






Sclerotinia stem rot of Canola: current and future research in CCDM's newest program


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Overview

- 1) Phenotyping a *Brassica napus* population for susceptibility to Sclerotinia stem rot (SSR) in collaboration with Prof. Jacqueline Batley lab, UWA
- 2) Susceptibility of hybrid vs open pollinated canola varieties to SSR
- 3) Pathogen genomics
- 4) 'Ground Infection' of canola stems by germinating sclerotia




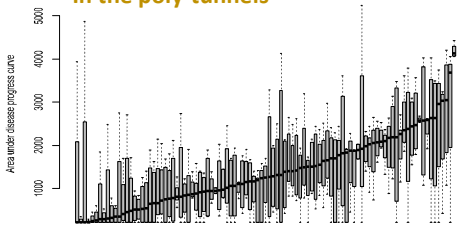
Phenotyping the ASSYST population

- ~ ASSOCIATIVE expression and systems analysis of complex traits in oilseed rape/canola
- ~ Coordinated by Prof. Rod Snowdon, Justus Liebig University, Giessen, Germany
- ~ 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 SSR susceptibility



Phenotyping the ASSYST population: Results from 2016


In the poly-tunnels

Welch's ANOVA
n = 4


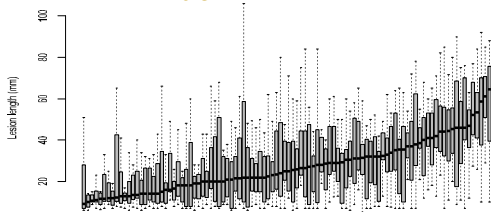
data: ASSYST and Variety
F = 32.496, num df = 99.00, denom df = 101.86, p-value < 2.2e-16

9 different pairwise groups based on Welch's t-test with Bonferroni correction



Phenotyping the ASSYST population: Results from 2016


In vitro

ANOVA
n = 12


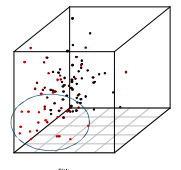

	Df	Sum Sq	Mean Sq	F value	Pr(>F)
Variety	99	135968	1373.4	4.966	<2e-16 ***
Residuals	1058	292600	276.6		

11 different pairwise groups based on Tukey's HSD

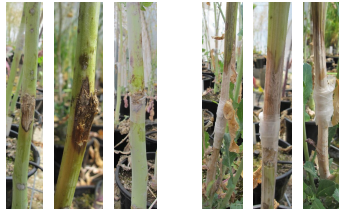


Phenotyping the ASSYST population: Results from 2016

Do these correlate with field data?

Phenotyping the ASSYST population: Results from 2016



Variety A
Mean AUDPC = 324
In vitro (min) = 16
Field (counts) = 0/150 stems

Variety B
Mean AUDPC = 2594
In vitro (min) = 41
Field (counts) = 10/150 stems



Work for 2017

- ~ Polytunnel screen
 - ~ This year: two experiments, ($n = 4$) x 2 = 12 total (3 blocks)
- ~ Field trial in more heavily infested paddock
- ~ *In vitro* stem assay
- ~ Association mapping using 60K SNP array



Susceptibility of hybrid vs open pollinated varieties to SSR

Background

- ~ Observation: Hybrids more susceptible to SSR than OPs
- ~ Is there a difference between hybrid and open pollinated varieties?
- ~ Is this physiological or related to the microclimate of the canopy?



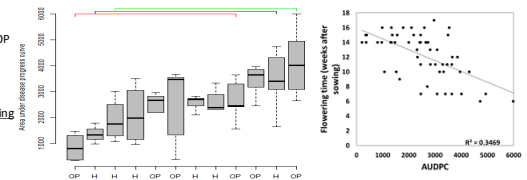
Susceptibility of hybrid vs open pollinated varieties to SSR

Differences between commercial varieties

Not correlated with HOP status.

BUT....

Correlated with flowering time of plant.



Work for 2017

- ~ Further testing of plant age hypothesis in glass house
- ~ Test widely grown hybrid and open pollinated varieties in heavily infested areas

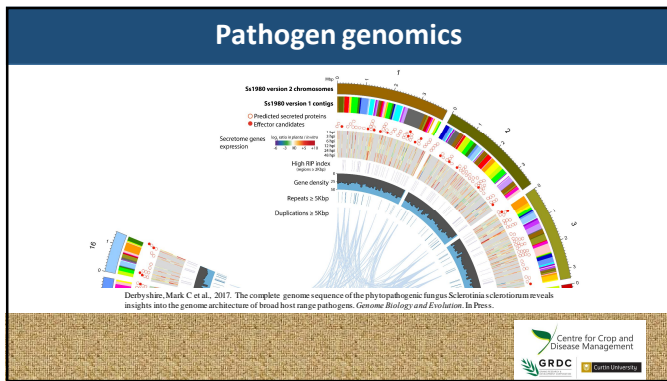


Pathogen genomics

Background

- ~ Fungal genome can be used to generate hypotheses about host pathogen interaction
- ~ Previous genome missing ~ 1 Million base pairs with many inaccurate gene annotations





Work for 2017

- ~ Genomic comparison of ~30 global isolates
- ~ List of candidate 'toxin' genes
- ~ Population structure of Australian vs global isolates

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'Ground Infection'

Background

- ~ Observations of stem infection directly from sclerotia
- ~ What environmental conditions promote this kind of infection?

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'Ground Infection'

Toodyay 23/08/2016

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Work for 2017

- ~ David Lane working on an honours project supervised by MCD and MDG
- ~ Aims:
 - ~ Assess what affects myceliogenic germination *in vitro*
 - ~ Apply 'primed' sclerotia to different plant tissues
 - ~ Assess yield response to an early fungicide spray

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Summary

- ~ Developed resources and capabilities necessary for robust hypothesis testing
- ~ Project is gaining momentum
- ~ 2017 should be a good year for data

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