Invaded forest landscapes: *Ceratocystis* in Malaysian forest plantations

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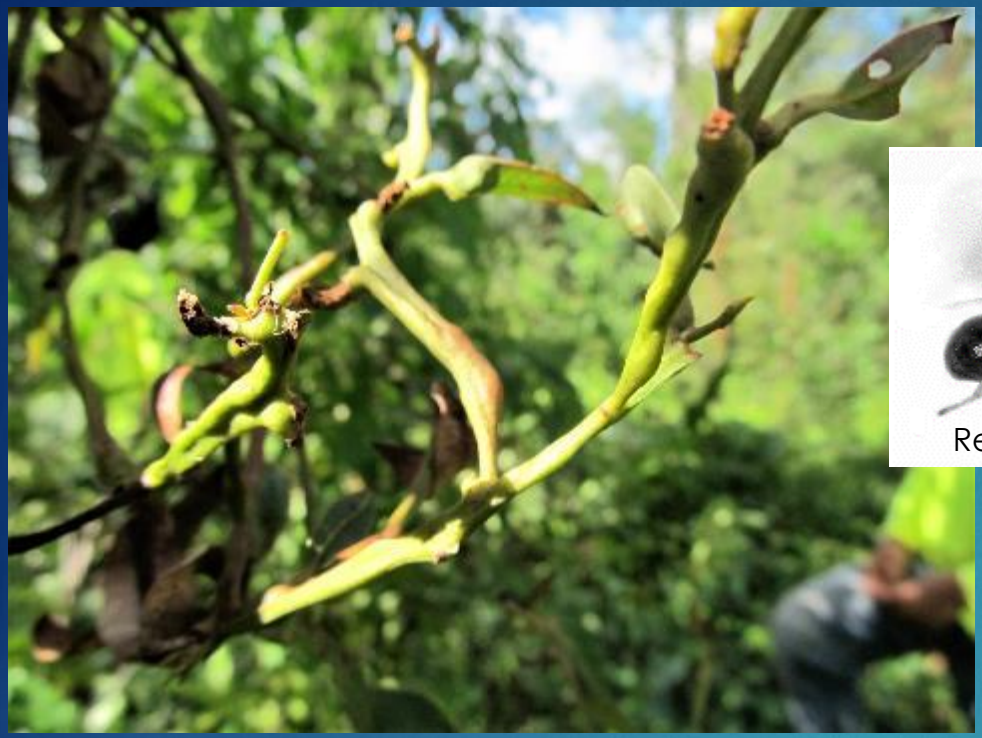
APFISN Workshop, 22-27 October 2017, Colombo, Sri Lanka

Malaysia's major IAS (for plant & forestry sector)

- *Acacia confusa*
- *Cercropia peltata* (Trumpet tree/Snakewood)
- *Clidemia hirta* (Koster's curse)
- *Chromolaena odorata* (Siam weed)
- *Candidatus liberobacter asiaticum* (citrus greening disease)
- *Erwinia papayae* (Papaya dieback)
- *Mimosa pigra*
- *Spodoptera exigua* (Beet armyworm)
- *Rottboellia cochinchinensis* (Itch grass)
- Papaya Ringspot Virus
- *Pomacea canaliculata* (Golden Apple Snail)
- *Pomacea insularum* (Black Apple Snail)
- *Striga asiatica*

Potentially damaging IAS (microbes) for forestry in Malaysia

- Fungi & insects:
  - *Ceratocystis* spp.
  - *Leptocybe invasa* (native to Queensland, Australia)
  - *Ophelimus maskelli* (native to Australia)
  - *Puccinia psidii* (native to Brazil)



Leptocybe invasa

ResearchGate.net

fredon-course.com

Ophelimus maskelli

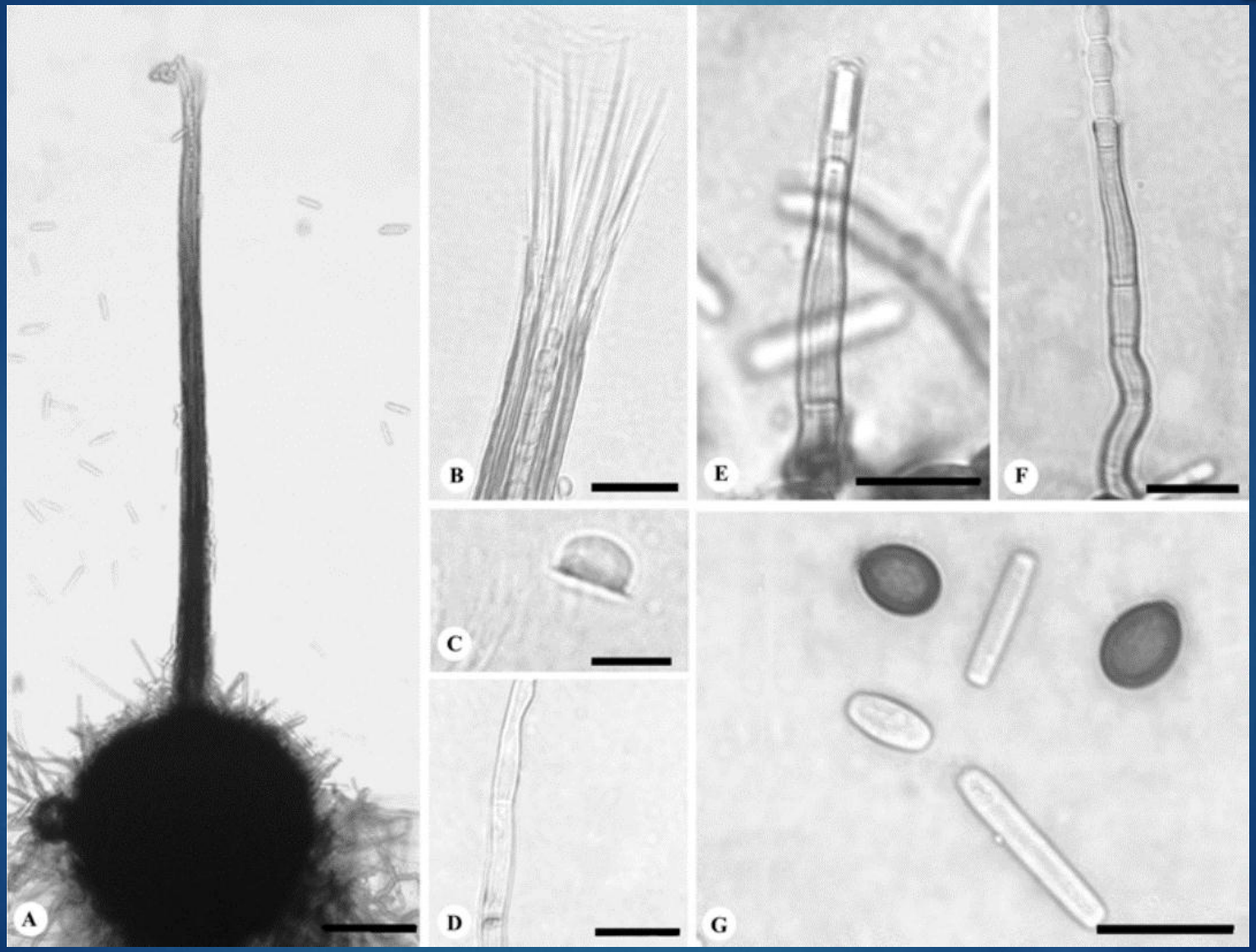
bicep.net.au

Puccinia psidii

www.prweb.com

Ceratocystis fimbriata complex

Ceratocystis manginecans



Source: M. van Wyk et al. (2007). Fungal Diversity 27: 213 - 230

Characteristics of the fungus

- Soil-borne fungus
- Wide distribution, some host specificity
- Origin of the Malaysian fungi – Brazil?
- Produces various types of spores – ascospores, conidia, thick-walled aleuroconidia
- Easily dispersed – insects, wind, root contact…
- Easily invades wounds on branches, stems, roots

Threatened host species

Commercial forest plantation species:

- *Acacia mangium*
- *Acacia* hybrid (*A. mangium* x *A. auriculiformis*)
- *Eucalyptus pellita*

- In Indonesia *C. fimbriata* first recorded on *Hevea brasiliensis* in 1925, in Malaysia in 1953.


6 month-old *Eucalyptus pellita* plantations


Acacia mangium plantations

Mortality due to *Ceratocystis*

Eucalyptus pellita

Acacia mangium

Management of IAS in Malaysia

- Prevention
- Early detection
- Eradication
- Control

- Implemented by DOA, Min. of Agriculture, under Malaysian Plant Quarantine Act 1976, Plant Quarantine Regulation 1981, Plant Variety Protection Bill 2003
- Other agencies involved – Dept. Wildlife & Nat. Parks, Dept. of Fisheries, Forestry Dept., Dept. of Vet. services

National Action Plan for Prevention, Eradication, Containment and Control of IAS in Malaysia

4 elements with activities to be implemented between 2014-2018:

- Element 1. Evaluation and Implementation of legislation, policies and regulations,
- Element 2. Enhance Public Awareness and Education,
- Element 3. Research and development on methodology of IAS management, and
- Element 4. Capacity building

Management efforts for *Ceratocystis*

- Fungus not yet recognised as IAS
- Management at individual plantation company level
- Educating plantation company staff in disease recognition
- Diseased trees removed and destroyed
- Breeding trees for tolerance/resistance

Problems

- IAS in agriculture of highest priority in Malaysia
- Few researchers, focused on overall pest and disease management not specifically on IAS
- Criteria for IAS Risk Assessment presently under discussion
- Malaysia does not yet have a protocol for species and landscape management
- IAS do not recognise political boundaries!

Habitat specific protocols for management of Invasive pathogens and Insect pests?

- Dutch Elm disease eliminated the elm trees from the landscape in many European countries which has allowed other trees to dominate
- Box wood moth and Box wood blight is changing the landscape of natural boxwood forests in the Caspian sea
- There is no generic protocol for measuring the impact of invasive pathogens and insect pests on a habitat or a landscape

Reason :

lack of a standard unit for measuring changes invasive species have on a landscape especialy microorganisms and Insect pests


Thank you for
your attention!