GOA trial site report

Is canola fungicide investment justified in low and medium rainfall environments of NSW?

Grain Orana Alliance

Trial name	Canola Fungicide
GOA code	GFDI01524-2
Season	Winter 2024
Location	Gulargambone
Trial cooperator	Alex Warner and Mat Shephard

Keywords

GFDI015, fungicides, sclerotinia, blackleg, alternaria leaf and pod spot, powdery mildew, rotations, Gulargambone

Take home messages

- Even in wet seasons an economic response to fungicide application is not guaranteed.
- Timing fungicide application to control sclerotinia is important to get adequate levels of control, and getting the timing right can be elusive.
- Recent background cropping history is not always a good indicator of potential returns from fungicide use.
- To make good fungicide decisions, consideration of paddock history, in-crop observations combined with recent and predicted weather conditions is essential (the SclerotiniaCM app can provide good insights).

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Background

Trials have been conducted by Grain Orana Alliance (GOA) and Brill Ag across southern and central NSW's low and medium rainfall zones since 2020 to determine canola's response to management of spring foliar fungal diseases through the applications of fungicide application during flowering. This work was primarily focused on sclerotinia stem rot.

The interest in the use of fungicide to control these diseases was supported by the run of good seasons experienced since 2020 as wetter spring conditions are a key requirement. The general findings from this work were that multiple diseases were often present including sclerotinia stem rot, upper canopy blackleg (UCB), powdery mildew (PM), and alternaria leaf and pod spot. Despite the presence of diseases and a reduction in their incidence in response to applied fungicides- yield responses were variable. Yield improvements were infrequent and often low in magnitude and even when yield responses were achieved- many were not economically justified.

However, the responses were not often predictable in relation to the weather conditions experienced, so it was considered that the background risk of diseases in any given paddock may help explain the varying response. Paddocks with a recent history of growing susceptible host crops may result in greater inoculum and disease pressure and hence higher levels of infection regardless of the seasonal conditions, and subsequently more likely to respond to applied fungicides.

If disease inoculum and hence disease pressure could be useful in better identifying circumstances that may respond more reliably to fungicide applications, unnecessary use of them may be avoided.

Aims

To compare a range of fungicide management options (product and timing) on disease development, yields and economic returns, across contrasting disease risk situations.

Methodology

The approach engaged in this work was to establish closely located 'paired' trial sites. To achieve this, two separate trials were established near each other. In doing so, it would both experience similar weather and moisture conditions but with varied sclerotinia inoculum levels and hence disease risk. This approach does not allow any statistical comparisons between the 2 trials. The observation may indicate the relative influence that disease or background pressure may have in determining responses. It should be noted that the reference to high or low risk is mostly associated with sclerotinia risk and there may be little difference in the risk for other diseases present such as blackleg, alternaria or powdery mildew.

At this location both trials were in the same paddock where one part was sown to linseed in 2024 and the other lupins. It is proposed that the linseed, as a non-host crop, would infer much lower disease risk than the more susceptible, lupins.

Levels of sclerotinia at both sites were assessed using a PredictaB[1] test. Samples were collected from the trial site and the immediate surrounding area at 15 locations, at the same time apothecia were visually counted.

The same treatments and timing were applied to both trials and are listed in Table 1. Applications were made with an ATV mounted boom applying 100 L/ha of spray mixture as a medium spray quality.

Timings:

- 30% bloom: 8/08/2024
- 50% bloom: 19/08/2024.

Table 1. Treatment products, timings and rates

	30% bloom		50% bloom	
Timing	**Product**	**Rate (mL/ha)**	**Product**	**Rate (mL/ha)**
30% bloom	Aviator® Xpro®	800	-	-
30% bloom	Prosaro®	450	-	-
30 and 50% bloom	Aviator® Xpro®	800	Prosaro®	450
30 and 50% bloom	Prosaro®	450	Aviator® Xpro®	800
50% bloom	-	-	Aviator® Xpro®	800
50% bloom	-	-	Prosaro®	450
UTC	-	-	-	-

Rainfall:

The 2024 season was wet, following the drier conditions of 2023. The in-crop rainfall was ~ 255.5 mm. Rainfall details are in Table 2.

Table 2. Monthly rainfall[2] (mm) and long-term average (LTA) at trial site

Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Total**
2024	65	50	30	58	58	70	39	37	8	40	101	57	**613**
LTA	62	51	47	37	40	43	40	32	36	46	52	54	**540**

[1] *South Australian Research and Development Institute (SARDI). (2025). Predicta® B soil testing service. Retrieved from* https://pir.sa.gov.au/sardi/services/molecular_diagnostics/predicta_b.

[2] Gridded data for the trial site from: Access Gridded Data | LongPaddock | Queensland Government

May and June were wet months, whilst July and August were close to average. September was very dry. There were no periods during the flowering, where extended periods of rain of 3 consecutive days or more during July-August occurred, which could lead to disease infection. However, there was in mid-October (Figure 1).

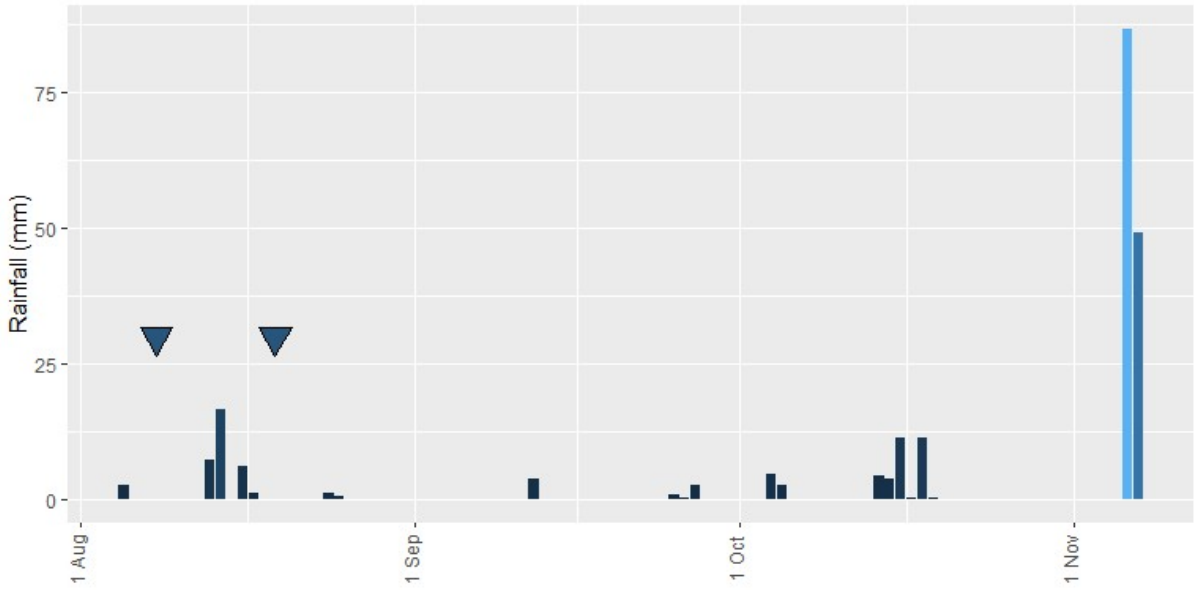

Figure 1. Daily rainfall received (vertical lines) and spray timings (inverted triangles).

A humidity sensor placed in the canopy at the time of the first spray application (~30% bloom), indicated that there were 2 periods where the humidity was close to the threshold for sclerotinia infections to occur, i.e. of being over 80% for 48 hours (data not presented).

The results have been analysed by ANOVA with a 95% confidence interval. Lettering should be only compared within each site (high or low risk), not between them.

Results

Disease:

The differing cropping history of the 2 sites for the previous season would appear to result in some contrasting predictions of disease risk as evidenced in the presence of apothecia and Predicta B testing as shown in Table *3*. It should be noted that these measurements and observations are over the two distinct trial areas and cannot be statistically analyzed or certain to be statistically different.

Apothecia is one of the stages of the sclerotinia infection cycles for above ground infections and were noted to be present at only 5 out 15 points of measurement in the low risk (linseed) site compared to 9 in the higher risk site. Inversely, the Predicta B testing, which measures the quantity of DNA, measured higher levels in the low-risk site than the high-risk site.

Table 3. Predicta B testing results and observations of Sclerotinia apothecia prior to application.

Rotation	Disease risk	Crop stage	Apothecia present	Sclerotinia* (kDNA copies/g Sample)
Canola-linseed	low	28% flower	5/15 samples	1,916
Canola-lupin	high	28% flower	9/15 samples	1,464

Note: Apothecia present indicates the presence of sclerotinia fruiting bodies at sampling.

**Sclerotinia sclerotiorum* (*S. minor* and *S. trifoliorum* = nil).

Sclerotinia stem rot infections were present at both the high and low disease risk sites (Table 4) with high levels of mainstem infections of up to 33%. Basal infections ranged from nil to ~4% with very low levels of branch infections.

There was no reduction in sclerotinia infections levels by any treatments at either site in basal, mainstem or branch infection. Except for one treatment- at the lower risk site, Aviator® Xpro® 800 mL/ha @ 50% bloom reduced Mainstem infections from 33% to 22% when compared to the control.

Table 4. Sclerotinia infections (%) at both sites. Treatments with the same letter within each site and variable are not significantly different.

Fungicide rate and timing	High risk			Low risk		
	Basal	Branch	Mainstem	Basal	Branch	Mainstem
Aviator® Xpro® 800 mL/ha @30% bloom	0.00 a	0.00 a	28.06 ab	4.17 a	0.0 a	27.83 ab
Prosaro® 450 mL/ha @30% bloom	0.98 a	0.00 a	19.22 b	4.03 a	0.6 a	31.73 a
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	1.88 a	0.48 a	28.69 a	1.74 ab	0.0 a	34.54 a
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	1.21 a	0.48 a	26.41 ab	2.44 ab	0.0 a	34.64 a
Aviator® Xpro® 800 mL/ha @ 50% bloom	0.56 a	0.00 a	26.57 ab	2.91 ab	0.0 a	22.21 b
Prosaro® 450 mL/ha @ 50% bloom	1.08 a	0.00 a	31.00 a	1.70 ab	0.0 a	34.20 a
UTC	1.30 a	0.00 a	28.53 ab	1.16 b	0.0 a	32.83 a
lsd	2.34 -	0.70 -	9.44 -	2.67 -	0.7 -	8.80 -

Alternaria infections were scored as follows:

- 0 = no infection observed
- 0.5 = at least one lesion found
- 1 = lesions present
- 2 = lesions common with 1-5% of pod/stem area infected
- 3 = lesions common with 5-15% of pod/stem area infected and low-level early pod senescence.
- 4 = lesions common with >15% of pod/stem area infected and high level of early pod senescence.

Both pod and branch Alternaria was present but at very low levels, the UTC only had a rating of 0.5.

Treatment had no impact on branch infections but pod infections were reduced in all treatments at the higher risk site, and at the lower risk site was reduced for all treatments with the exception of Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom and Aviator® Xpro® 800 mL/ha @30% bloom (Table 5).

Table 5. Alternaria infection scores at the high and low disease risks sites. Treatments with the same letter within each site and variable are not significantly different.

Fungicide rate and timing	High risk		Low risk	
	Branch	Pod	Branch	Pod
Aviator® Xpro® 800 mL/ha @30% bloom	0.00 a	0.01 C	0.12 a	0.38 ab
Prosaro® 450 mL/ha @30% bloom	0.00 a	0.50 B	0.00 a	0.00 c
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0.00 a	0.37 B	0.00 a	0.25 abc
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	0.12 a	0.00 C	0.00 a	0.00 c
Aviator® Xpro® 800 mL/ha @ 50% bloom	0.13 a	0.00 C	0.00 a	0.00 c
Prosaro® 450 mL/ha @ 50% bloom	0.00 a	0.37 B	0.00 a	0.12 bc
UTC	0.00 a	0.75 a	0.13 a	0.50 a
lsd	0.18	0.26	0.20	0.34

Upper canopy blackleg was not detected at either site.

Powdery mildew was present at both sites, with more than 20% stem area infected in the untreated (Table 6).

- All treatments tested reduced disease incidence. Disease incidence following treatments ranged from 0-7%.
- 30% bloom treatments had higher infections than the 50% bloom treatments at the higher risk site.
- Aviator® Xpro® applied at 30% bloom had higher PM stem infections than where Prosaro® was applied at 50% bloom or in a two-spray strategy.

Table 6. Percentage of stem area infected by powdery mildew infection at both sites. Treatments with the same letter within each site and variable are not significantly different.

Fungicide rate and timing	High risk		Low risk	
Aviator® Xpro® 800 mL/ha @30% bloom	5.6	b	6.3	b
Prosaro® 450 mL/ha @30% bloom	6.9	b	4.4	bc
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0.6	c	0.5	cd
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	3.1	bc	0.0	d
Aviator® Xpro® 800 mL/ha @ 50% bloom	3.1	bc	3.8	bcd
Prosaro® 450 mL/ha @ 50% bloom	1.3	c	2.1	cd
UTC	23.0	a	22.5	a
lsd	4.4	-	4.0	-

Grain yield

At the higher risk site, only the Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom treatments had higher yields than the control (+ 300 kg/ha) (Figure 2).

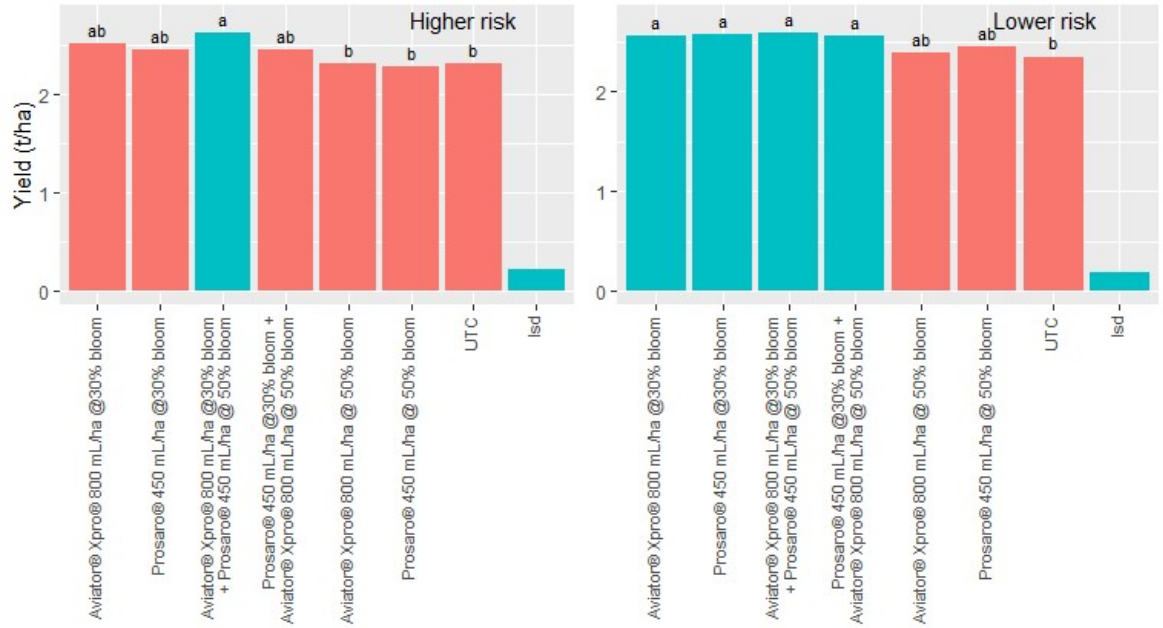

Figure 2. Canola yield (t/ha) at both high and low risk sites. Treatments with the same letter within each site and variable are not significantly different.

Grain quality

There were no differences in oil content when compared to the untreated (Figure 3).

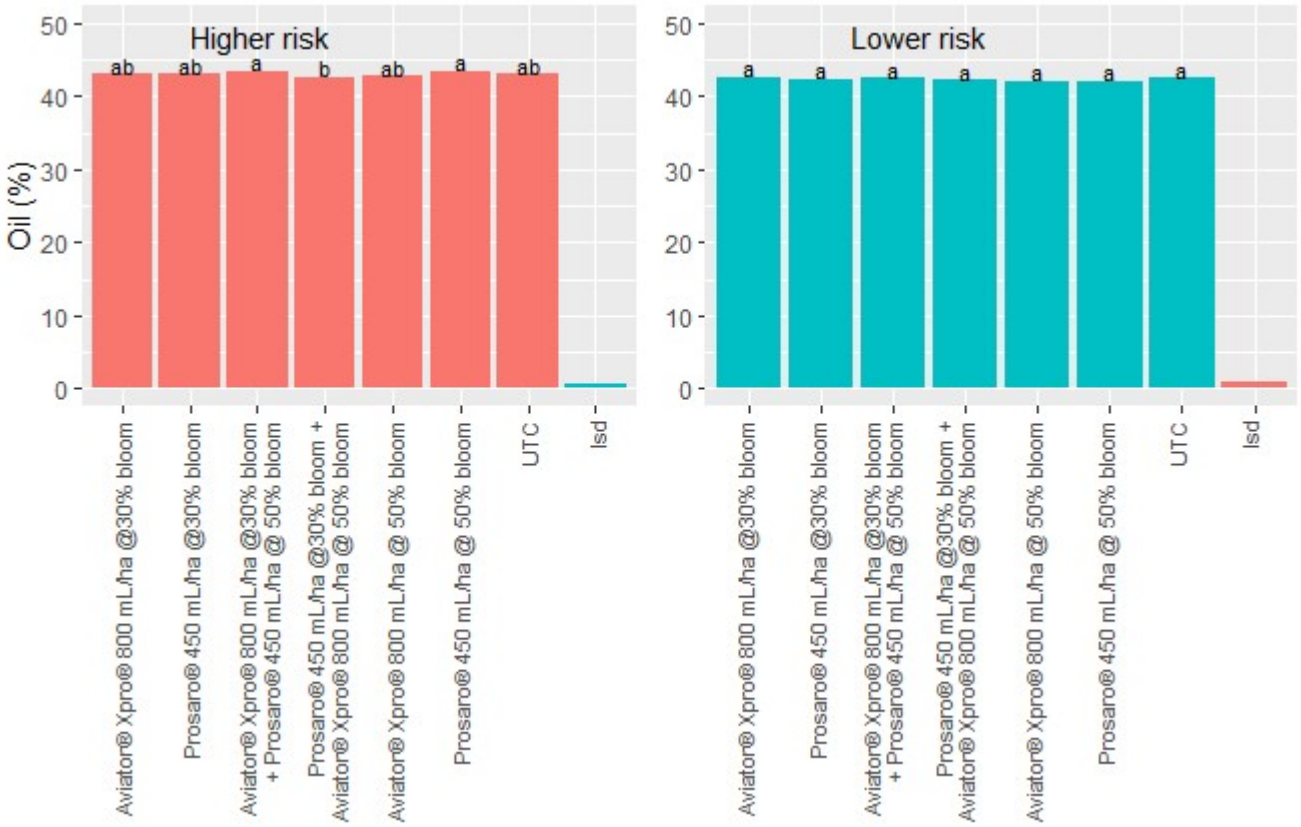

Figure 3. Canola oil (%). Treatments with the same letter within each site and variable are not significantly different.

Net return on fungicide investment:

At the higher risk site, the net return was only better than the UTC for Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom treatment and was $84/ha and $155/ha at the lower ($500/t) and higher canola price ($730/t).

At the lower risk site, the four treatments that included a 30% bloom application had an increased yield (when compared to the untreated, and the net return ranged from $32 up to $143/ha depending on the canola price (Table 7).

Table 7. Net return on fungicide investment based on yield differences to the untreated control and canola at $500 and $730/t (Aviator® Xpro @ $43/L, Prosaro® @ $22/L, application $13/ha).

	Higher risk site			Lower risk site		
	Yield Δ	Net return ($/ha)		Yield Δ	Net return ($/ha)	
Description		$500/t	$730/t		$500/t	$730/t
Aviator® Xpro® 800 mL/ha @30% bloom	ns	-47	-47	0.21	57	105
Prosaro® 450 mL/ha @30% bloom	ns	-23	-23	0.23	91	143
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0.3	84	155	0.24	47	101
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	ns	-70	-70	0.20	32	79
Aviator® Xpro® 800 mL/ha @ 50% bloom	ns	-47	-47	ns	-47	-47
Prosaro® 450 mL/ha @ 50% bloom	ns	-23	-23	ns	-23	-23
UTC		0	0		0	0

Discussion

2024 was an above average rainfall year in which district canola yields were good. The trial average yield was ~ 2.51 t/ha, and oil was ~ 42.3%. Disease was present with more than 1 in 4 plants having a mainstem sclerotinia infection and with infections of powdery mildew affecting up to 23% of stem area in the UTC. Other common diseases in Alternaria and Blackleg were not present or at very low levels.

Fungicide applications did improve yields in some treatments by up to 300 kg/ha but there is no clear correlations with disease reductions and improved yields.

There was very little basal and branch infection of sclerotinia and fungicide applications had little impact. Mainstem infections were high but application of even two fungicides did little to reduce the levels of mainstem sclerotinia infections across both sites compared to the control. Given such poor efficacy from the range of fungicide tested it is speculated that the infections may have occurred prior to applications. This could be supported by the rainfall data showing very few potential infection periods that followed the fungicide applications.

The first fungicide timing was also only applied at 30% bloom. An earlier application may have been more effective at reducing the sclerotinia infections at this site however the site was sprayed to coincide with the

grower's application to the surrounding crop. Spraying at the earliest label recommended timing of 20% would have only been able to be completed a few days prior.

Arguably PM was the most prominent disease that was impacted by fungicide usage at both sites, with the level of PM reduced by most treatments, however yield improvements from all treatments that achieved similar levels of PM reductions.

And blackleg and alternaria were either not present or at levels that would not be expected to be able to impact yields.

There was little to no effect on oil content from the treatments.

At the high-risk site, only one treatment that gave an economic benefit from fungicide application, regardless of the grain pricing used. Inversely, given the yields from all other treatments resulted in yields no different to the UTC all resulted in lower gross margins.

At the low-risk site 4 treatments resulted in economic benefits of up to $143/ha (8% increase to net income) under the higher canola price of $730/t. The highest return was from the single application of Prosaro @ 30% bloom.

What is unclear from this trial is whether an early fungicide application may have had better control on the mainstem infections, and changed the outcome, this may be worthy of further investigation (noting both the Prosaro® and Aviator® Xpro labels recommend application between 20% and 50% bloom).

The background history of the paddock had limited impact on disease, as both the high and low risk sites had similar disease numbers. This may have to do with the relative proximity of the trials and the ability of spores to travel distance. In the case of sclerotinia infections, it may also have been more related to the longer-term paddock history rather than just the crop grown in 2023, which was a relatively dry year, and most likely not ideal for disease proliferation.

Conclusions

It is unclear what level of influence the recent cropping history may have on the sclerotinia disease risk. Following a dry year, any influence may be more likely to be related to the medium-term history of the paddock. This aspect of the disease and its impact would be hard to research.

Fungicide choice and application timings tested appear to have had little impact on reducing the incidence of sclerotinia and an earlier application may have been more effective (though possibly outside of label recommendations).

Despite the low level of impact on disease, several treatments did improve yields. If this was in relation to disease reduction alone, powdery mildew would seem the most likely, yet PM incidence did not correlate well with yields outcomes.

Several treatments did result in economic benefits from their use, but the returns were not large in their magnitude. Put another way- losses from not applying fungicides were not extremely large either- at their worst ~15%.

Decisions about application timing and product choice to achieve an economic return are not easy, use the ScleroCM App[3] for useful guidance.

Acknowledgements

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DISCLAIMER — TECHNICAL

[3] Sclerotinia CM – Sclerotinia management app | Department of Primary Industries and Regional Development www.dpird.wa.gov.au/online-tools/sclerotinia-cm–sclerotinia-management-app/

ANNEX

Table 8. Yield and oil% results - Higher risk site

Fungicide treatment	Yield (t/ha)	Oil (%)
Aviator® Xpro® 800 mL/ha @30% bloom	2.5 ab	43.0 ab
Prosaro® 450 mL/ha @30% bloom	2.5 ab	43.0 ab
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	2.6 a	43.4 a
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	2.5 ab	42.6 b
Aviator® Xpro® 800 mL/ha @ 50% bloom	2.3 b	42.8 ab
Prosaro® 450 mL/ha @ 50% bloom	2.3 b	43.5 a
UTC	2.3 b	43.0 ab
lsd	0.2	0.7

Table 9. Yield and oil% results - Lower risk site.

Fungicide treatment	Yield (t/ha)	Oil (%)
Aviator® Xpro® 800 mL/ha @30% bloom	2.6 a	42.6 a
Prosaro® 450 mL/ha @30% bloom	2.6 a	42.4 a
Aviator® Xpro® 800 mL/ha @30% bloom + Prosaro® 450 mL/ha @ 50% bloom	2.6 a	42.5 a
Prosaro® 450 mL/ha @30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	2.6 a	42.2 a
Aviator® Xpro® 800 mL/ha @ 50% bloom	2.4 ab	42.1 a
Prosaro® 450 mL/ha @ 50% bloom	2.4 ab	42.1 a
UTC	2.3 b	42.5 a
lsd	0.2	0.8