

GOA trial site report

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

Grain Orana Alliance

Trial name	Canola Fungicides
GOA code	GFDI01524-4
Season	Winter 2024
Location	Wongarbon
Grower	Al and Gus Kelly

Keywords

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

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 disease risk.
- To make good fungicide decisions, consideration of paddock history and in-crop observations, combined with recent and predicted weather conditions is essential (the SclerotiniaCM app can provide good insights).

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

GOA trial site report

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 one site had been in a long-term pasture before a wheat crop in 2023 and suspected to have a low sclerotinia disease risk. The second site was in the directly neighboring paddock where a long term minimum tillage, continuous canola- wheat rotation operating for at least the last 8 years

The 2 sites were ~900 m apart. While no statistical comparisons of treatments can be made between paddocks, the observations between trials were interesting.

Levels of sclerotinia at both sites were assessed using a PredictaB¹ test, at the same time as samples were collected a visual count of apothecia was conducted

The 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.

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.

GOA trial site report

Timings:

- 30% bloom: 12/08/2024
- 50% bloom: 20/08/2024.

Table 1. Products, timings and rates (mL).

	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:

2024 was a wet season following the drier conditions of 2023. The in-crop rainfall was ~ 278.5 mm. June, July and August were above average rainfall months, whilst September was well below average. Rainfall details are in Table 2.

Table 2. Monthly rainfall² (mm) and long-term average (LTA) at trial site

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2024	96	78	62	88	39	55	59	69	12	39	91	55	743
LTA	63	54	52	45	44	47	45	44	44	53	56	54	601

There was one period during the flowering window where rain fell on 3 consecutive days (14-16th August) (Figure 1) possibly close to the threshold for sclerotinia infections of >80% humidity for 48 hours.

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

GOA trial site report

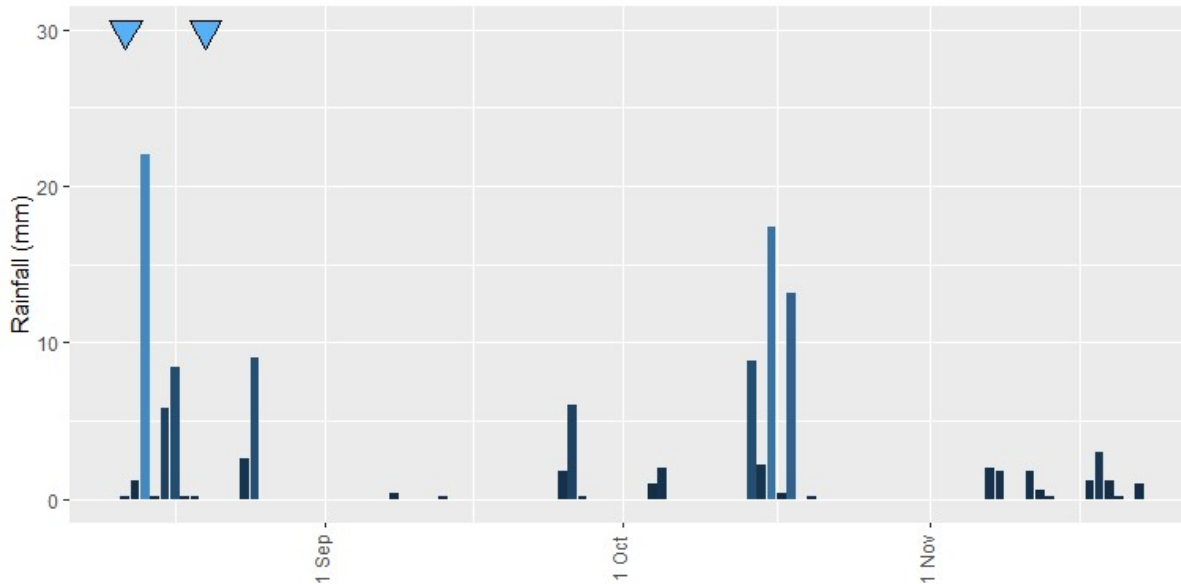


Figure 1. Daily rainfall received (vertical lines) and spray timings (inverted triangles).

Results

Disease

The differing cropping history of the 2 sites for the previous season would appear to result in significant increase in disease inoculum as evidenced in the presence of apothecia and Predicta B testing as shown in Figure 3. It should be noted that these measurements and observations are over the two distinct trial areas and cannot be statistically analysed or certain to be statistically different.

Apothecia is one of the stages of the sclerotinia infection cycles for above ground infections and were not noted to be present in the low-risk site compared to 9 in the higher risk site. Predicta B testing, which measures the quantity of DNA, measured much higher levels in the low-risk site than the high-risk site.

Table 3. Site sclerotinia disease risk profile at flowering.

Rotation	Disease risk	Crop stage	Apothecia present	Sclerotinia* (kDNA copies/g Sample)
Wheat-canola-wheat	higher	35% flower	Yes, 9/15 sites	9,353
Pasture-wheat-canola	lower	35% flower	No	12

Note: Visible apothecia indicate the presence of sclerotinia fruiting bodies at sampling.

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

GOA trial site report

Sclerotinia was present at both the high and low disease risk sites (Table 4). There was no basal sclerotinia infections at the low-risk site, but only very low levels at the high risk site (less than 1%). Branch infections were also evident in both sites but at low levels also (<2%). There was no treatment impact on either basal or branch infections.

Mainstem infections were present at both sites. Infections were measured to be higher in the low-risk site at 13% compared to the low risk at 10%.

At the high-risk site, 4 treatments all consisting of a 30% bloom application reduced infections when compared to the UTC or 50% fungicide application (regardless of product). Two of the 4 had a second application as well, but this did not result in any further reduction in disease incidence.

AT the low-risk sites all treatments reduced mainstem infections. Aviator applied at 50% bloom reduced levels to ~8%, all other treatments reduced disease to less than 4%. Two fungicide applications did not result in a further improvement in control than single pass options.

Table 4. Sclerotinia infections (%) 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		
	Basal	Mainstem	Branch	Basal	Mainstem	Branch
Aviator® Xpro® 800 mL/ha @ 30% bloom	0.00 a	3.81 b	0.02 b	0 a	1.56 c	1.11 a
Prosaro® 450 mL/ha @ 30% bloom	0.53 a	3.35 b	0.57 ab	0 a	3.74 c	1.09 a
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0.00 a	3.90 b	0.00 b	0 a	0.93 c	0.00 a
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	0.50 a	1.66 b	0.74 ab	0 a	1.39 c	0.00 a
Aviator® Xpro® 800 mL/ha @ 50% bloom	0.00 a	9.31 a	2.41 a	0 a	8.57 b	0.02 a
Prosaro® 450 mL/ha @ 50% bloom	0.00 a	9.77 a	0.00 b	0 a	2.67 c	1.43 a
UTC	0.79 a	10.47 a	1.71 ab	0 a	13.21 a	0.00 a
lsd	1.08	3.74	2.10	0	4.32	2.48

GOA trial site report

Alternaria was present at very low levels only on the pod only, on average there was less than one lesion found in the 100 plants assessed. Nil disease was observed on the branches (Table 5). Only at the high-risk site was there any impact of treatment. Alternaria was 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.

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 a	0.00 b	0 a	0.00 a
Prosaro® 450 mL/ha @ 30% bloom	0 a	0.25 a	0 a	0.00 a
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0 a	0.00 b	0 a	0.00 a
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	0 a	0.25 a	0 a	0.12 a
Aviator® Xpro® 800 mL/ha @ 50% bloom	0 a	0.00 b	0 a	0.00 a
Prosaro® 450 mL/ha @ 50% bloom	0 a	0.13 ab	0 a	0.00 a
UTC	0 a	0.13 ab	0 a	0.12 a
Isd	0	0.24	0	0.18

UCB was not observed.

Lodging was not observed at the time of assessments; however, at harvest several plots had lodged. Using a visual score, the UTC had higher levels of lodging than other treatments, except for Aviator® Xpro® 800 mL/ha @ 50% bloom, (data not presented).

Powdery mildew was detected at ~5% in the UTC. All treatments applied at both sites reduced disease incidence to less than 1 % in all cases bar 1. But there was no difference in the reductions between the fungicide strategies applied (Table 6).

GOA trial site report

Table 6. Percentage of stem area infected by PM 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	2.0 b	0.9 b
Prosaro® 450 mL/ha @ 30% bloom	0.3 c	0.8 b
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	0.0 c	0.1 b
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	0.0 c	0.1 b
Aviator® Xpro® 800 mL/ha @ 50% bloom	0.0 c	0.3 b
Prosaro® 450 mL/ha @ 50% bloom	0.0 c	0.9 b
UTC	5.1 a	4.6 a
lsd	0.7 -	2.0 -

Grain yield:

Canola yields were very high at both sites, averaging 3.19 and 2.84 t/ha at the high and low sites respectively (Figure 2). There were no treatments except for 1 that resulted in any significant yield impacts when compared to the UTC.

Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom at the low-risk site resulted in a 700kg/ha higher yield.

GOA trial site report

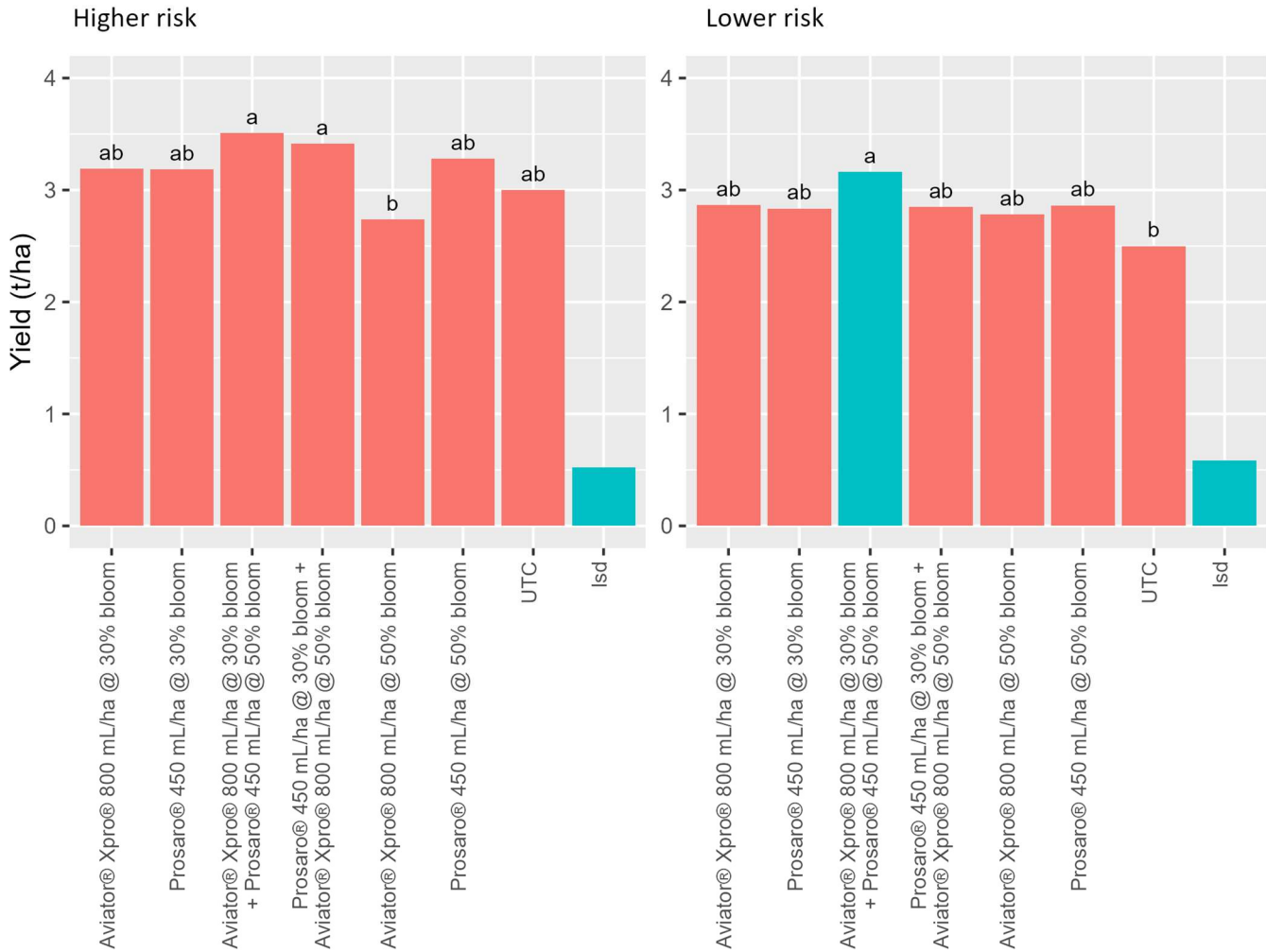


Figure 2. Canola yield (t/ha) at the higher and lower risk sites. Treatments with the same letter within each site are not significantly different.

Grain quality:

No treatments had oil contents different to the UTC at either site. Oil levels were similar at 46.2% and 46.2% at the high and low sites respectively (Figure 3).

GOA trial site report

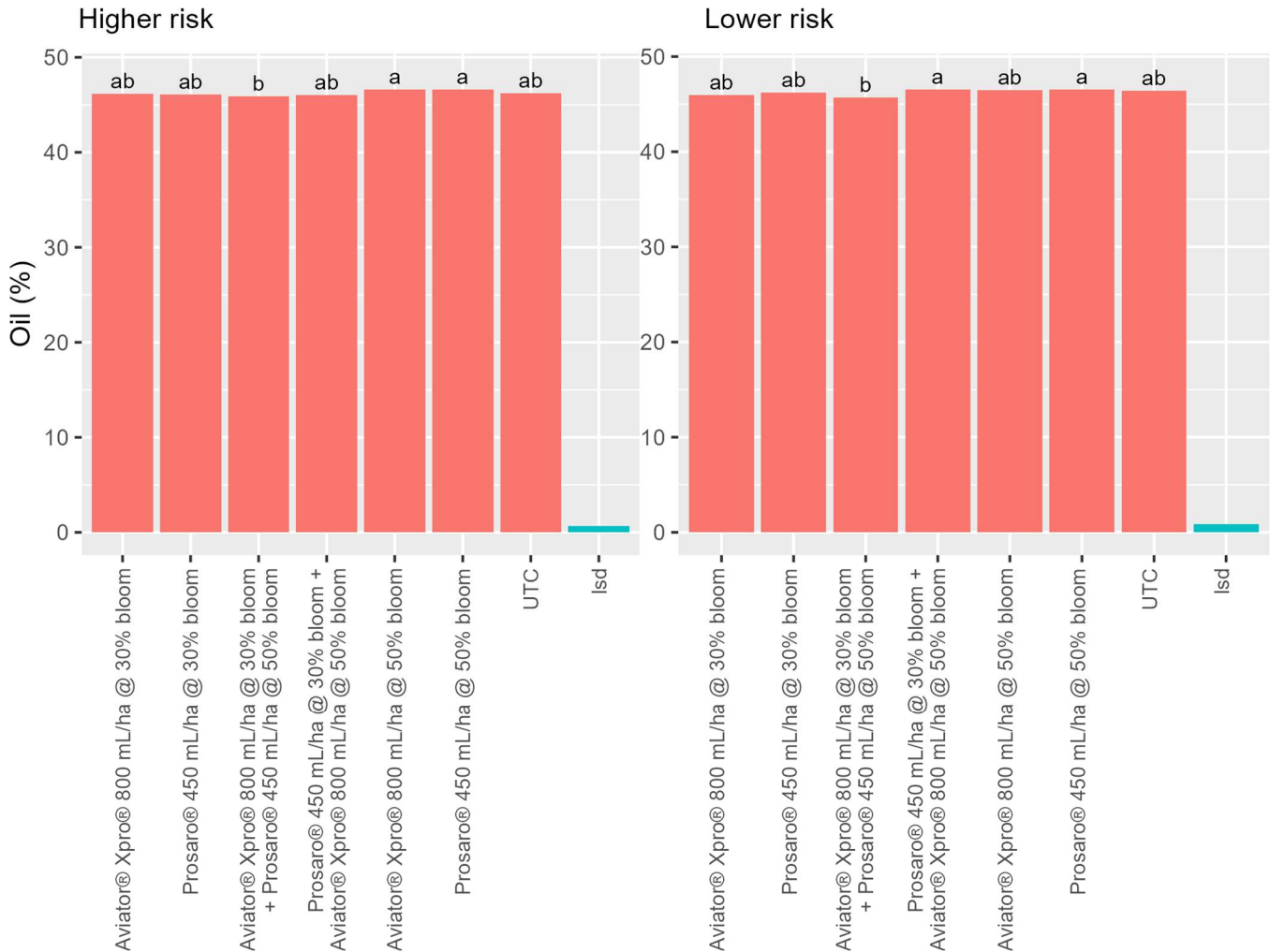


Figure 3. Canola oil (%). Treatments with the same letter within each site are not significantly different.

Economics:

Net returns were calculated where there was a significant difference in yield. At the higher risk site there were no yield differences, hence there was a net cost for the fungicide application. Similarly, at the lower risk site most treatments resulted in a negative net return on the fungicide investment, the exception was where Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom was applied, which resulted in a net return on investment of \$260 and \$413 when canola prices were assumed to be \$500 and \$730/t respectively (Table 7).

GOA trial site report

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).

Fungicide rate and timing	Higher risk site			Lower risk site		
	Yield Δ	Net return? (\$/ha)		Yield Δ	Net return (\$/ha)	
		\$500/t	\$730/t		\$500/t	\$730/t
Aviator® Xpro® 800 mL/ha @ 30% bloom	ns	-47	-47	ns	-47	-47
Prosaro® 450 mL/ha @ 30% bloom	ns	-23	-23	ns	-23	-23
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	ns	-70	-70	0.66	260	413
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	ns	-70	-70	ns	-70	-70
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	reference	0	0	reference	0	0

Discussion

2024 was above average for rainfall, and high yields and oil contents were achieved at both sites. Despite the wet conditions, only low levels of sclerotinia and PM were detected, and virtually no UCB, alternaria. Where diseases were present, the application of fungicides was effective in reducing the disease incidence.

Interestingly there was only one treatment which resulted in any difference in yield (Prosaro followed by Aviator). Following the treatment with fungicide there was a reduction in both Sclerotinia and PM, but the reductions were not dissimilar to that achieved from other treatments that resulted in no differences in yields.

The earlier applications of fungicide at 30% bloom did not provide 100% control. It is unknown if an even earlier application would have provided even better control, however applying at the earlier label timing of 20% would have meant application may have only been a few days earlier.

As there was only one treatment that resulted in an improvement in yields and a good return on the money spent on the fungicides all other treatments represented a reduction in profit through their use.

Both sites had very different background cropping histories and would have predicted to present significantly greater risk of disease, confirmed by the presence of apothecia levels and higher levels of DNA in the soil when tested. Yet this did not appear to translate strongly into a difference in the returns from using fungicides.

GOA trial site report

Conclusions

In this experiment there was a good correlation of cropping history and potential indicators of sclerotinia disease risk. Following an intensive wheat: canola rotation there was both high levels of DNA present and apothecia, the lower risk site in contrast had little to none.

Despite this background increase in disease risk, similar levels of disease developed at both sites, suggesting the presence of apothecia or DNA testing may be a poor predictor of likely response alone.

Application of fungicides did reduce the diseases that were present, however the disease reductions did not reliably result in increases in yields. As there were few cases where yield was improved, despite the expense of buying and applying the fungicides, net profit would have been reduced compared to doing nothing at all.

In the one treatment that resulted in yield increases the increase in net profit was not insubstantial at \$260/ha however such a result cannot be comfortably explained through disease control outcomes from its use when compared to many other fungicide options resulted in similar disease reduction but without the yield impacts. Possibly the uneven nature of the crop yields within the trial site may have contributed to this.

In summary cropping history in these two paired trial sites could be considered a poor indicator of likely fungicide response when considered alone. This should be combined with other factors such as weather conditions, to determine the necessity for fungicide use. The Sclerotinia CM³ app is a useful tool to achieve this.

Acknowledgements

The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the Grains Research and Development Corporation (GRDC). The authors would like to thank them for their continued support. Special thanks go out to Al and Gus Kelly who hosted this trial.

DISCLAIMER — TECHNICAL

This report has been prepared in good faith based on information available at the date of publication without any independent verification. The GRDC and GOA do not guarantee or warrant the accuracy, reliability, completeness of currency of the information in this publication nor its usefulness in achieving any purpose.

Readers are responsible for assessing the relevance and accuracy of the content of this publication. The GRDC and GOA will not be liable for any loss, damage, cost or expense incurred or arising by reason of any person using or relying on the information in this publication.

Products may be identified by proprietary or trade names to help readers identify types of products, but this is not, and is not intended to be, an endorsement or recommendation of any product or manufacturer referred to. Other products may perform as well or better than those specifically referred to.

³ Sclerotinia CM – Sclerotinia management app | Department of Primary Industries and Regional Development
<https://www.dpir.wa.gov.au/online-tools/sclerotinia-cm--sclerotinia-management-app/>

GOA trial site report

ANNEX

Table 8. Results - Higher risk site: in crop and harvest observations

Fungicide rate and timing	Yield		Oil	
	(t/ha)		(%)	
Aviator® Xpro® 800 mL/ha @ 30% bloom	3.2	ab	46.2	ab
Prosaro® 450 mL/ha @ 30% bloom	3.2	ab	46.1	ab
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	3.5	a	45.9	b
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	3.4	a	46.0	ab
Aviator® Xpro® 800 mL/ha @ 50% bloom	2.7	b	46.6	a
Prosaro® 450 mL/ha @ 50% bloom	3.3	ab	46.6	a
UTC	3.0	ab	46.2	ab
lsd	0.5		0.7	

Table 9. Results - Lower risk site: in crop and harvest observations

Fungicide rate and timing	Yield		Oil	
	(t/ha)		(%)	
Aviator® Xpro® 800 mL/ha @ 30% bloom	2.9	ab	45.9	ab
Prosaro® 450 mL/ha @ 30% bloom	2.8	ab	46.2	ab
Aviator® Xpro® 800 mL/ha @ 30% bloom + Prosaro® 450 mL/ha @ 50% bloom	3.2	a	45.7	b
Prosaro® 450 mL/ha @ 30% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom	2.9	ab	46.5	a
Aviator® Xpro® 800 mL/ha @ 50% bloom	2.8	ab	46.4	ab
Prosaro® 450 mL/ha @ 50% bloom	2.9	ab	46.5	a
UTC	2.5	b	46.4	ab
lsd	0.6		0.8	