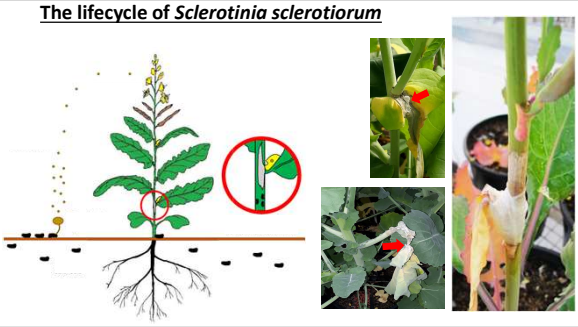
Sclerotinia sclerotiorum

- ***Sclerotinia sclerotiorum*** **is a necrotrophic fungal pathogen that infects the above-ground tissues of > 400 plant species (Boland & Hall, 1994)**

- **No effective natural resistance in current canola varieties**

Centre for Crop and Disease Management

The lifecycle of *Sclerotinia sclerotiorum*



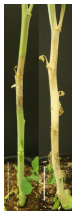
ERANET ASSYST population

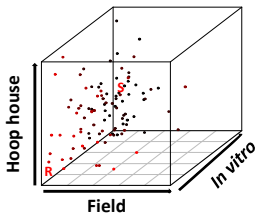
- A genetically diverse set of ~350 winter and spring *Brassica napus* varieties
- 60K single nucleotide polymorphism (SNP) array
- 100 spring varieties phenotyped at the CCDM for differences in response to SSR

Centre for Crop and Disease Management

Genetic resistance to SSR in *B. napus*

Res *Westar*





- Two years of evaluation of the ERANET ASSYST GWAS population in the
  1. Field
  2. Hoop house
  3. Lab
- GWAS analysis underway

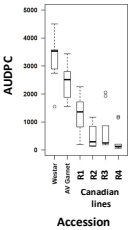
Centre for Crop and Disease Management

Genetic resistance to SSR in *B. napus*

Screening Canadian partially resistant germplasm with Australian isolates

R3 *Westar* *AVGarnet*

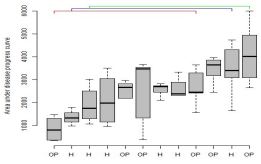
Denton-Giles et al., 2017 unpublished



- Canadian material are an additional source of SSR resistance
- No direct comparison between GWAS lines and Canadian lines conducted
- Need to develop mapping populations in collaboration with breeding companies

Hybrid vs OP

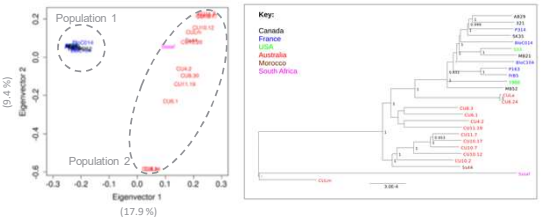
Differences between commercial varieties



- Not correlated with Hybrid or OP status

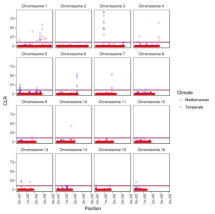
Sclerotinia genomics

WA SSR isolates are distinct from Northern SSR isolates based on the re-sequencing of 25 isolates

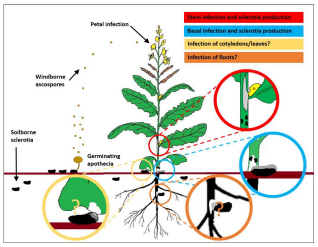


Sclerotinia genomics

- Selective sweep analysis revealed specific regions under selection pressure in the Temperature and Mediteranean populations
- Candidate gene list for knock-down generated



Sclerotinia stem rot – infection points



Adapted from Derbyshire and Denton-Giles, 2016. Plant Pathology

Stem infection literature

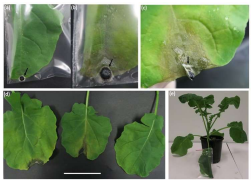
Rana *et al.*, 2017.
Gyawali *et al.*, 2016.
Wei *et al.*, 2016.
Wu *et al.*, 2013.

How important is basal infection?

Assay to screen for basal infection

David Lane – Honours student

- Established which factors influence myceliogenic germination
- Developed a protocol to promote myceliogenic germination of sclerotia
- Developing assays to determine how basal infection occurs



Lane et al 2018 In preparation

Summary

- Partial resistance to SSR identified in *B. napus* germplasm
- Assay to screen for basal infection developed
- WA SSR isolates are distinct from Northern hemisphere SSR isolates based on the re-sequencing of 25 global isolates

Acknowledgements

Centre for Crop and Disease Management
GRDC
Curtin University

Matt Denton-Giles
Mark Derbyshire
David Lane
Yuphin Khentry

International collaborations

Agriculture and Agri-Food Canada — Lone Buckwaldt, Dwayne Hegedus
INRA SCIENCE & IMPACT — Sylvain Raffale
WAGENINGEN UNIVERSITY & RESEARCH — Jan van Kan
THE UNIVERSITY OF WARWICK — John Clarkson