

CENTRE FOR CROP AND DISEASE MANAGEMENT



School of Molecular and Life Sciences, Curtin University

Screening for genetic resistance to Sclerotinia stem rot – plans for a rating system *2020 Canola Pathology Workshop*



Sarita Bennett

12/3/21

 @theCCDM
 ccdm.com.au

Content



Background to work completed

- Hoop house trials
- Field trials

Developing a disease rating system - Differences

Discussion and questions

School of Molecular and Life Sciences, Curtin University

 @theCCDM  ccdm.com.au

Summary of varieties by trial



Category	Variety	Harvest maturity	Release	Company	% grown (2019)	hoop house 2020	hoop house 2015	field trials 2020	field trials 2019	field trials 2018	field trials 2017	No. field trials in
RR Hy	DG 408RR	4	2017	Seednet	3	✓	✓	✓	✓			8
RR Hy	Hyola® 404RR	4	2010	Advanta Seeds	5	✓						
RR Hy	Pioneer® 43Y29 RR	3	2018	Pioneer	3	✓						
RR Hy	Pioneer® 43Y23 RR	3	2012	Pioneer	7	✓	✓	✓	✓			8
RR Hy	Pioneer® 44Y27 RR	4	2017	Pioneer	7	✓	✓	✓	✓			8
TF Hy	Hyola® 410XX	4	2018	Advanta Seeds	1	✓						
TF Hy	InVigor® R 4022P	4	2019	BASF		✓		✓				3
TF Hy	Xseed Raptor	4	2019	Nuseed		✓		✓				3
TT Hy	Hyola® 559TT	5	2012	Advanta Seeds	2	✓	✓	✓	✓	✓	✓	25
TT Hy	HYTtec® Trident	3	2019	Nuseed		✓		✓				3
TT Hy	InVigor®T4510	4	2016	BASF	3	✓	✓	✓	✓	✓		18
TT Hy	Hyola® 350TT	3	2017	Advanta Seeds		✓			✓			5
TT Hy	HYTtec® Trophy	4	2017	Nuseed	2	✓	✓	✓	✓			5
TT OP	ATR Bonito	4	2013	Nuseed	39	✓	✓	✓	✓	✓	✓	25
TT OP	ATR Mako	4	2015	Nuseed	3	✓	✓	✓	✓			18
TT OP	ATR Wahoo	6	2013	Nuseed	1	✓						
TT OP	ATR-Stingray	3	2011	Nuseed	6	✓						
Z TT+TF Hy	Hyola® 530XT	5	2018	Advanta Seeds			✓		✓			5
Breeding line	K22	6					✓					
Breeding line	BL99	4				✓						
Breeding line	BL116	5				✓						
					19	11		10	10	4	2	

School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au

Hoop house Trials

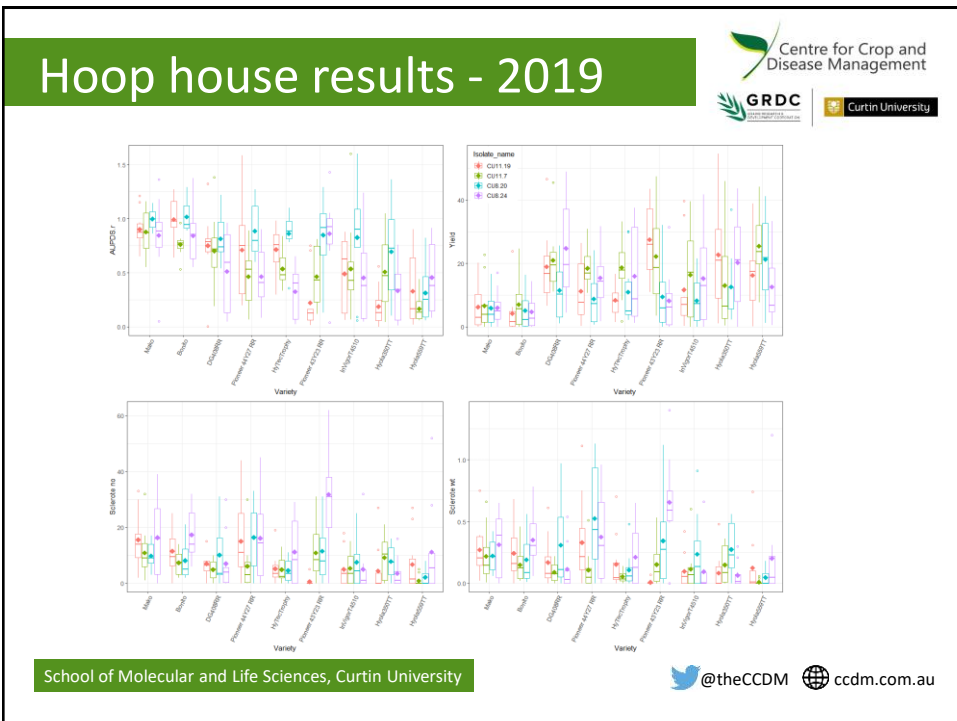
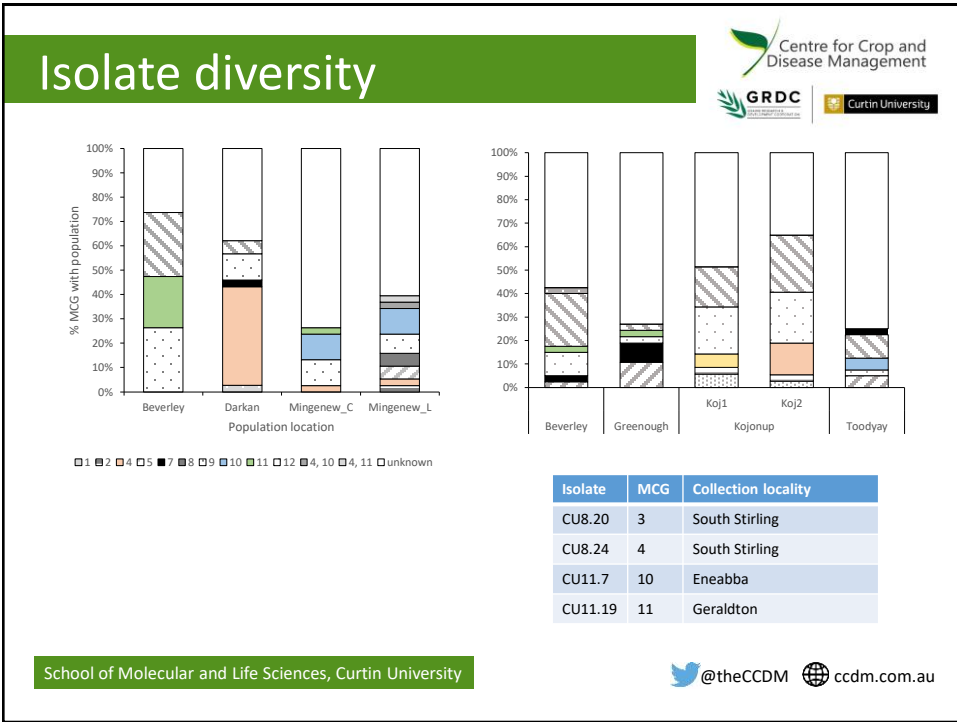


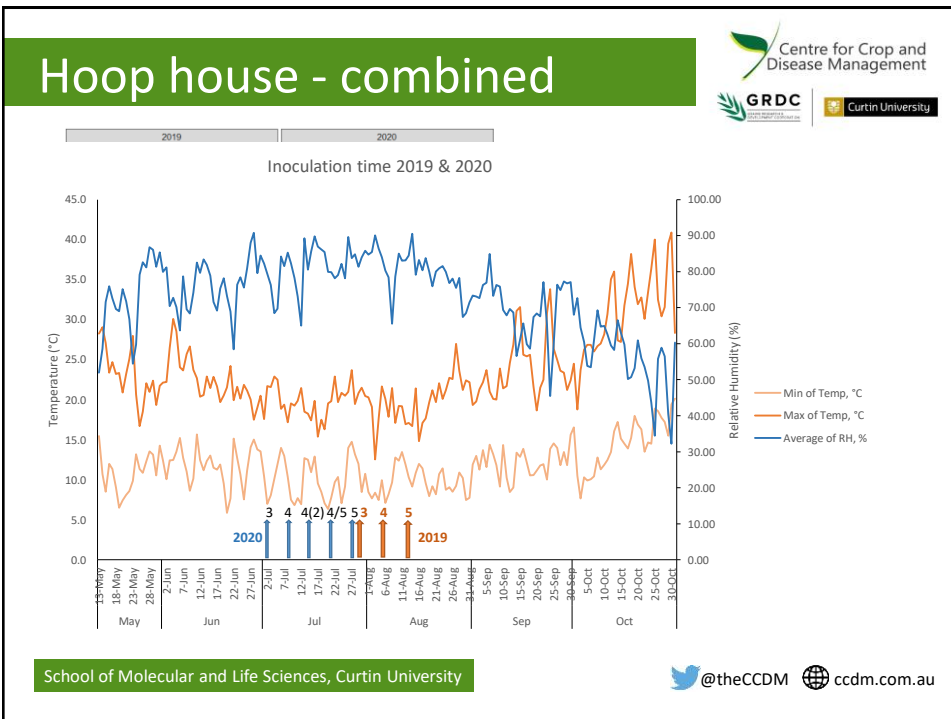
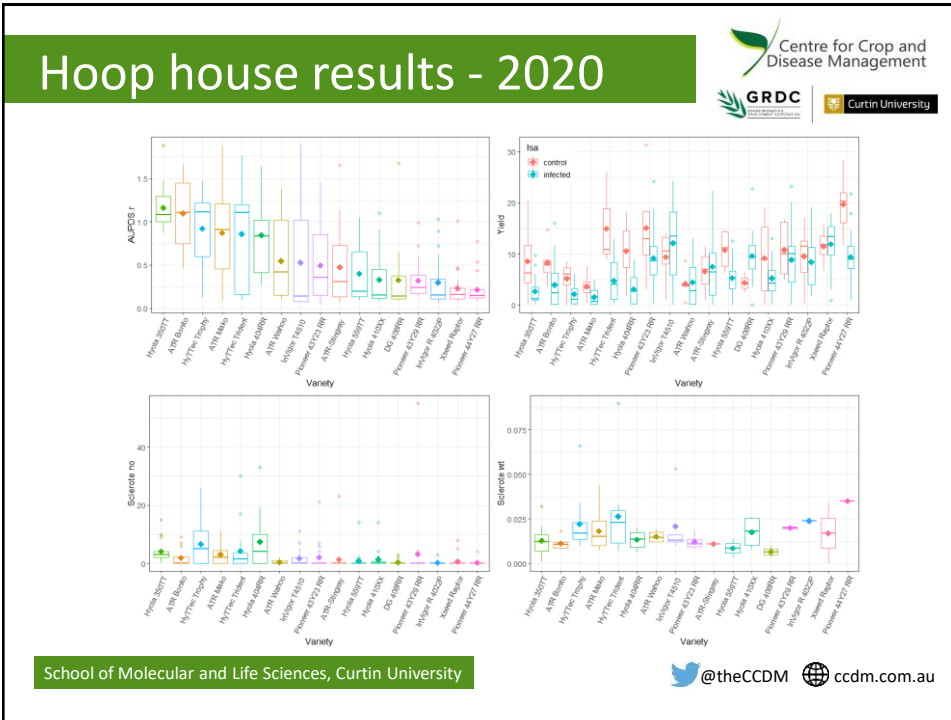
- Run in 2019 and 2020
- 2019 – 10 varieties (11 lines)
stem and leaf axis inoculation
- 2020 – 17 varieties (19 lines)
stem inoculation only
- 4 isolates (widespread in WA grainbelt, 2 x aggressive, 2 x less aggressive)
- Inoculated at 30% flowering
- Recorded – lesion length (AUDPS), yield, no. sclerotia, sclerotia wt



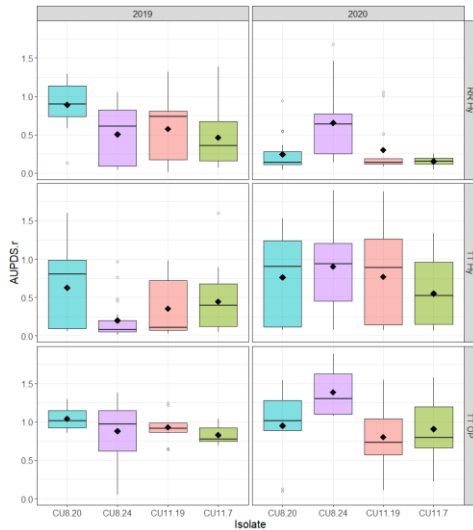
School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au





Hoop house - combined



- Varieties respond differently to different isolates
- Isolate aggressiveness varies with temperature/humidity conditions?
- Is lesion length an adequate measure of susceptibility?
- Importance of sclerotia production (wt & no.)

School of Molecular and Life Sciences, Curtin University

[@theCCDM](https://twitter.com/theCCDM) ccdm.com.au



How does this relate to the field?

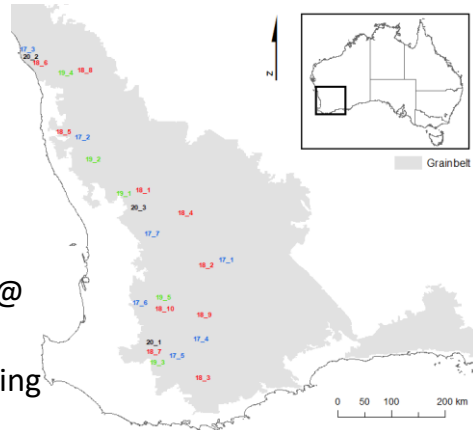
[@theCCDM](https://twitter.com/theCCDM) ccdm.com.au

Field Trials



4 years of trials (25 sites);

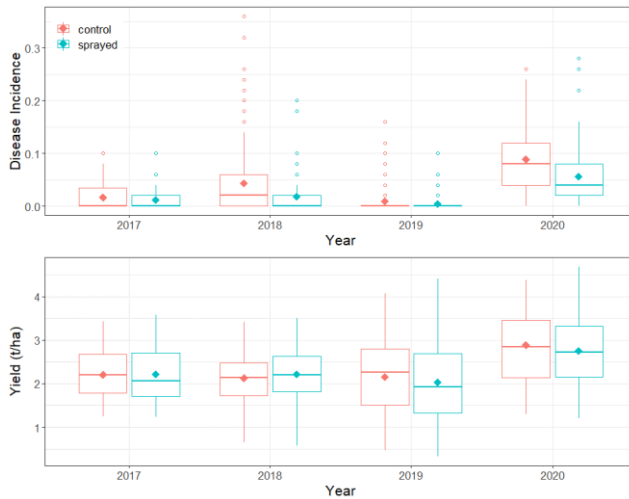
- 2017 – 7 sites
- 2018 – 10 sites
- 2019 – 5 sites
- 2020 – 3 sites
- +/- fungicide application @ 30% flowering
- Some sites @ 50% flowering
- OP/TT/RR/RT varieties



School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au


Disease incidence & yield





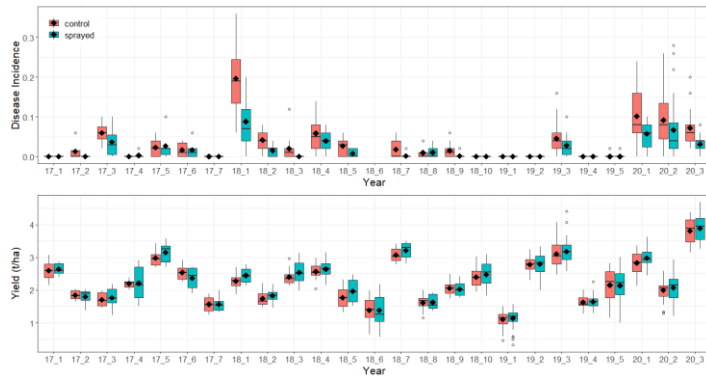
School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au

Disease incidence & yield










- 2020 highest disease levels
- Disease levels lower in sprayed plots
- Does not lead to a difference in yield
- What level of infection is required to show benefit of spraying?

School of Molecular and Life Sciences, Curtin University

 @theCCDM
  ccdm.com.au


Disease incidence & yield



by variety

- New releases higher yield
- Control > DI
- Varieties in 2019 trials 0% DI
- No yield benefit to spraying at these levels of DI



School of Molecular and Life Sciences

18

5

25

5

5

25

18

8

8

8

3

3

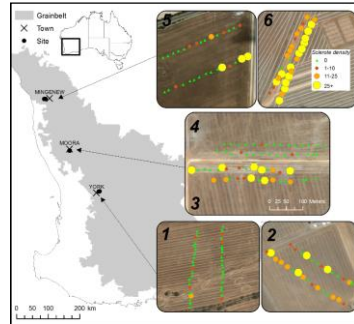
3

om.au

Field Trials – background risk



- 2017-19 sites co-located with canola NVT
- 2020 - selected sites with pre-existing SSR recorded
- Soil sampling prior to sowing
- Petal testing at 30% flowering
- Lesion length
- Sclerote no. & wt



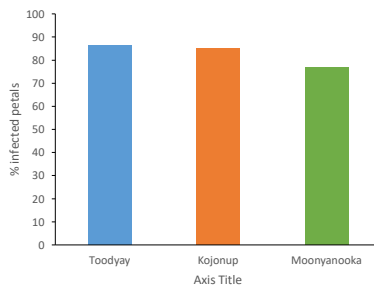
School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au

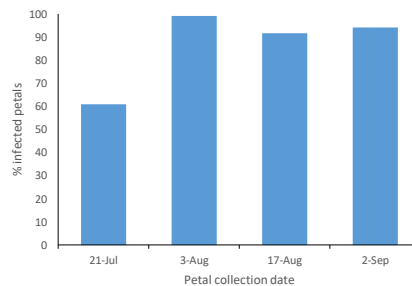
Field Trials – petal testing



Per site (30% flowering)



Toodyay (over flowering period)



School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au

Conclusion



1. Variability in field and hoophouse related to environmental conditions in isolate response as well as varieties
2. In field DI not high enough to lead to yield reponse
3. For disease rating system would need to increase no. varieties being tested, and to include new varieties each year
4. Testing only in WA each year. Need to expand to all canola growing regions of Australia
5. \$\$ and personnel required with no guarantee of significant infection and therefore valuable results

School of Molecular and Life Sciences, Curtin University

 @theCCDM  ccdm.com.au

Questions for audience



1. Do you like the idea of a Sclerotinia disease rating system?
2. Do you like the CCDM approach of evaluating varieties?
3. Would you be willing to provide your varieties for testing using the approach outlined?
4. Would you like a Sclerotinia disease rating system listed in the canola variety guides?
5. What are the issues that would like to raise regarding the development of a Canola Sclerotinia Disease Rating System
6. Is it possible to develop a Canola Sclerotinia Disease Rating System?

School of Molecular and Life Sciences, Curtin University

 @theCCDM  ccdm.com.au

Acknowledgements



Dr Pippa Michael, Ashmita Rijal Lamichhane (CCDM C1 project team)

Linda Thompson, King Yin Liu (CCDM P1 (2017-18))

Service Providers: Living Farm, Crop Circle Consulting

living farm



School of Molecular and Life Sciences, Curtin University

@theCCDM ccdm.com.au

THANK YOU



A/Prof. Sarita Bennett, CCDM

@SJB_Ag

+ 61 (0)8 9266 2740 Sarita.bennett@curtin.edu.au



ccdm.com.au

@theCCDM

School of Molecular and Life Sciences, Curtin University