

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

Grain Orana Alliance

|                   |                           |
|-------------------|---------------------------|
| <b>Trial name</b> | Canola fungicide response |
| <b>GOA code</b>   | GFDI01524                 |
| <b>Season</b>     | Winter 2024               |
| <b>Location</b>   | Ganmain                   |
| <b>Grower</b>     | Rohan Brill               |

### Keywords

GFDI015, fungicides, sclerotinia, blackleg, alternaria black spot, powdery mildew, rotations, Ganmain

### 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).

### 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 for disease development. The general

findings from this work were that multiple diseases were often present including sclerotinia stem rot, upper canopy blackleg (UCB), 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.

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, 2 separate trials were established near each other. In doing so, it would both experience similar weather and moisture conditions but with varied sclerotinia 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. 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 PM.

The 2 sites of this trial were selected as one paddock had been in a barley in 2023 and suspected to have a lower sclerotinia disease risk profile. The other site was in a nearby paddock where vetch was grown in 2023 (wheat in 2022 and canola in 2021) and was considered a much higher disease risk. While no statistical comparisons of treatments can be made, the observations from both trials provide interesting observations.

The high-risk site was sown on 6 May with Nuseed Diamond, a fast-developing variety with anecdotal evidence of being susceptible to sclerotinia. The low-risk site was sown on 13 April with 44Y94 CL. The aim was to synchronise flowering but the 44Y94 CL established rapidly and its phenology tracked slightly ahead through the season.

Levels of sclerotinia at both sites were assessed using a PredictaB<sup>1</sup> test, at the same time as samples were collected a visual count of apothecia was conducted.

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.

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<sup>1</sup> 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](https://pir.sa.gov.au/sardi/services/molecular_diagnostics/predicta_b).

## Timings:

- 10% bloom: 22 August (high risk site only)
- 25% bloom: 22 August (low risk site) & 9 September (high risk site)
- 50% bloom: 9 September (low risk site) & 20 September (high risk site).

Table 1. Products, timings and rates (active Ingredients for these products are included in the annex).

| Description  | Site      |
|--|-----------|
| Mantaray# 450 mL/ha @ 10% bloom                                      | High only |
| Mantaray 450 mL/ha @ 10% bloom + Mantaray 450 mL/ha @ 50% bloom      | High only |
| Aviator Xpro 800 mL/ha @ 25% bloom                                   | Both      |
| Mantaray 450 mL/ha @ 25% bloom                                       | Both      |
| MIRAVIS Star 750 mL/ha @ 25% bloom                                   | High only |
| Aviator Xpro 800 mL/ha @ 25% bloom + Mantaray 450 mL/ha @ 50% bloom  | Both      |
| Mantaray 450 mL/ha @ 25% bloom + Aviator® Xpro 800 mL/ha @ 50% bloom | Both      |
| Aviator Xpro 800 mL/ha @ 50% bloom                                   | Both      |
| Mantaray 450 mL/ha @ 50% bloom                                       | Both      |
| UTC  | Both      |

#Mantaray- 210 g/L Prothioconazole + 210 g/L Tebuconazole, similar actives to Prosaro

## Rainfall

The 2024 season was close to average, following the drier conditions of 2023. The in-crop rainfall was approximately 190.8 mm. June, July, September, and October were below average rainfall months, whilst August was just above average Table 2.

Table 2. Monthly rainfall<sup>2</sup> (mm) and long-term average (LTA) at trial site.

| Month       | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | Total      |
|-------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------------|
| <b>2024</b> | 56  | 15  | 8   | 45  | 37  | 18  | 36  | 53  | 26  | 22  | 79  | 37  | <b>432</b> |
| <b>LTA</b>  | 40  | 36  | 38  | 39  | 40  | 45  | 42  | 43  | 40  | 47  | 44  | 39  | <b>493</b> |

<sup>2</sup> Gridded data for the trial site from: Access Gridded Data | LongPaddock | Queensland Government

The flowering period was short in 2024, with rainfall events during the flowering period (mid-August to mid to late September) being intermittent. There were no consecutive rainy days till the end of September where rain fell on 3 consecutive days (25-27th Sept) (Table 2). This is possibly close to the required threshold for sclerotinia infections of being over 80% humidity for 48 hours but by this stage flowering had finished on the low risk site and was ~80% complete on the high risk site.

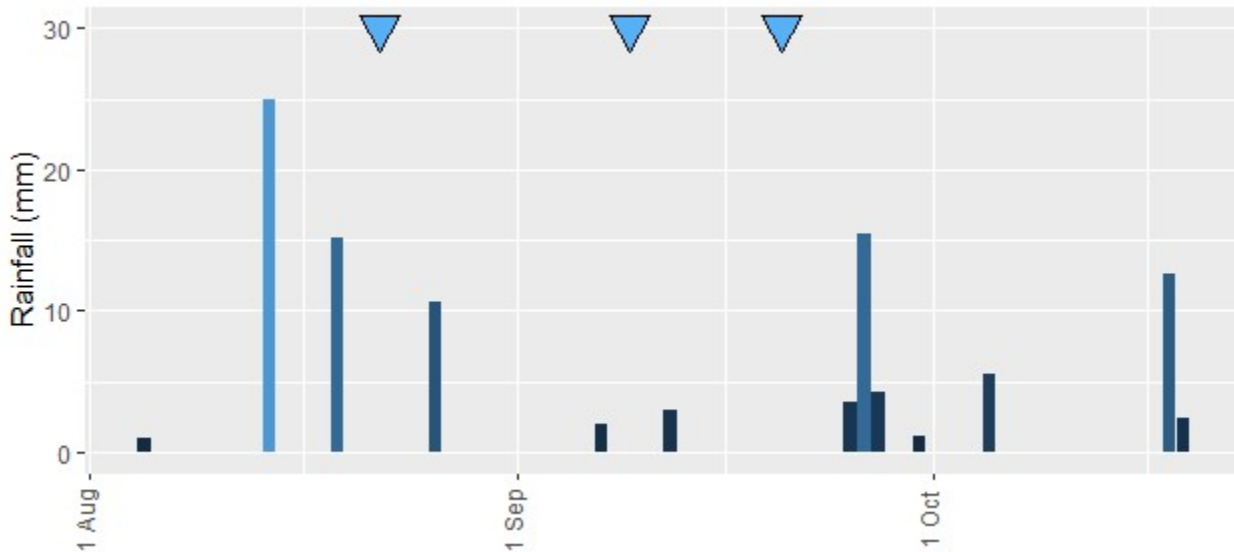


Figure 1. Daily rainfall received (vertical lines) and spray timings. (Rainfall data from BOM, 74202 GANMAIN-ROSEDALE).

## Results

### Disease:

The different cropping history of the 2 sites for the previous 3 seasons was why these paddocks were selected for the trials. The higher risk site did have higher numbers of apothecia present and a higher PredictaB DNA count (Table 3). It should be noted that these measurements and observations are over the 2 distinct trial areas and cannot be statistically analyzed or certain to be statistically different.

Apothecia is one of the stages of the sclerotinia life cycle and is the initiation of above ground infections. There were nearly triple the number visible at the higher risk site. The Predicta B testing, which measures the quantity of DNA present in the soil, showed close to a 10-fold difference between the 2 sites. It should however be noted that in terms of PredictaB testing both results are relatively low, and other sites tested at the same time (data not presented) had sclerotinia DNA counts in the thousands.

Table 3. Site sclerotinia disease risk profile at flowering (22 August).

| Farm      | Rotation                        | Disease risk | Crop stage | Apothecia no#/m <sup>2</sup> | Sclerotinia (kDNA copies/g sample) * |
|-----------|---------------------------------|--------------|------------|------------------------------|--------------------------------------|
| Erinvale  | 21Wheat, 22Faba beans, 23Barley | lower        | 25% bloom  | 5.9                          | 7                                    |
| Brushwood | 21Canola, 22Wheat, 23 Vetch     | higher       | 10% bloom  | 18.7                         | 64                                   |

Note: 'Apothecia present' indicates the presence of Sclerotinia fruiting bodies at sampling.  
 \**Sclerotinia sclerotiorum* (*S. minor* and *S. trifoliorum* = nil).

Sclerotinia was present at both the high and low fungicide sites (Table 4). Basal infections were below 5% with no treatment differences.

Basal infections in the UTC were ~1 and 5% for the high and low risk sites respectively with no treatments tested having any effect in reducing the disease incidence. These infections likely occurred before fungicide application. Similarly, some of the main stem infections appeared to have been pre-flowering, not by the typical infection pathway driven by petal drop.

Main stem infections in the UTC were 14 and 17% for the high and low risk sites respectively.

At both sites several treatments did reduce disease incidence:

- high risk site: both 2-spray strategies and the Mantaray® application at 25% flowering reduced main stem infections, to an average of ~5%. Miravis Star and Aviator applied at 25% didn't reduce sclerotinia main stem infections
- Low risk site: all fungicides applied at 25% flowering, including the 2-spray strategy, reduced main stem infections to an average of ~5%.

Branch infections in the UTC were 4.88 and 3.74% for the high and low risk sites respectively.

- High risk site: all treatments reduced infections, except for Mantaray applied at 10 and 50% bloom.
- Low risk site: all treatments reduced infections.

Table 4. Sclerotinia infections (%) at the higher and lower 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 |
| Mantaray 450 mL/ha @ 10% bloom                                      | 1.19 b    | 10.58 abc | 4.42 a  | -        | -        | -      |
| Mantaray 450 mL/ha @ 10% bloom + Mantaray 450 mL/ha @ 50% bloom     | 1.46 ab   | 5.62 de   | 0.76 c  | -        | -        | -      |
| Aviator Xpro 800 mL/ha @ 25% bloom                                  | 3.20 a    | 11.14 abc | 0.00 c  | 2.99 a   | 5.91 c   | 1.21 b |
| Mantaray 450 mL/ha @ 25% bloom                                      | 0.39 b    | 9.75 bcd  | 0.72 c  | 3.51 a   | 6.84 bc  | 0.89 b |
| MIRAVIS Star 750 mL/ha @ 25% bloom                                  | 0.82 b    | 11.90 ab  | 0.79 c  | -        | -        | -      |
| Aviator Xpro 800 mL/ha @ 25% bloom + Mantaray 450 mL/ha @ 50% bloom | 1.17 b    | 7.03 cde  | 0.36 c  | 2.40 a   | 4.64 c   | 0.56 b |
| Mantaray 450 mL/ha @ 25% bloom + Aviator Xpro 800 mL/ha @ 50% bloom | 1.83 ab   | 3.54 e    | 0.00 c  | 4.91 a   | 6.28 bc  | 0.48 b |
| Aviator Xpro 800 mL/ha @ 50% bloom                                  | 2.04 ab   | 12.72 ab  | 1.69 bc | 4.10 a   | 11.83 ab | 0.58 b |
| Mantaray 450 mL/ha @ 50% bloom                                      | 1.44 ab   | 11.74 ab  | 3.54 ab | 4.08 a   | 15.89 a  | 0.00 b |
| UTC   | 1.20 b    | 14.25 a   | 4.88 a  | 4.96 a   | 17.01 a  | 3.74 a |
| Isd   | 1.94      | 4.38      | 2.37    | 4.93     | 5.82     | 1.71   |

Upper canopy blackleg was observed however treatment differences were not detected. Alternaria and PM were not observed, and no lodging was detected.

## Grain yield

Average canola yields at each of the high and low risk sites were 2.24t/ha and 2.04 t/ha respectively (see Figure 2) with overall yield reduced by frost damage, especially at the low risk site (-3°C on 15 September).

At the high-risk site yields were higher than the UTC where the following treatment were applied (columns shaded in blue):

- Mantaray® 450 mL/ha @ 10% bloom (+300kg/ha)
- Mantaray® 450 mL/ha @ 25% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom (+400kg/ha)
- Mantaray® 450 mL/ha @ 10% bloom + Mantaray® 450 mL/ha @ 50% bloom (+500kg/ha)
- Aviator® Xpro® 800 mL/ha @ 25% bloom (+300 kg/ha)

At the low-risk site yields were higher than the UTC where the following was applied:

- Mantaray® 450 mL/ha @ 25% bloom + Aviator® Xpro® 800 mL/ha @ 50% bloom (+300kg/ha)

- Aviator® Xpro® 800 mL/ha @ 25% bloom (+300kg/ha)

There was more yield variability at the higher risk site between the treatments with a range of 0.47 t/ha while the difference at the lower risk site 0.31 t/ha.

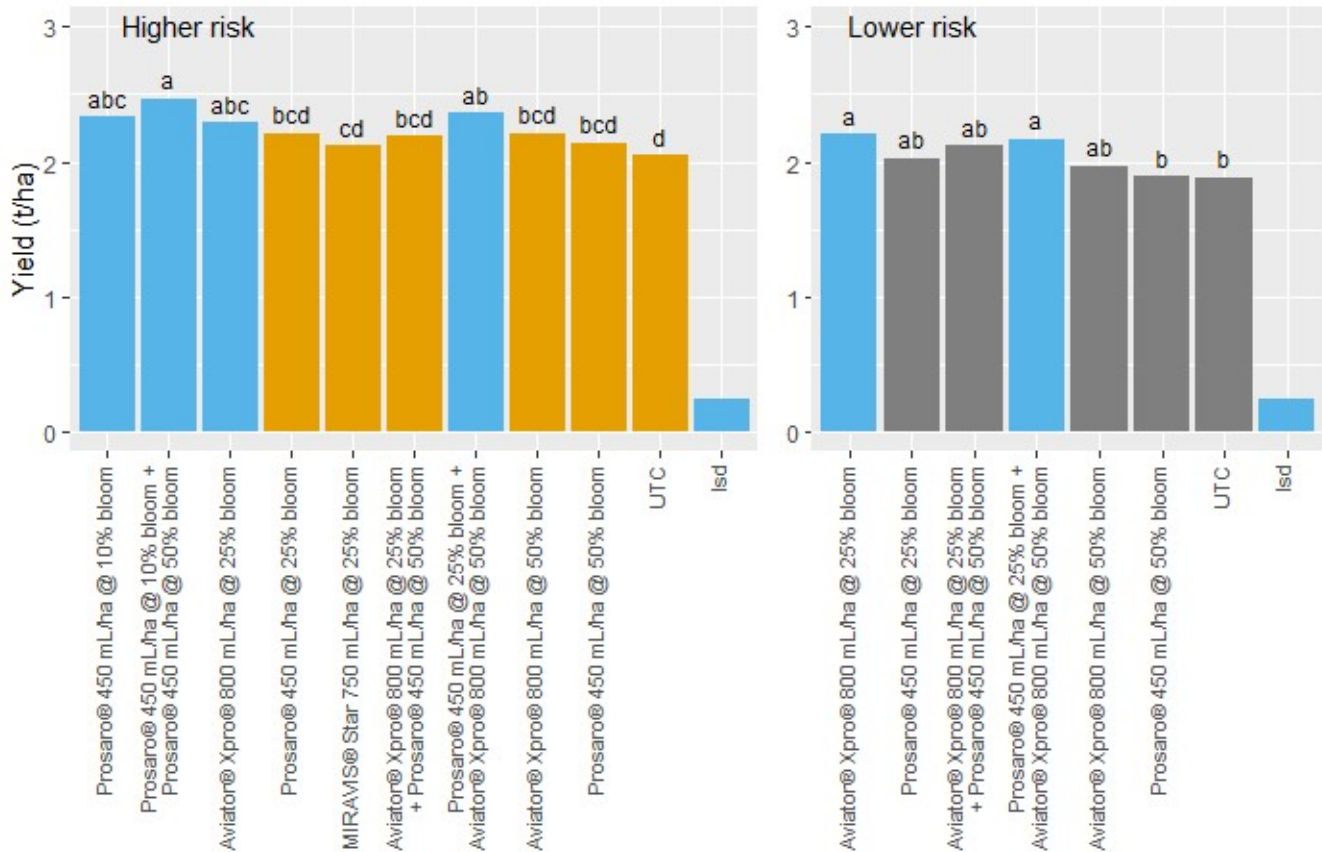


Figure 2. Canola yield (t/ha) at the higher and lower risk sites. Treatments with the same letter within each site and variable are not significantly different.

## Grain quality

Average oil levels were 42.9% and 44% at the high and low sites respectively (Figure 3).

- No treatments had oil contents different to the UTC at the low-risk site.
- At the high-risk site, the following had a lower oil content than the UTC:
  - Miravas® Star: 750 mL/ha @ 25% bloom
  - Aviator® Xpro®: 800 mL/ha @ 25% bloom.

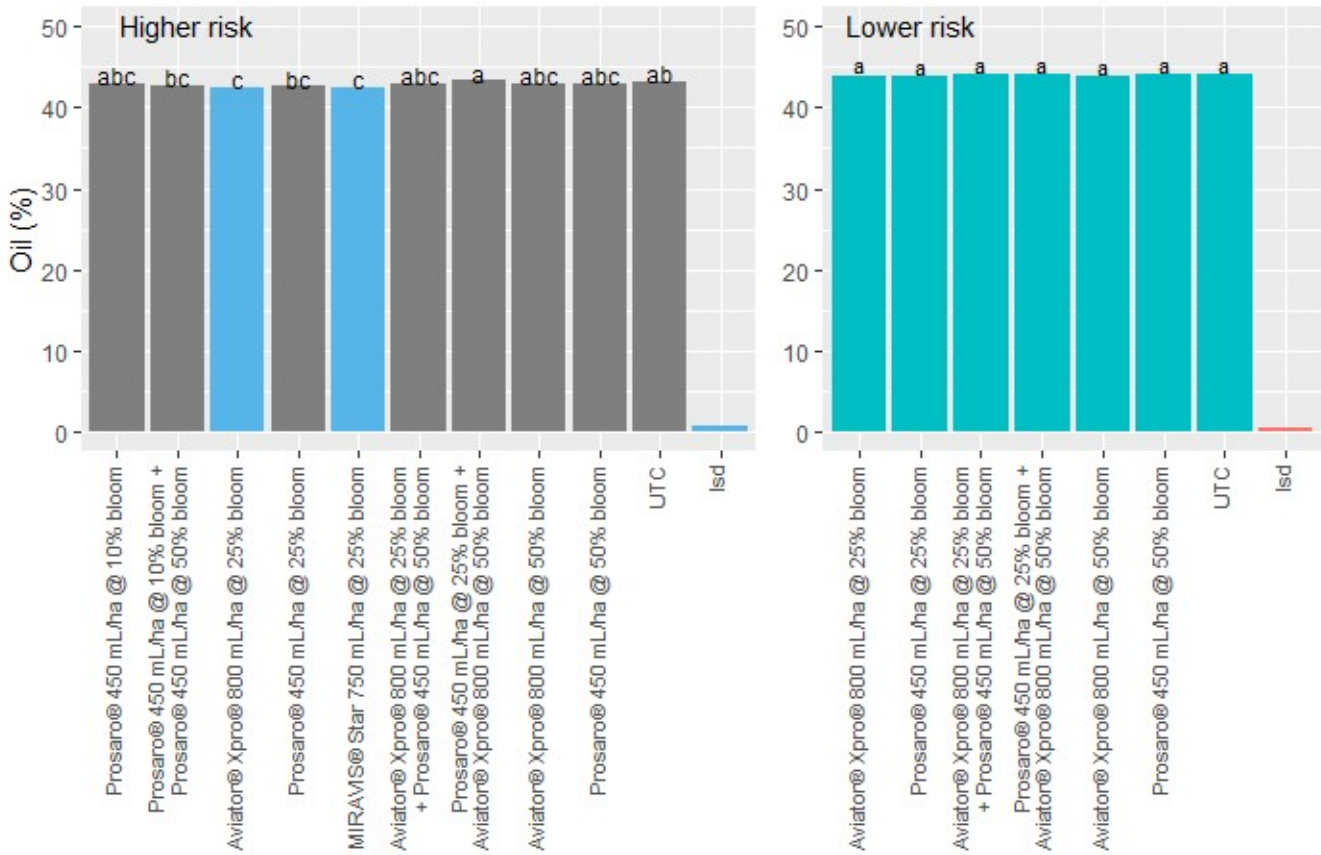


Figure 3. Canola oil (%). Treatments with the same letter within each site and variable are not significantly different.

### Economics

At the high-risk site, the following treatments had a higher economic return than the UTC:

- Mantaray® 450 mL/ha @ 10% bloom
- Mantaray® 450 mL/ha @ 10% bloom + Mantaray® 450 mL/ha @ 50% bloom.

At the low-risk site, only one treatment (Aviator® Xpro® 800 mL/ha @ 25% bloom) had a higher economic return, and only at the higher canola price of \$730/ton (Table 5).

Table 5. Net return on fungicide investment based on yield differences to the untreated control and canola at \$500 and \$730/t (Aviator® Xpro @ \$43/L, Mantaray @ \$22/L, application \$13/ha).

| Description  | Higher risk site |                    |         | Lower risk site |                    |         |
|--|------------------|--------------------|---------|-----------------|--------------------|---------|
|  | Yield Δ          | Net return/(\$/ha) |         | Yield Δ         | Net return (\$/ha) |         |
|  |                  | \$500/t            | \$730/t |                 | \$500/t            | \$730/t |
| Mantaray 450 mL/ha @ 10% bloom   | 0.29             | 120                | 186     | -               | -                  | -       |
| Mantaray 450 mL/ha @ 10% bloom +<br>Mantaray 450 mL/ha @ 50% bloom     | 0.42             | 164                | 261     | -               | -                  | -       |
| Aviator Xpro 800 mL/ha @ 25% bloom                                     | 0.24             | 75                 | 131     | 0.32            | 113                | 186     |
| Mantaray 450 mL/ha @ 25% bloom   | ns               | -23                | -23     | ns              | -23                | -23     |
| MIRAVIS Star 750 mL/ha @ 25% bloom                                     | ns               | -57                | -57     | -               | -                  | -       |
| Aviator Xpro 800 mL/ha @ 25% bloom +<br>Mantaray 450 mL/ha @ 50% bloom | ns               | -70                | -70     | 0.28            | 71                 | 136     |
| Mantaray 450 mL/ha @ 25% bloom + Aviator<br>Xpro 800 mL/ha @ 50% bloom | 0.32             | 88                 | 161     | ns              | -70                | -70     |
| Aviator Xpro 800 mL/ha @ 50% bloom                                     | ns               | -47                | -47     | ns              | -47                | -47     |
| Mantaray 450 mL/ha @ 50% bloom   | ns               | -23                | -23     | ns              | -23                | -23     |
| UTC  | reference        | 0                  | 0       | reference       | 0                  | 0       |

## Discussion

2024 was a slightly below average rainfall year, with average yields and oil contents achieved at both sites. A frost event of -3°C on 15 September at Ganmain reduced overall yield potential. Moderate levels of sclerotinia were detected, and virtually no blackleg, alternaria, or PM. Some (not all) fungicide treatments increased yield at the high and low risk sites.

Most of the fungicide treatments reduced sclerotinia branch infections, although infections were relatively low (less than 5%). Mainstem infections at the low-risk site were reduced where a 25% application timing was applied, regardless of fungicide choices. Reductions in mainstem infections were observed in all 2 timing strategies, however only two of these resulted in a yield improvement.

There was yield benefit from the application of some of the fungicide treatments, however there was not a strong relationship between infection levels and economic returns, i.e. the application of Mantaray® had improved economics over the untreated, however sclerotinia infection levels were not different to the untreated. The yield variability tended to cause greater differences in net income than the cost of the fungicides. This meant that there was not necessarily an economic penalty from the application of fungicides.

Both sites had very different cropping histories, and the high-risk site did have observably higher levels of apothecia in the field and tested with higher levels of DNA in the soil. However, the cropping history and the observations did not correlate with the infection levels observed in the crop.

There was an economic benefit to some treatments (and the benefit was greater at the higher grain prices), but not all. This data set does tend to suggest that in 2024 an early application (10% flower) gave a positive economic outcome, but not necessarily due to control of typical sclerotinia infections.

## Conclusions

In this set of experiments there does appear to be some evidence that cropping history may influence disease pressure or risk through the abundance of apothecia and/or DNA through PredictaB testing. However, these differences did not correlate well to actual disease infections with the lower risk site having greater level of infection than the high-risk site. This may indicate that DNA testing or presence of apothecia alone is not a good predictor of disease incidence.

Application of fungicides in these trials did reduce sclerotinia but did not eradicate the disease.

Despite the reduction of disease by several treatments not all resulted in yield increases. Of the options that did increase yields over that of the UTC only 6 treatments of 16 tested over the two sites resulted in any economic advantage. However, the best of these resulted in a net benefit of \$260/ha.

However, many options that achieved similar disease control did not result in similar levels of economic benefit, and the outcomes are hard to explain on disease control alone. Furthermore, the highest returns were achieved at the high-risk site.

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

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## ANNEX

Table 6. Higher risk site results.

| Fungicide rate and timing   | Yield      | Oil        |
|---|------------|------------|
|   | (t/ha)     | (%)        |
| Mantaray 450 mL/ha @ 10% bloom                                      | 2.3 abc    | 42.9 abc   |
| Mantaray 450 mL/ha @ 10% bloom + Mantaray 450 mL/ha @ 50% bloom     | 2.5 a      | 42.7 bc    |
| Aviator Xpro 800 mL/ha @ 25% bloom                                  | 2.3 abc    | 42.5 c     |
| Mantaray 450 mL/ha @ 25% bloom                                      | 2.2 bcd    | 42.6 bc    |
| MIRAVIS Star 750 mL/ha @ 25% bloom                                  | 2.1 cd     | 42.5 c     |
| Aviator Xpro 800 mL/ha @ 25% bloom + Mantaray 450 mL/ha @ 50% bloom | 2.2 bcd    | 42.9 abc   |
| Mantaray 450 mL/ha @ 25% bloom + Aviator Xpro 800 mL/ha @ 50% bloom | 2.4 ab     | 43.3 a     |
| Aviator Xpro 800 mL/ha @ 50% bloom                                  | 2.2 bcd    | 43.0 abc   |
| Mantaray 450 mL/ha @ 50% bloom                                      | 2.1 bcd    | 43.0 abc   |
| UTC   | 2.0 d      | 43.2 ab    |
| <b>Isd</b>  | <b>0.2</b> | <b>0.6</b> |

Table 7. Lower risk site results: in crop and harvest observations.

| Fungicide rate and timing   | Yield  | Oil    |
|---|--------|--------|
|   | (t/ha) | (%)    |
| Aviator Xpro 800 mL/ha @ 25% bloom                                  | 2.2 a  | 44.0 a |
| Mantaray 450 mL/ha @ 25% bloom                                      | 2.0 ab | 43.9 a |
| Aviator Xpro 800 mL/ha @ 25% bloom + Mantaray 450 mL/ha @ 50% bloom | 2.1 ab | 44.1 a |
| Mantaray 450 mL/ha @ 25% bloom + Aviator Xpro 800 mL/ha @ 50% bloom | 2.2 a  | 44.0 a |
| Aviator Xpro 800 mL/ha @ 50% bloom                                  | 2.0 ab | 43.9 a |
| Mantaray 450 mL/ha @ 50% bloom                                      | 1.9 b  | 44.0 a |
| UTC   | 1.9 b  | 44.1 a |
| Isd   | 0.2    | 0.4    |

Table 8. Fungicide list

| Commercial name | Active  | Group |
|-----------------|---|-------|
| Aviator Xpro    | 150 g/L prothioconazole, 75 g/L bixafen       | 3,7   |
| Miravis Star    | 150 g/L fludioxonil, 100 g/L pydiflumetofen   | 7,12  |
| Mantaray        | 210 g/L prothioconazole, 210 g/L tebuconazole | 3     |
| Prosaro         | 210 g/L prothioconazole, 210 g/L tebuconazole | 3     |