

Centre for Crop and Disease Management

Cropping for the Future

GRDC

Grains
Research &
Development
Corporation

 Curtin University

CCDM

1. Agronomy
2. Communications
3. Wheat Septoria nodorum blotch
4. Wheat Yellow spot
5. Barley net-blotch
6. Sclerotinia of canola
7. Legume ascochyta blights
8. Barley powdery mildew
9. Fungicide resistance management
10. Bioinformatics

Pg 6 - Outputs

- 1. An improvement in area-averaged disease resistance ratings of released cultivars of canola by one unit by 2025 and every 5 years thereafter in each Australia agro-ecological zones (AEZ).
- 2. By June 2019, breeders and pre-breeders having access to germplasm with resistance to Sclerotinia stem rot to develop adapted Canola varieties.
- 3. By June 2019, growers have enhanced adoption of cost effective management options.

Experimental approaches

- Agronomy
- Fungicides
- Host genetics
- Functional genomics

Staff

- Matthew Denton-Giles
- Mark Derbyshire

International collaboration

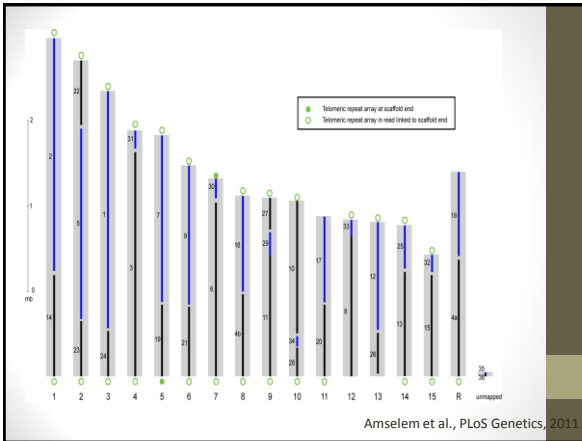
- Canada – Lone Buchwaldt, Dwayne Hegedus
 - Isolates and data
- USA – Christina Cuomo; Data
 - Marty Dickman, discussions
 - Jeff Rollins, data,
- UK, John Clarkson Warwick, Richard Harrison
 - Isolates and data
- UK, Rres (Hammond-Kosack, West) data, methods, isolates
- NL, Van Kan, isolates, data, DNA preparation
- FR, Sylvain Raffaele, data, isolates

National collaborations

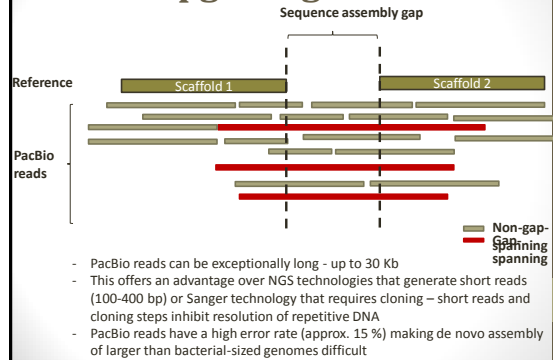
Finish the Genome sequence

- Isolate 1980 was sanger-sequenced in 2007. Can't bring this isolate to Australia; 16 linkage groups/optical chromosomes
- RPO obtained KNAW fellowship to Wageningen; made hmw DNA; sent for sequencing
- MD has used new data to "finish" the assembly.

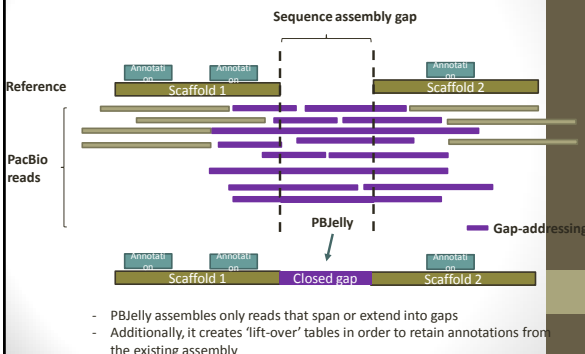
	Old	New
Total length	38.3 Mbp	38.7
Longest scaffold	2.7 Mbp	5.46 Mbp
N50	9	5
L50	1.5 Mbp	2.4 Mbp
Scaffold count	37	18



Using PacBio reads to upgrade genomes

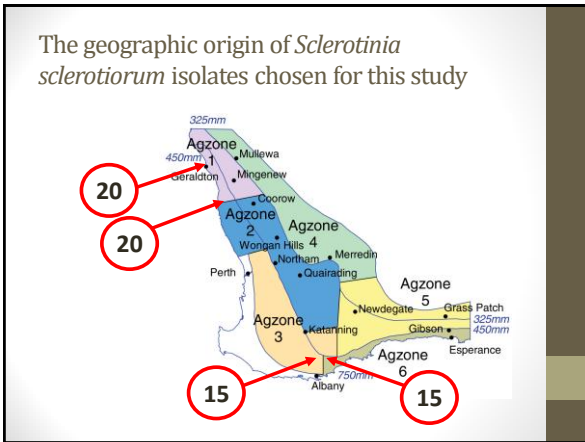


PBJelly pipeline

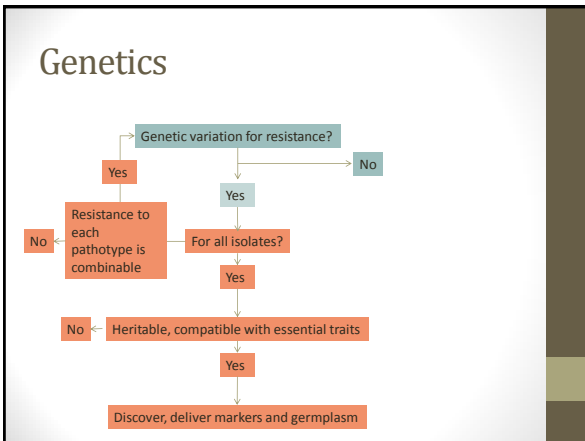


Next steps genomics

- Illumina reseq of ca 12 Australian isolates
 - International resequencing project
- RNA seq and re-annotation
- Develop functional analysis tools
- Worldwide isolate genetic diversity



- ## Fungicides
- Current registered fungicides
 - Iprodione E3 dicarboximide
 - Procyimidon E3 dicarboximide
 - Prothioconazole/tebuconazole G1 triazole
 - Possibilities
 - Cyprodinil D1 Anilinopyrimidines
 - Fludioxinil E2 Phenylpyrroles
 - Sedaxane C2 SDHI
 - Pyraclostrobin C1 QoI
 - Other triazoles??



- ## If any answer is no!
- Fungicides
 - Big problem with timing and limited registrations
 - GM

- ## GM
- Roundup ready already widely grown in advanced states
 - GRDC/CSIRO investing in ω -3 fatty acids GM
 - Leptosphaeria maculans* an ongoing problem likely to be controlled by the same genes that control SSR
 - BWVY also has GM solution
 - RPW8 for powdery mildew

- ## Functional Genomics
- Discover effectors
 - Vulnerabilities in lifecycle
 - Novel GM solutions
 - Novel fungicides/fungicide targets

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