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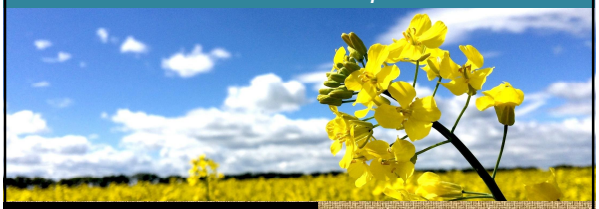
Unravelling the genetic basis of resistance and susceptibility to Sclerotinia sclerotiorum on Brassica napus



Dr Matt Denton-Giles 02.03.16

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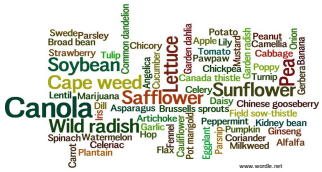
Sclerotinia sclerotiorum

- ***Sclerotinia sclerotiorum* is a necrotrophic fungal pathogen that infects the above-ground tissues of > 400 plant species***



- **Homothallic, multinucleate, secretes oxalic acid, secretes CAZymes, secretes proteinaceous effectors.**
- **No effective natural resistance in current canola varieties.**

*Boland & Hall, 1994

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How can we generate resistance to *Sclerotinia sclerotiorum* in canola?

1. **Natural resistance – Does effective natural resistance exist within canola germplasm?**
2. **Understanding pathogenicity - Which *Sclerotinia sclerotiorum* genetic loci are important for pathogenicity and can they be used for selective breeding?**

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1. Natural resistance?

Our strategy

- **ERANET-ASSYST GWAS population of 369 genetically diverse *Brassica napus* cultivars. Genotyped with 60k SNP array. (In collaboration with Assoc. Prof. Jacqui Batley, UWA)**

Cotyledon screening **Field trials**

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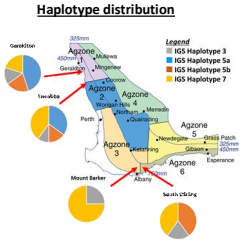
2. Understanding pathogenicity

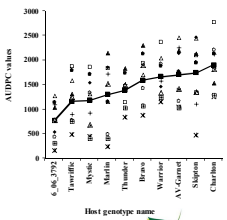
Our strategy

- **Establish informative biological resources.**
  - **Isolate collection (*n* = 138)**

Haplotype distribution



Adult plant path-assay



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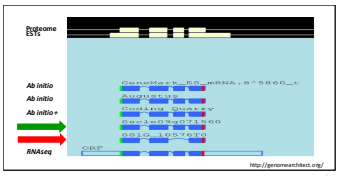
2. Understanding pathogenicity

Our strategy

- **Establish quality genetic resources (MCD).**
  - **Amselem et al., (2011) genome based on old technology.**
  - **Genome resequencing and annotation using PacBio and RNAseq data.**
  - **Comparative analysis of isolate genomes.**

3% of genes significantly different in length and identity.



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2. Understanding pathogenicity

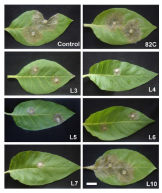
Our strategy

Using RNAi technology to identify *S. sclerotiorum* pathogenicity factors.

1. **Quick screen – Transient Agroinfiltration + infection.**
2. **Confirmation – Transformation of Arabidopsis and fungal KO.**

Targets: OAH, novel genes.

3. **Outcome – Effector assisted breeding + resistant GM plants.**



Andrade et al., (2015). Plant pathology online

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3. Outcomes

- **Extensive genetic resources for *S. sclerotiorum*.**
- ***S. sclerotiorum* resistance QTLs.**
- **New effector-assisted breeding tools.**
- ***S. sclerotiorum* resistant GM plants (RNAi).**
- **An increased understanding of the *S. sclerotiorum* / *B. napus* interaction.**

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Thank You!

2. Understanding pathogenicity

Our strategy

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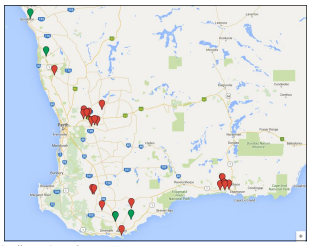

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