

TACKLING SCLEROTINIA – AN INSIGHT INTO THE FACTORS INFLUENCING DISEASE DEVELOPMENT

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Centre for Crop and
Disease Management



CONTENT

- 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



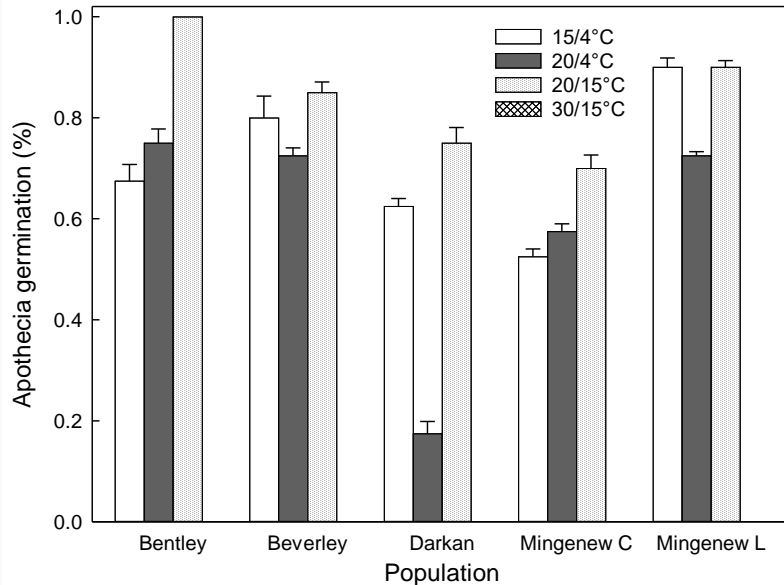
GERMINATION TEMPERATURES OVER THE GROWING SEASON

- Germination of sclerotes and apothecia production scored for 180 days

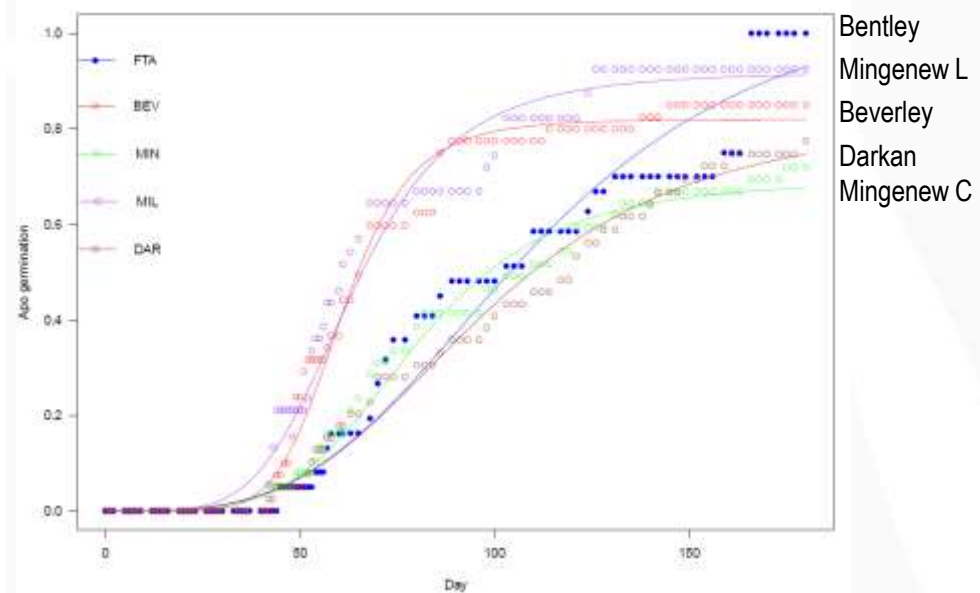


FIVE *SCLEROTINIA* POPULATIONS INCUBATED AT FOUR ALTERNATING TEMPERATURES (15/4°C, 20/15°C, 20/4°C, 30/15°C; 12/12HOURLY LIGHT/DARK) FOR 180 DAYS

Total apothecia production



20/15°C treatment



Is temperature range as important as temperature itself?

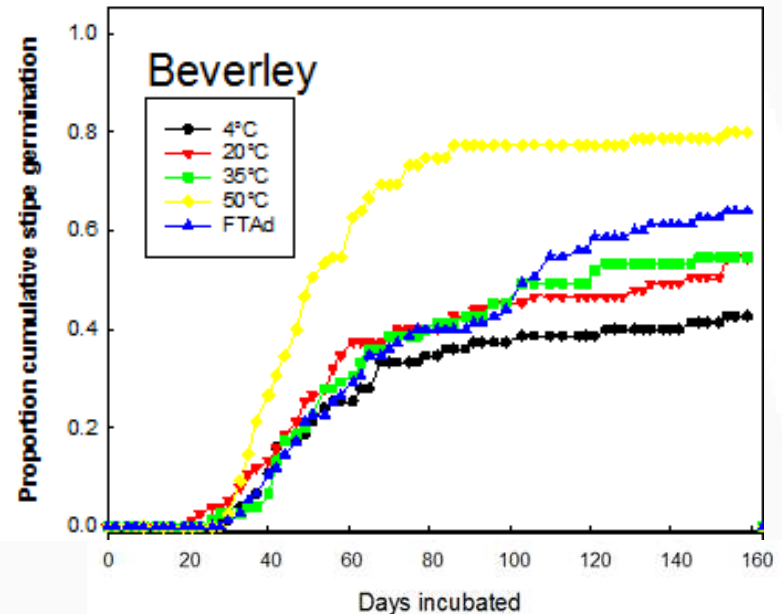
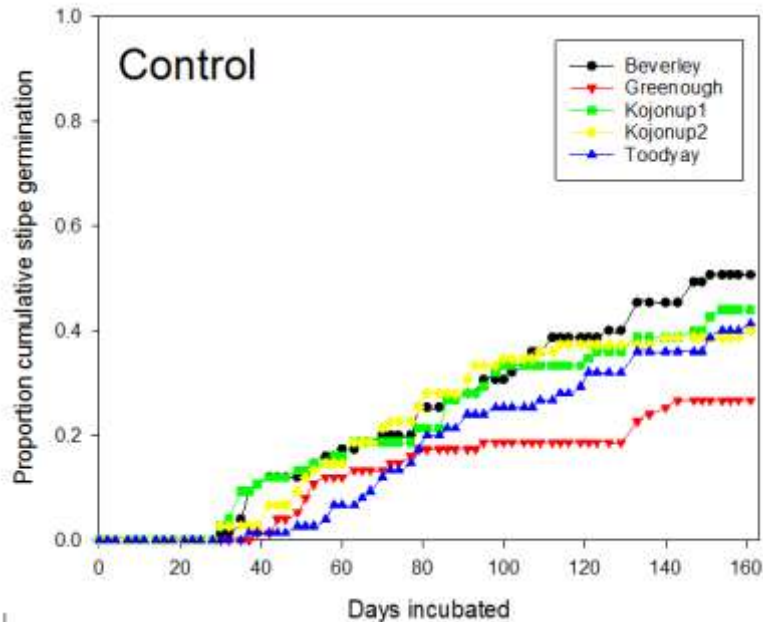
SUMMER TEMPERATURE PRECONDITIONING

- 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

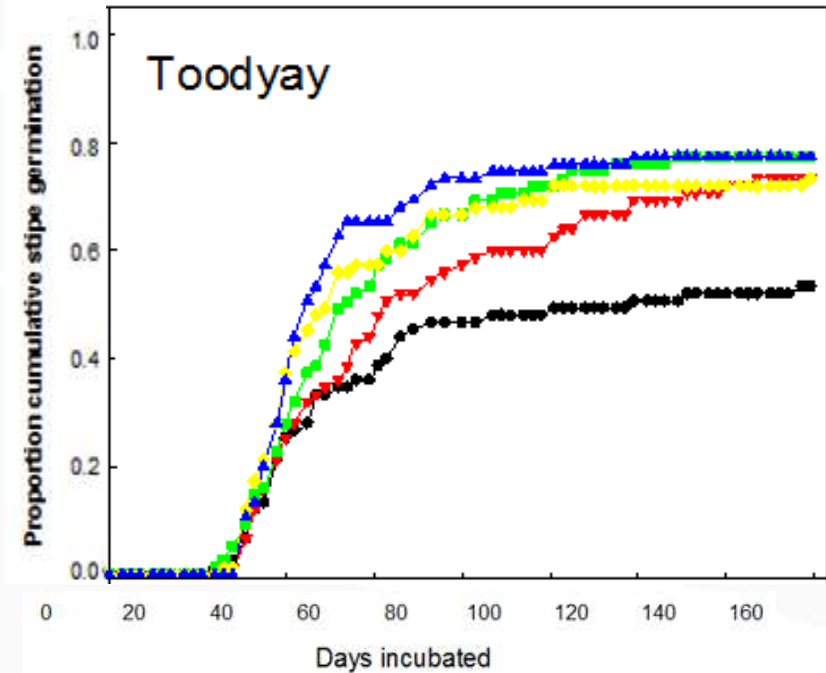
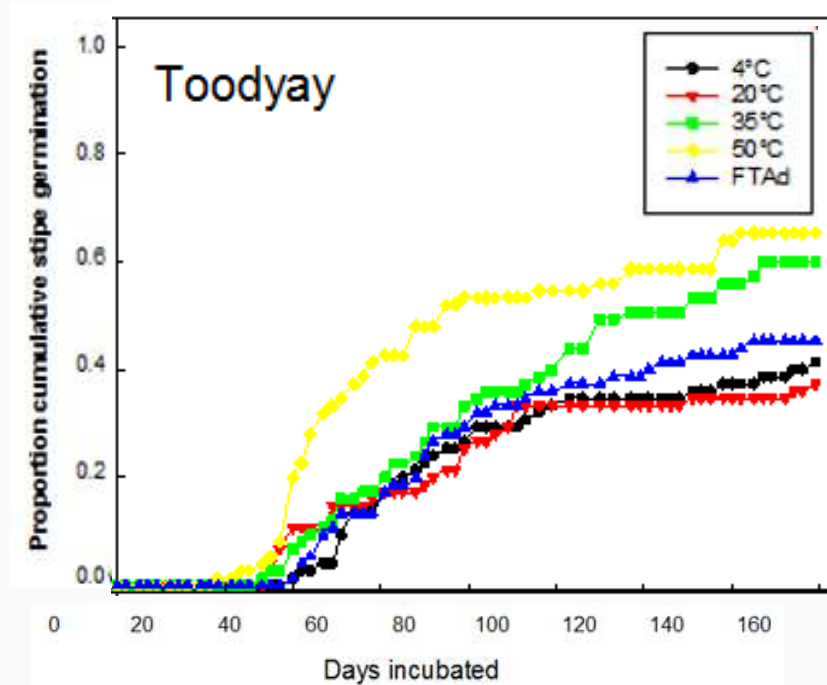
30 days pre-conditioning (1 population)



SUMMER TEMPERATURE PRECONDITIONING

30 days pre-conditioning (1 population)

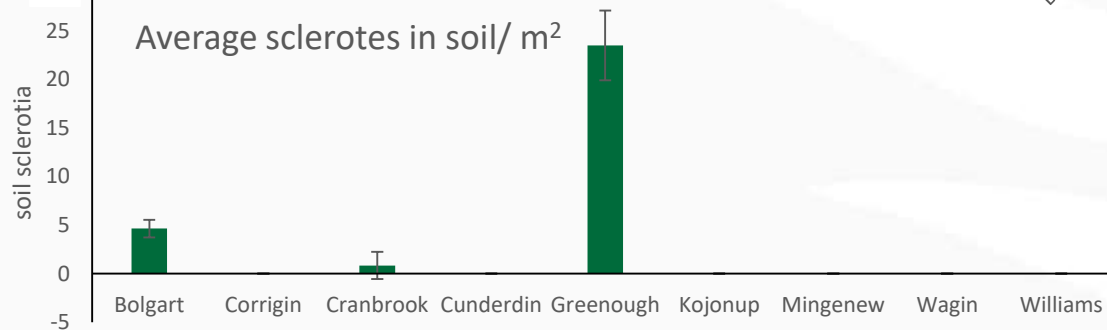
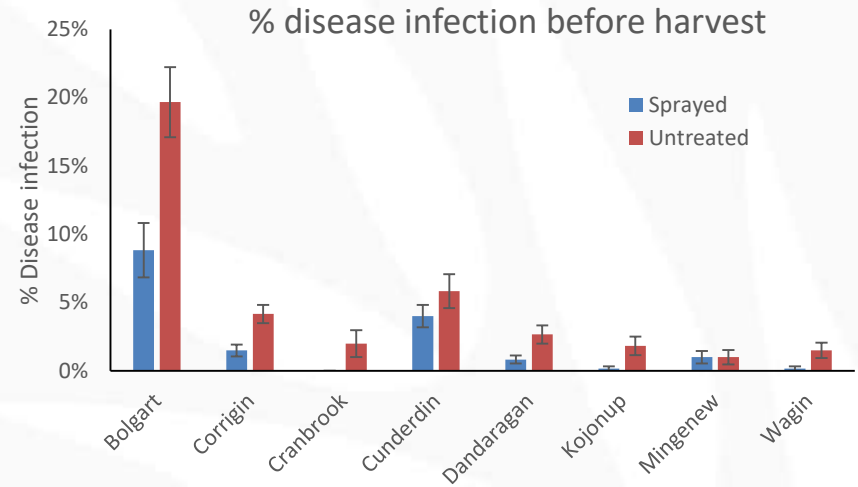
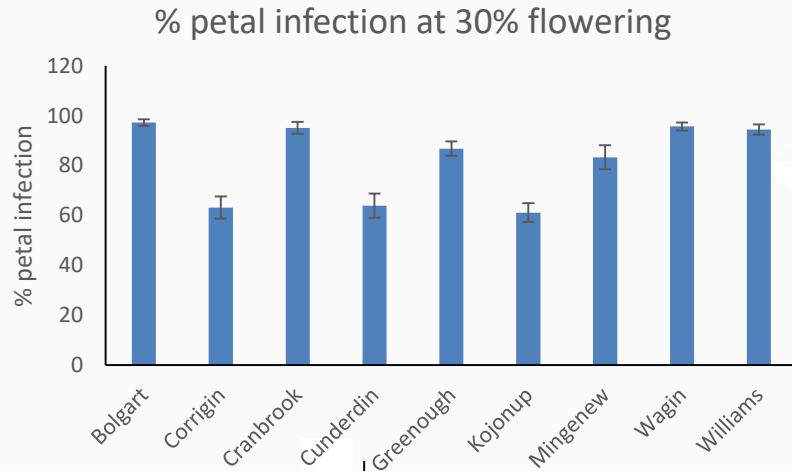
60 days pre-conditioning (1 population)



2018 CANOLA-SCLEROTINIA FIELD TRIALS

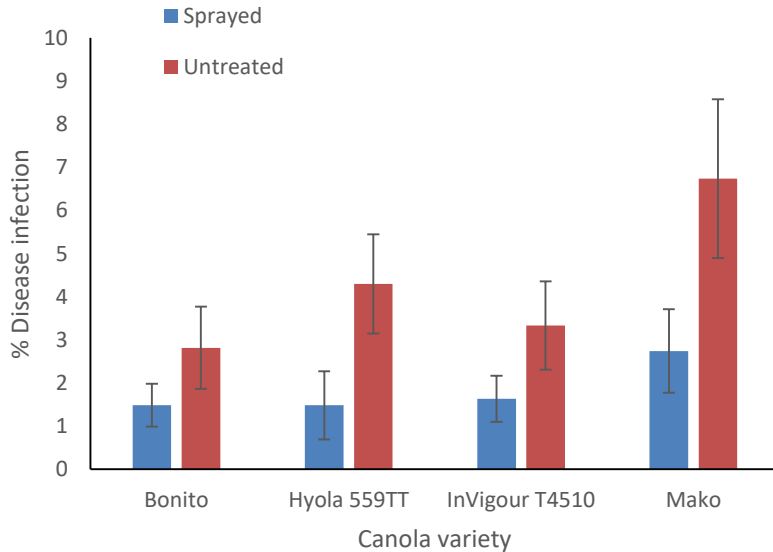
- Ten field trials run in 2018 across the wheatbelt in conjunction with NVT trials where possible
- Four varieties: Bonito, Mako (OP), Hyola 559 TT, InVigour T4510 (hybrid)
- +/- fungicide treatment at 30% flowering
- Detailed assessment for risk of Sclerotinia;
 - Soil sampled per plot prior to sowing 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

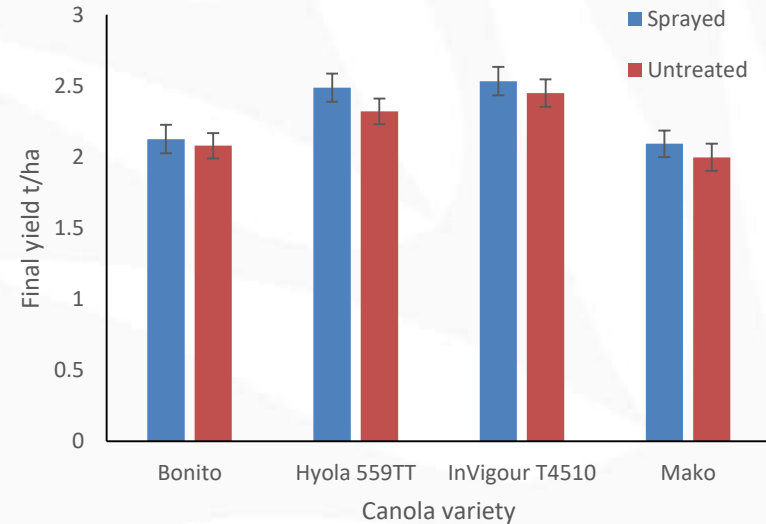


2018 CANOLA-SCLEROTINIA FIELD TRIALS

% disease infection per variety



Final yield per variety



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 sclerotes 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

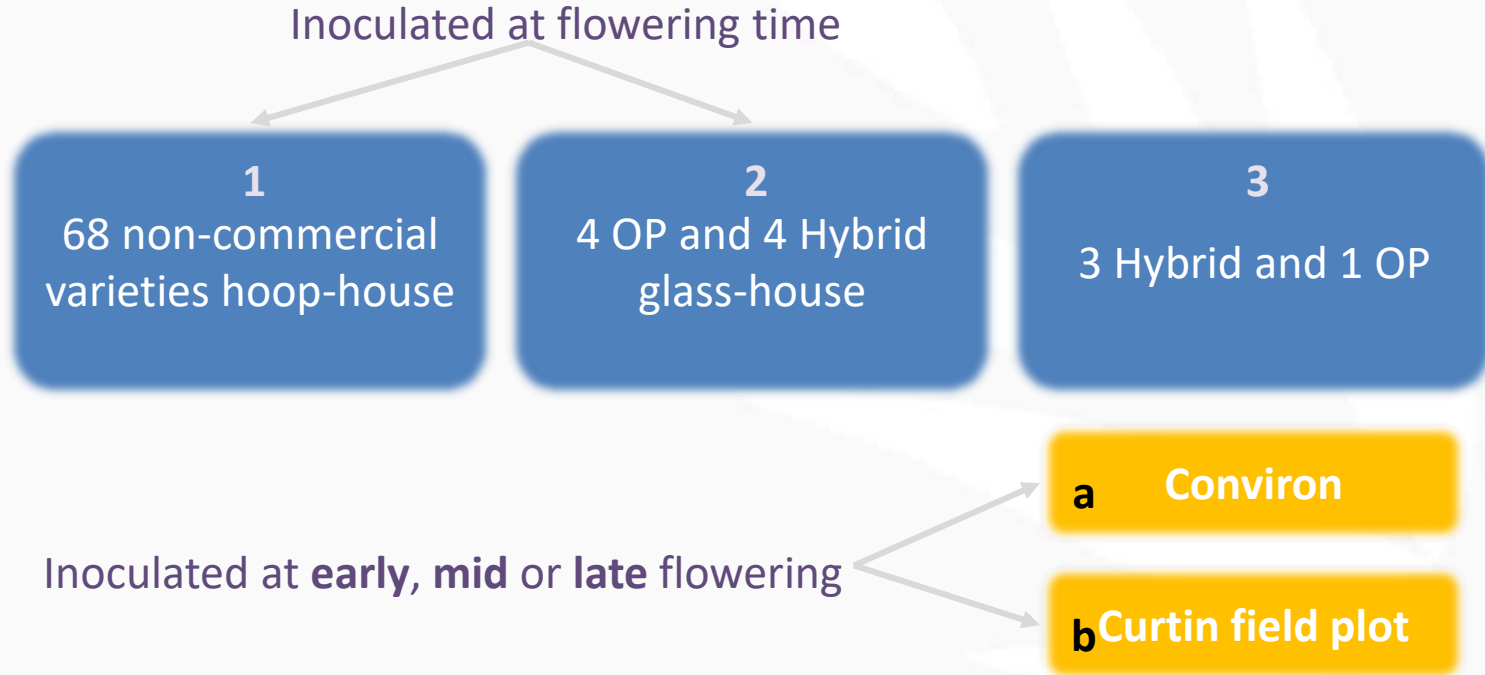
BACKGROUND



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

- 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.

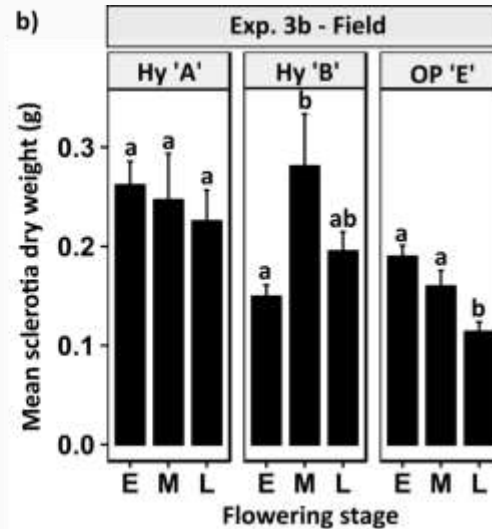
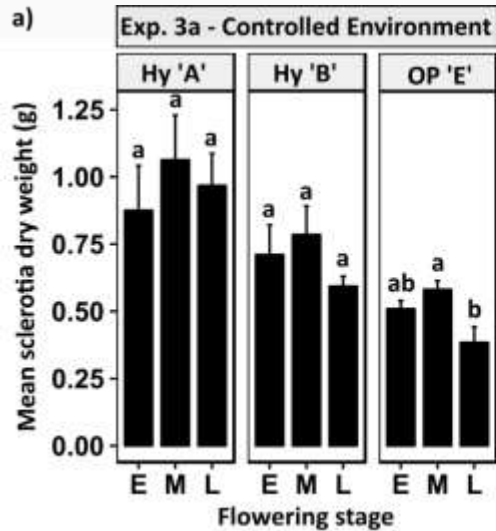
EXPERIMENTAL DESIGN



THE CURTIN CANOLA CROP

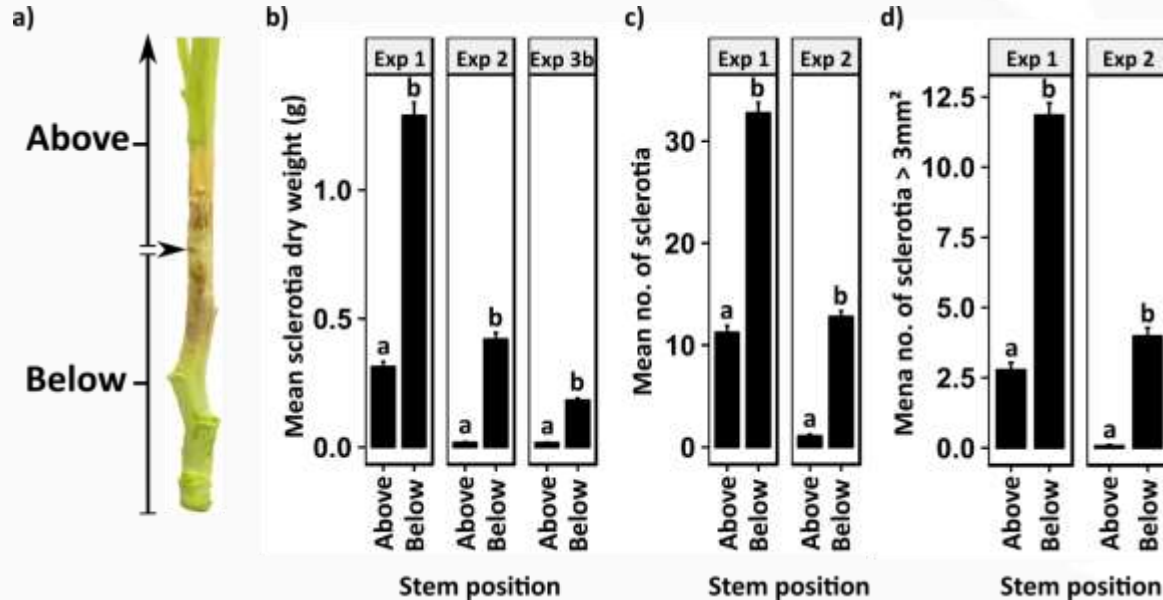


HYBRID VS OP SCLEROTIUM CONTENT



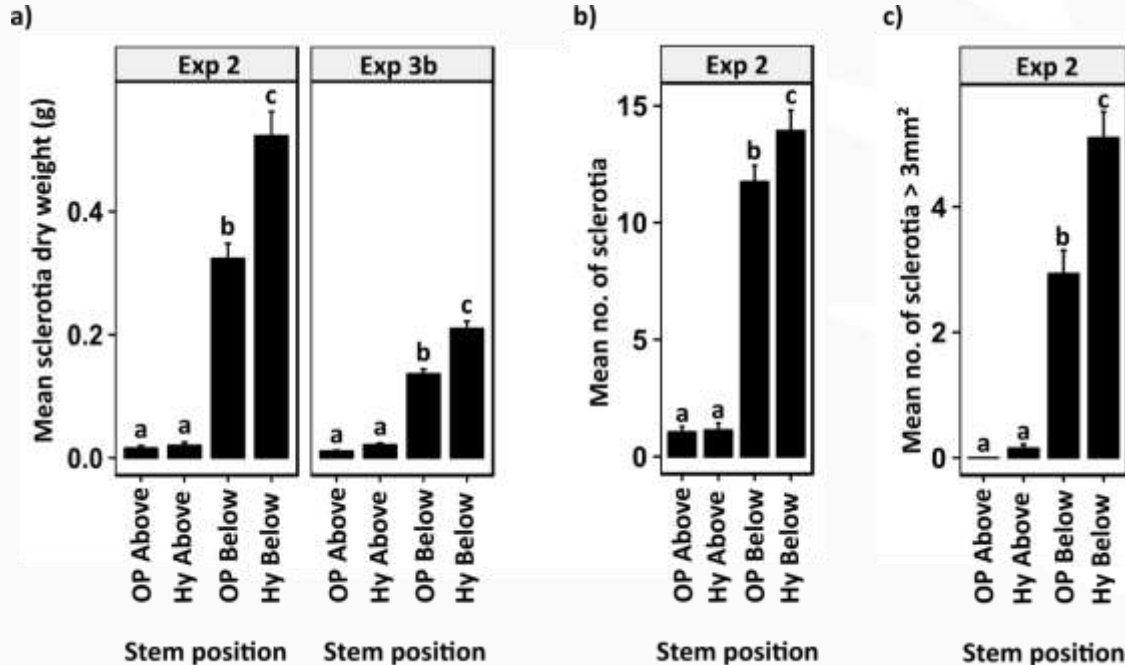
- Hybrid cultivar 'A' consistently produced more sclerotia than OP cultivar 'E'.
- No strong effect of flowering stage.

STEM REGION SCLEROTIUM CONTENT



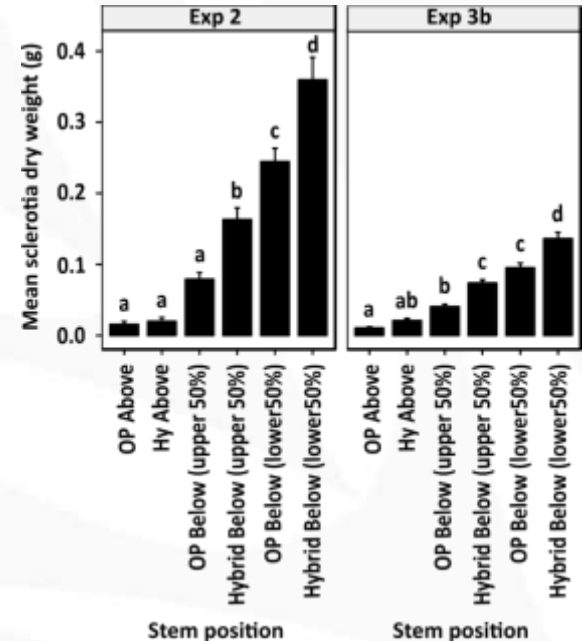
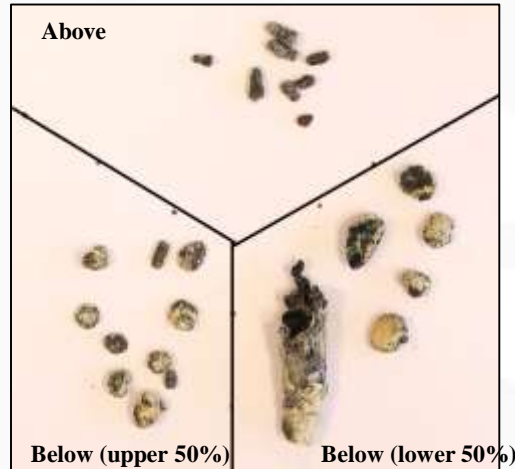
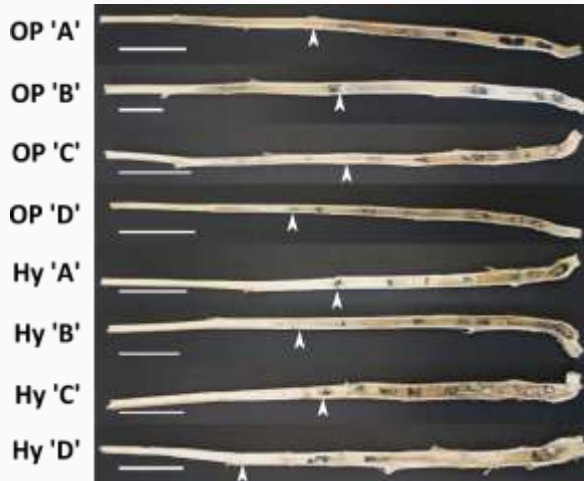
- More sclerotia produced below point of inoculation.
- Larger sclerotia produced below point of inoculation.

HYBRID VS OP X STEM REGION SCLEROTIUM CONTENT



- Hybrids produce more sclerotia below inoculation point than OPs.

HYBRID VS OP X STEM REGION SCLEROTRIUM CONTENT



- 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.

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