Pests and diseases in Australian walnut orchards

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AWIA Nagambie
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WN13002 Description and management of premature fruit drop in walnuts

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Charles Sturt University: Emily Thomas
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Pests and diseases

• Insect and mite pests
  • Frosted scale
  • Helicoverpa spp (Heliothis)
  • Spider mites – Two spotted mite and European red mite

• Fruit, shoot and foliage disease
  • Walnut blight
  • Brown apical necrosis (BAN) and/or Apical necrosis (AN)
  • Botryosphaeria (BOT)
Frosted scale

• Large populations in NSW and TAS orchards
  • One generation per year
  • Overwinter as nymphs on twigs and small branches
  • Grow rapidly in Spring and form a frostlike waxy cover. Adults lay eggs in late Spring and then die after egg production.
  • Newly hatched crawlers emerge from mid-November through December onto leaves, where they feed over summer
  • In autumn, nymphs move back to twigs to overwinter

• Heavy populations reduce terminal growth and vigor, resulting in smaller nuts and poor kernel quality

• Cultural and/or chemical management strategies
  • Five nymphs per foot of last years wood, and parasitism not significant
  • IPM friendly chemical control options i.e., APVMA PER81848
Helicoverpa spp and LBAM

Helicoverpa spp (Heliothis) and Light brown apple moth (LBAM)

- Occasional pest in NSW orchards
- Larvae tunnel into small fruits leading to premature fruit drop

Chemical management

- IPM friendly chemical control options available;
  - Altacor (chlorantraniliprole), APVMA PER81956, current to 31 October 2022
Two-spotted spider mite (TSM)

- Large ‘patchy’ populations of TSM present in NSW orchards
  - *European red mite occasionally seen in TAS orchards*
- TSM feed on leaf cell contents; large populations can lead to premature defoliation of trees
  - Early-season defoliation may reduce nut yield and quality
  - Late season defoliation can lead to harvest delays
- Webbing and leaf stippling evident on infested leaves from mid- to late-summer
- Predatory mite release programme
## Fruit disease – orchard baseline

Plant pathogenic fungi and bacteria isolated from walnut fruits and vegetation with symptoms describing apical necrosis, botryosphaeria canker and walnut blight, from commercial orchards in different geographic regions within NSW and Tasmania. A dash indicates that plant pathogenic fungi and/or bacteria were not isolated from that sample.

<table>
<thead>
<tr>
<th>State</th>
<th>Region</th>
<th>Cultivar</th>
<th>Host</th>
<th>Sample location</th>
<th>Disease symptoms</th>
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<th>Fungi</th>
<th>Bacteria</th>
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<tbody>
<tr>
<td>NSW</td>
<td>Leeton</td>
<td>Vina, Lara</td>
<td>large fruit</td>
<td>tree</td>
<td>apical lesions &amp; spots</td>
<td>17-Dec-14</td>
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<td>Xanthomonas²</td>
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<td>TAS</td>
<td>Cranbrook</td>
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<td>tree</td>
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<td>17-Dec-14</td>
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</table>

¹ Isolates identified by fungal culturing; ² Isolates identified by PCR and DNA sequencing: N. australe = Neofusicoccum australe (syn. Botryosphaeria australis), D. seriata = Diplodia seriata (syn. Botryosphaeria obtusa); ³ Isolates identified by culturing and biochemical tests.
Walnut blight

• Water soaking and necrosis on current seasons fruits, shoots and foliage

• Epidemics in NSW and Tasmanian orchards; rainfall and free moisture involved in disease development
  • *X. arboricola pv juglandis*

• Disease managed by copper + mancozeb sprays
  • APVMA PER13124, current to 31 March 2022

• Predictive spray models developed i.e., Xanthocast, RainCast
Fruit disease (Vina, Leeton, NSW)

- Brown-black coloured lesions on the apical end of fruit
- Botryosphaeria and Alternaria isolated along with the walnut blight bacterium

**Fungal ID**
- Diplodia seriata (B. obtusa)
- Alternaria daucifolii

**Bacterial ID**
- X. arboricola pv juglandis
Fruit disease (Tulare, Leeton, NSW)

- Necrotic lesions on current seasons shoots
- Botryosphaeria (mostly) and some Fusarium and Alternaria isolated from shoots

**Fungal ID**
- Neofusicoccum australe (B. australis)
- Alternaria spp., Fusarium spp.

**Bacterial ID**
- X. arboricola pv juglandis
Fruit disease (Lara, Leeton, NSW)

- Necrotic lesions on current seasons fruits

- Fusarium (frequently) and a few Botryosphaeria and Alternaria isolated from fruits

- **Fungal ID**
  - *Fusarium oxysporum*, *F. solani*
  - *Neofusicoccum australe* (*B. australis*), *Alternaria spp.*

- **Bacterial ID**
  - *X. arboricola pv juglandis*
Fruit disease (Howard, Leeton, NSW)

• Lesions on current seasons fruits

• Botryosphaeria, Fusarium and Alternaria isolated from fruits
  • *Neofusicoccum australe* (*B. australis*)
  • *Fusarium* spp., *Alternaria* spp.

• Walnut blight bacterium not detected

(Fusarium and Alternaria spp were also isolated from diseased Vina fruits without Xaj in Tasmania in a previous study)
Fruit disease (Vina, Swansea, TAS)

- Necrotic lesions on current seasons fruits
- Botryosphaeria and Alternaria
  - *Botryosphaeria* spp. (*Dothiorella* omnivore, *D. vidmadera*)
  - *Alternaria* spp.
- Walnut blight bacterium not detected
  (Alternaria were also isolated from diseased Howard and Chandler fruits in orchards located in northern and eastern Tasmania)
Spurs and laterals – NSW

Dieback of spurs and laterals

• *Diplodia seriata* and *Diaporthe novem* isolated from pycnidia on spurs and laterals of cultivar Tulare

• *Botryosphaeria* spp. isolated in scaffolds below winter pruning cuts in 8 year old trees of cultivar Serr and Chandler

• Presence of pycnidia on spurs and laterals on Serr; isolation and ID ongoing
Spurs and laterals – Tasmania

Dieback of spurs and laterals in older orchards

- Dieback prevalent in different walnut growing regions of Tasmania
- Presence of pycnidia on spurs and laterals?

Pathogen isolation and ID

- Botryosphaeria (Dothiorella omnivor, D. vidmadera) isolated from diseased fruit collected from Swansea orchard
- Isolation and identification of diseased spurs and laterals ongoing
Outcomes

• Fruit, shoot and foliage disease evident at Riverina and Tasmanian orchards
  • considerable loss of crop yield evident without effective management strategies

• Cultural and chemical options available
  • Frosted scale (APVMA PER 81848)
  • Helicoverpa (APVMA PER 81956)
  • Walnut blight (APVMA PER 81848)
  • Apical necrosis (APVMA PER 85212)
  • Botryosphaeria (APVMA PER 85211)

• Expanded disease survey in Australian walnut orchards warranted
Thankyou