FUNGI INFECTING MEDICINAL BARK WOUNDS IN SOUTHERN AFRICA

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Tree Protection Cooperative Programme

CAUSES OF PLANT/TREE DEATH

Biotic	Abiotic
Fungi	Chemicals
Bacteria	Nutrients
Viruses	Environmental conditions eg. Drought, hail, frost etc.
Phytoplasmas	

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FUNGI

Macroscopic eg. *Amanita* spp., *Armillaria* spp.

Microscopic eg. *Ceratocystis* spp., *Botryosphaeria* spp.

Some edible for humans, others toxic

Grow on a wide range of substrates eg. Bread, dung, plants, human skin etc.

CATEGORIES OF PATHOGENS

- Saprophytes
- Opportunistic pathogens
- Primary pathogens

FUNGI CAN CAUSE DEVASTATING DISEASES OF AGRICULTURAL CROPS AND TREES

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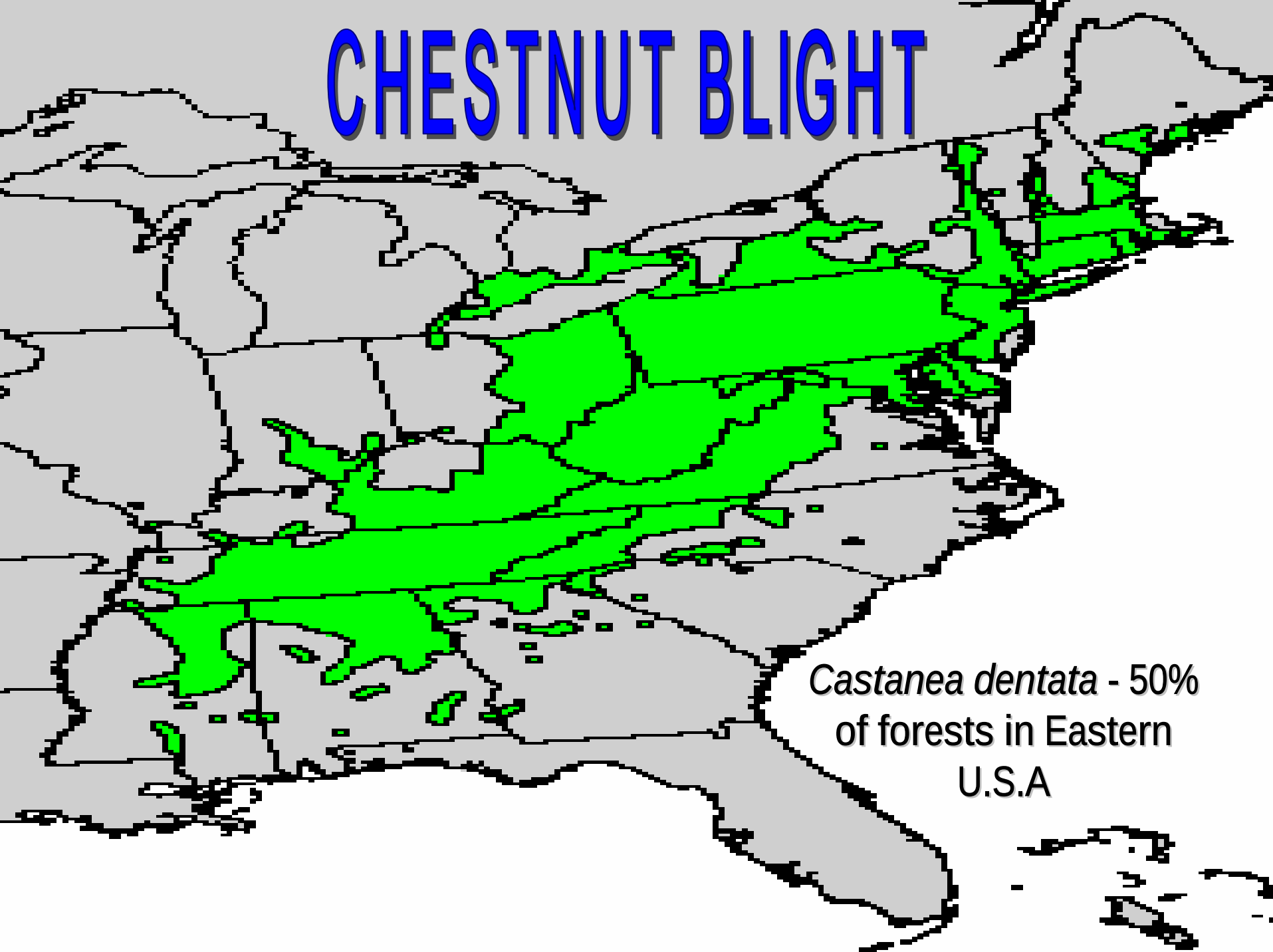
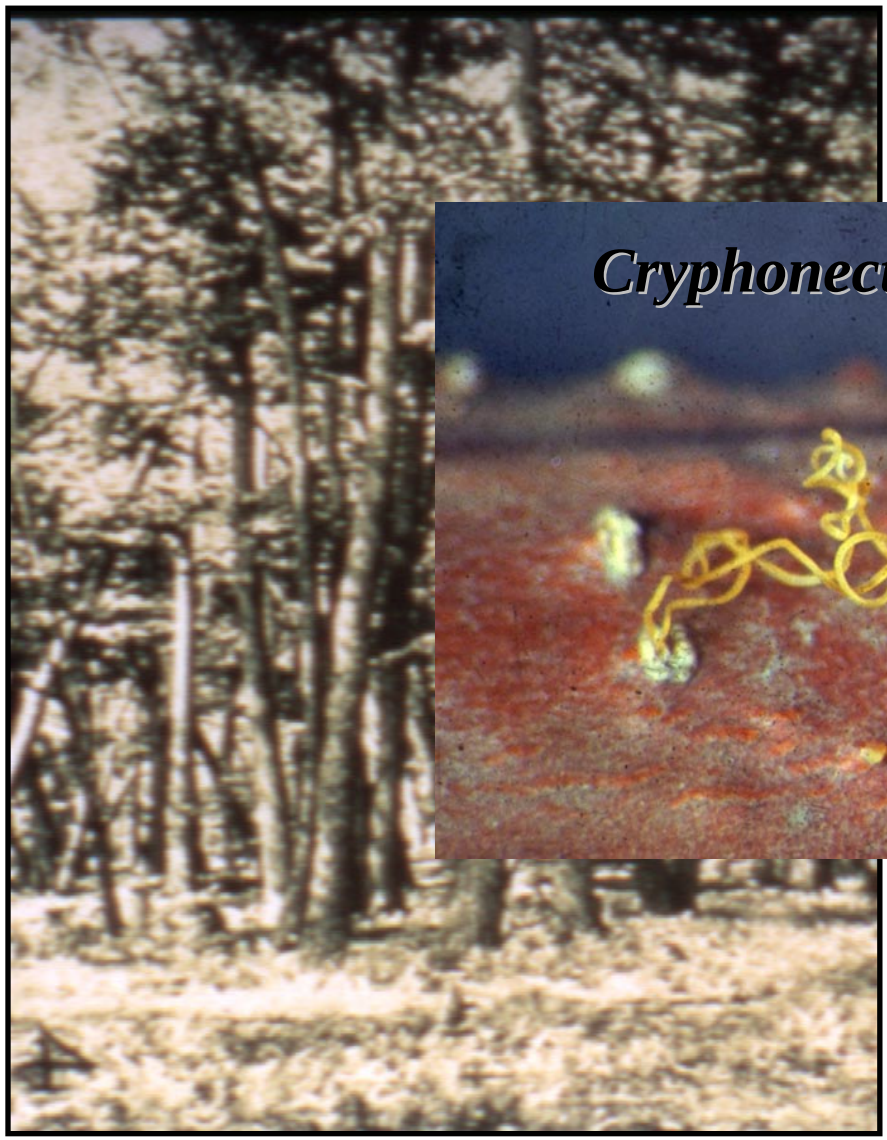
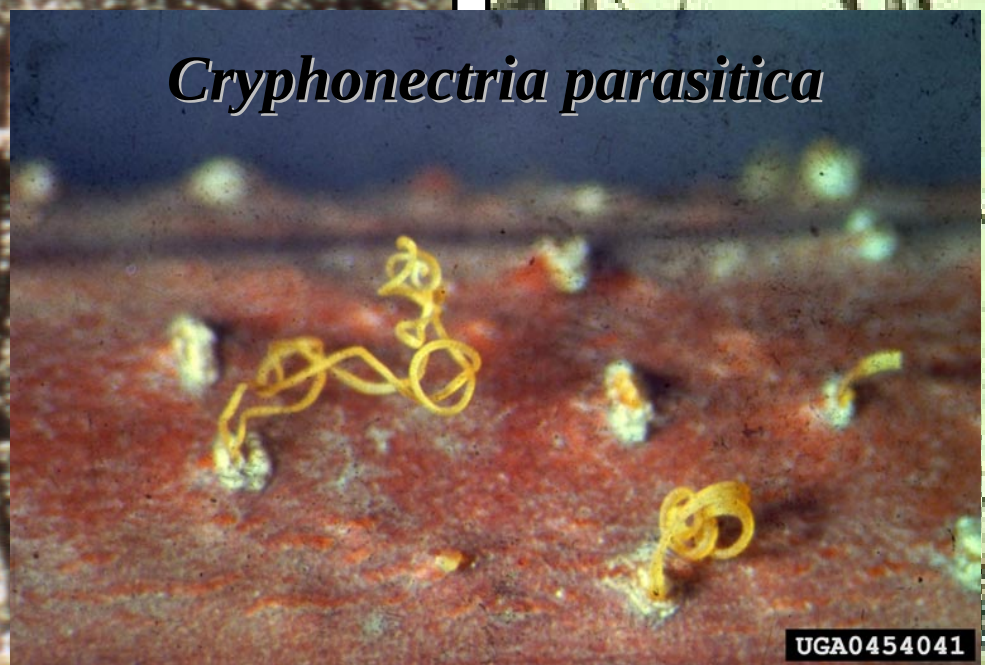
CHESTNUT BLIGHT



Estimated thousand million trees in 1900
1963 only ~180





BARK HARVESTING

If bark harvesting results in fungal infection, why has the trees not died out long ago?

- New pressure on resources
- Higher demand due to larger populations
- Less resources due to land use changes and habitat destructions
- More wounds per tree, larger wounds than in past?
- More competition for resources

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INFECTION MECHANISMS

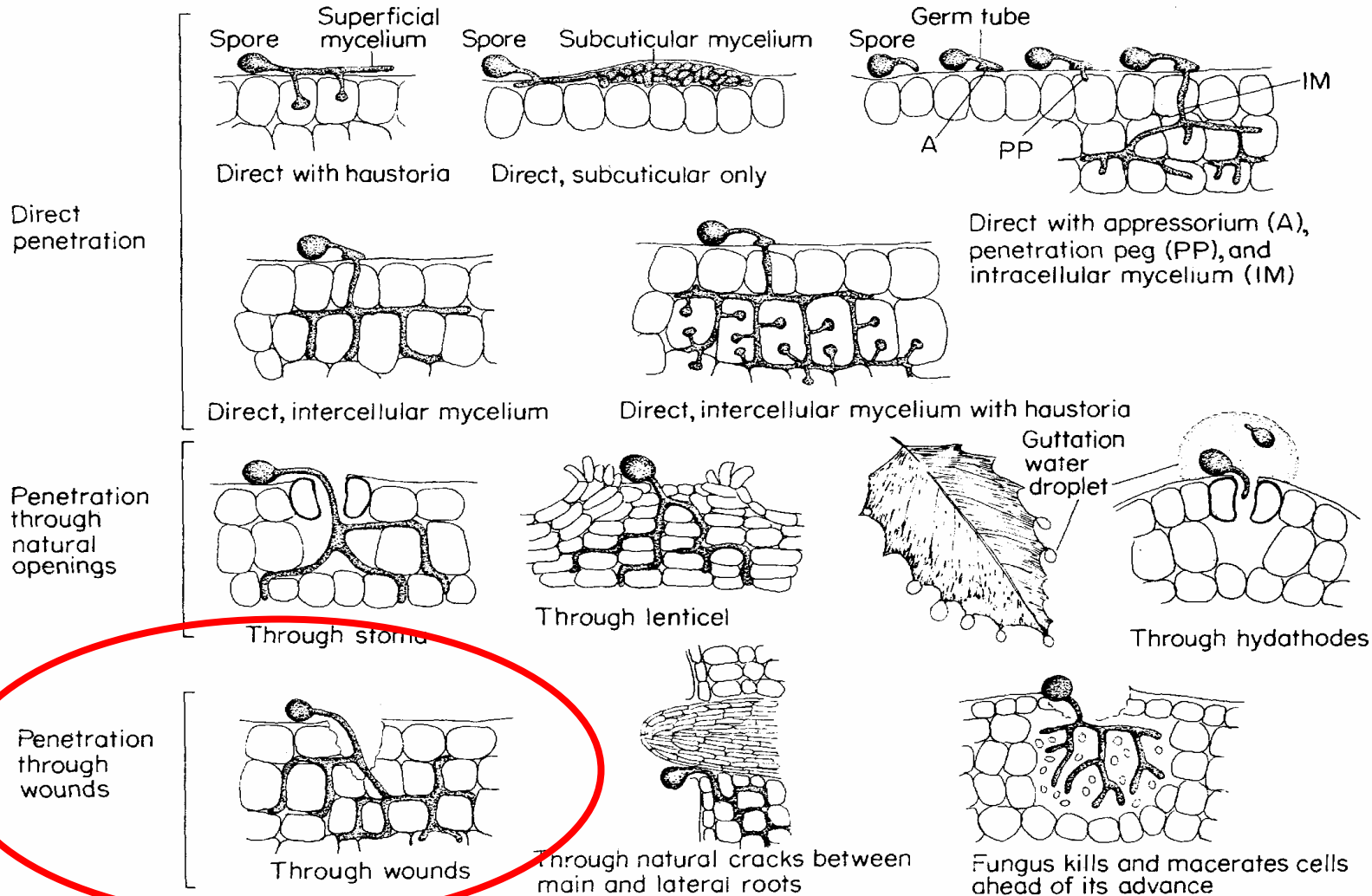

FIGURE 2-4 Methods of penetration and invasion by fungi.

AIMS

To identify the fungi infecting medicinal bark wounds in Southern Africa

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DNA extraction & sequencing

Morphological identification

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RESULTS & DISCUSSION

- **Extensive wood discolouration present in some cases after wounding and fungal infection**
- **No correlation between external fungal growth and internal infection**
- **External fungal growth mostly *Penicillium*, *Trichoderma, Mucor* spp.**
- **Insects associated with streaking visible in some cases – wood boring beetles *Ambrosiodmus tropicus*, *Xyleborus principalis*, *X. ferrugineus*, sap feeders**

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RESULTS & DISCUSSION

Malawi	South Africa	Zambia
C. albifundus	*C. albifundus*	*C. albifundus*
	C. fimbriata sensu lato	*C. fimbriata sensu lato*
Ceratocystis sp.	*Ceratocystis* sp.	*Ceratocystis* sp.
P. quercus *Pesotum* spp.	*Pesotum* spp.	*P. quercus* *Pesotum* spp.

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CERATOCYSTIS SPECIES

- First described from sweet potato – 1890
- Wide host range including hardwoods, agricultural and fruit crops
- Aromatic – fruity, often banana odour
- Insect associates
- Require wounds for infection
- Causes wilt and death of trees, root diseases, fruit rots, stem cankers

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CERATOCYSTIS & OPHIOSTOMA IN AFRICA

- **Very little information known about *Ceratocystis* and *Ophiostoma* spp. from the African continent**
- **Some reports from mostly agricultural crops eg.**
  - ***Thielaviopsis* spp. (as *Chalara*) – Ivory Coast, Zimbabwe, Sierra Leone, Ghana, Nigeria, Kenya**
  - ***Ceratocystis* spp. – South Africa, Ghana**
  - ***Ophiostoma* spp. – South Africa**
- **In last 5 years there have however, been increasing numbers of reports from exotic plantation species in Africa**
- **Knowledge on biodiversity and threat to native African trees unknown**

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CERATOCYSTIS ALBIFUNDUS

Foto: I. Barnes, © FABI, UP

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- **Most important pathogen of exotic *Acacia mearnsii* in South Africa**
- **Results in rapid wilt and death, as well as stem and bark cankers on trees of all ages**

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KNOWN HOST RANGE – S. AFRICA

Protea cynaroides
P. gigantea
P. gaguedi

S. African *Protea* spp.

Acacia caffra
Burkea africana
Faurea saligna
***Combretum* spp.**
Ochna pulchra
Ozoroa paniculata
Terminalia sericea

Native S. African trees

Acacia decurrens
A. mearnsii

Australian *Acacia* spp.

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KNOWN HOST RANGE – E/S AFRICA

KENYA – *A. mearnsii*

UGANDA – *A. mearnsii*

TANZANIA – *A. mearnsii*

Exotic hosts

MALAWI

Brachystegia speciformis

B. busei

Parinari curatellifolia

Pterocarpus angolensis

ZAMBIA

B. speciformis

Dalbergia nitidula

Julbenarida paniculuta

P. curatellifolia

Native hosts

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CONCLUSIONS

- ***C. albifundus*** **a common wound infector**
- **Wide-spread in East and Southern Africa**
- **Serious pathogen of *A. mearnsii***
- **Role on native African hosts under investigation**

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CONCLUSIONS

- **Substantial fungal infection after bark wounding**
- **Longer term monitoring essential to assess true impact**
- **External fungal growth not a true indicator of internal infection**
- **Insects play important role in fungal infection**
- **Two new species of fungi found, one known pathogen of exotic *Acacia* spp.**

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RECOMMENDATIONS

- Type of wound – don't leave "bark flaps"
- Different recommendations for different species and different areas
- Utilize entire trees for sensitive species before they rot, where current data show it is appropriate for that specific species. Less trees required for more product
- We need to know more about fungal/insect interactions with bark wounds and about our native trees in Africa
- Must keep exotic fungi/insects out! – Regional quarantine at least

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