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Published by NSW Department of Primary Industries,
a part of the Department of Regional New South Wales.

Petal survey and sclerotinia stem rot development in canola across central and southern NSW, and northern Victoria – 2016

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Key findings

- Wet conditions from June to September resulted in high levels of petal infestation.
- High-disease-risk districts were identified as having high intensity canola production, reliable spring rainfall (particularly during flowering) and long flowering periods.
- Petal infestation levels were similar to that of 2015, but above average rainfall in August and September in southern NSW and northern Victoria favoured sclerotinia stem rot development.

Introduction

Petal testing for sclerotinia stem rot fungus can provide information on the presence and levels of Sclerotinia ascospores in canola-growing regions. Apothecia, the fruiting bodies of the fungus, germinate in early winter and release airborne ascospores, which can colonise canola petals. Infested petals fall into the canola crop canopy and become lodged against the leaf and branch axils. When weather conditions are favourable, ascospores on infested petals germinate and infect plant tissues which eventually lead to Sclerotinia.

The petal survey was conducted to identify the drivers for Sclerotinia development in different districts, with the aim of understanding how background inoculum levels and environmental conditions influence the disease development in a given year.

Material and methods

Site details

Weekly petal samples were collected from 31 commercial canola crops. Locations in NSW were divided into three meteorological regions: Riverina; South West Slopes; and Central West Slopes and Plains. All petal samples from northern Victoria were collected from commercial canola crops located at Dookie and Rutherglen (Table 1).

Table 1. Locations of petal test survey in central and southern NSW, and northern Victoria.

Riverina	South West Slopes	Central West Slopes and Plains	Northern Victoria
Mayrung	Griffith	Condobolin	Rutherglen
Barooga	Mirrool	West Wyalong	Dookie
Rennie	Coolamon	Quandialla	
Corowa	Temora	Grenfell	
Lockhart	Junee	Parkes	
Alma Park	Cootamundra	Cowra	
Morven	Harden	Canowindra	
Daysdale		Manildra	
Wagga Wagga			

Details recorded weekly for each paddock were:

- time of sowing
- time of fungicide application
- date of sample collection
- bloom stage
- variety
- nearest town location
- presence of apothecia
- presence of stem lesions
- background information on Sclerotinia incidence in the district.

At the end of the growing season, the percentage of main stem infection was also recorded by counting the number of main stem infected plants out of a total of 100 plants in five locations (four corners and one central location). Each location is at least 10 metres apart.

Sample collection and analysis

Flower heads were collected weekly from each site during the flowering period. Whenever possible, flower heads were sampled from areas within the crop where no foliar fungicide had been applied. Samples were sent to NSW DPI at Wagga Wagga for analysis. Random petals from the flower heads were plated onto agar and inspected after five days. Counts were taken for the number of petals per sample that produced a Sclerotinia colony.

Results and discussion

Petal test survey

Sites within the Riverina (Table 2), the South West Slopes (Table 3) and Rutherglen in northern Victoria (Table 5) had an 80–100% petal infestation early in the flowering period. Most of the Central West Slopes and Plains (Table 4), and Dookie in northern Victoria (Table 5) had relatively low petal infestation (40–60%) compared with other regions.

There was high disease pressure at sites within the Riverina and South West Slopes where Sclerotinia epidemics are known to frequently occur given the reliable spring rainfall and intensive canola production. Most sites in the Riverina and the South West Slopes showed high levels of petal infestation early in the growing season, which was most likely due to apothecia germinating in the field in early winter; the prolonged wet conditions were suitable for colonising emerging petals. Most sites within the Riverina also had high levels of petal infestation throughout the growing season. Mayrung, Barooga and Rennie had lower overall petal infestation, due presumably to lower rainfall during the flowering period and lower annual rainfall. This pattern was also observed in the South West Slopes where higher levels of petal infestation were detected at Temora, Junee and Cootamundra with the increased rainfall compared with other sites in the region. Although the highest amount of rainfall was recorded in Harden, its lower petal infestation could be due to the history of low intensity canola and Sclerotinia-susceptible crops grown in the paddock.

Other regions such as the Central West Slopes and Plains recorded the lowest petal infestation levels across all sites, indicating the lowest disease pressure region. Even though the Central West Slopes and Plains had experienced the same amount of rainfall as parts of the Riverina and the South West Slopes, the low petal test results could be due to the low background inoculum levels in the region, most likely a result of less intensive canola production.

In the northern Victoria region, all three sites had similar rainfall and a moderate level of petal infestation during the growing season.

When the 2016 survey data was compared with the 2015 data, the levels of petal infestation within the Riverina, the South West Slopes and northern Victoria were similar between years, but the above average rainfall throughout the growing season allowed infested petals to develop into stem lesions more severely in 2016 compared with the drier spring conditions in 2015. The only difference in petal infestation was found in the Central West Slopes and Plains where levels increased in 2016 compared with 2015. Increasing petal infestation in the Central West Slopes and Plains was most likely due to the significantly higher rainfall received in 2016, which favoured prolonged germination of apothecia in the field.

The collated data on the percentage of stem infection development at individual sites showed that levels ranged from less than 1% to 10% (data not shown). This was relatively low considering the wet conditions experienced in 2016, suggesting that applying foliar fungicide during the flowering period effectively controlled the disease. Consistent with previous studies, the percentage of petal infestation did not have any correlation with the percentage of Sclerotinia infection.

Table 2. Percentage of Sclerotinia-infested petals, total rainfall during flowering and total annual rainfall at the Riverina sites.

Week no. Date	Mayrung	Barooga	Rennie	Corowa	Daysdale	Alma Park 1	Alma Park 2	Morven	Wagga Wagga 1	Wagga Wagga 2	Lockhart 1	Lockhart 2
1 3 Jul–10 Jul											100	
2 10 Jul–17 Jul							88					
3 17 Jul–24 Jul						100	90					
4 24 Jul–31 Jul					100	100	100	100			100	98
5 31 Jul–7 Aug			96		100	100	100	100	100	100	100	98
6 7 Aug–14 Aug	46		22	68	100	100	72	94	100	100	78	92
7 14 Aug–21 Aug	22			90	44	98	78	54	90	66	58	60
8 21 Aug–28 Aug			36	98	64	90	60	98			54	90
9 28 Aug–4 Sep	56		56	56	86	100	78	94	44	60	100	60
10 4 Sep–11 Sep	14	38	60	52	54	86	70	74	88	98	54	58
11 11 Sep–18 Sep	36	38	52	72	70	84	76	50	98	98	52	66
12 18 Sep–25 Sep	18	0	40	96	58	78	80	94	80	94	76	40
13 25 Sep–2 Oct		0	74		48	100	44	52	96	96	84	2
14 2 Oct–9 Oct		18	6			100	100	48	0	22	12	
15 9 Oct–16 Oct		20						28	20	76		
16 16 Oct–23 Oct		14						32		38		
Total rainfall during flowering (mm)	196.2	214.8	229.5	224.3	229.5	254.6	254.6	249.2	298.5	298.5	273.2	273.2
Total annual rainfall (mm)	566.4	600.0	700.0	707.4	700.0	804.4	804.4	736.8	773.8	773.8	759.6	759.6

0–20%	21–40%	41–60%	61–80%	81–100%

Table 3. Percentage of Sclerotinia-infested petals, total rainfall during flowering and total annual rainfall at the South West Slopes sites.

Week no. Date	Griffith	Mirrool	Coolamon	Temora	Junee	Cootamundra 1	Cootamundra 2	Harden
1 3 Jul–10 Jul								
2 10 Jul–17 Jul								
3 17 Jul–24 Jul								
4 24 Jul–31 Jul	98							
5 31 Jul–7 Aug	70			100				
6 7 Aug–14 Aug	54			98			100	
7 14 Aug–21 Aug	24	86	44	92	96		96	
8 21 Aug–28 Aug				44	94	100	82	
9 28 Aug–4 Sep	36	74	68	86	62	98	30	22
10 4 Sep–11 Sep	16	34	36	42	80	94	96	12
11 11 Sep–18 Sep		40		100		86	56	58
12 18 Sep–25 Sep			36			86	92	84
13 25 Sep–2 Oct				96	100	96	96	60
14 2 Oct–9 Oct					62	84	70	44
15 9 Oct–16 Oct					100	60	36	26
16 16 Oct–23 Oct								
Total rainfall during flowering (mm)	247.0	297.5	268.8	304.4	272.0	369.5	369.5	329.2
Total annual rainfall (mm)	686.2	805.5	793.6	703.6	833.6	947.2	947.2	876.0

0–20%	21–40%	41–60%	61–80%	81–100%

Table 4. Percentage of Sclerotinia-infested petals, total rainfall during flowering and total annual rainfall at the Central West Slopes and Plains sites.

Week no. Date	Condobolin	West Wyalong	Quandialla	Grenfell	Parkes	Cowra	Canowindra	Manildra
1 3 Jul–10 Jul							4	
2 10 Jul–17 Jul	64							
3 17 Jul–24 Jul	74							
4 24 Jul–31 Jul	44							
5 31 Jul–7 Aug	58		100					
6 7 Aug–14 Aug	22			64				
7 14 Aug–21 Aug	22	46	48	56				
8 21 Aug–28 Aug	0	10	16	16				
9 28 Aug–4 Sep	8	68	34	16	36	98		4
10 4 Sep–11 Sep	4	24	6	22	20	92	20	66
11 11 Sep–18 Sep	4		4	14	48	6		2
12 18 Sep–25 Sep	4		6	36		98	60	
13 25 Sep–2 Oct	6	4	8		10	2	30	0
14 2 Oct–9 Oct		0	0			0		
15 9 Oct–16 Oct						0		
16 16 Oct–23 Oct								
Total rainfall during flowering (mm)	215.3	258.2	253.9	337.3	305.8	268.9	265.6	321.0
Total annual rainfall (mm)	698.6	762.6	700.6	921.5	833.2	802.8	895.4	940.4

0–20% 21–40% 41–60% 61–80% 81–100%

Table 5. Percentage of Sclerotinia-infested petals, total rainfall during flowering and total annual rainfall at the northern Victoria sites.

Week no.	Date	Dookie 1	Dookie 2	Rutherglen
1	3 Jul–10 Jul			
2	10 Jul–17 Jul			
3	17 Jul–24 Jul			
4	24 Jul–1 Jul			
5	31 Jul–7 Aug	44	44	
6	7 Aug–14 Aug	24	20	
7	14 Aug–21 Aug	66	82	
8	21 Aug–28 Aug	26	42	
9	28 Aug–4 Sep	60	68	98
10	4 Sep–11 Sep	40	44	50
11	11 Sep–18 Sep	68	74	36
12	18 Sep–25 Sep	80	26	54
13	25 Sep–2 Oct	42	74	66
14	2 Oct–9 Oct	0	4	64
15	9 Oct–16 Oct			
16	16 Oct–23 Oct			
Total rainfall during flowering (mm)		227.6	199.0	230.6
Total annual rainfall (mm)		687.8	687.8	642.4

0–20%	21–40%	41–60%
61–80%	81–100%	

Summary

This survey was conducted to identify the drivers for sclerotinia stem rot epidemics by comparing the level of petal infestation in different meteorological regions.

The results have shown that Sclerotinia ascospores were present in every canola crop sampled in southern NSW and northern Victoria, and that the highest levels of petal infestation occurred early in the growing season when conditions were cool and wet. However, in some cases for certain districts which traditionally develop disease every year, high levels of petal infestation were observed throughout the entire flowering period. The highest levels of infestation were found in districts that have reliable spring rainfall and high intensity canola production, specifically districts within the Riverina and the South West Slopes regions.

Levels of petal infestation in 2016 were similar to 2015 levels, indicating that environmental conditions within the crop canopy are more important in Sclerotinia development compared with petal infestation alone.

Acknowledgements

This study is part of the 'National Canola Pathology Project', UM0051, 2013–18, with joint investment by GRDC and NSW DPI.

The authors would like to thank growers and agronomists who participated in this study, and Dr Sujeewa Rathnayake for technical support.