

# Diseases in Macadamia nurseries and orchards

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## SGASA Annual Symposium

**Nelspruit**

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**Nelspruit, 1200**





# Diseases in Macadamia nurseries

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Diseases - limiting factors in nurseries - **high moisture and nutrient regimes** – provide **very favourable conditions** for **infection** and **disease spread**

Some pathogens causing diseases in nurseries are the same as those causing diseases in orchards, but others are **limited to nurseries**



# Diseases in Macadamia nurseries

- Black leaf blight
- Brown leaf blight
- Leaf anthracnose
- Yellow halo leaf blight
- Macadamia ringspot virus (MRSV)
- Phomopsis graft dieback
- Botryosphaeria dieback
- Phytophthora root rot and stem canker

# Black leaf blight (Alternaria leaf blight)

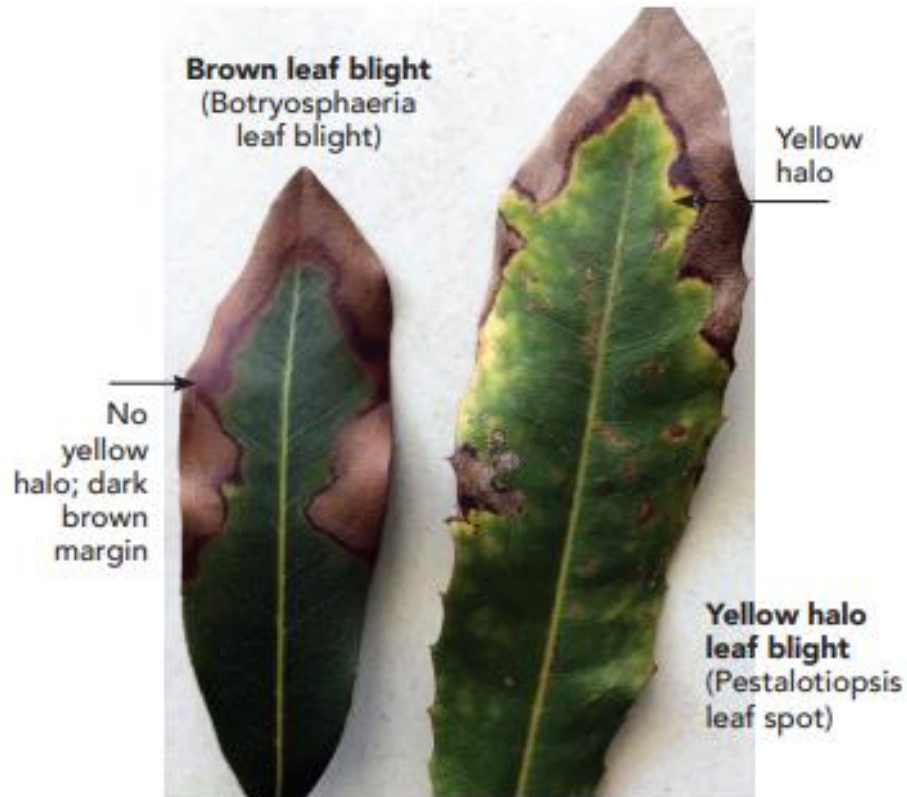
- Affects young immature leaves
- Overhead irrigation - wet for long periods
- Also in orchards
- Total collapse of apical young leaf flush
- Affected tissue become paper thin - disintegrate upon being touched
- Control - reducing the period of leaf wetness



**Black leaf blight or Alternaria leaf blight**

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# Brown leaf blight (Botryosphaeria leaf blight)

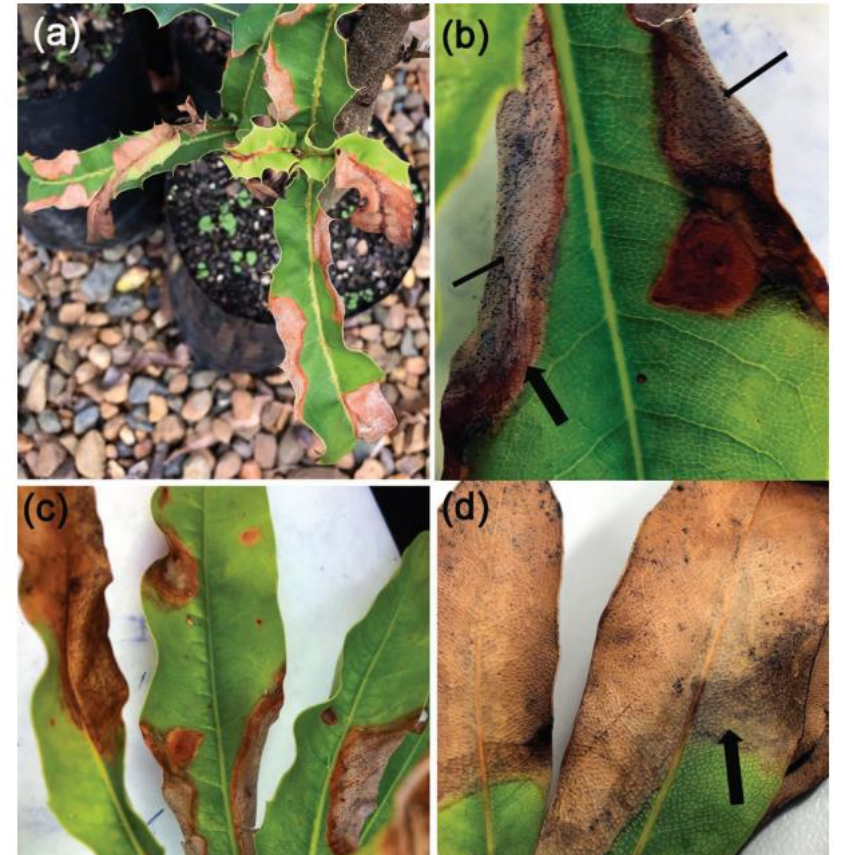


Akinsanmi & Searle 2020

- Affects mature, full-sized leaves - nurseries and orchards
- Often confused with salt damage
- Extensive brown blotches with a distinct dark brown margin between the brown blotch and healthy green tissue
- Dark brown region – easily distinguishable from yellow halo leaf blight - with yellow margin

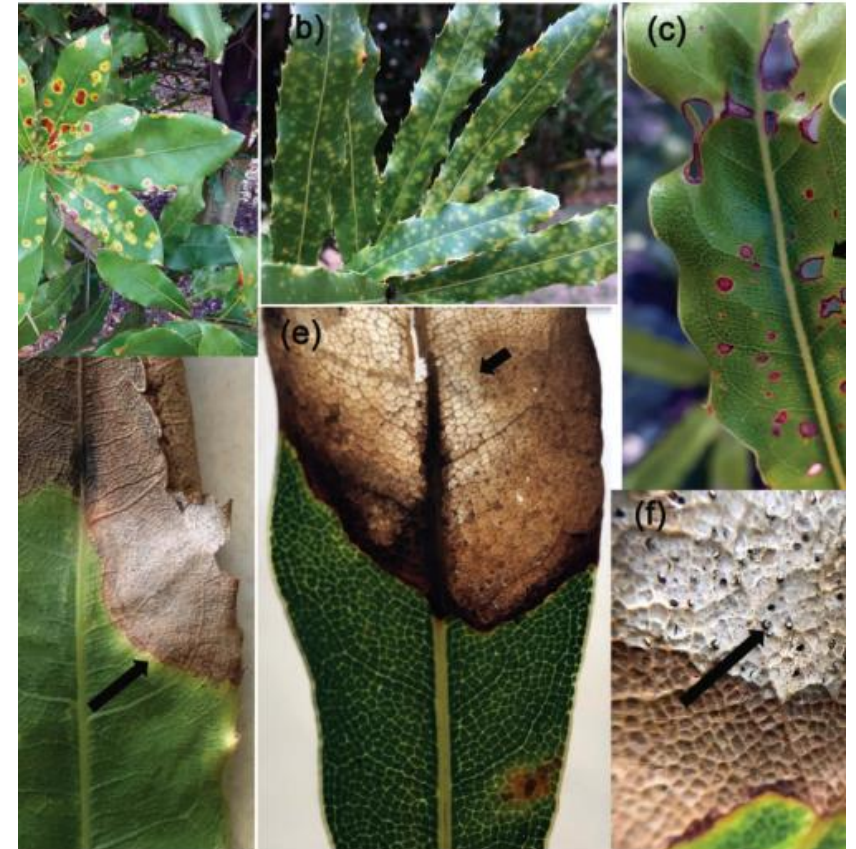
# Leaf anthracnose (Colletotrichum leaf spot)

- Affects immature and mature full-sized leaves - nurseries and orchards
- Distinct spots on leaves or irregular brown patches along leaf blade or tip of leaf
- Spots may merge - form brown patches
- Advancing lesion – appear water soaked at border
- Black fungal structures
- Spores spread by rain splash to surrounding leaves



# Yellow halo leaf blight (Pestalotiopsis leaf blight)

- Immature and full-sized leaves – nurseries and orchards
- Circular spot with a distinct yellow halo - necrotic centre
- Dead necrotic centre falls out – shot hole appearance
- Infection of leaf tip or margin – brown patches with a distinct yellow margin between the necrotic and healthy part
- Advanced stages - brown lesion turns whitish – dead part becomes very thin
- Black structures of fungus



Akinsanmi & Searle, 2020

# Diseases in Macadamia nurseries

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- Yellow halo leaf blight and leaf anthracnose - potential economic significance in Australia
- Phytophthora blight:
  - Caused by *Phytophthora capsici* and *P. palmivora*
  - Reported from Hawaii



Akinsanmi & Searle, 2020



# Diseases in Macadamia nurseries

- Pathogens can survive in infected leaves
- Source of inoculum
  - Flowers
  - Nuts
  - Young twigs
- Spores – easily dispersed by splashing rain
- Spores – spread throughout canopy

# Diseases in Macadamia nurseries

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- No products registered in SA
- Some practices can however minimize the risk of infection:
  - Adequate nutrition
  - Good sanitation practices
  - Minimize leaf wetness
  - Good air circulation
  - Remove and destroy heavily infected plants
- Determine contribution of pathogens in the leaves to the rapid establishment and spread of diseases such as **Botryosphaeria branch dieback** and **flower blight**



# MRSV – macadamia ringspot virus disease

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- Nurseries and in the orchard
  - New leaf flush - very susceptible
  - Direct economic effect not known
  - Other viruses can cause significant yield losses
  - Most probably transmitted by thrips

# Phomopsis graft dieback

- Caused by *Phomopsis* spp.
- Scion dies after grafting – rootstock looks healthy
- Dark stain or discolouration of vascular tissue
- Wilting and complete dieback of scion
- Botryosphaeriaceae fungi - have also been associated with graft dieback
- Infection occurs during grafting

# Botryosphaeria dieback

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- Family Botryosphaeriaceae
- Enter plant through injury, pruning, grafting or insect wounds
- Dark stains which indicate branch dieback
- Leaves are brown and dead

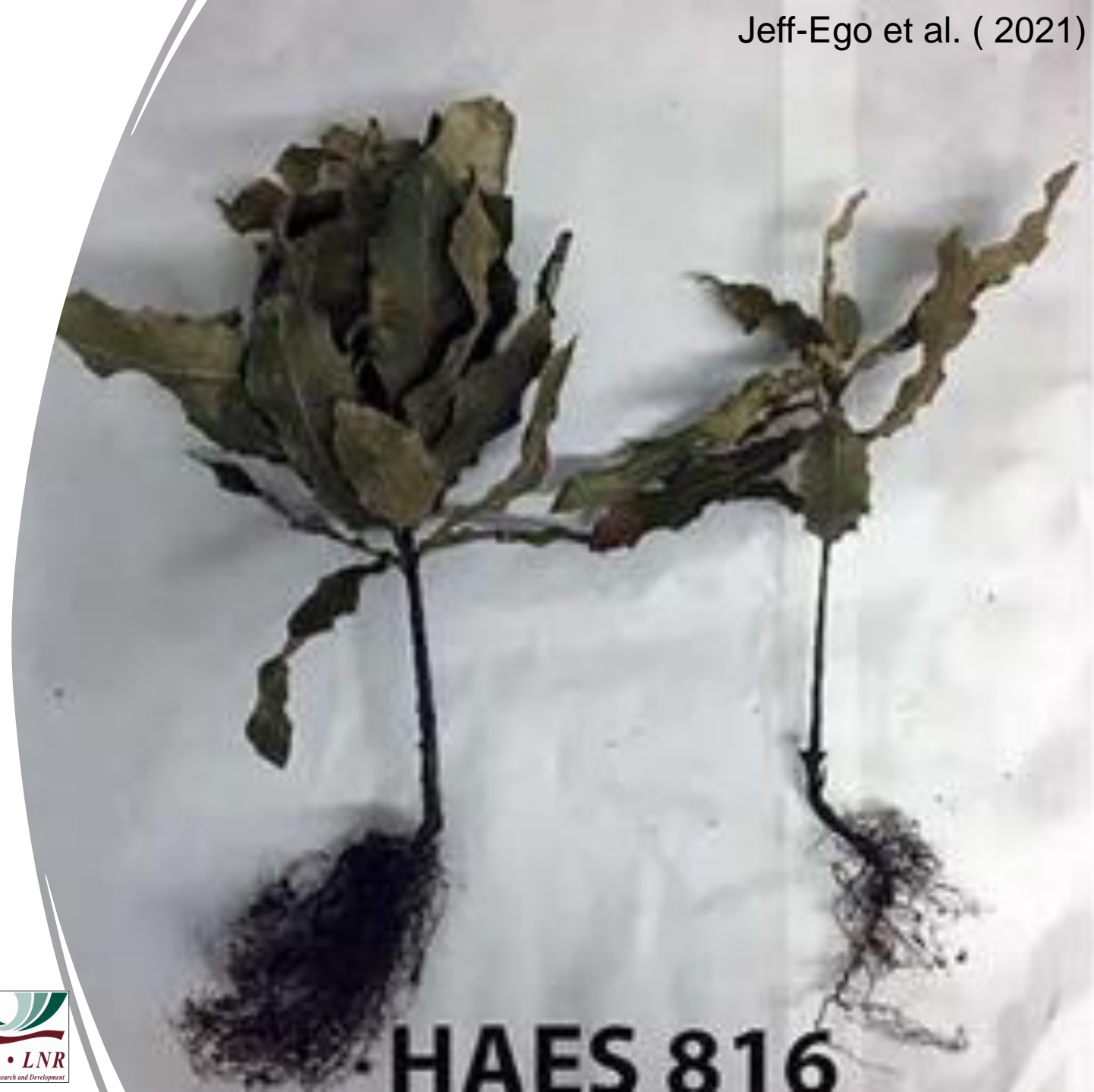


Photo by FABI

# Phytophthora root rot and stem canker

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- *Phytophthora cinnamomi*
- Serious in macadamia nurseries
- Reduces plant vigour and growth
- Up to 80% plant losses in *Phytophthora*-infested potting soil vs clean potting soil
- Sparse root growth or lack of feeder roots



# Phytophthora root rot and stem canker

- *Pythium*, *Phytopythium* and *Globisporangium* spp.
- Main source of infection in nurseries
  - Contaminated irrigation water
  - Contaminated potting mix
  - Soils from the nursery floor

# Diseases in Macadamia orchards

- Flower blights
  - Dry flower disease
  - Cladosporium blight
  - Botrytis blight
- Husk rot
- Botryosphaeria branch dieback
- Phytophthora root rot and stem canker





# Flower blights

- Three known flower blights affecting macadamia in SA
  - Dry flower disease (*Neopestalotiopsis* and *Pestalotiopsis* spp.)
  - Green mould (Cladosporium blight)
  - Grey mould (Botrytis blight)

# Dry flower disease

- *Neopestalotiopsis* and *Pestalotiopsis* spp.
- Symptoms:
  - Dry and brown appearance raceme
  - Dieback of rachis (rat tail) and necrosis of flowers
  - Flower buds become blighted, turn brown
  - Infected flowers may dislodge
- All development stages
- Prefer warm dry conditions – 25-27°C



# Cladosporium blight (Green mould)

- *Cladosporium* spp.
- Symptoms
  - Racemes become blighted – covered with olive grey fungal growth
  - Tip of rachis is affected – Rat tail
- Prefers wet, cool humid conditions - 21-25°C



# Botrytis blight (Grey mould)



- Two *Botrytis* spp.
- Prefers cool wet conditions 18-22°C
- Symptoms
  - Small brown necrotic flecks on flowers
  - Entire raceme become blighted
  - Necrotic flowers may remain attached - become covered by matt of grey hyphae
- *Botrytis* generally infects senescent (old) flower parts

# Husk rot

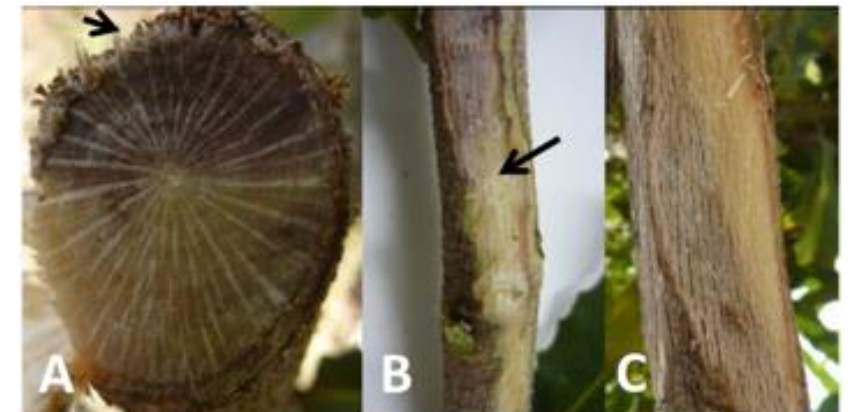
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- *Colletotrichum gloeosporioides* and *Phomopsis/Diaportha* spp.
- Symptoms
  - Diffuse soft and spongy black lesions (0.5-1cm diameter)
    - clearly distinct on green husk
  - Spots coalesce - form fast-spreading, dark-coloured greasy decay - present right through the green husk
  - Infection spreads through husk into pedicel and stalk - premature nut drop



# Macadamia branch dieback

- Family Botryosphaeriaceae and Diaporthaceae
- Symptoms
  - Brown or dry foliage among the otherwise healthy green foliage on tree canopy
  - Leaves on affected branches dry out but remain attached to branch
  - Extensive necrotic wood discoloration are evident in a cross section of affected branches or main trunk
  - Wood discoloration often appear wedge shape



# Macadamia Branch Dieback

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- Botryosphaeriaceae family
  - Endophytic nature
  - Opportunistic pathogens
  - Cause diseases when plants become stressed by:
    - Drought
    - Nutrient deficiencies
    - Mechanical damage
    - Damage caused by pests and/or other pathogens



# Diseases in Macadamia orchards

## Phytophthora root rot

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- *Phytophthora cinnamomi*
- Symptoms:
  - Branch dieback
  - Chlorosis
  - Sparse canopy
  - Bleeding







Thank you