TACKLING SCLEROTINIA – AN INSIGHT INTO THE FACTORS INFLUENCING DISEASE DEVELOPMENT

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• Carpogenic (apothecia) germination of sclerotia under different temperatures, and in relation to location of formation

• Influence of summer temperatures on sclerotia preconditioning prior to winter growing season

• Variety by location by management variation in Sclerotinia infection in canola. Field trial results from 2018
GERMINATION TEMPERATURES OVER THE GROWING SEASON

• Sclerotes collected from 4 infected canola paddocks (Bentley, Beverley, Darkan & Mingenew) 1 infected lupin crop (Mingenew)

• Four alternating (12/12 hr) temperature treatments; 15/4°C, 20/4°C, 20/15°C and 30/20°C with light at warmer temperature
GERMINATION TEMPERATURES OVER THE GROWING SEASON

• Germination of sclerotes and apothecia production scored for 180 days
FIVE SCLEROTINIA POPULATIONS INCUBATED AT FOUR ALTERNATING TEMPERATURES (15/4°C, 20/15°C, 20/4°C, 30/15°C; 12/12HOURLY LIGHT/DARK) FOR 180 DAYS

Total apothecia production

Is temperature range as important as temperature itself?
SUMMER TEMPERATURE PRECONDITIONING

- Sclerotes collected from canola infected crops at five locations in 2017; Greenough, Toodyay, Beverley, Kojonup 1 and 2.
- Pre-conditioning at five temperature treatments; 4°C, 20°C, 35°C, 50°C and outside under rainout shelter over summer at Curtin University
- Four time durations; control (0 days), 30 days, 60 days and 120 days
- Germinated at 20/15°C
- On-going with preliminary results
SUMMER TEMPERATURE PRECONDITIONING

Control – 0 days preconditioning

30 days pre-conditioning (1 population)
SUMMER TEMPERATURE PRECONDITIONING

30 days pre-conditioning (1 population)  60 days pre-conditioning (1 population)
2018 CANOLA-SCLEROTINIA FIELD TRIALS

- Ten field trials run in 2018 across the wheatbelt in conjunction with NVT trials where possible
- Four varieties: Bonito, Mako (OP), Hyola 559 TT, InVigour T4510 (hybrid)
- +/- fungicide treatment at 30% flowering
- Detailed assessment for risk of Sclerotinia:
  - Soil sampled per plot prior to sowing for soil sclerotia
  - Petals sampled per untreated plots at 30% flowering for airborne Sclerotinia spores
  - Disease incidence recorded within each plot prior to harvest
  - Diseased stems collected for Sclerotinia infected plant measurements
  - Harvested seed sieved for sclerote contamination
2018 CANOLA-SCLEROTINIA FIELD TRIALS

% petal infection at 30% flowering

% disease infection before harvest

Average sclerotia in soil/ m²

Sprayed
Untreated
How much disease is required to compromise final yield?
TO SUMMARISE

• Greatest germination of sclerotia is at 20/15°C
  ➢ But is temperature range as important as temperature?
• Pre-conditioning of sclerotia over summer is important for germination over winter growing season
• Greatest risk of Sclerotinia infection in canola field trials is from airborne spores on petals
  ➢ But environmental conditions critical in final disease incidence
  ➢ And what level of disease is required to lead to a yield reduction in crop?

Economics and Australian data-based prediction software vital
BACKGROUND

- Sclerotia are the ‘fuel’ for sclerotinia outbreaks.
- Small sclerotia produce fewer apothecia.

**Aims:**
- Test whether hybrids produce more sclerotia than OPs.
- Determine stem area producing most sclerotia.
- Test the effect of plant development on sclerotia production.

Image source: American Phytopathological Society
(http://www.apsnet.org/edcenter/instcomm/teachingnotes/pages/productionofapotheciaandascospores.aspx)
EXPERIMENTAL DESIGN

Inoculated at flowering time

1. 68 non-commercial varieties hoop-house
2. 4 OP and 4 Hybrid glass-house
3. 3 Hybrid and 1 OP

Inoculated at early, mid or late flowering

a. Conviron
b. Curtin field plot
THE CURTIN CANOLA CROP
HYBRID VS OP SCLEROTIUM CONTENT

- Hybrid cultivar ‘A’ consistently produced more sclerotia than OP cultivar ‘E’.
- No strong effect of flowering stage.
**STEM REGION SCLEROTIUM CONTENT**

- More sclerotia produced below point of inoculation.
- Larger sclerotia produced below point of inoculation.
• Hybrids produce more sclerotia below inoculation point than OPs.
Hybrids produce more sclerotia below inoculation point than OPs.
TAKE HOME MESSAGE

• The larger size of hybrids may cause an increase in production of sclerotia.
• More sclerotia are produced below the site of infection.
• The largest sclerotia accumulate at the stem’s base.
• Keeping canola clear of SSR is important to avoid immediate yield losses but also inoculum build-up.
• This may be most important for larger plants such as hybrids.
• Further research is needed.
Acknowledgements:
Pippa Michael, Linda Thomson and King Yin Lui (now DPIRD)
Matthew Denton-Giles and Yupin Khentry
CCDM, Curtin University

Thank you