

Living with Myrtle Rust – Research in Queensland





Understanding myrtle rust epidemiology and host specificity to determine disease impact in Australia



- CRC National Plant Biosecurity funded project
 - DAFF (Biosecurity and Agri-Science Queensland)
 - Dr Geoff Pegg, Dr Suzy Perry, Dr Kylie Ireland, Dr Fiona Giblin
 - NSW DPI
 - Dr Angus Carnegie
- July 2011 – June 2012





Project aims

- Determine host range and impact on native Myrtaceae
- Identify factors influencing spread and severity of myrtle rust
- Investigate variability and host specificity of *Puccinia psidii*



<i>Agonis flexuosa</i>	<i>Melaleuca polandii</i>
<i>Anetholea anisata</i>	<i>Melaleuca quinquenervia</i>
<i>Austromyrtus dulcis</i>	<i>Melaleuca viridiflora</i>
<i>Backhousia citriodora</i>	<i>Rhodamnia angustifolia</i>
<i>Chamelaucium uncinatum</i>	<i>Rhodamnia costata</i>
<i>Choricarpia leptopetala</i>	<i>Rhodamnia dumicola</i>
<i>Decaspermum humile</i>	<i>Rhodamnia maideniana</i>
<i>Eugenia reinwardtiana</i>	<i>Rhodamnia rubescens</i>
<i>Gossia acmenoides</i>	<i>Rhodamnia sessiliflora</i>
<i>Gossia gonoclada</i>	<i>Rhodomyrtus psidioides</i>
<i>Gossia hillii</i>	<i>Rhodomyrtus tomentosa</i>
<i>Gossia inophloia</i>	<i>Syzygium jambos</i>
<i>Lenwebbia prominens</i>	<i>Syzygium oleosum</i>
<i>Melaleuca fluviatilis</i>	<i>Tristania neriifolia</i>
<i>Melaleuca leucadendra</i>	<i>Xanthostemon oppositifolius</i>
<i>Melaleuca nodosa</i>	



- More than 120 species from 35 genera
 - 31 species considered as highly or extremely susceptible



Rhodamnia angustifolia



March 2011

June 2012



Impact on flowering



Melaleuca leucadendra



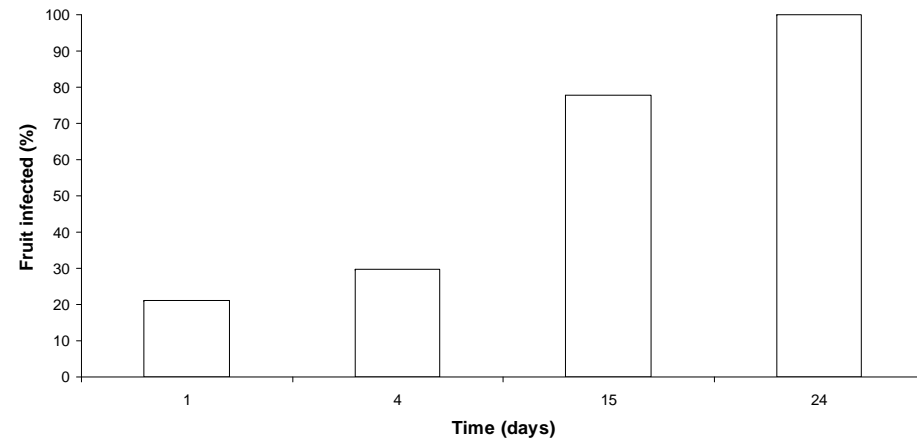
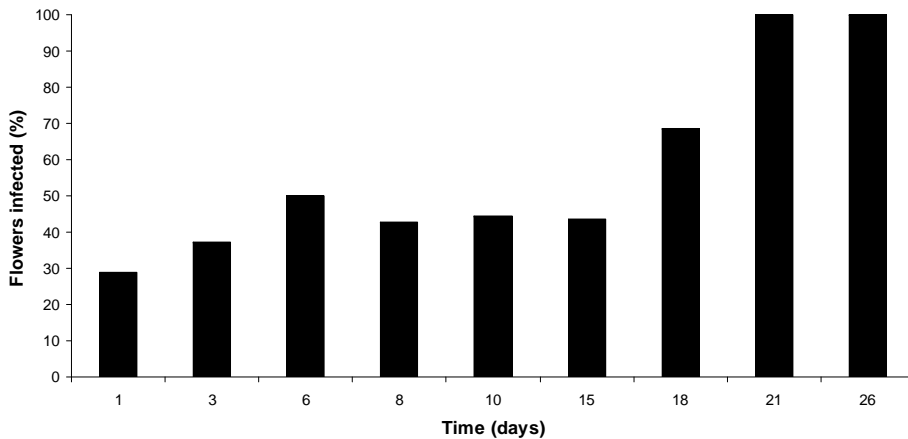
Photos G. Pegg





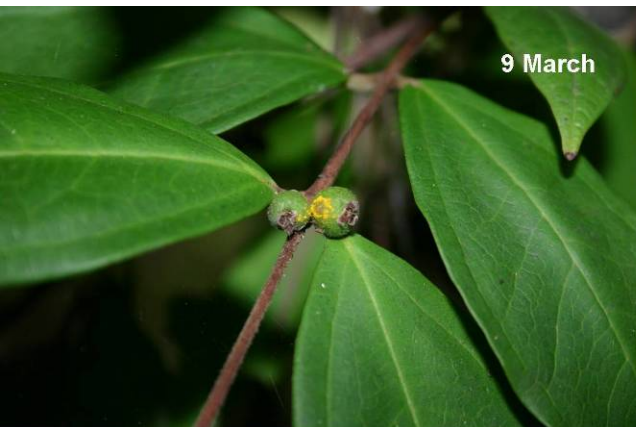
Flower & fruit infection

- Rate and level of flower & fruit infection

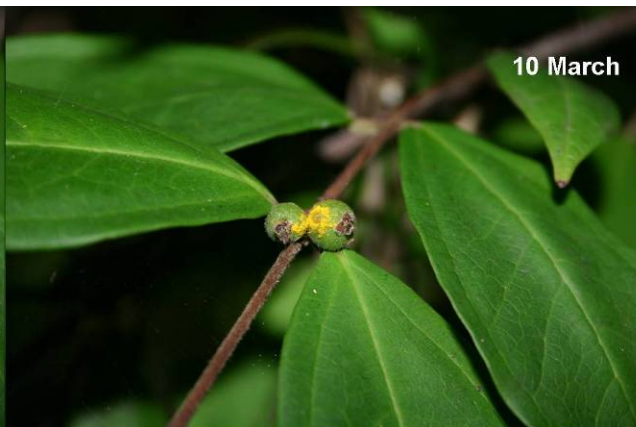




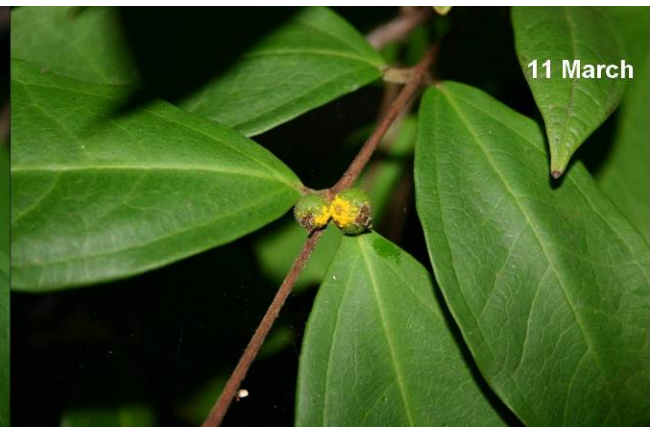
Myrtle Rust Program



9 March



10 March



11 March



12 March



13 March



14 March



15 March

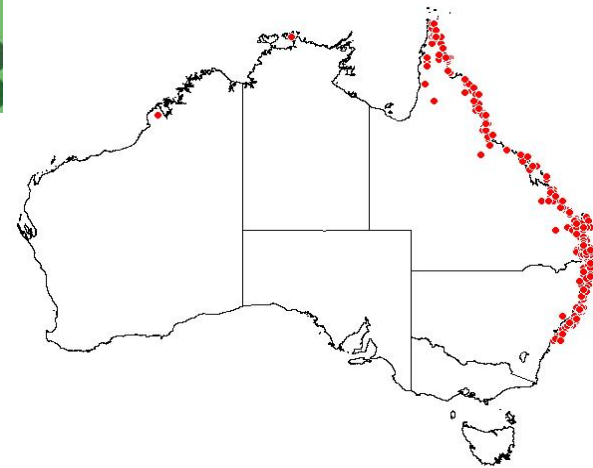


19 March



Melaleuca quinquenervia

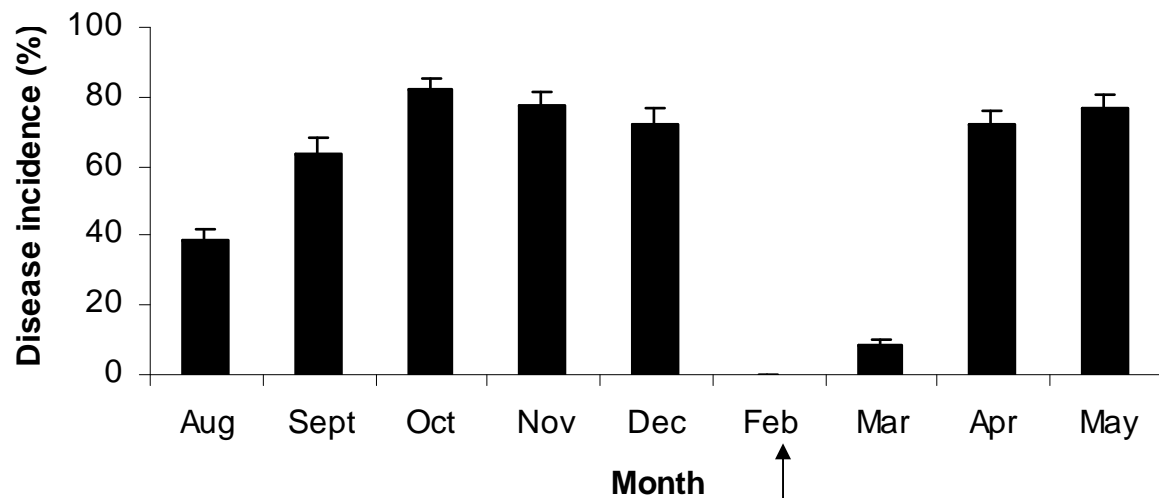
- Impact of rust on regeneration
 - Monthly assessments
 - Disease incidence and severity
 - Impact on;
 - Growth
 - Survival
 - Flower/seed production



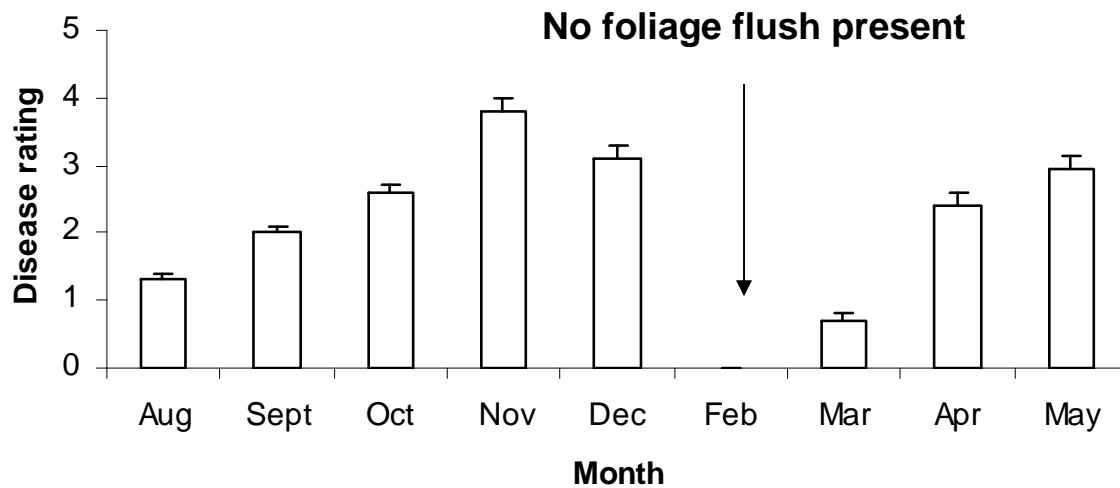
Generated on 15 Dec 2010, copyright Australia's Virtual Herbarium



biosecurity built on science



- Average disease incidence on new shoots



- Average disease severity rating on new shoots



Flower production was first detected in April 2012

- Only 10% of trees with evidence of flowering
 - only 7% having more than two flowers
 - infection detected on the flower buds/flowers
 - No flowers on trees with evidence of stem infection or cankering – severity rating 3 or higher





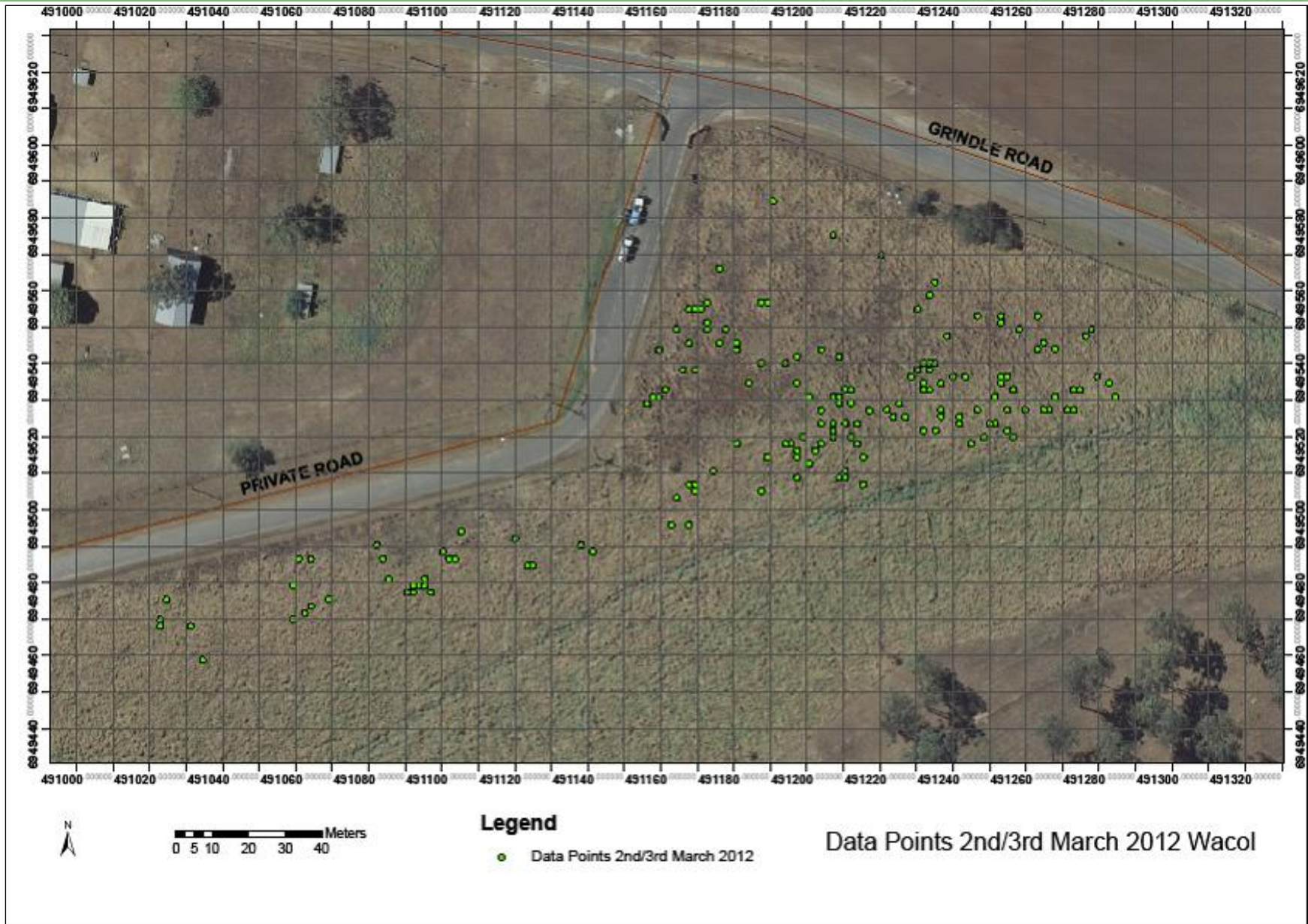
Factors influencing spread and severity of rust

- Patterns of disease development
- Rate of spread within planting
- Influence of climate
 - Temperature
 - RH
 - Dew point/leaf wetness



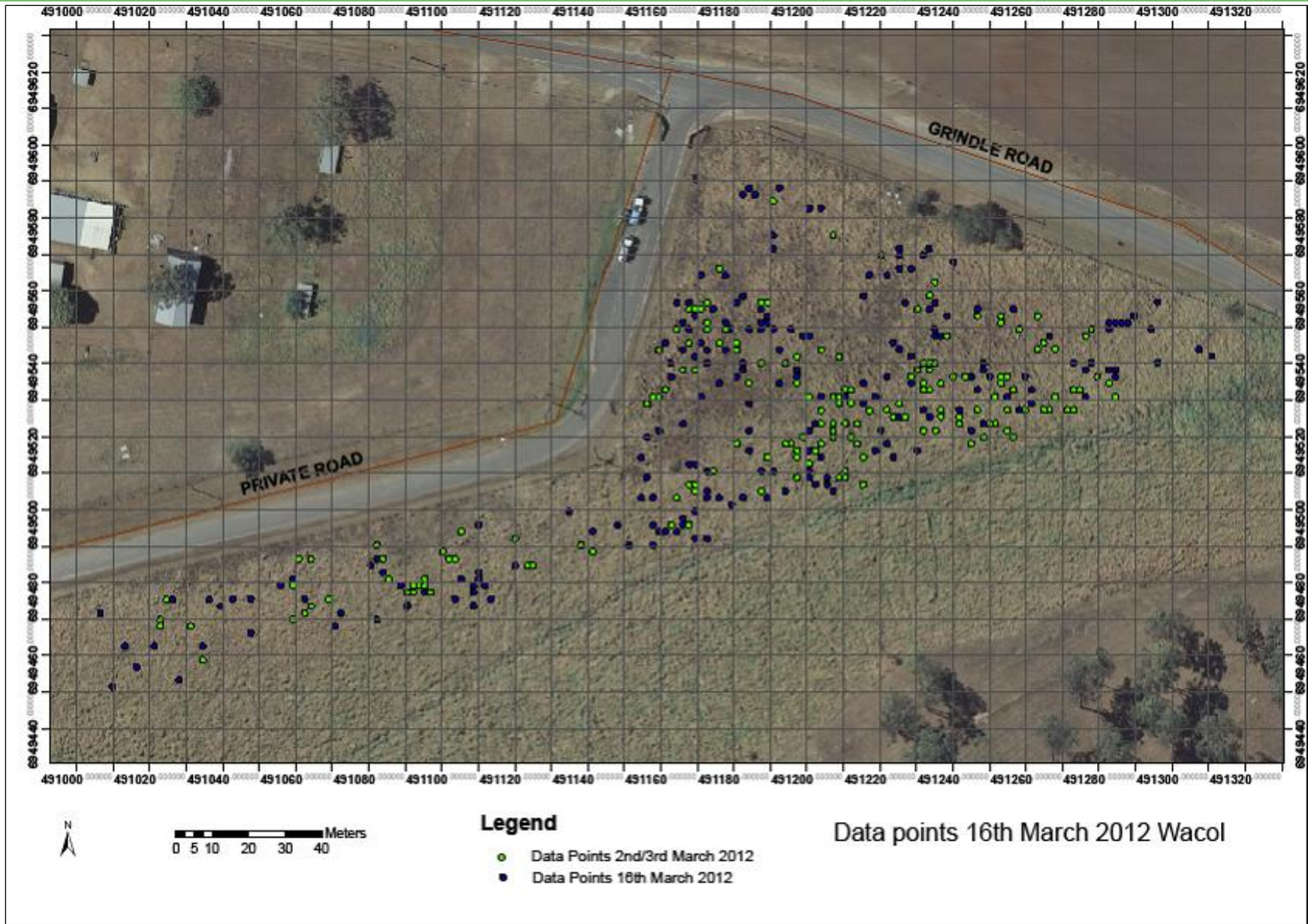


Myrtle Rust Program



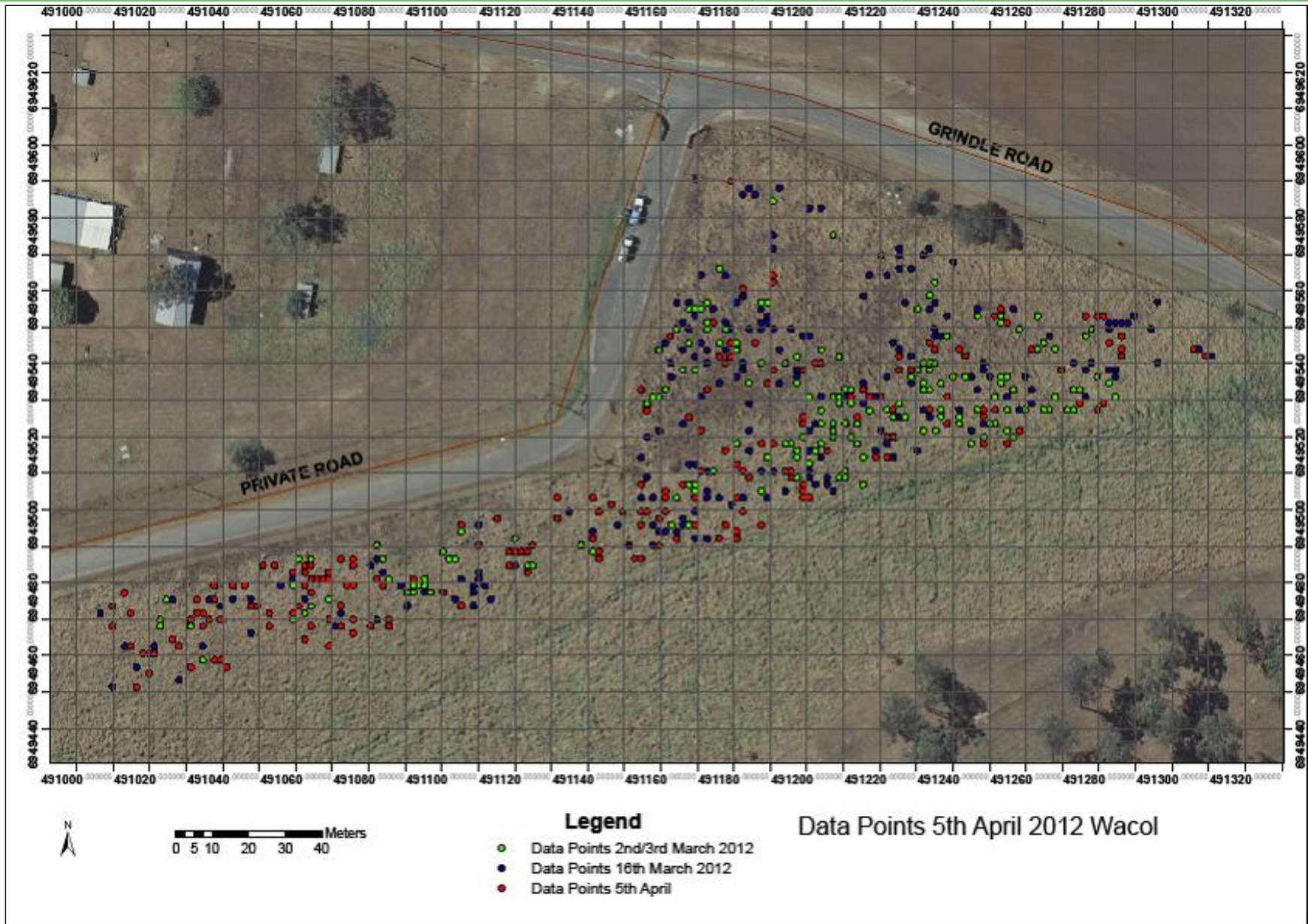


Myrtle Rust Program



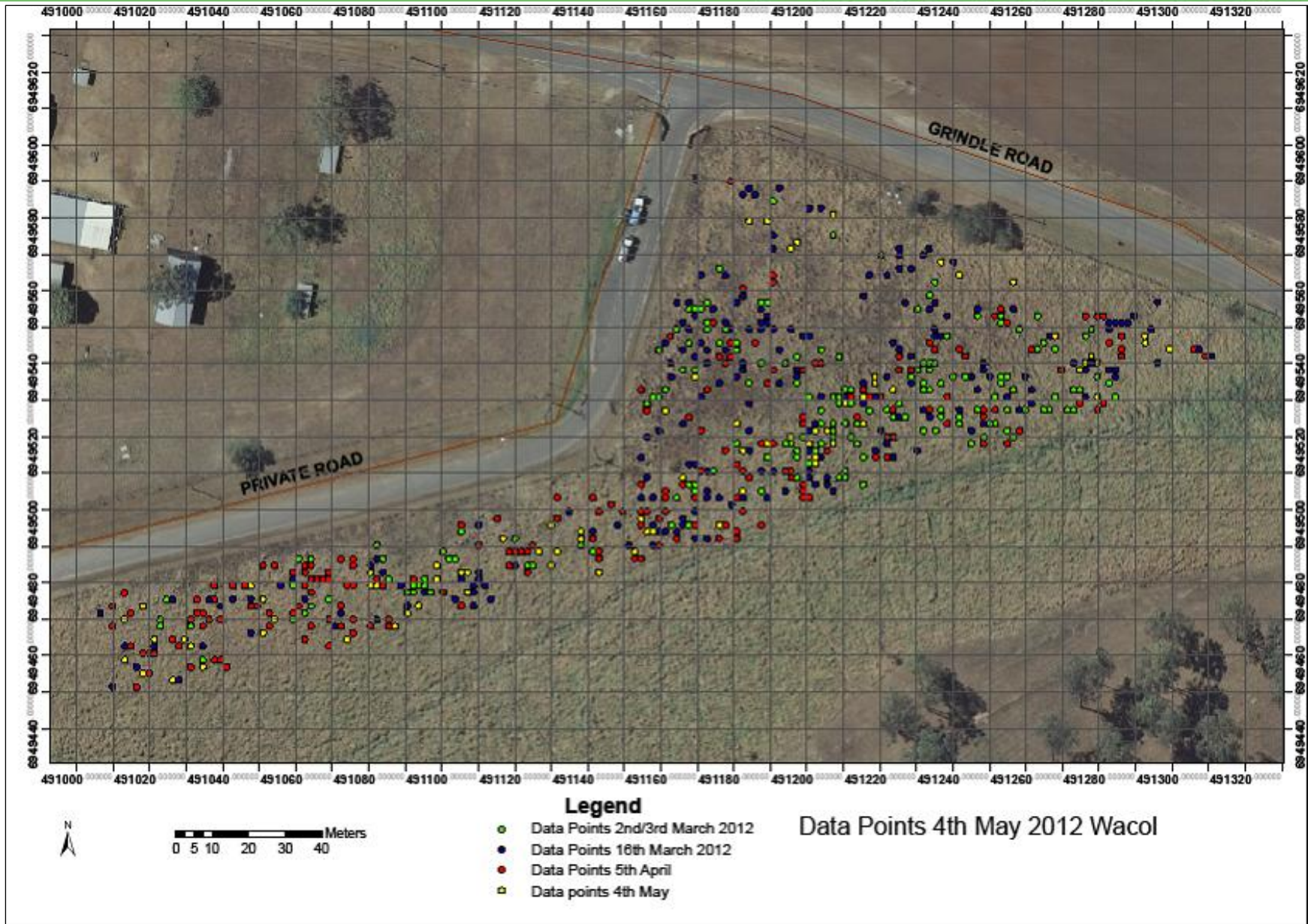


Myrtle Rust Program





Myrtle Rust Program





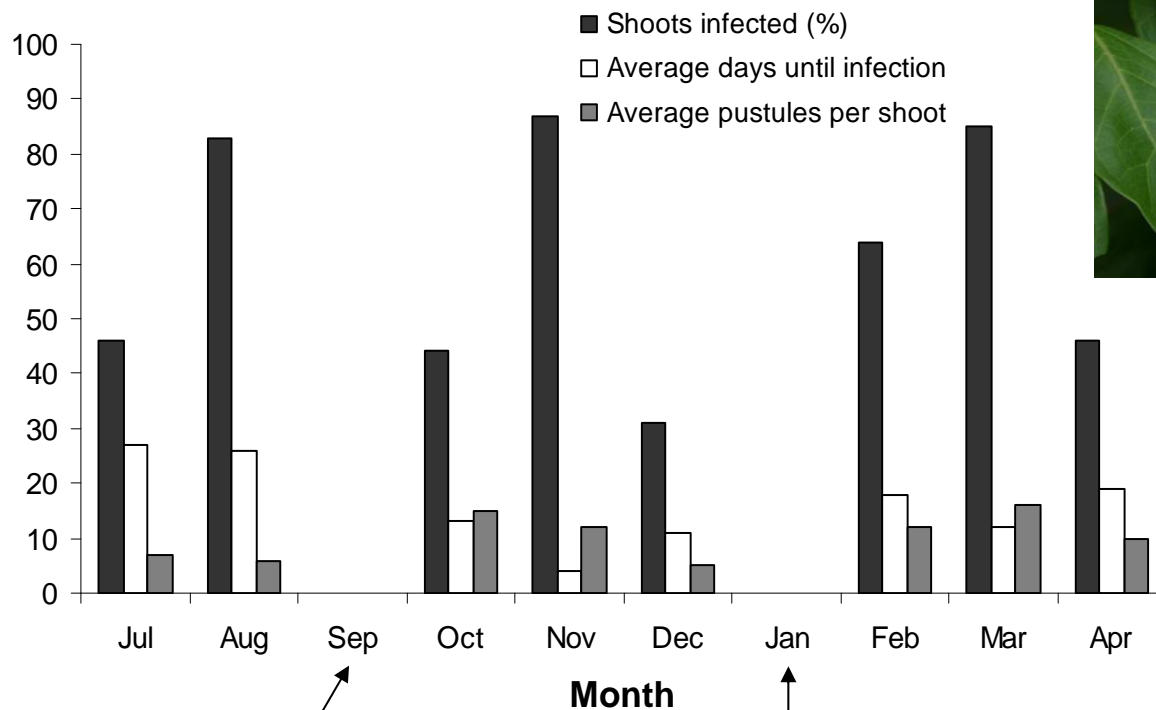
Rate of infection

- ***Rhodamnia sessiliflora***
 - Time of infection
 - Days until infection occurs
 - Level of infection
 - Number pustules per shoot
- Climate data captured
 - Temp
 - RH
 - Dew point
 - Leaf wetness





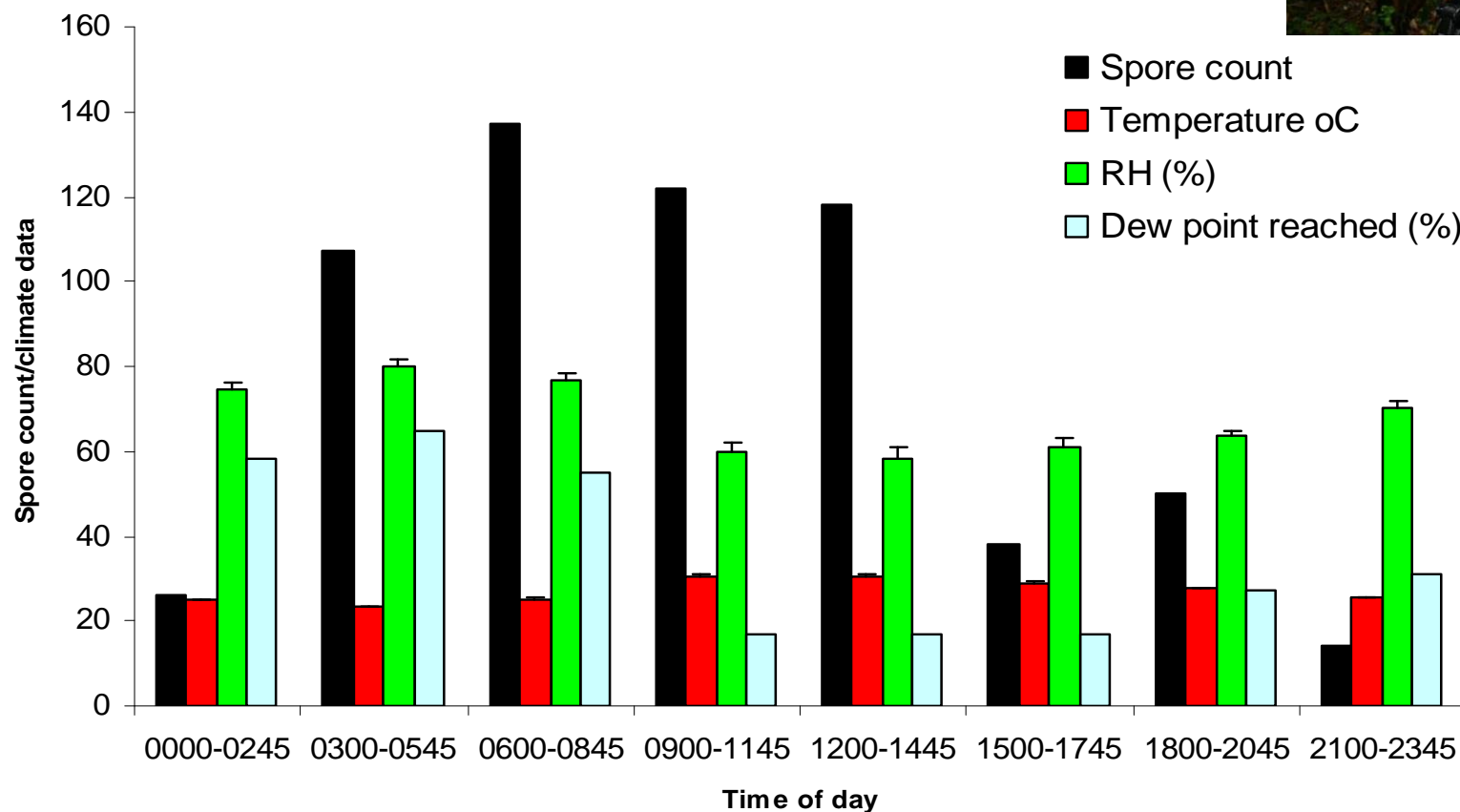
Myrtle Rust Program



- 30 new shoots – no infection
- No new shoots – large number of flowers produced



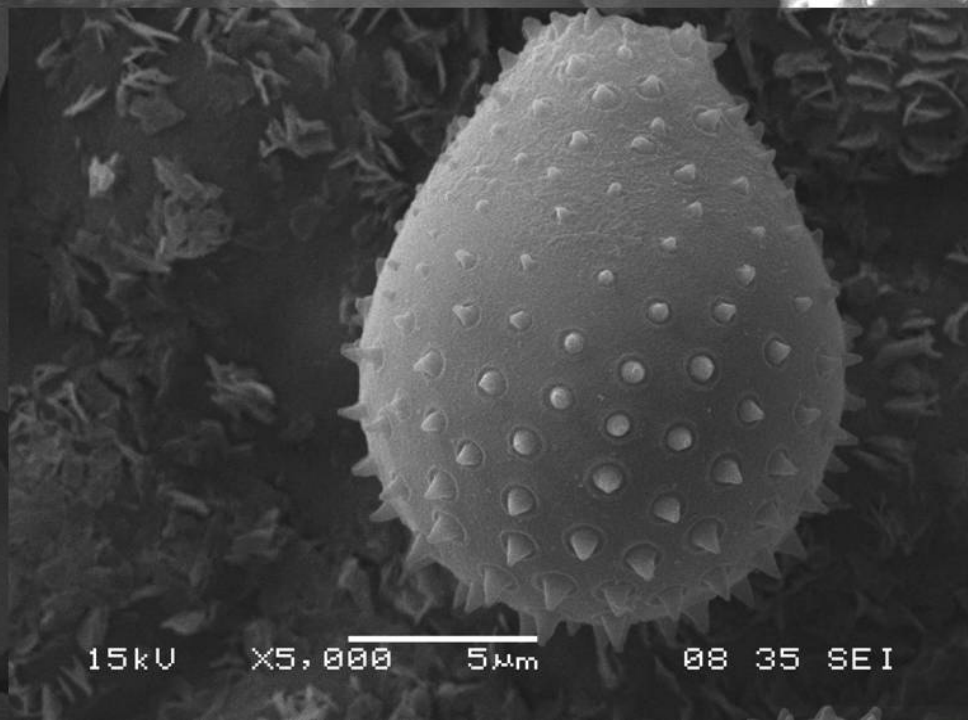
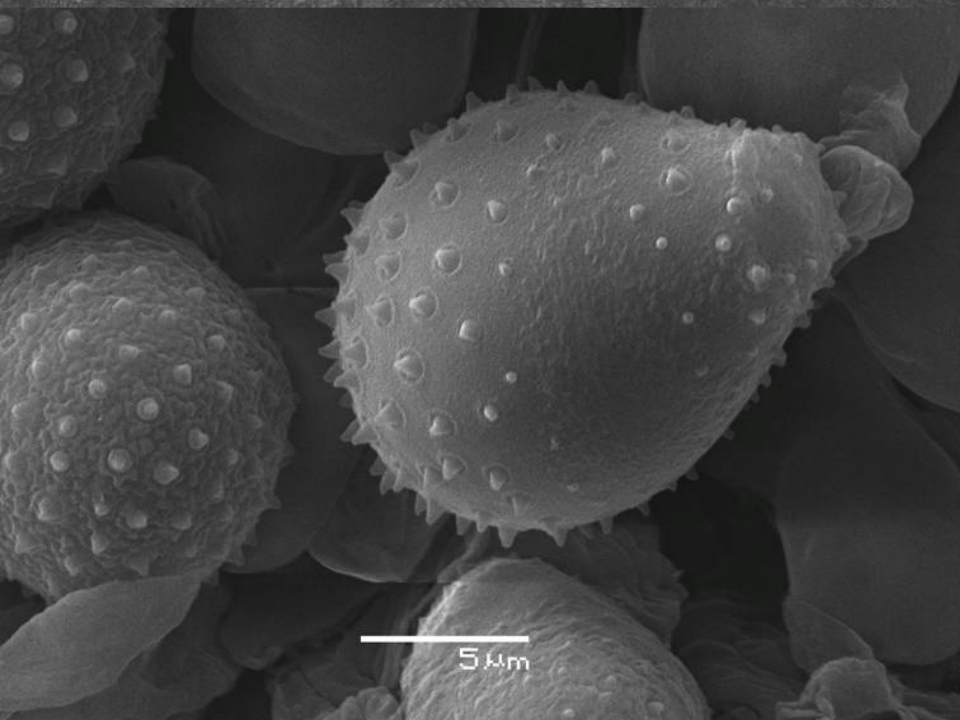
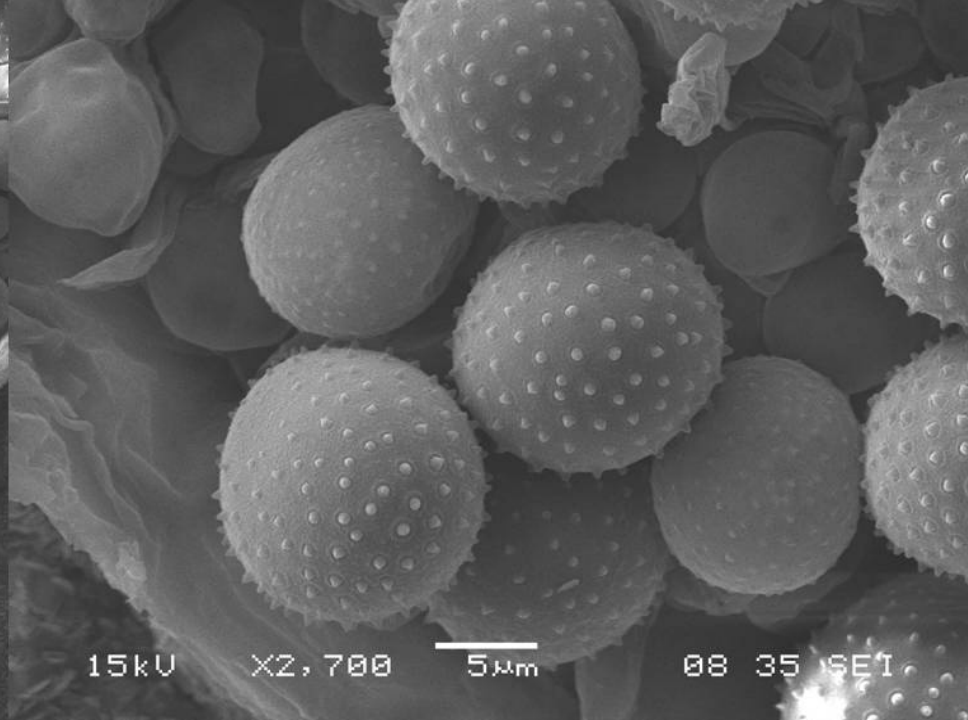
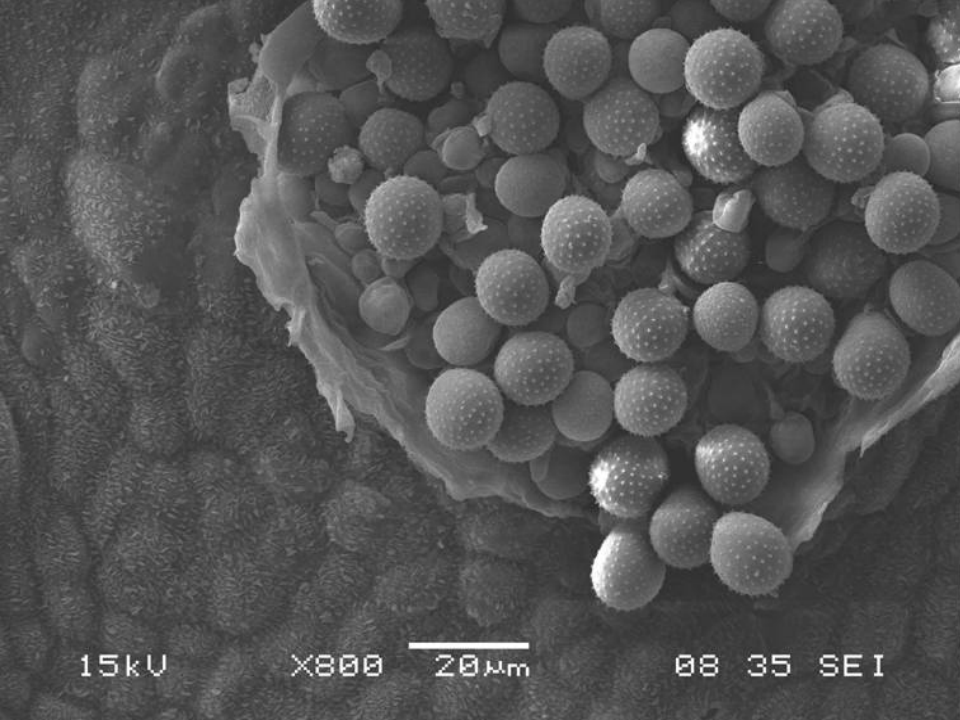
Spore production





Variability & host specificity

- Baseline data for detecting a change in pathogen population
 - Selection of isolates for use in breeding programs
 - Information on strain present in relation to strains not present in Australia to protect trade
- Collection of isolates & optimising screening protocols
 - Baseline data on pathogen population
 - 60 isolates
 - Selection of a differential set
 - Monitoring change



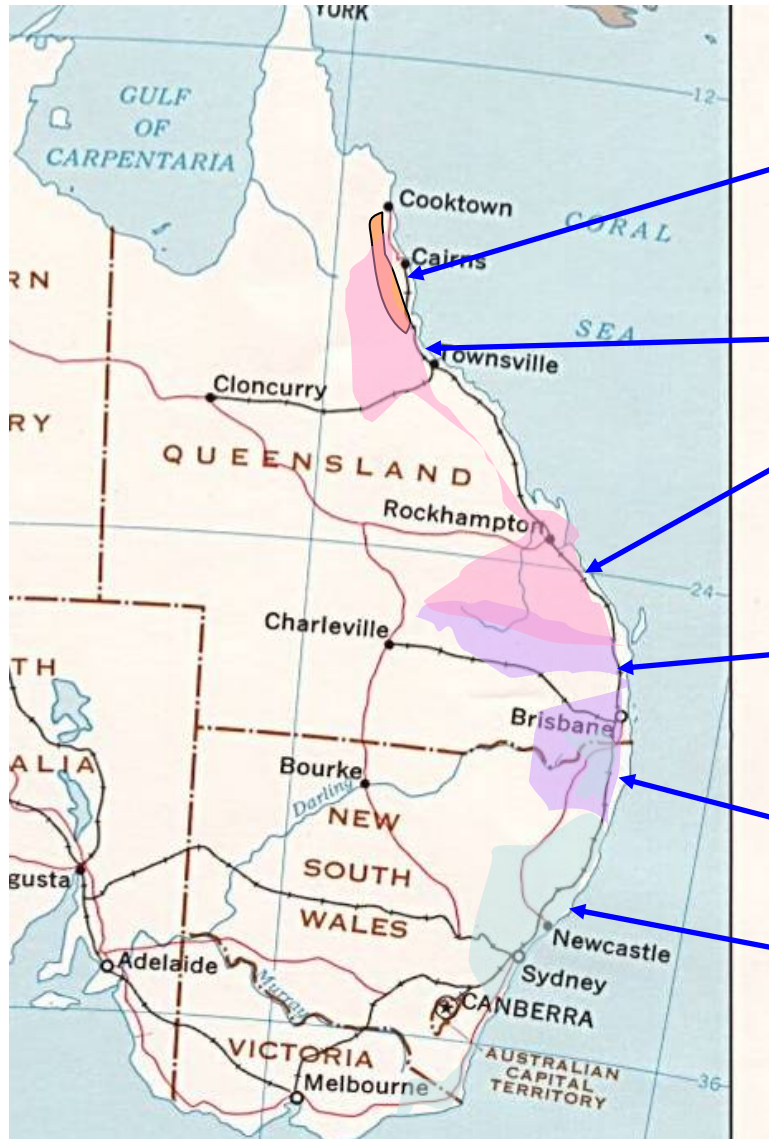


Susceptibility of key Queensland eucalypt species to *Puccinia psidii*

- DAFF Queensland project
 - H&FS (Geoff Pegg)
 - Collaboration
 - USC/DAFF Qld (David Lee)
 - CSIRO (Jeremy Brawner)
- Project Aim
 - Characterise susceptibility of key Queensland eucalypt species to *Puccinia psidii*



Taxonomy & distribution of the Spotted Gums



(Corymbia torelliana)

Corymbia citriodora
subsp. *citriodora*
(CCC)

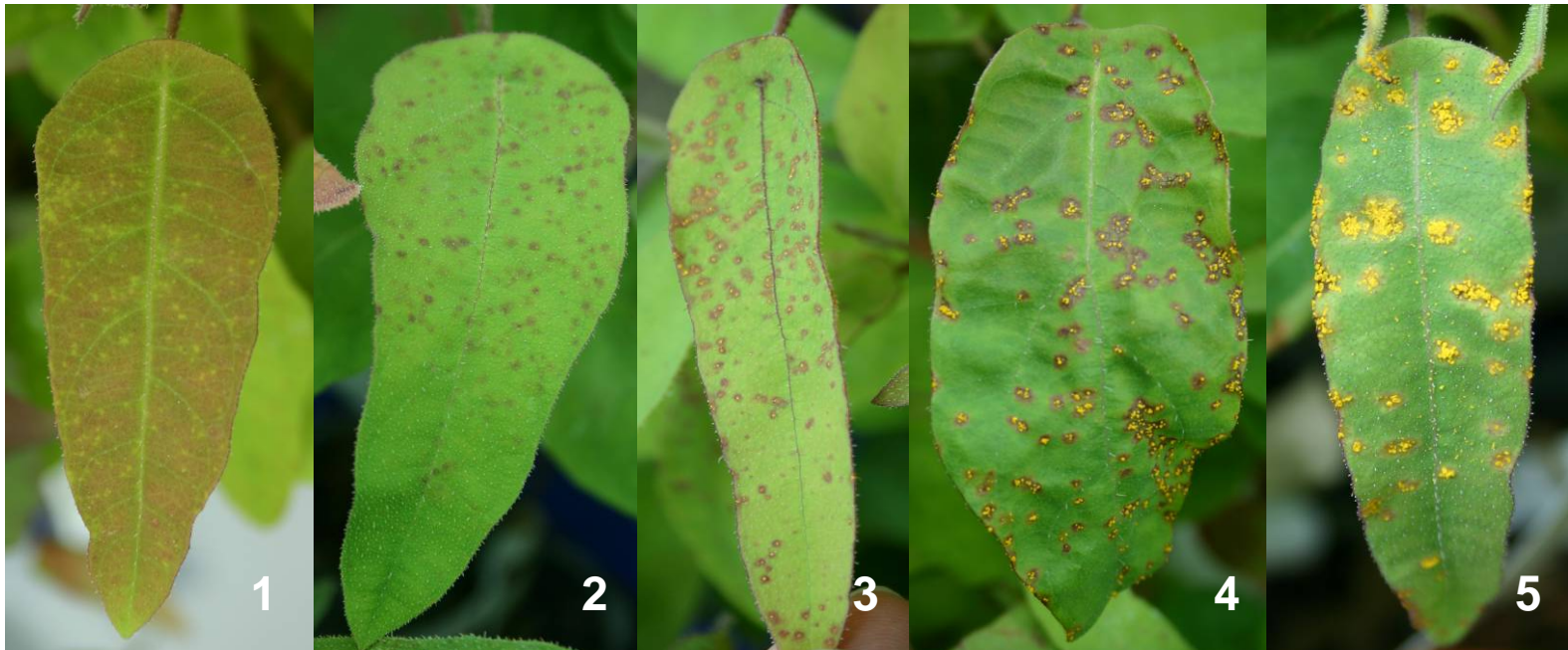
Corymbia citriodora
subsp. *variegata*
(CCV)

Corymbia henryi

Corymbia maculata



Spotted gum screening



Based on Brazilian rating system

1= "Immune" – yellow flecks

2 = HR – no evidence of pustules; necrotic lesions

3 = S1 < 0.8mm in diameter

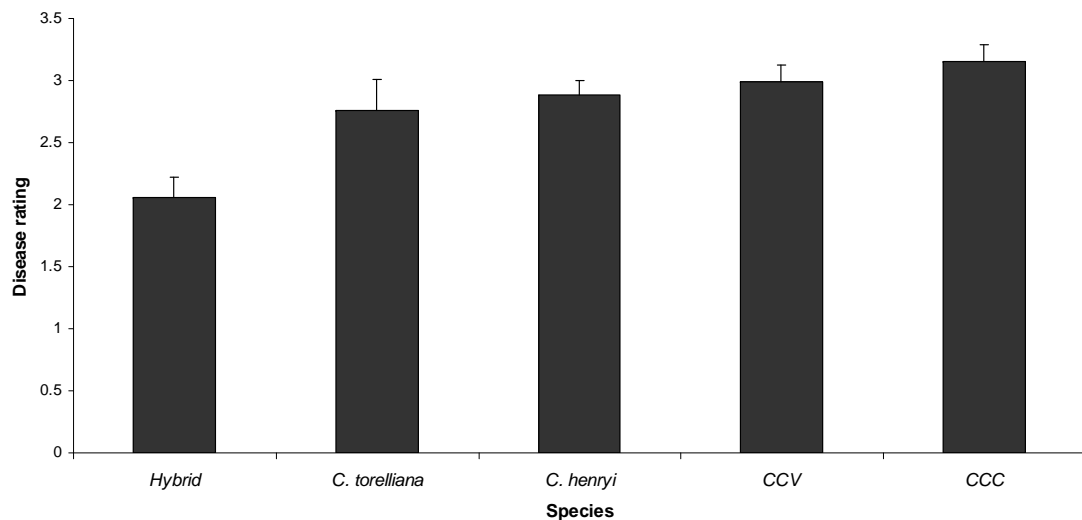
4 = S2 pustules of 0.8-1.6mm diameter

5 = S3 >1.6mm in diameter

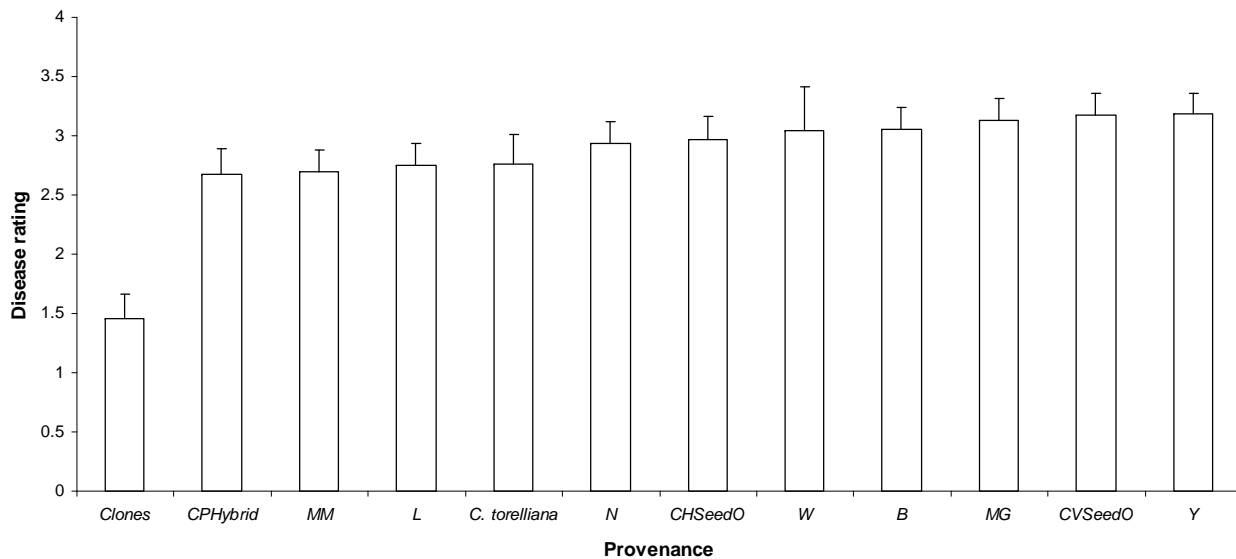




Spotted gum species & provenances

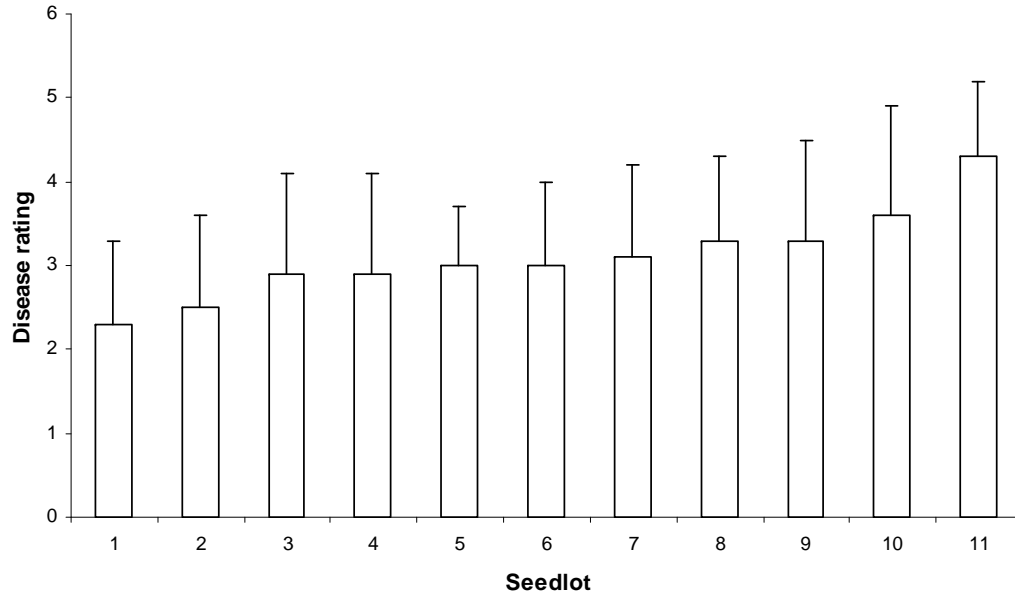


- Rating system**
- 1= "Immune" – yellow flecks
 - 2 = HR – no evidence of pustules; necrotic lesions
 - 3 = S1 < 0.8mm in diameter
 - 4 = S2 pustules of 0.8-1.6mm diameter
 - 5 = S3 >1.6mm in diameter





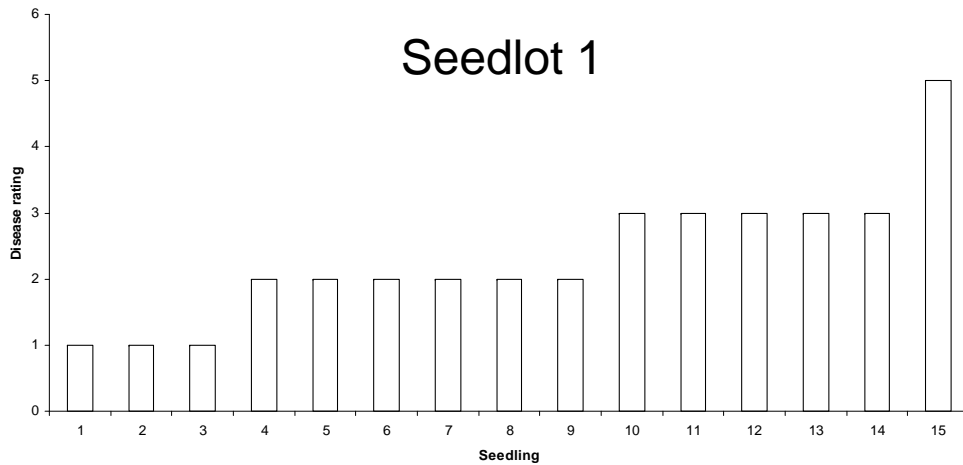
Families



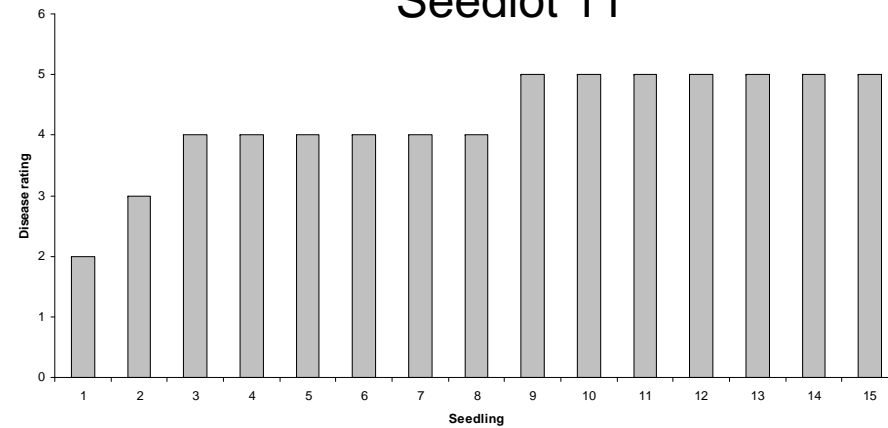
CCV - Woondum



Seedlot 1

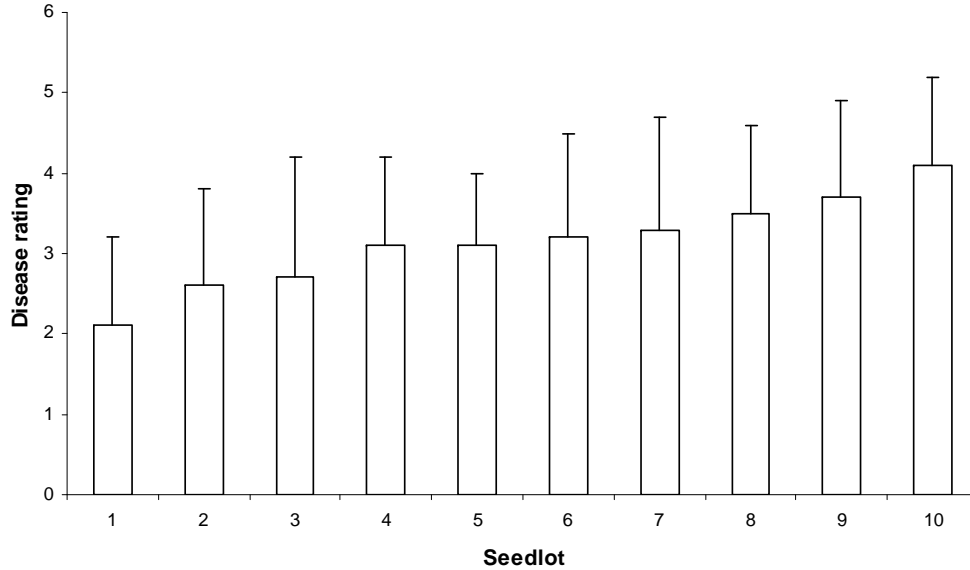


Seedlot 11





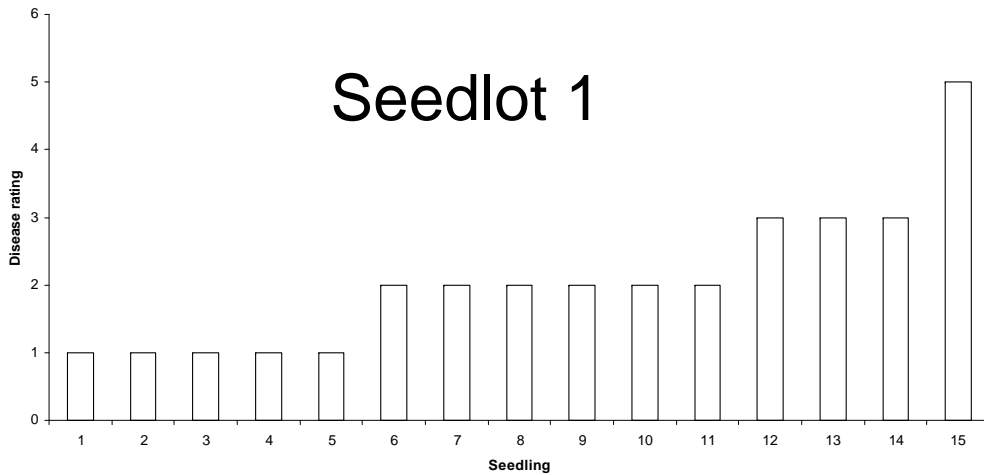
Families



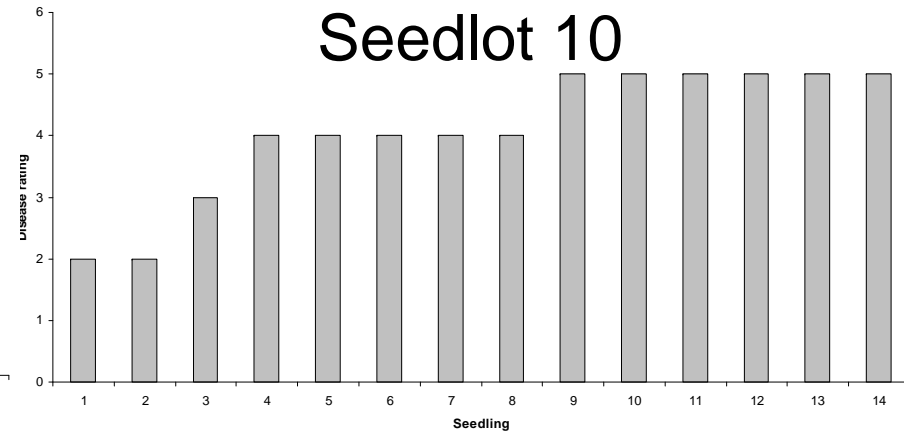
CCC - Mt Garnet



Seedlot 1

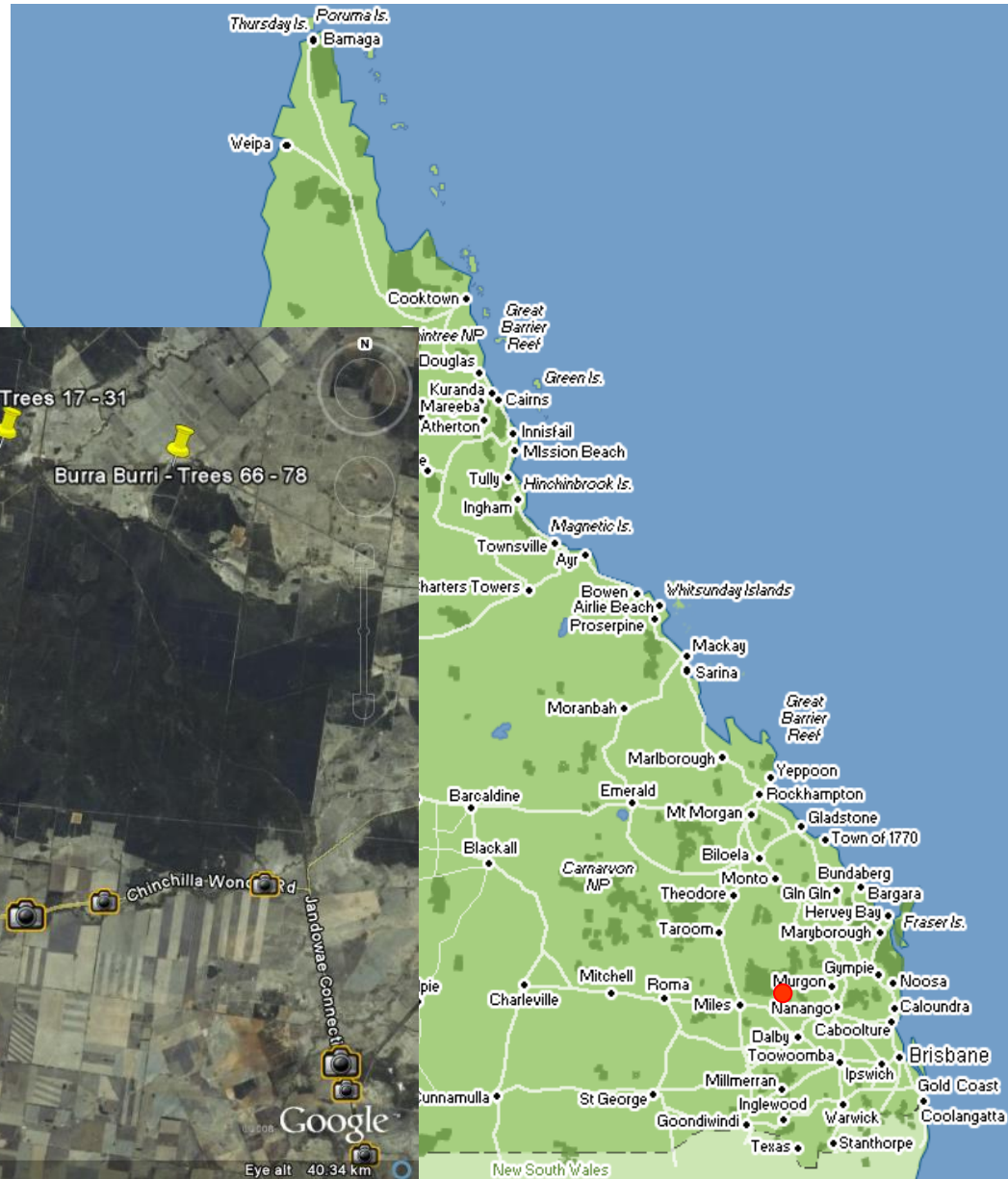


Seedlot 10



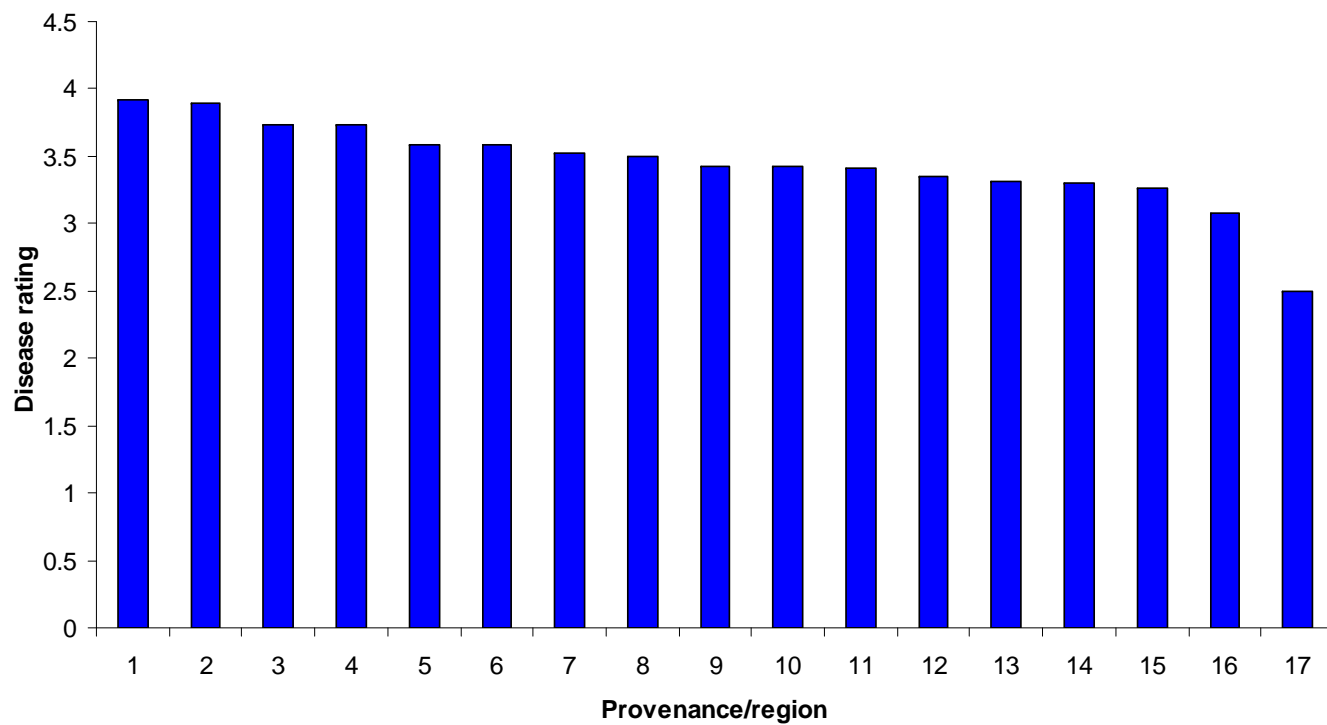


Eucalyptus argophloia distribution



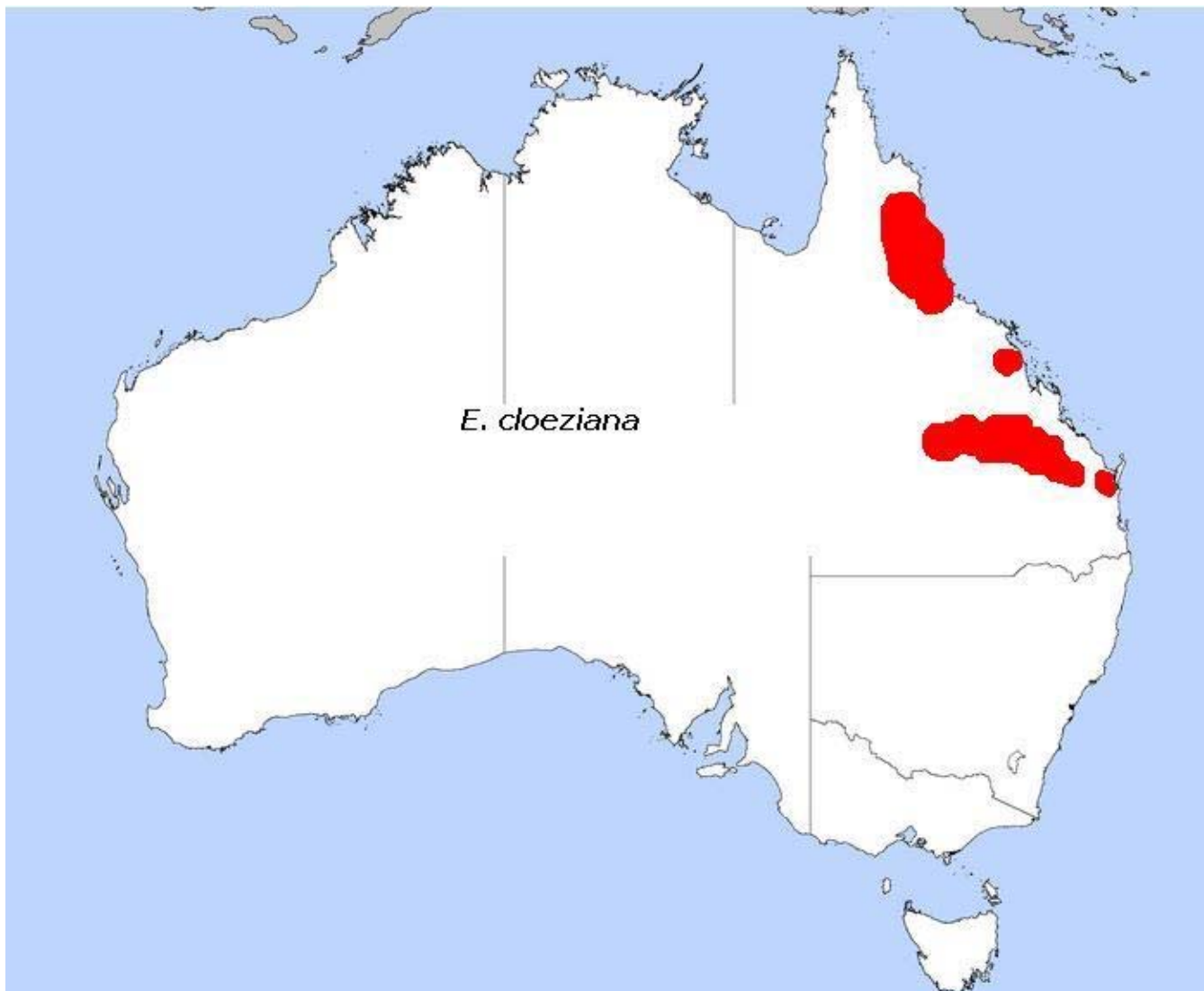


Eucalyptus argophloia



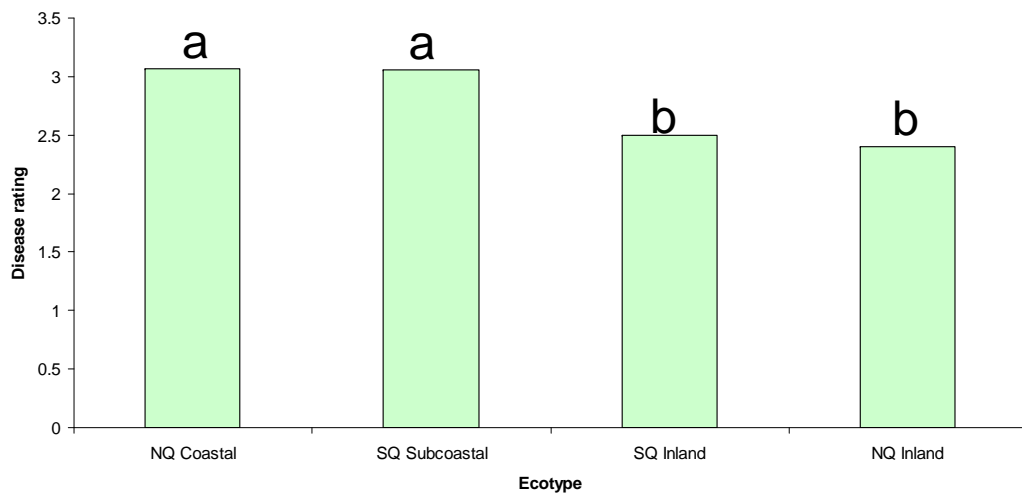
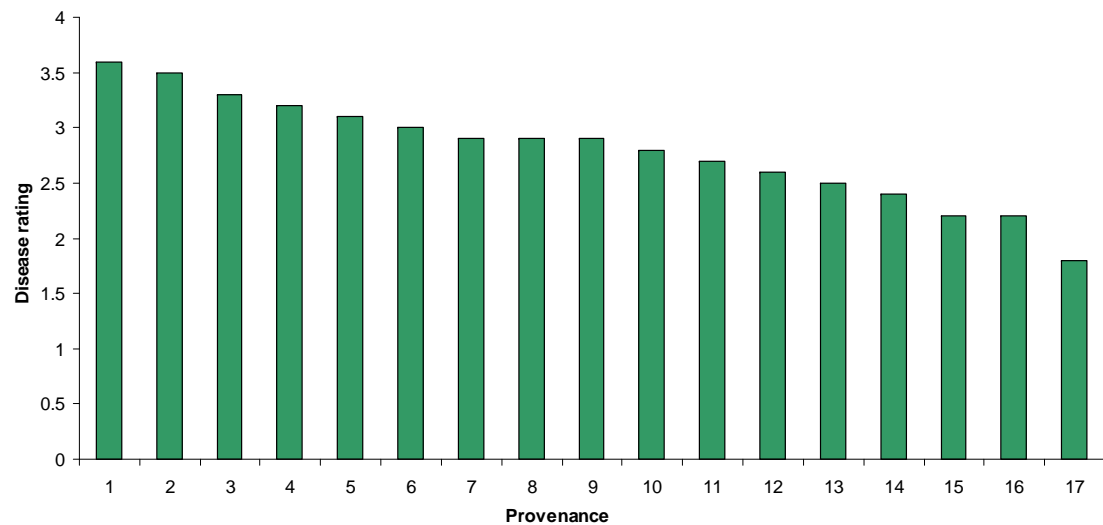


Eucalyptus cloeziana distribution



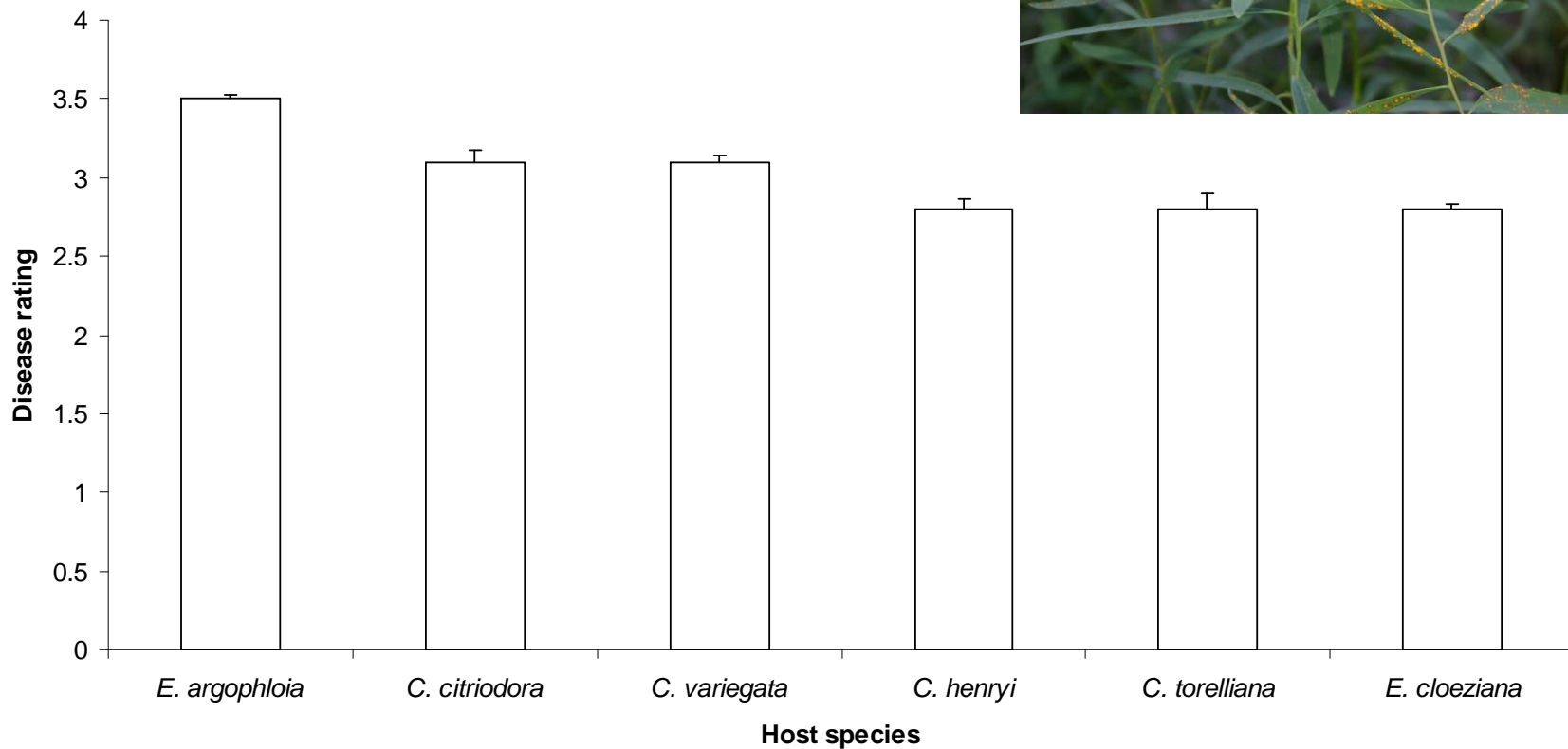


Eucalyptus cloeziana





Susceptibility of *eucalypt* species





Conclusion

- Large host range with impact on environmentally and commercially important species
 - Growth
 - Flower/fruit production
 - Regeneration
 - Impact yet to be fully understood
- Triggers for disease spread & severity yet to be determined
 - Host/pathogen interaction
 - Climate – tropical/subtropical/temperate
- Baseline pathogen population established
 - Screening method
 - Need to conduct pathogenicity tests
 - Selection of differential set

Thank you

- CRC Plant biosecurity
- Dr Suzy Perry, Dr Angus Carnegie, Dr Kylie Ireland, Dr Fiona Giblin, Peter Entwistle, Dr David Lee, Jeremy Brawner
- DAFF Queensland - Biosecurity Queensland, Agri-science Queensland
- For more information, please email Geoff.Pegg@daff.qld.gov.au; myrtlerustprogram@deedi.qld.gov.au



An Australian Government Initiative

