


Myrtle rust – impact on native Myrtaceae and associated plant communities in Australia

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CRC PLANTbiosecurity

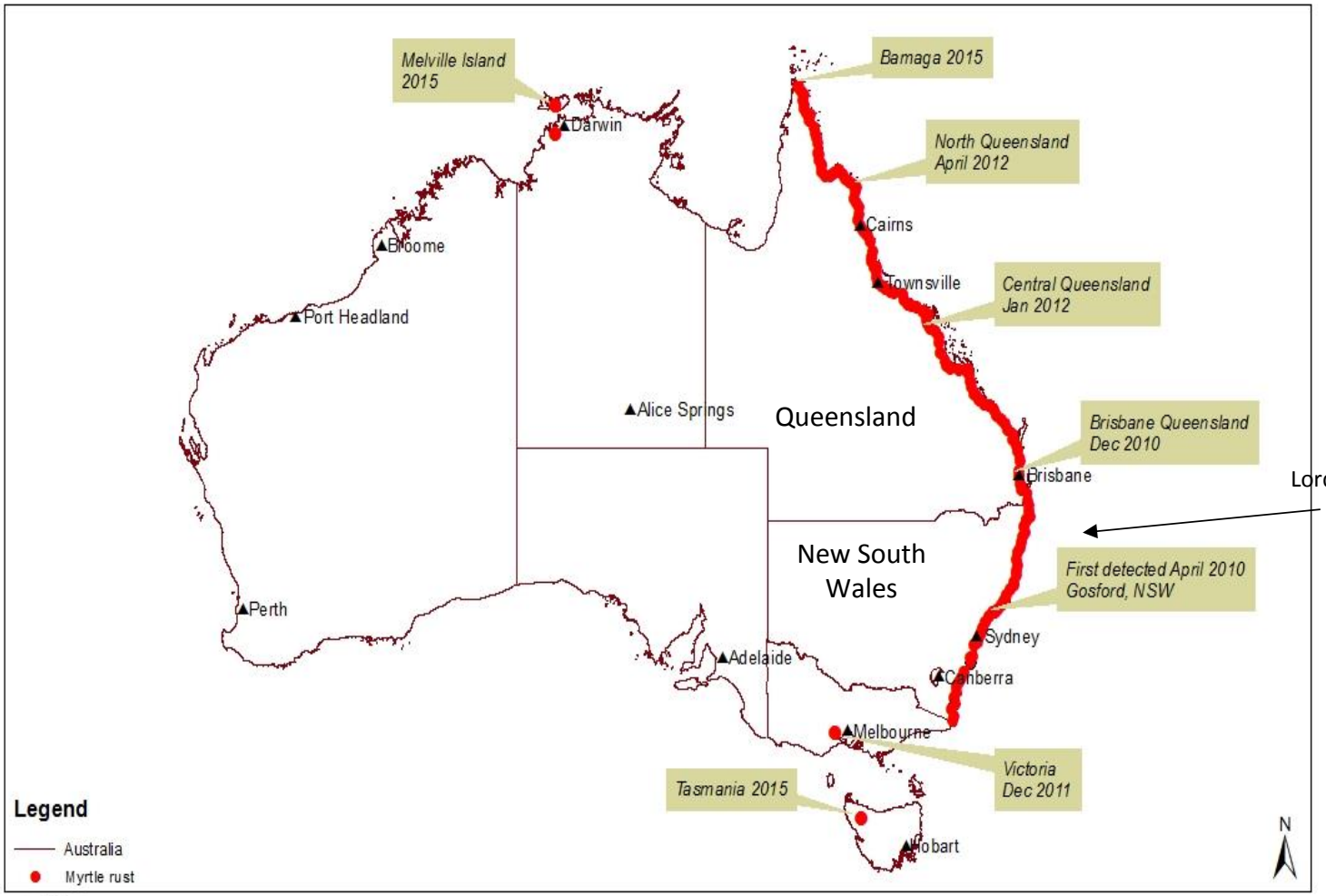
Queensland Government

What is myrtle rust & why significant to Australia?

- **Myrtle rust**
  - **Rust fungus *Austropuccinia psidii* (formerly *Puccinia psidii*)**
    - Origins in South America
      - = guava/eucalypt rust
      - Multiple strains/biotypes
        - Pandemic strain identified in Australia

- **Myrtaceae in Australia**
  - >2250 species from 88 genera
  - Dominate many fragile and essential ecosystems
  - Important socially & commercially

Spread in Australia



Lord Howe Island October 2016

Spread in Australia

0 475 950 1,900 Kilometers

1:25 000 000

QUEENSLAND GOVERNMENT

Research aims

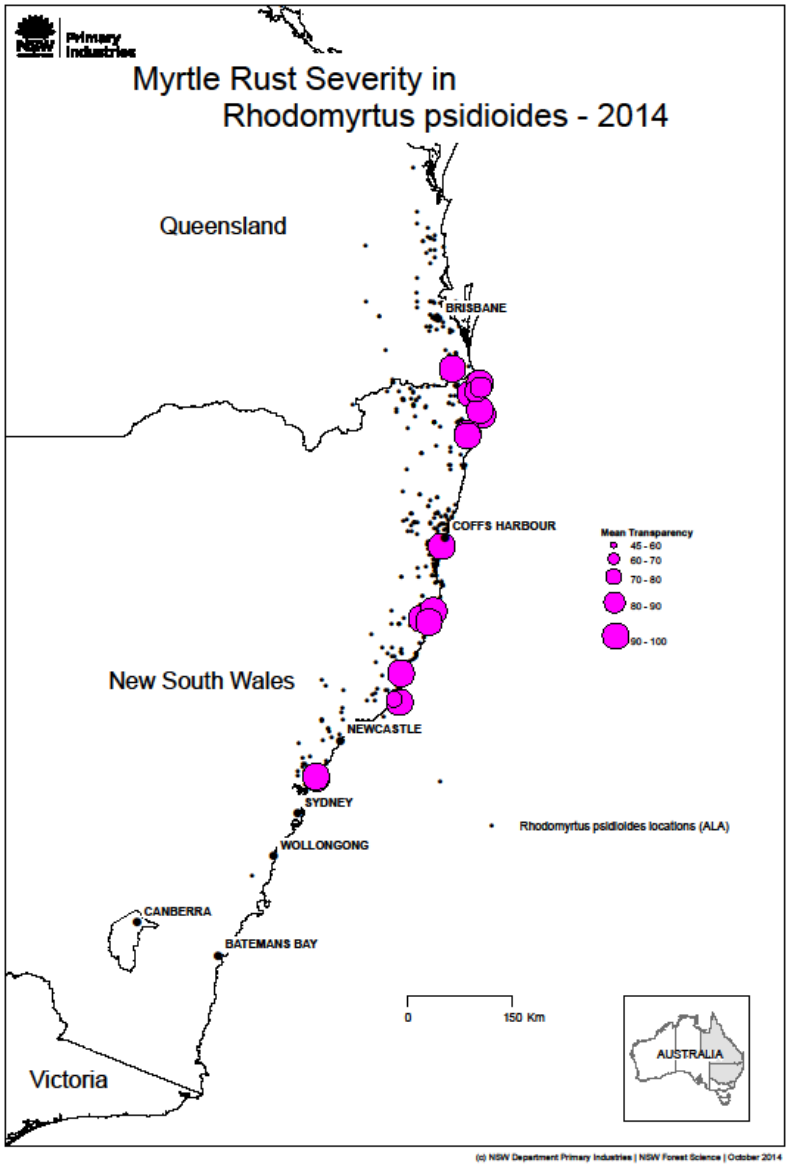
- Determine susceptibility of Australian Myrtaceae to *A. psidii*

- Determine impact on plant communities
  - **Wet sclerophyll/Subtropical rainforest environment**

Host range & susceptibility

- **>350 species from 57 different genera**
  - Giblin FR & Carnegie AJ (2014) *Puccinia psidii* (Myrtle rust) - Australian host list. Version current at 23 Oct. 2014. http://www.anpc.asn.au/myrtle-rust
  - 180 species rated for susceptibility and impact over time
    - 30% highly or extremely susceptible with severe dieback and tree deaths recorded

Rhodomyrtus psidioides
Native guava



- **Myrtle rust impact**
  - Affecting all life stages
    - Mature trees dead or dying
    - Death of epicormic shoots
    - Root suckers infected &/or killed
    - Flowers/fruit infected
    - No evidence of seedlings
- **Species extinct from a number of sites**

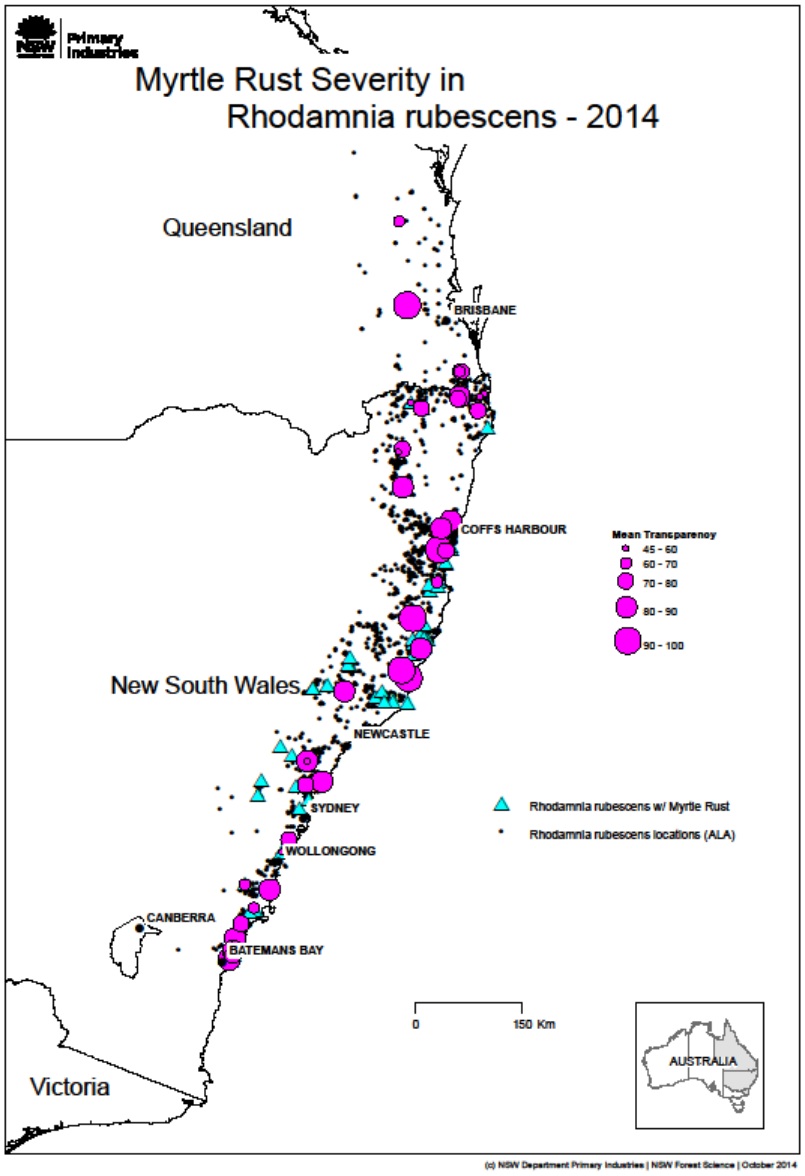
Location	% dead 2014	% dead 2016
Bongil Bongil NP, NSW	72	100
Port Macquarie 1, NSW	12	69
Tallebudgera Valley, Qld	97	100

Carnegie et al. 2016, Biological Invasions 18:127-144

Decline of established stands of *Rhodomyrtus psidioides*

Rapid decline of regenerating root suckers

Rhodamnia rubescens
Malletwood



- **Myrtle rust impact**
  - Slower rates of decline – reduction in leaf size, dieback initiated in the lower canopy
  - Flower & fruit infection results in premature senescence
  - Seedlings rarely observed

Location	% dead 2014	% dead 2016
Gold Ck , Qld	73	92
Tallebudgera 1, Qld	25	30
Tallebudgera 2, Qld	0	31
Bongil Bongil , NSW	10	50
Royal NP, NSW	23	50

Carnegie et al. 2016, Biological Invasions 18:127-144

Decline of *Rhodamnia rubescens*

Rhodamnia rubescens 2014

Rhodamnia rubescens 2016

Rhodamnia rubescens 2017

Rhodamnia rubescens & *Rhodomyrtus psidioides* proposed new listing - **Critically Endangered**

NSW only - not nationally applied!!

The Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Preliminary Determination to support a proposal to list the shrub or small tree *Rhodamnia rubescens* (Benth.) Miq. as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act.

The Scientific Committee, established by the *Threatened Species Conservation Act 1995*, has made a Preliminary Determination to support a proposal to list the shrub or small tree *Rhodomyrtus psidioides* (G.Don) Benth. as a CRITICALLY ENDANGERED SPECIES in Part 1 of Schedule 1A of the Act.

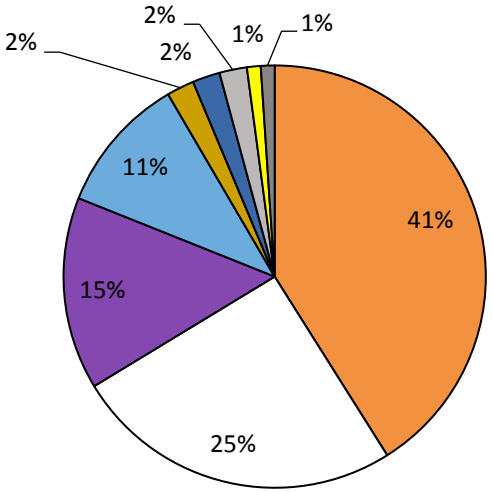
Impact of *A. psidii* on plant communities

- Tallebudgera Valley, south east Queensland
  - Wet sclerophyll forest with a rainforest under-story
    - These ecosystems are unique to Australia
      - » Dominated by *Eucalyptus grandis* and *Lophostemon confertus* over-story
  - Transitioning to sub-tropical rainforest
    - In the absence of fire or other disturbances, many wet sclerophyll sites will transition to rainforest

Impact of *A. psidii* on plant communities

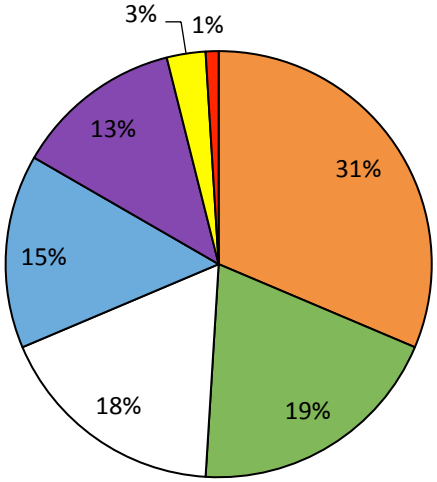
- Study site – established 2016
  - Four 50m x 2m plots established to determine impact on Myrtaceae species
    - Each tree labelled
      - Myrtaceae & non-Myrtaceae
        - » Mid-story/Under-story/Regenerating seedlings
        - » Myrtaceae identified to species level
    - *A. psidii* impact assessment
      - incidence/severity
      - Dieback levels
        - » Branch death/dieback/crown transparency
      - **Tree deaths – 2016 & 2017**

Mid-story species and composition



- ***Archirhodomyrtus beckleri***
- ***Gossia hillii***
- ***Decaspermum humile***
- ***Acmena smithii***
- *Rhodamnia rubescens*
- *Rhodomyrtus psidioides*
- *Syzygium hodgkinsoniae*
- *Pilidiostigma glabrum*
- *Syzygium oleosum*

Under-story species and composition

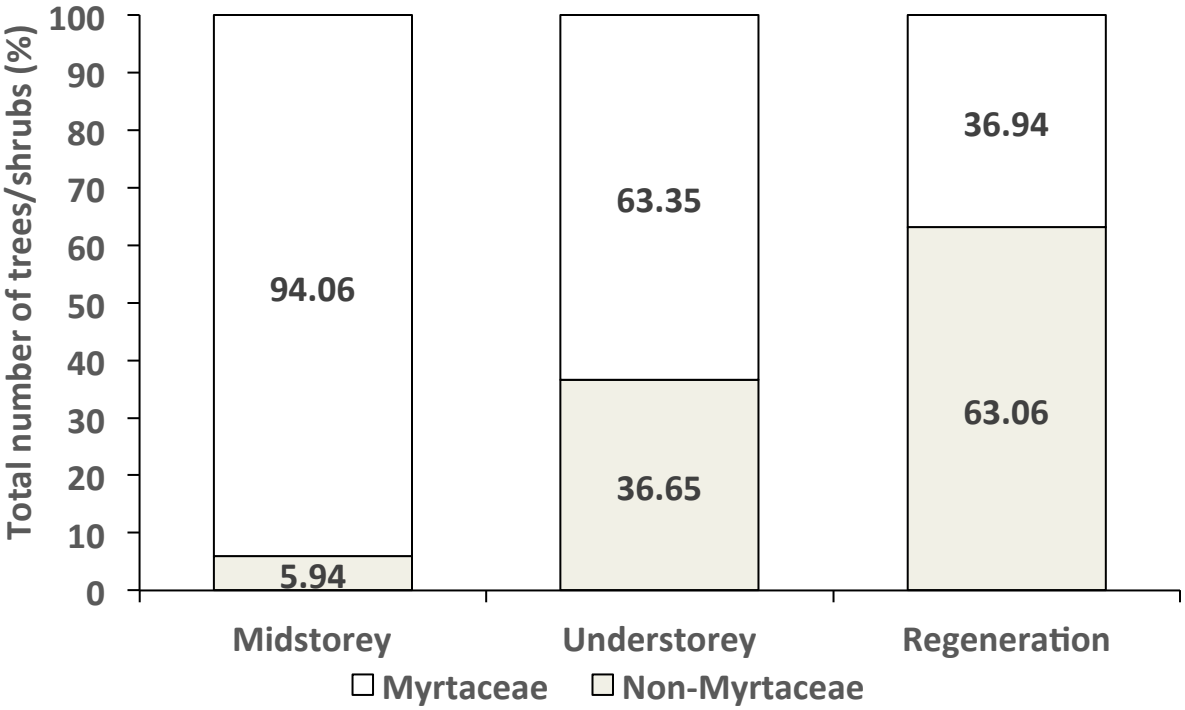


- ***Archirhodomyrtus beckleri***
- ***Rhodamnia maideniana***
- ***Gossia hillii***
- ***Acmena smithii***
- ***Decaspermum humile***
- *Pilidiostigma glabrum*
- *Syzygium oleosum*

10 species of Myrtaceae

Wet sclerophyll/subtropical rainforest

- Myrtle rust is causing significant dieback on all mid and under-storey species apart from *Acmena smithii*
- Myrtaceae being replaced by non-Myrtaceae seedlings



Rate of decline of species

	Trees dead 2016 (%)	Trees dead 2017 (%)
Acmena smithii	0	0
Archirhodomyrtus beckleri	13.1	44.1
Decaspermum humile	36.4	72.7
Gossia hillii	17.8	37.8
Rhodamnia maideniana	0	0

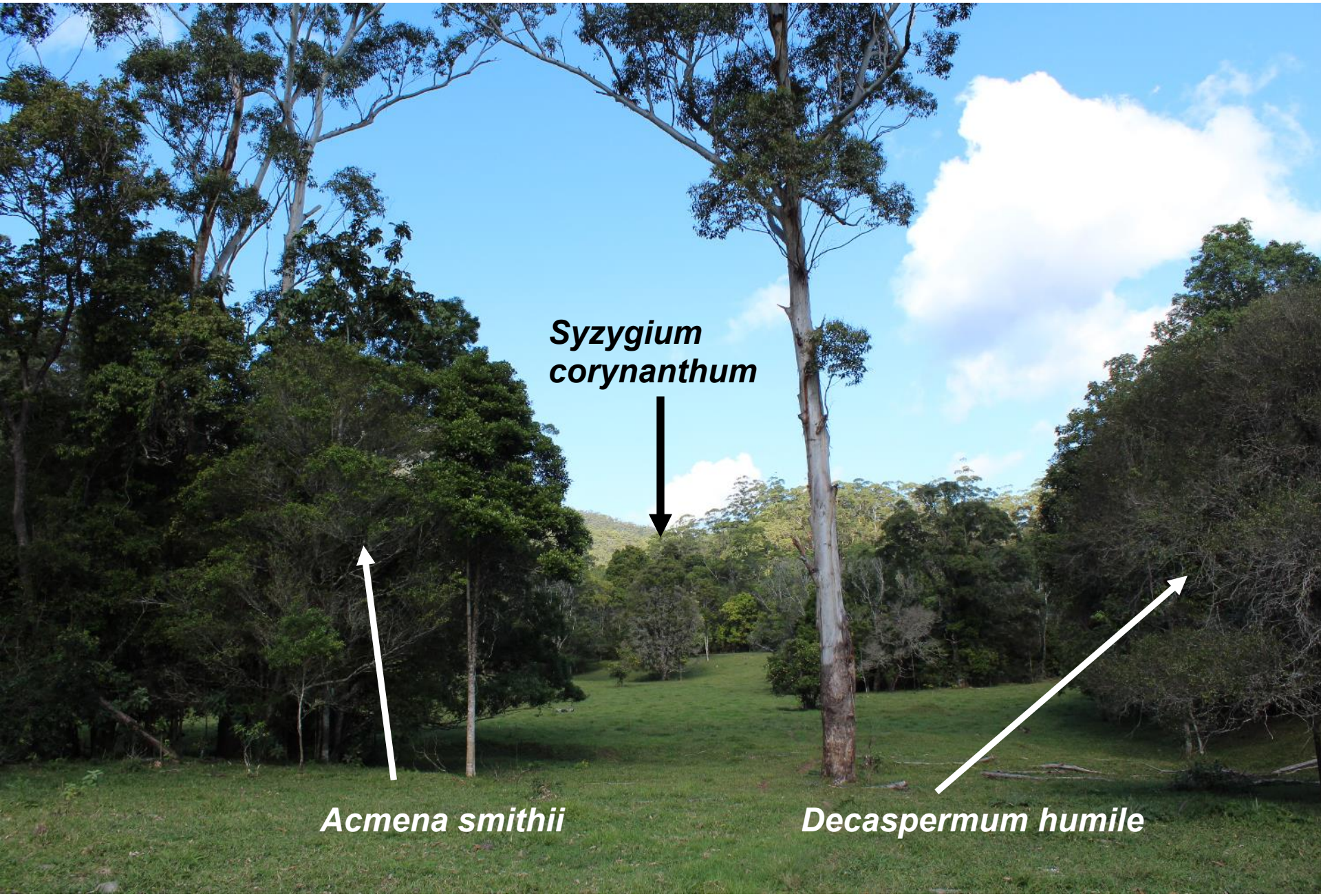
Rhodamnia maideniana

Acmena smithii

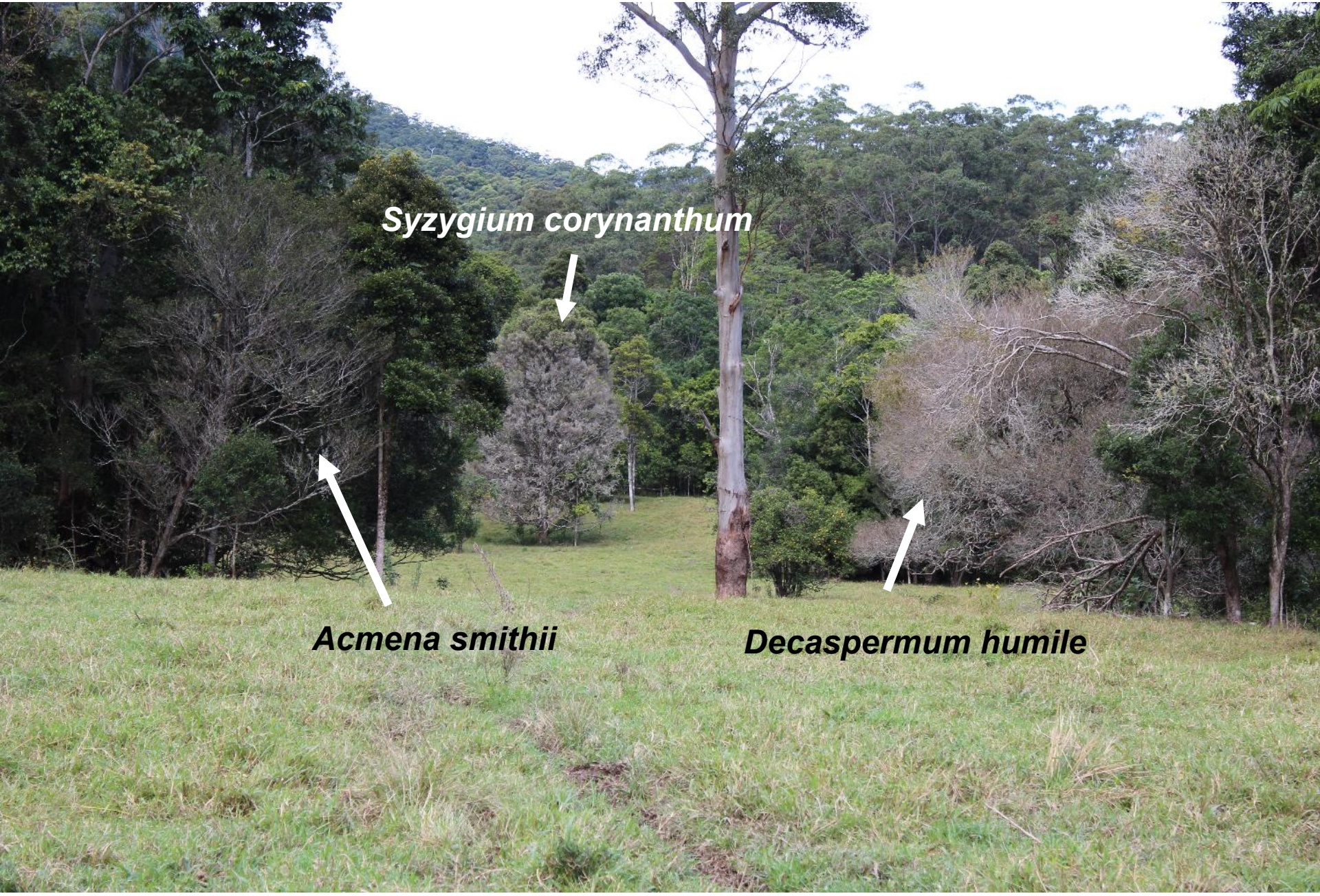
Dieback of *Archirhodomyrtus beckleri* & *Gossia hillii*

Dieback of understory *Archirhodomyrtus beckleri*

Decline of rainforest species - 2014



Decline of rainforest species - 2016



Summary

- Impact on threatened and widespread species
  - Local extinction of species
  - Already seeing changes in species composition
- Changes in plant communities
  - Is this typical of the impact in other areas?
    - Different forest types?
    - Established rainforest ecosystems?
  - Change in biodiversity?
  - Change in ecosystem function?
    - Impact on pollinators and pollination process?
    - Impact on species specific insects?

Thank you

- **Plant Biosecurity CRC**
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