



UP scientists unravel hidden plant pathogenic fungi

Scientists from the Department of Genetics and the Forestry and Agricultural Biotechnology Institute (FABI) recently discovered a previously unknown species of a *Eucalyptus* pathogen.

Some fungi that have the same functions in ecosystems look identical, even though they are different species. One such fungal organism is known as *Chrysosporthe austroafricana* (Latin for 'orange destroyer from southern Africa'). This fungus is closely related to *Chrysosporthe cubensis* ('orange destroyer from Cuba', although it occurs throughout South America). Both can self-fertilise and both cause a serious stem disease of plantation *Eucalyptus* (blue gum) trees, which can weaken the stem and cause the tree to die or fall down during high wind. *Chrysosporthe cubensis* is also present in Southeast Asia, where it causes an identical disease.

For a long time scientists thought that the fungus from South America and the one from Southeast Asia might be different species, simply because of the vast distances between them, but evidence for this separation was not forthcoming.

Albe van der Merwe and his co-workers resolved this problem and published their findings in an article in the journal *Fungal Biology*. They used population genetics to show that populations of *C. cubensis* from South America and Southeast Asia are genetically different and do not exchange genetic material.

They sequenced the beta-tubulin gene – which codes for proteins that form part of the cytoskeleton of a cell – and uncovered two DNA sequences that could aid in differentiating the three species of *Chrysosporthe*. When specific enzymes are added to amplifications of this gene from individuals of the fungi, they differentially cut the DNA at these sites, forming different sizes of fragments. These fragments can then be separated based on size, and a profile can be obtained. This represents a breakthrough in developing a quick identification technique, because most laboratories have the equipment and expertise needed to perform this technique.

Once the species could be distinguished from each other, the final task was to describe the fungus from Southeast Asia as a new species. Scientists have recently started to use DNA identification techniques to describe cryptic species in other fungi, although only a few such fungi have been described with new names. The UP scientists followed this trend and used information from the quick identification technique to convince the scientific community that these three species really are different. The fungus was thus described as *Chrysosporthe deuterocubensis* (the 'other' cubensis).

The new information gathered by UP scientists has important implications for quarantine and the continued prosperity of forestry in South Africa. The unholy trinity of gum tree pathogens is represented by three species of *Chrysosporthe*, each of which occurs in a different part of the world. Trade in wood and wood products could introduce one of these species to another part of the world, where it could intensify disease on forest trees. In fact, both *C. cubensis* and *C. deuterocubensis* have already been introduced on the African continent, although those populations are far north of South Africa. Nobody knows what the effect will be when these fungi reach South Africa, and that is why it is important never to transport wood between different countries without a permit.



Fruiting structures of *Chrysosporthe cubensis*