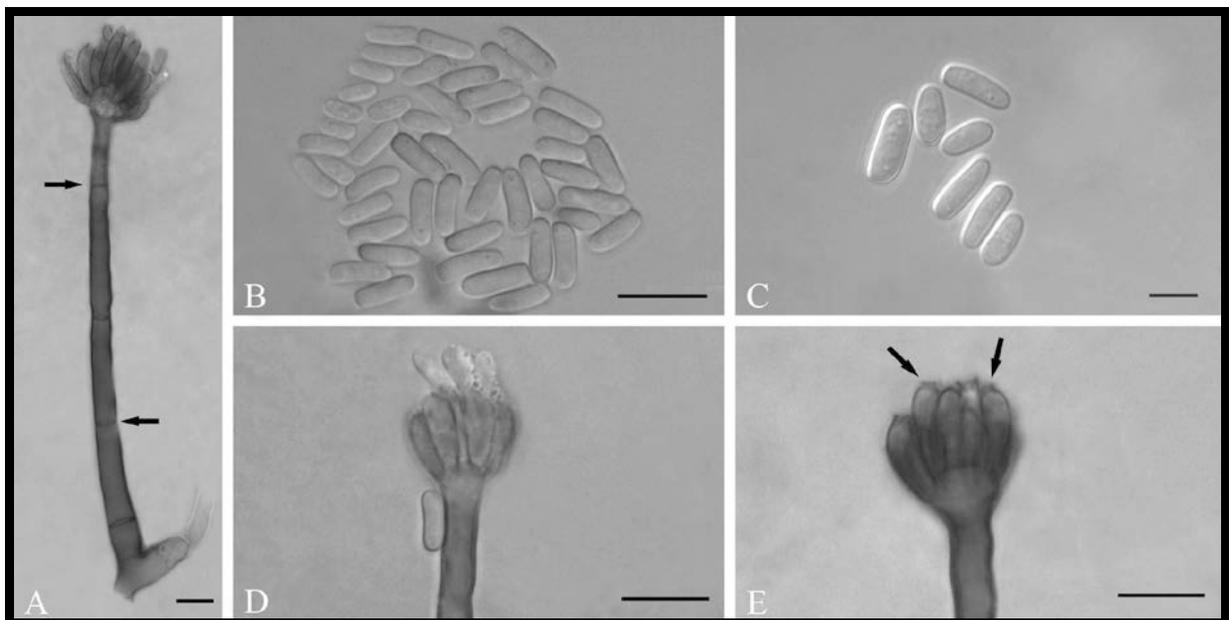


Figure 2. *Gondwanamyces serotectus* (A) Conidiophore showing foot cell and sinuate stipe. (B) Obovate conidia. (C) Conidia of variable size. (D) Conidiophore with phialidic conidiogenous cells and newly produced conidia. (E) Conidiophore with conidiogenous cells showing phialides with distinct collarettes. Bars: A, B, D, E = 10 μ m; C = 5 μ m.

Euphorbia ingens trees in the Limpopo Province are dying at an alarming rate. Prior investigations, including this study, have found a high diversity of fungi and insects on the diseased trees. The roles of these fungi and insects remain uncertain, but it seems that an environmental factor is involved, stressing the trees and making them more susceptible to these fungi and insects.

Related publications:

Van der Linde JA, Six DL, Wingfield MJ, Roux J, 2012. New species of *Gondwanamyces* from dying *Euphorbia* trees in South Africa. *Mycologia* 104, 574-584.

Van der Linde JA, Six DL, Wingfield MJ, Roux J, 2012. *Lasiodiplodia* species associated with dying *Euphorbia ingens* in South Africa. *Southern Forests: a Journal of Forest Science* 73:3-4, 165-173.