Biosecurity in conservation collections

Plant disease issues in ex situ collections and translocations

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PlantClinic



A total of 17232 species across the three gardens!

12 Species extinct in the wild; 614 critically endangered species; 3 unique environments

Human doctors have it easy!!!!









Fungal Planet 664 – 20 December 2017 *Ochroconis podocarpi* Crous, sp. nov.

Etymology. Name refers to Podocarpus, the host genus from which this fungus was collected.

Classification — Sympoventuriaceae, Venturiales, Dothideomycetes. Mycelium consisting of smooth, pale brown to medium brown, septate, branched, 1.5–2 µm diam hyphae, giving rise to hyphal strands and hyphal coils. Conidiophores erect, 1-septate, unbranched, medium brown, smooth, subcylindrical, 5–16 × 2 µm. Conidiogenous cells terminal, medium brown, smooth, subcylindrical, 5–12 × 2 µm, with 1–4 terminal cylindrical denticles, 1–1.5 × 1 µm. Conidia solitary, medianly 1-septate, fusoidellipsoid to subcylindrical, apex obtuse, base with truncate scar, 0.5 µm diam, medium brown, verruculose, (6–)7–9(–10) × 2(–2.5) µm.

Culture characteristics — Colonies flat, spreading, with moderate aerial mycelium and smooth, lobate margins, reaching 20 mm diam after 2 wk at 25 °C. On MEA, PDA and OA surface amber, reverse chestnut.

Typus. Australia, New South Wales, **Australian Botanic Garden, Mount Annan**, on leaves of *Podocarpus grayae* (Podocarpaceae), 25 Nov. 2016, P.W. Crous (holotype CBS H-23267, culture ex-type CPC 32829 = CBS 143174, ITS, LSU and tub2 sequences GenBank MG386032, MG386085 and MG386162, MycoBank MB823373).

Key management practices for disease control in botanic gardens

- Prevention
- Avoidance
- Quarantine
- Removal
- Awareness

• Pesticide use is the last resort



Phytophthora root rot

- Most important disease of trees and shrubs in Australia
- Enormous host range especially in Proteaceae, Epacridaceae.
- Attacks root system limiting the ability of plants to extract water and nutrients from soil.
- Found in those areas where rainfall greater than 600 mm per annum.
- Once an area is infested the pathogen will remain in the soil for years
- A legislated Key Threatening Process in both NSW and Federal government legislation.

Phytophthora in Australia

- An Oomycete
- 91 species recorded in Australia (+8 species unsubstantiated)
- 27 species are native to Australia
- Phytophthora cinnamomi is the most commonly reported species
- Other common species are:-
 - P. multivora, P. nicotianae, P. palmivora, P. cryptogea, P. pseudocryptogea, P. elongata, P. sojae, P. clandestina, P. citrophthora, P. cactorum, P. drechsleri, P. arenaria, P. thermophila, P. infestans, P. inundata and P. citricola.
- The most important species are introduced exotic pathogens – our flora hasn't evolved defences to the pathogens



Host plants

- 130 host Families416 host Genera
- Exotics and native species
- •Trees, shrubs, herbaceous and annuals

Life Cycle of Phytophthora cinnamomi



Production and release of zoospores of *Phytophthora cinnamomi*



Infection

- Infection occurs on the roots zoospores encyst on the roots and infect.
- Generally infection requires high moisture levels. The spores cannot reach the roots and cannot penetrate the plant roots without moisture.
- The mycelium grows through the roots destroying cells.
- Infections results in a disfunctional root system unable to extract moisture and nutrients.



















Phytophthora cactorum affected eucalypt

Frequency of *Phytophthora* recovered overall



Phytophthora Negative Phytophthora Positive







Sudden oak death

Tanoak (*Notholithocarpus densiflorus*), coast live oak (*Quercus agrifolia*) *Phytophthora ramorum* Photo: USFS Region 5, Flickr Creative Commons.



Kauri dieback Agathis australis; Phytophthora agathidicida Photo: Peter Scott SCION

> Pine dieback Pinus spp.; Phytophthora pluvialis Photo: Scion, NZ;

