Sclerotinia Research 2013 – 18

Summary of Major Findings & Future Directions

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Summary

- Rainfall leading up to and during flowering drives sclerotinia and resulting leaf wetness
- Long leaf wetness periods are critical for infection to occur
- Canola can quickly build up levels of sclerotia
- Commencement of flowering is a major driver of disease development
- Sclerotinia is slow to develop compared to other diseases
- Petal infestation can be found in every canola crop
- Timing of application is critical for foliar fungicides

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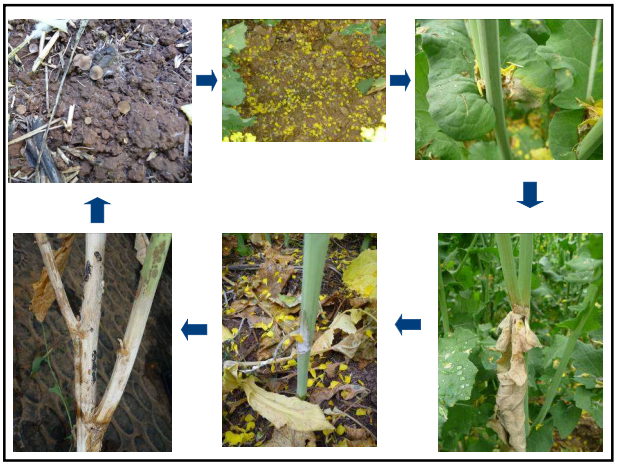

The Sclerotinia myths

- Sclerotinia is a warm weather disease
  - BUSTED – Disease is driven by moisture
- Every rainfall event during flowering is a risk
  - BUSTED – Only certain rainfall events are a disease risk
- Petal testing is a reliable predictor of disease
  - BUSTED – Levels of petal infestation do not correlate with stem infection

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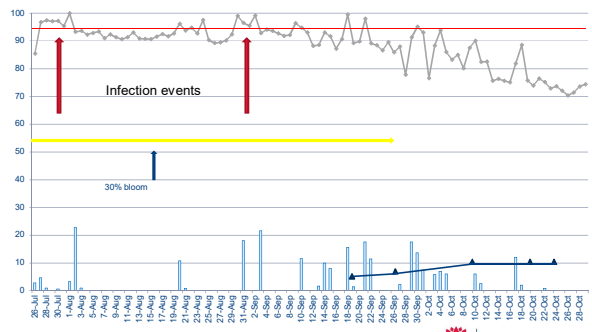
Daysdale 2016



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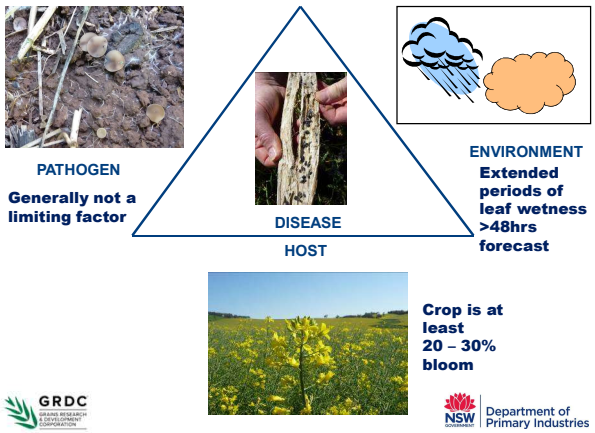

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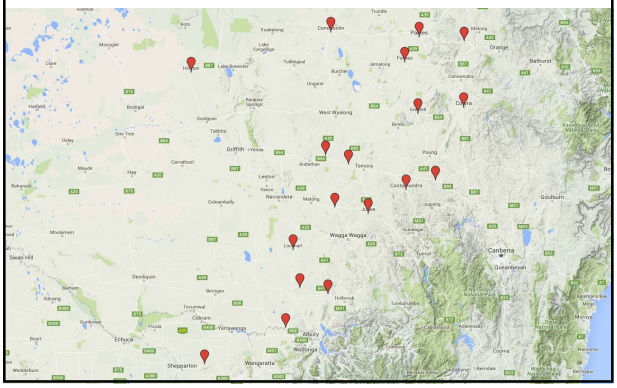
Petal testing sites



% Petal infestation – Victoria 2017

No. of week	Date	Rutherglen	Dookie 1	Dookie 2	Ballarat
1	3/7 - 10/7				
2	10/7 - 17/7				
3	17/7 - 24/7				
4	24/7 - 31/7				
5	31/7 - 7/8				
6	7/8 - 14/8			72	4
7	14/8 - 21/8		22	8	20
8	21/8 - 28/8		70	80	8
9	28/8 - 4/9	74	34	78	4
10	4/9 - 11/9	78	100	98	18
11	11/9 -18/9	100	74	22	42
12	18/9 - 25/9	22	22	26	44
13	25/9 - 2/10	84	0	4	96
14	2/10 - 9/10	12	0	0	0
15	9/10 - 16/10	22	0	4	
16	16/10 - 23/10	14			
Total rainfall during flowering (mm)		52.6	70.9	88.9	155.2
% stem infection		21%	-	-	3%

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Crop rotation - 2017

Date	Alma Park 1	Alma Park 2	Alma Park 3
3/7 - 10/7		0	0
10/7 - 17/7		0	0
17/7 - 24/7		36	2
24/7 - 31/7		66	6
31/7 - 7/8	84	70	26
7/8 - 14/8	96	48	20
14/8 - 21/8	94	48	20
21/8 - 28/8	100	82	56
28/8 - 4/9	100	94	26
4/9 - 11/9	100	92	26
11/9 -18/9	100	98	56
18/9 - 25/9	4	72	24
25/9 - 2/10	0	4	0
2/10 - 9/10		2	0
9/10 - 16/10			0
% Stem infection	15	3	1
Years since canola	1	2	3

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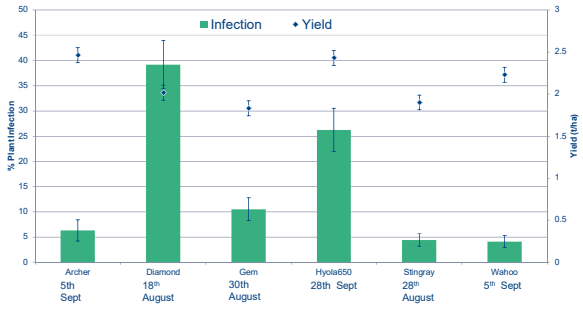
Variety comparison – Wagga Wagga



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Foliar fungicides

- Effective control when applied correctly
  - Timing is critical
  - High water rates for good coverage
  - Best applied at 20 – 30% bloom
  - Main stem coverage protects most yield

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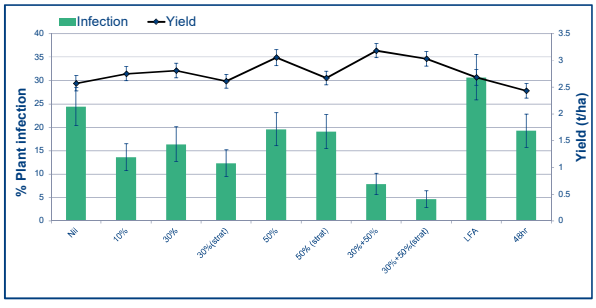
Timing of application – Wagga Wagga



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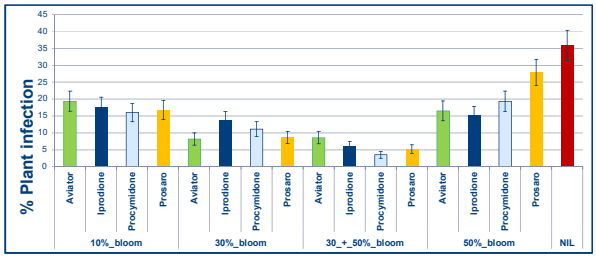
Fungicide Choice



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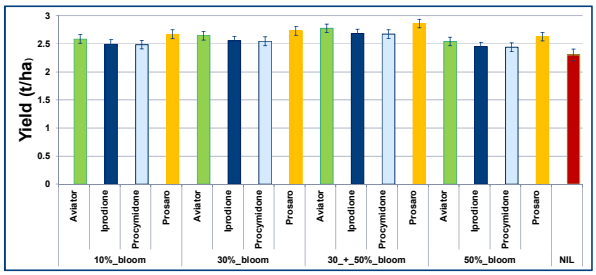
Fungicide Choice



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Site	Infection type	% Yield loss per plant			
		2014	2015	2016	2017
Howlong	None	0	0	0	0
Howlong	Main stem	72	82	36	70
Howlong	Branch	19	20	6	14
Morven	None	0	0	0	0
Morven	Main stem	63	54	94	76
Morven	Branch	18	9	23	12

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Acknowledgements

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Summary of Key findings - WA

- Disease epidemics favoured by continuous wet and humid conditions in the 3 weeks before and after the commencement of bloom
- Cultural practices provide limited or no benefit, fungicide application is the only tool for in-season disease management
- Timing is crucial
  - Northern region
    - ➢Early epidemics (15-30% bloom)
    - ➢Late epidemics (50% and beyond)
  - Southern region (25-50%)
  - ROI
    - Well timed single spray ($41-$240/ha)
    - Two sprays-extended season ($40-148$)
    - Very late spray (-$21/ha)
- Basal infections have complex aetiology BUT subsequent disease spread is controllable

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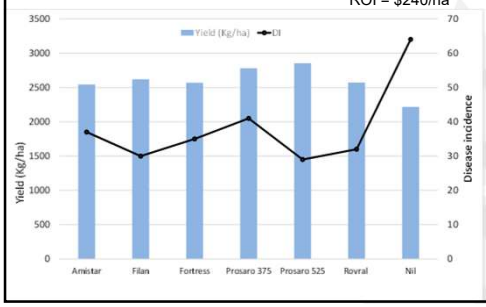
Sclerotinia Research in WA (2007-2017)

- **Management Strategies**
  - Product evaluation
  - Timing of fungicide application

ROI = $240/ha



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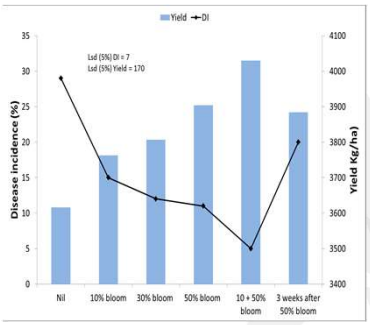
Fungicide timing for SSR (North WA) 2016



ROI : $118 (1 spray), $148 (2 sprays)

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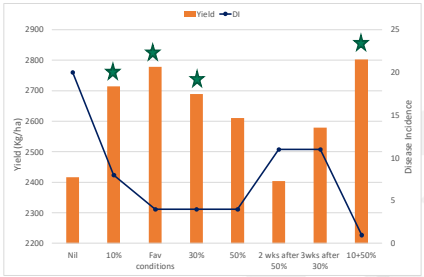
Fungicide timing for SSR (WA North) 2017



ROI : $131 (1 spray), $92 (2 sprays)

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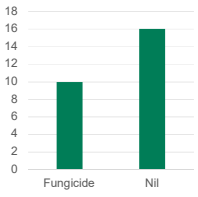
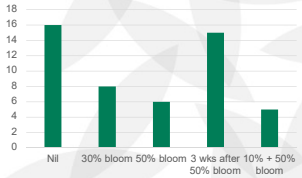
Fungicide timing for SSR (WA South) 2017



Hot off the press!
ROI : $82-88/ha



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Results from 2017

- Ciara had 3 opportunistic canola sclerotinia trials +/- fungicide at 50% bloom near Geraldton. 2 were harvested, one had significant yield response of 0.2 t/ha (untreated 1.5 t/ha).

Average of treatments

Fungicide treatment at 50% bloom	Primary stem has lesion (%)	Lateral branch is dead or dying (%)	Primary stem dead or dying (%)	Lodged (%)	Total Disease (%)
Nil	3	10	40	3	56
Prosaro @ 450mL/ha	2	9	28	0	38

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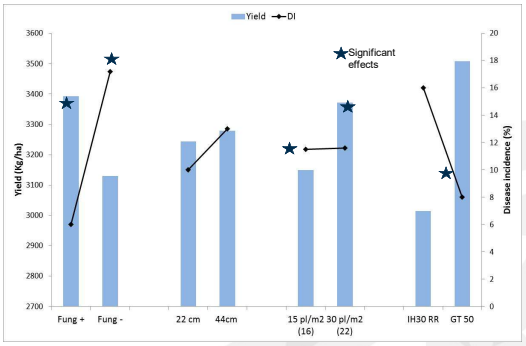
Effect of row spacing/plant density in conjunction with fungicide on SSR and yield 2016



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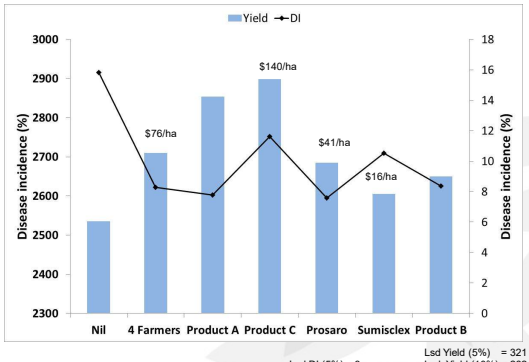
Ground infection-fungicides (Darkan)



Lsd DI (5%) = 3
Lsd Yield (5%) = 321
Lsd Yield (10%) = 262

Sclerote germination under laboratory conditions (Geraldton)

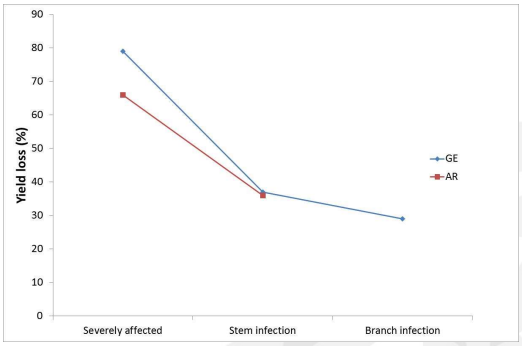
- Under laboratory conditions germination of sclerotia of *Sclerotinia sclerotiorum* was favoured by a night/day temperature of 10/20°C.
- None germinated at a higher night/day temperature of 16/29°C
- In an average year, and assuming sufficient moisture is available, this is likely to be May-October in cooler climates like Esperance, and June-September in warmer climates like Mingenew.
- Sclerotia that were ground to simulate the effects of seed destructor technology were still able to germinate under laboratory conditions. Apothecia produced from ground up sclerotia were smaller than those produced from intact sclerotia.
- Turning the sclerotia into a 'flour' (<0.5mm), however, significantly reduced and delayed germination.

Ciara Beard, DPIRD

Sclerotia germination under field conditions (South Perth)

- **Germination range 17-63%**
- **The shortest time for germination = 23 days**
- **Optimum temp for germination = 15-18 °C**
- **Larger sclerotia produced more apothecia**

Yield loss from Sclerotinia (individual plant basis)



Sclerotinia future research

Evaluate epidemiological processes potentially associated with ground infection

- Determine what is ground infection
- Identify the conditions leading to myceliogenic germination
- Sample sites for PredictaB analysis – early, mid and late in year. Identify relationships between regions, cropping history, seasonal conditions and outbreaks of the disease

Sclerotinia future research

Develop fungicide control strategies for managing infections pre-flowering

- Investigate use of seed applied, treated fertiliser and liquid in-furrow systems.
- Investigate foliar fungicide applications at early vegetative (ie 4-6 leaf) and management of ground infections
- Investigate timing of foliar fungicide application on reducing severity of disease and hence sclerotial load returned to soil (including use of salvage spraying)

Sclerotinia future research

Determine the actual levels of ground infection and associated yield loss in commercial crops

- Undertake canola crop surveillance to determine incidence and severity of ground infection
- Sample crops with a range of infection types to determine the level of yield loss

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Sclerotinia future research

Validate key environmental triggers for Sclerotinia basal rot to develop a robust fore-warning system

- Use of sclerote 'depots' to monitor sclerote germination across a range of environments
- Use of 'new' environmental detecting technologies
  - Leaf wetness
  - Soil moisture
- Provide data on mycelial (basal infection) and apothecia (stem infection) germination to validate sclerote germination risk model

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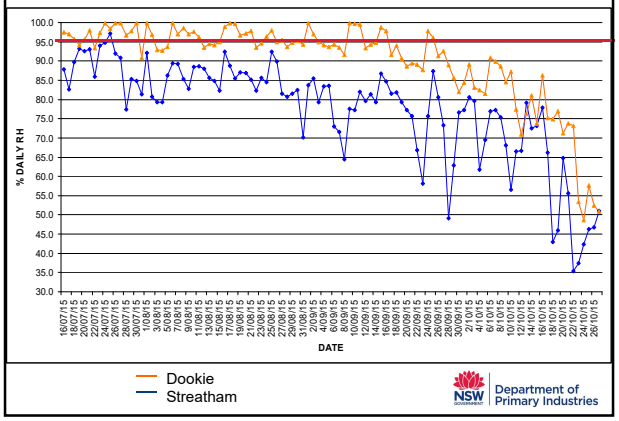
In-crop Relative Humidity (RH) 2015



Average 9:00am wind speed in 2017