

Environmental Biosecurity & Forest Health

An introduction to biosecurity and forest health

Part 4

DAF Queensland

Dr Geoff Pegg, Dr Louise Shuey, Janet McDonald

DES

Alana Hazel

BAC

Chantel Van Wamelen, Matilda Davis, Jodie Rainbow, Myles Broome, Blayde Foley



Workshop outline

- **Part 1 - Biosecurity overview**
 - Environmental biosecurity priority lists
 - Significance of biosecurity
 - How do things get here
 - Reducing the risk & what happens when they do arrive
- **Part 2 – What are we protecting?**
 - K'gari
- **Part 3 – Forest health & biosecurity**
 - plant pests and pathogens
- **Part 4 – What can I do to help?**
 - Surveillance & reporting
 - Symptoms and signs



What can I do to help?

- **Create Awareness**

- Increasing awareness and knowledge of biosecurity in the environments we work/live in
- Familiarise yourself with your surroundings
 - Look for changes – pest detective

- **Educate**

- Increase capacity to detect and report
 - Make biosecurity and forest health a part of normal activities
- Get the message out there
 - Come clean go clean
 - Develop communication strategies
 - Develop networks
 - Landcare & garden groups
 - Schools



What can I do to help?

- **Surveillance**

- Active surveillance
 - Planned/structured activities looking for specifics
 - Aerial
 - Drive/walk-through
 - Trapping
- Passive surveillance
 - Observations of pests and diseases during routine activities
 - Adhoc/irregular

- **Reporting**

- **Suspected exotic pest or disease – EXOTIC PLANT PEST HOTLINE**
- Local Government Department
 - Diagnosis of the issue
- MyTreePest app – in development
 - Information on native pests and pathogens

**IF YOU SEE ANYTHING UNUSUAL,
CALL THE EXOTIC PLANT PEST HOTLINE**

1800 084 881



Benefits of forest health surveillance

- Assess the health of the forests and develop baseline information on the status of the forest and what pests and diseases are already present
 - Easier to identify change and emerging pest and disease threats
 - Timely implementation of management processes
 - Timely reporting in the case of exotic/new pests and disease threats
 - Provide timely advice for land managers/owners
 - Provide baseline information to inform management of pest & disease issues
 - Provide information for reporting requirements
 - World Heritage OUV's on K'gari; State of the Forest/Environment
- FHS is effective in detecting a number of new and emerging pests, evaluating their potential impact and assisting in focusing future research efforts.

What am I looking for?

- **Symptoms**

- The visible response of a plant to a causal agent over time

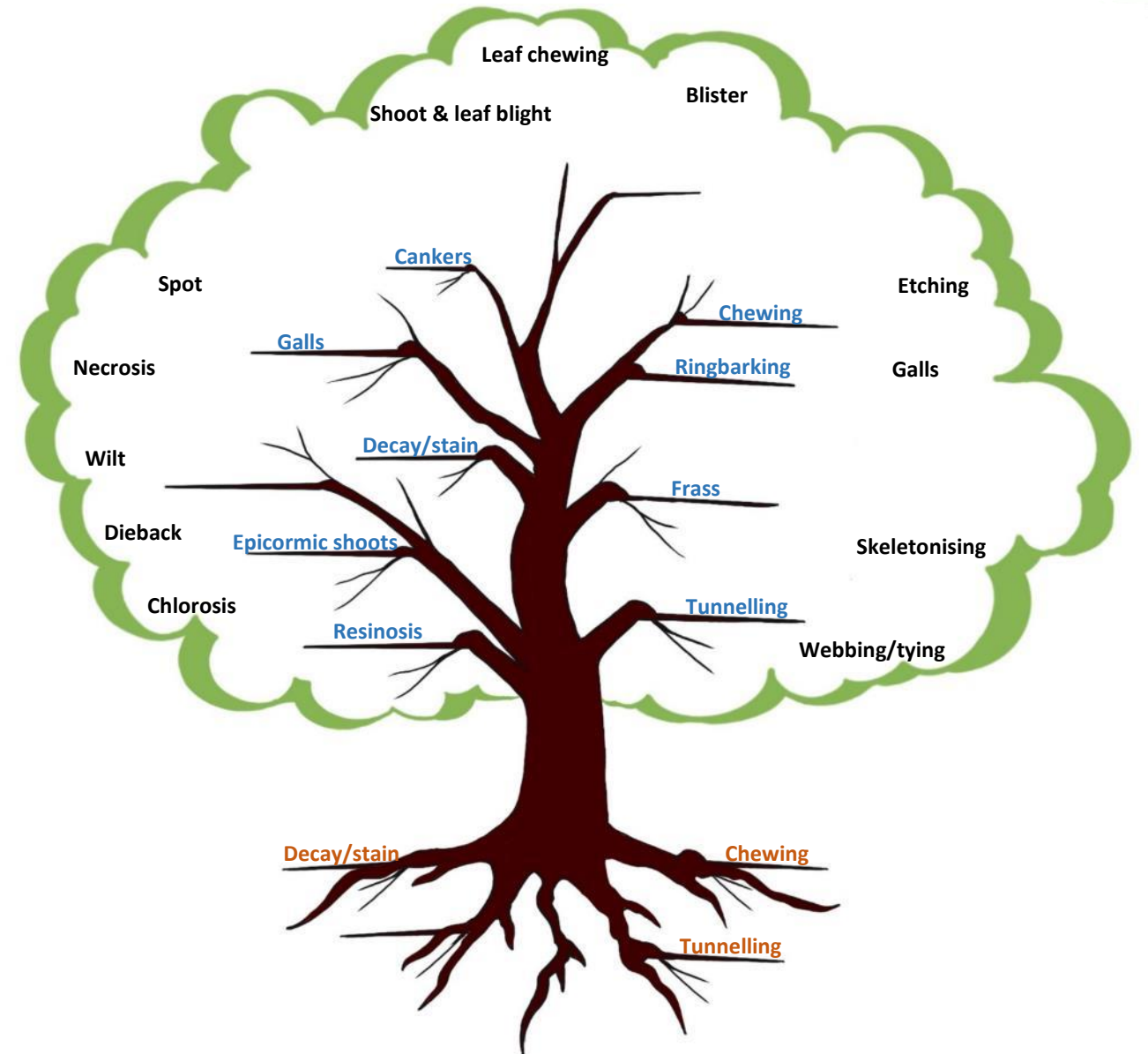
- **Signs**

- Structures produced by the causal agent of that disease that are more specific than symptoms and are more useful in the accurate diagnosis of a disease



Symptoms

- Symptoms can be caused by
 - Abiotic agents
 - Non-living agents
 - Biotic
 - Living agents
- Symptoms can occur on all plant parts
 - Foliage
 - Stem
 - Root



- **Environmental**

- Drought
- Frost
- Lightning
- Water-logging
- Fire

- **Chemical**

- Herbicide application
- Salinity

- **Nutritional**

- Toxicity
- Deficiency

Abiotic Agents



Biotic agents

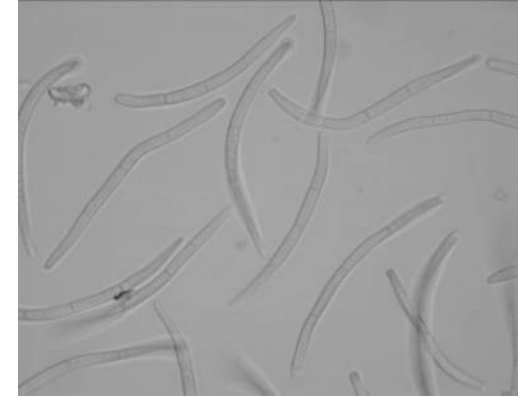
- Insects
- Fungi
- Bacteria
- Mycoplasmas
- Viruses
- Nematodes
- Parasitic plants



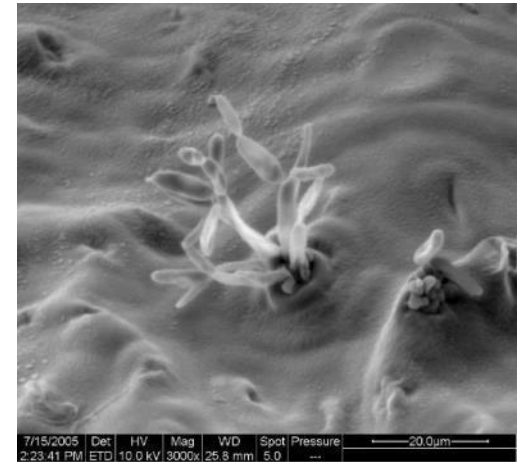
Symptoms

Signs

Teratosphaeria pseudoeucalypti



Quambalaria pitereka

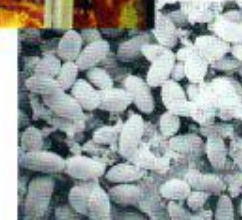


Similar Symptoms



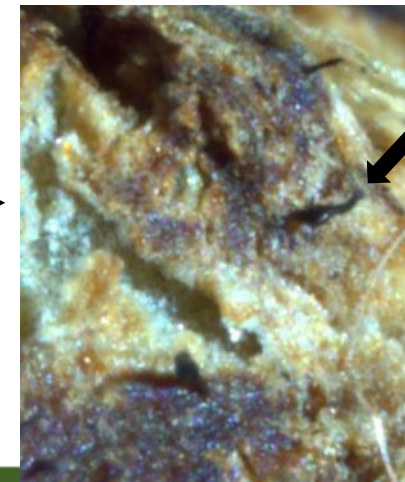
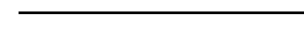
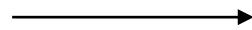
Teratosphaeria zuluensis

Different Signs



Caliciopsis sp.

Stem cankers



Similar Symptoms



Wilting



Bacterial ooze



Ralstonia solanacearum



Very different Signs

Fungal "stocking" – *Phellinus noxius*

Similar Symptoms



Very different
Signs



Symptoms – leaf & shoot blight/blotch



Teratosphaeria destructans leaf blight



Quambalaria pitereka shoot blight



Teratosphaeria leaf blight



Teratosphaeria leaf blight



Severe *Teratosphaeria* leaf blight



Defoliation by *Teratosphaeria* leaf blight

- Leaf blight refers to the parts of leaves that become discoloured, dried out, or dead in response to a pathogen infection.
- Shoot blight is the distortion and death of young shoots and leaves caused by fungal pathogens.

Symptoms – leaf spot

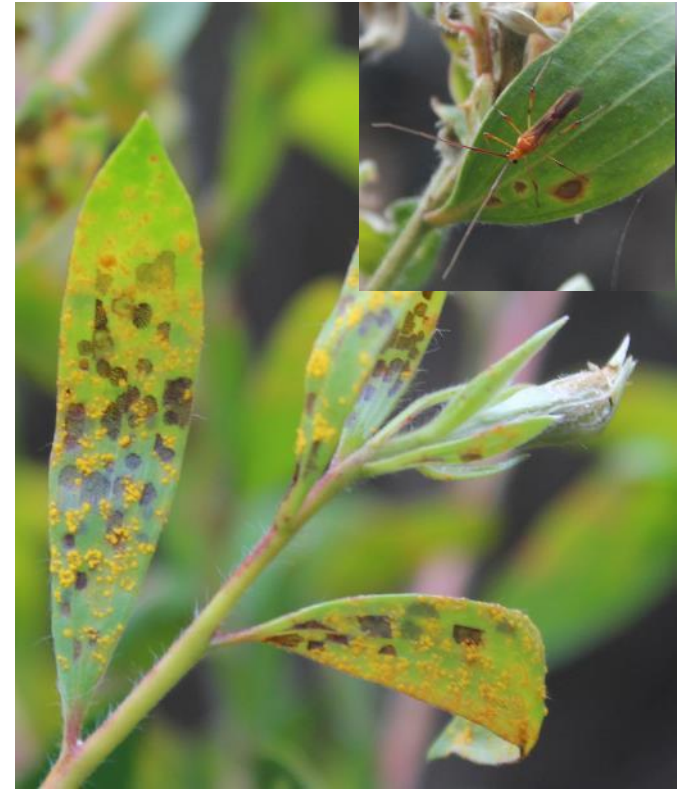
Characterized by discoloured often circular spots on the leaves



Aulographina eucalypti on *Eucalyptus cloeziana*



Austropuccinia psidii on *Syzygium wilsonii* & *Eucalyptus grandis*



Austropuccinia psidii & Mirid leaf spots on *Melaleuca quinquenervia*

Symptoms - Dieback



Characterised by progressive death of twigs, branches, shoots, or roots, starting at the tips.

Stag-head is a slow **dieback** of the upper branches of a **tree**; the dead, leafless limbs superficially resemble a stag's head.

Symptoms - Dieback



Photo: Stuart Johnson QPWS



Photo: G Pegg DAF

Symptom – Dieback & Epicormic shoots

- Occur on the tree's branches and trunk
 - Triggered by stress fire, drought and continual defoliation or pests and disease attack
 - Can also be more susceptible to pests and disease attack.



Fire induced epicormic



Fire induced epicormic impacted by myrtle rust
Melaleuca quinquenervia, *Eucalyptus pilularis*



Epicormic induced growth due to myrtle rust
Syzygium corynanthum



Symptom - Galls



Galls are a kind of swelling growth on the external tissues of plants, fungi, or animals. Plant galls are abnormal outgrowths of plant tissues. They can be caused by various parasites - viruses, fungi and bacteria – as well as other plants, insects or mites.



Symptom - Galls



- **Insect** galls occur in different shapes and colours on stems, branches, twigs and foliage.
- They are abnormal growths of plant tissue.
- Galls act as both the habitat and food source for the maker of the gall.
- Galls can be characteristic of different agents (mostly flies and wasps) which allows field identification.

Symptom - Galls



Rust gall on a branch



Rust galls on *Acacia* sp. foliage

- **Fungal** galls can be rust coloured, rough textured and larger than insect galls
- Can occur on branches, twigs and foliage
- Many of these fungal galls are formed by a specific class of fungi known as rusts.

Symptoms - Canker



- Localized, sunken, slightly discoloured, brown-to-reddish lesions on trunks and branches, or smaller twigs.
- Formed by the interaction between the host and pathogen - the host tree tries to contain the growth.
- Can take months or years to enlarge enough to girdle twigs, branches, or trunks.



Symptoms - Wilt



Affected parts lose their turgidity and droop

A **wilt disease** is any number of diseases that affect the vascular system of plants.

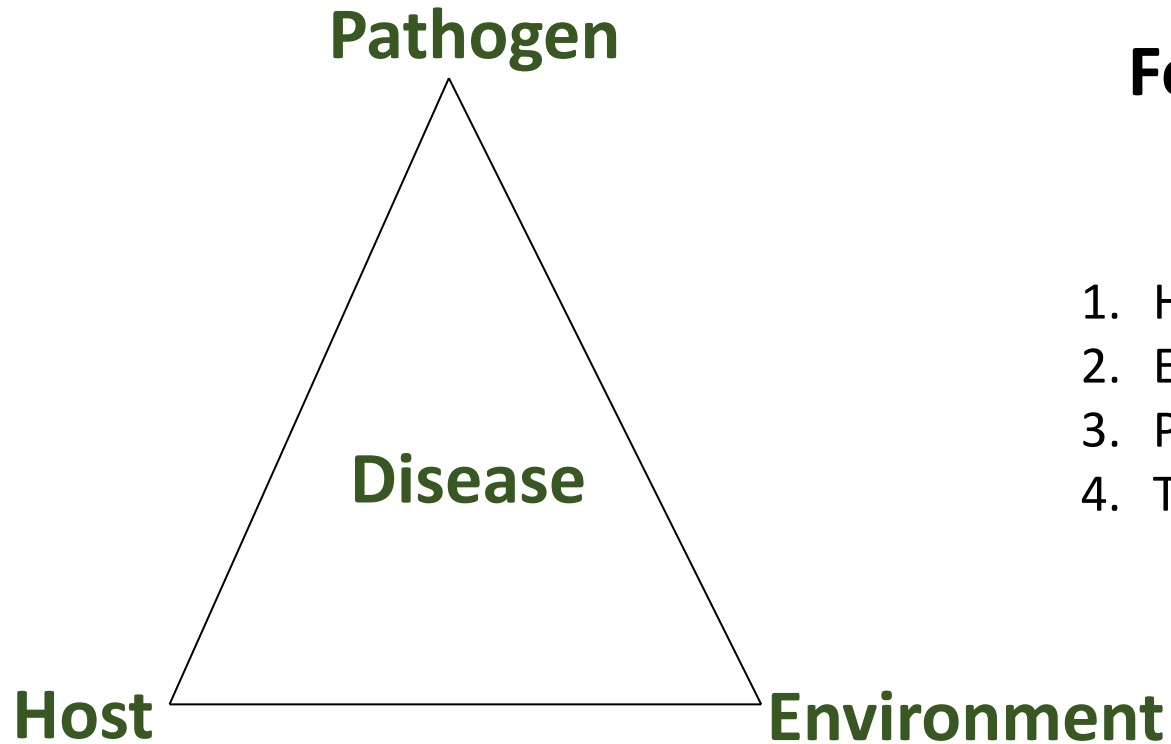
Wilt can be caused by root and crown rots, stem cankers, insect injuries, drought or excess water, soil compaction etc.

Activity

- Hervey Bay Botanic gardens – pest and pathogen symptoms
 - Photograph pest and pathogen symptoms
 - Collect samples and describe



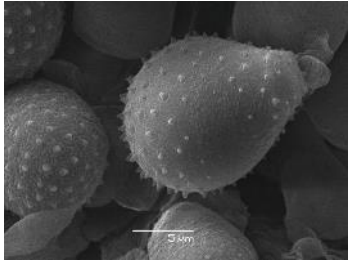
Surveillance - Disease triangle



Four factors needed for a disease to occur

1. Host or susceptible plant
2. Environment – rainfall/humidity
3. Pathogen or disease causing agent
4. Time for disease to occur

Disease triangle – myrtle rust example



**Pathogen - *A. psidii*
urediniospores**



**Myrtle rust
disease**

**Myrtaceae – new
growth flush**

**Environment – moisture for plant growth
and to allow fungal spore germination
and host infection**

- Host or susceptible plant
 - actively growing Myrtaceae – seedling – mature tree
- Environment
 - rainfall & high humidity – minimum 8hrs leaf wetness for spore germination
- Pathogen or disease causing agent
 - high number of spores to increase chance of finding and infection a susceptible host
- Time for disease to occur
 - 7 to 14 days from infection to completion of the disease cycle and production of new spores

Where to look?

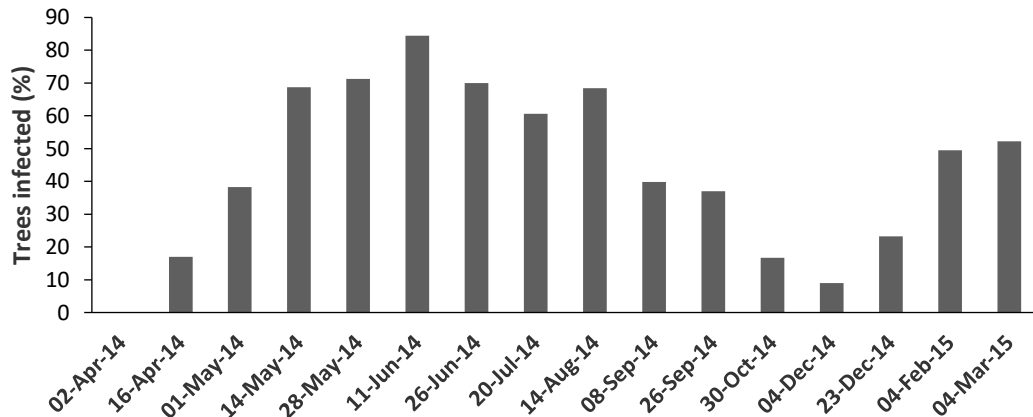
- **Nurseries**
 - Frequent watering
 - High density of susceptible species
 - Active growth
- **Revegetation plantings/landscaping**
 - High density plantings
- **Botanic gardens**
 - Target known susceptible species
- **Waterways – swamps, creek banks**
- **Fire recovery sites**
 - Areas of mass regeneration
 - Seedlings/epicormic regrowth
- **Valley ecosystems**
 - High humidity – year round suitable conditions



When to look?

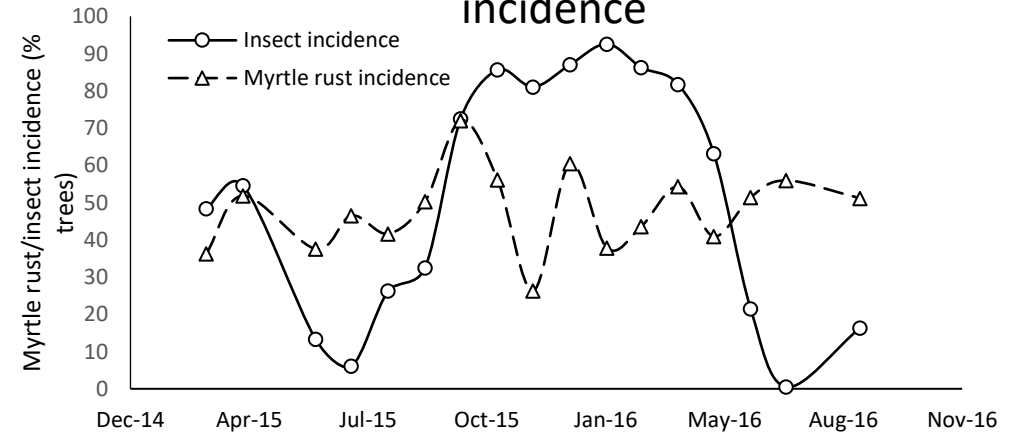
- Optimum times in subtropical conditions appears to be autumn – early spring
 - Variable with some sites being all year round
 - In some cases more host driven than climatic
 - *Melaleuca quinquenervia*

Fire regeneration – disease incidence



Peak in disease incidence in Autumn/Winter

Melaleuca swamp – disease and insect incidence



Fluctuations independent of climatic variables

What to look for?

Seedlings, saplings.....100 year old mature trees



Symptoms

- Wide range of symptoms
 - Infects new growth, fruit and flowers
 - Old growth is resistant to infection
- Restricted leaf spots to blighting
- Red-purple spots associated with pustules
- “Glowing” yellow pustules to “scorched” appearance with no obvious pustules
- Significant dieback to tree death
 - Rate of decline is variable





“Scorched” appearance with little to no obvious yellow pustules















What is biosecurity & why is it important

- What does the term “biosecurity” mean to you?
- Why is it important?

- Revisit Group activity – 4 tables of 5 with Rangers helping lead discussions on tables
- 15 minutes