FUNGI ASSOCIATED WITH BARK WOUNDS ON INDIGENOUS AFRICAN TREES

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Figure 1: Typical bark wound on an indigenous tree. Fungal samples were collected from the bark and wood below and adjacent to these wounds

Figure 2: Gum exudation associated with some wounds, two months after wounding

Figure 3: Fungal growth on surface of bark wound

BACKGROUND

In Africa many people rely on plant products for the treatment of ailments. These products are often obtained from the bark of specific tree species. However, there are increasing concern about the survival of these tree species and the sustainability of the bark harvesting techniques used by some people. A project was, therefore, initiated to investigate the impact of different harvesting techniques and wound sizes on the survival of a range of different indigenous tree species in South Africa, Malawi and Zambia.

AIMS

To determine if fungal pathogens infect bark wounds and may result in decline of trees.
To identify the fungi infecting bark wounds in three African countries, namely South Africa, Malawi and Zambia.

MATERIALS AND METHODS

Bark wounds (Figure 1) were created on selected tree species commonly used for the harvesting of bark for medicinal purposes. Between 6-10 weeks after wounding samples were collected from the bark and wood adjacent to the wounds. Material was examined using a light microscope and isolations made from fungi growing on the wound surfaces or under the bark. Isolations were also made by either plating sections of discoloured wood directly onto growth media, or by placing the material in moisture chambers to induce growth and sporulation of fungi.

Fungi were identified using standard mycological keys. The identity of selected isolates were also determined and/or confirmed using DNA sequence data of the ITS and 5.8S regions of the internally transcribed spacer regions of the ribosomal DNA.

RESULTS

Extensive fungal infection associated with wounds was observed. Some trees still exuded gum, even two months after wounding (Figure 2) and in the majority of cases extensive fungal growth was present on the surfaces of the wounds (Figure 3). Some trees did not yet show callus formation after 6-10 weeks, with extensive bark lifting and infection present around the wounds (Figure 4). In some cases the infection had reached a depth of more than 2cm within 6-8 weeks after wounding (Figure 5). A wide range of fungal genera was isolated. These included known saprophytes as well as known pathogens of other tree species.

The geographic distributions and host ranges of important pathogens such as *C. albofundus* (Figure 6) and *C. fimbriata* were greatly expanded through these wounding trials. These pathogens seem a lot more common than indicated by publications and previous reports. Insect activity, especially beetles, was common on many wounds, often accompanied with fungal infection spreading from the tunnels (Figure 7).

Table 1. List of fungal genera isolated, their hosts and geographic range.

FUNGAL TAXON	HOST	AREA
Aspergillus sp.	*Brachystegia speciformis, Julbenardia paniculata, Parinari curatellifolia, Rapanea melaonophloeos, Rhus chirendensis*	Malawi, South Africa, Zambia
Ceratocystis albofundus	*B. busei, B. speciformis, Dalbergia nitidula, J. paniculata, P. curatellifolia*	Malawi, Zambia
Ceratocystis fimbriata	*P. curatellifolia, R. melanophoeos*	South Africa, Zambia
Ceratocystis moniliformis	*B. speciformis, P. curatellifolia, J. paniculata*	Malawi, South Africa, Zambia
Cladosporium sp.	*Ilex mitis, O. bullata, Prunus africana, P. curatellifolia, R. melanophoeos, Rhus chirendensis*	"
Fusarium spp.	*P. curatellifolia*	"
Gliocladium sp.	*O. bullata, P. africana, P. curatellifolia*	"
Mucor sp.	*P. africana*	"
Penicillium sp.	*P. africana, R. melanophoeos*	"
Pestalotiopsis sp.	*O. bullata*	"
Pesotum spp.	*I. mitis, R. melanophoeos, R. chirendensis*	"
Phomopsis sp.		"
Trichoderma sp.	*R. chirendensis*	"

CONCLUSIONS

- Fungal infection of bark wounds poses a threat to the survival of native trees used for medicinal purposes
- The degree of external fungal growth is not an accurate indication of internal infection
- Insects seem to play a role in introducing fungi to wounded trees
- *Ceratocystis albofundus* and *C. fimbriata*, two wilt pathogens commonly infect wounds and have a much wider distribution and host range than previously indicated

Figure 4: Discolouration and infection spreading from bark wound

Figure 5: Fungal infection of wood associated with bark wounds

Figure 6: *Ceratocystis albofundus* fruiting on wood of *Parinari curatellifolia*

Figure 7: Fungal infection associated with beetle attack on wounds

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