Cost versus value: was there an economic benefit to applying fungicide in canola on the south coast of WA?

Nick Hardie[a], Jack Randall[b], and Darren Hughes[c], Laconik
[A]m. 0498 489 788 e. nick.hardie@laconik.com.au
[b]m. 0477 098 459 e. jack.randall@laconik.com.au
[c]m. 0436 115 462 e. darren.hughes@laconik.com.au

In 2023, six farm-scale fungicide trials were established west of Munglinup, WA, to measure grain yield and economic returns from Prosaro® and Aviator® Xpro® applied in canola at early flowering.

Key findings

- Both Prosaro® & Aviator® Xpro® increased grain yield and delivered a positive return on investment (ROI).
- Prosaro® delivered a 70 kg/ha increase in grain yield compared to the untreated, resulting in a $33/ha profit increase.
- Aviator® Xpro® delivered a 200 kg/ha increase in grain yield compared to the untreated, resulting in a $117/ha profit increase.
- Investing $1/ha in Prosaro® delivered a $1.65/ha ROI. Investing $1/ha in Aviator® Xpro® delivered a $3.44/ha ROI.
- Economic returns from Aviator® Xpro® were more than double the returns of Prosaro®.
- The active ingredients in Prosaro®, prothioconazole and tebuconazole, have come off patent, leading to generic supplies entering the market and causing a significant price drop. Just because a product is cheap does not mean it will deliver the best ROI.
- Based on this research, we recommend that growers focus on ROI rather than cost when making fungicide decisions this season.

Background

Growers in Laconik's Atomic Network raised the issue that they were unaware of the economic value of fungicide application in canola. Applying fungicides is expensive, and it isn't easy to know, with certainty, the financial benefit. Fungicide trials are typically located in paddocks with a high disease risk or paddocks with significant disease already present. Moreover, fungicide trials are traditionally done using small plot trials where grain yield and economic responses can be challenging to measure. Little work has been done on the grain yield and financial response to fungicide applied to canola at scale.

Laconik established a research project to measure grain yield and ROI from different fungicides applied to canola to address this research gap. In partnership with a local grower, six farm-scale trials were established west of Munglinup, Western Australia.

Trial Details

Prosaro® was applied in three paddocks, covering a total area of 861 ha. Aviator® Xpro® was applied to three paddocks, covering a total area of 1081 ha. A Laconik Combine® trial was created for each paddock. The grower filled up the boom spray with either Prosaro® or Aviator® Xpro® and uploaded the corresponding prescription into the rate controller. As the grower went over the paddocks, the rate controller adjusted the water rate in accordance with the trial parameters.

The rate of fungicide applied represents the bottom, middle and top of recommended label rates. The water rate was changed to achieve different fungicide rates. To achieve Prosaro® application rates of 375 mL/ha, 412 mL/h, and 450 mL/ha, the water application rate was 83 L/ha, 92 L/ha, and 100 L/ha, respectively. To achieve Aviator® Xpro® application rates of 560 mL/ha, 680 mL/h, and 800 mL/ha, the water application rate was 82 L/ha, 100 L/ha, and 117 L/ha, respectively. The trials were sprayed using a John Deere 616R self-propelled boom spray on canola at 10% flowering. Examples of the trial layout are shown in Figure 1. Details on paddock rotation and varieties are in Table 1.

Statistical analysis was completed using ANVOA at P=0.10.

Figure 1: A Laconik Combine® trial design was used to measure grain yield and economic responses from fungicide (data from the greyed-out reps was removed from the analysis).

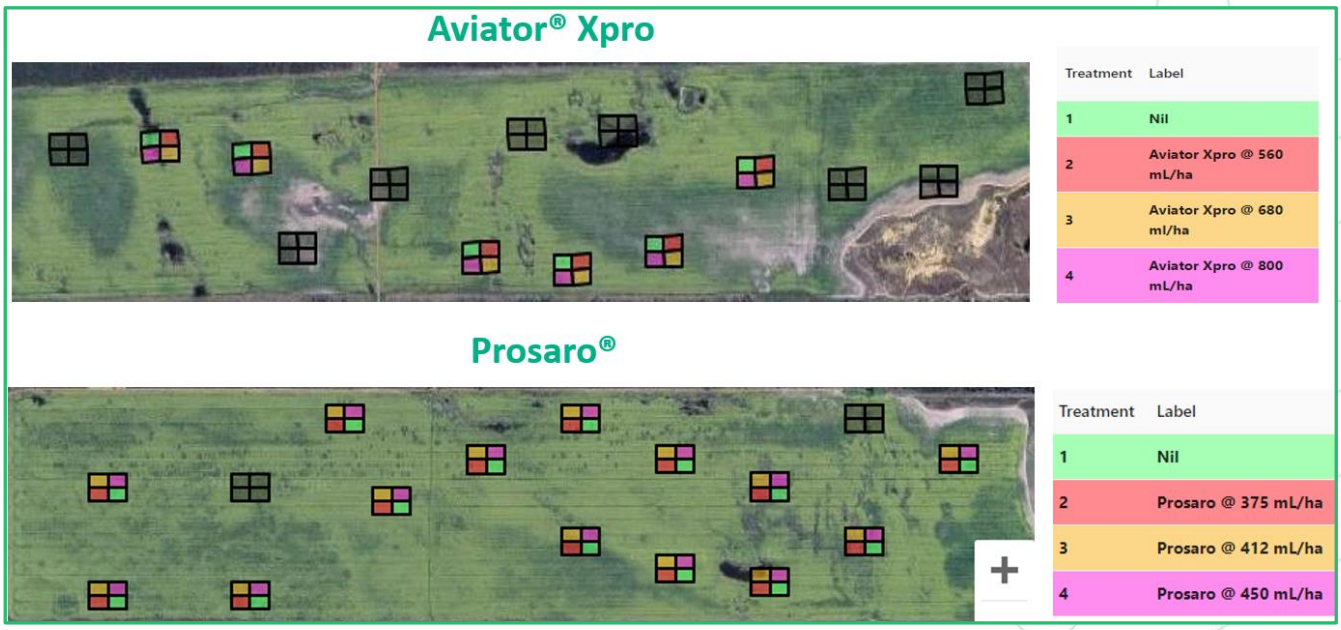

Table 1: Trial paddock rotations and varieties.

Rotation	2021 – Paddocks 1&6 – Wheat Paddocks 2,3,4&5 - Canola 2022 - Paddocks 1&6 – Canola Paddock 2,3,4&5 - Wheat 2023 - Canola
Varieties	Paddock 1 – Trifecta® TT Paddock 2 – 45Y28 Paddock 3 – Dynatron® TT & Trifecta® TT Paddock 4 – Dynatron® TT & Trifecta® TT Paddock 5 – 45Y28 Paddock 6 – PY520C® TT & Trifecta® TT

Results and discussion

Prosaro®

Grain yields ranged from 2.31 t/ha for the Untreated Control (UTC) in Paddock 1 to 3.29 t/ha for Prosaro® at 375 mL/ha in Paddock 2. Across all three paddocks, the UTC yielded 2.81 t/ha. Across all Prosaro® treatments, there was a 70 kg/ha increase in grain yield compared to the UTC. The lowest label rate of 375 mL/ha yielded the most over the three paddocks, with an 80kg/ha yield increase over the UTC. Paddock 3 had the best response to the application of Prosaro® with the 412 mL/ha rate, increasing yield by 300kg/ha (Table 2).

Assuming Prosaro® at a cost of $21/L and an application cost of $6/ha, on average, applying fungicide resulted in a $33/ha increase in profit. Over a 2000 ha canola program, that works out to a profit gain of $66,527 (Table 3).

Based on the results of these trials, applying Prosaro® to canola increases grain yield and delivers a positive financial return.

Table 2: Grain yield (t/ha) response to Prosaro®.

	Grain yield for each trial paddock							
Treatment	Paddock 1[a]		Paddock 2[a]		Paddock 3[a]		Average grain yield over all trials	Grain yield gain over UTC
Untreated (UTC)	2.31	b	3.19	b	2.92	d	2.81	
Prosaro® 375 mL/ha	2.29	b	3.29	a	3.08	b	2.89	0.08
Prosaro® 412 mL/ha	2.31	b	3.07	c	3.22	a	2.87	0.06
Prosaro® 450 mL/ha	2.36	a	3.26	d	3.02	c	2.88	0.07
[a]Treatments followed by the same letter are not statistically significant.							Average	0.07

Table 3: Economic response to Prosaro®.

Treatment	Grain yield gain (t/ha) over UTC	$/ha gain over UTC (assuming canola @ $750/t)	$/ha cost of Prosaro® + Application cost ($6/ha)	Net profit ($/ha) for each treatment	Profit over 2000 ha canola program
Prosaro® 375 mL/ha	0.08	60	18	42	$ 84,480
Prosaro® 412 mL/ha	0.06	45	20	25	$ 50,700
Prosaro® 450 mL/ha	0.07	55	23	32	$ 64,400
	0.07	53	20	33	$ 66,527

Aviator® Xpro

Grain yields in the Aviator® Xpro® trials ranged from 2.55 t/ha for the UTC in Paddock 3 to 3.45 t/ha for Aviator® Xpro® @ 800 mL/ha in Paddock 2. Across all three paddocks, the UTC yielded 2.79 t/ha. Across all Aviator® Xpro® treatments, there was a 200 kg/ha increase in grain yield compared to the UTC. The highest label rate of Aviator® Xpro®, 800 mL/ha, yielded the most over the three paddocks, with a 240 kg/ha yield increase. Paddock 2 had the best response to the application of Aviator® Xpro® with the 800 mL/ha rate, increasing yield by 610 kg/ha (Table 5).

Aviator® Xpro® yielded an average 200kg/ha more than the UTC. Assuming the cost of Aviator® Xpro® at $42/L, the net profit per hectare is $117/ha. Over a 2000 ha canola program, that is a profit gain of $233,387.

Based on the results of these trials, applying Aviator® Xpro® to canola increases grain yield and delivers a positive financial return.

Table 4: Grain yield (t/ha) response to Aviator® Xpro®.

	Grain yield for each trial paddock							
Treatment	**Paddock 1[a]**		**Paddock 2[a]**		**Paddock 3[a]**		**Average grain yield over all trials**	**Grain yield gain over UTC**
Untreated (UTC)	2.97	c	2.84	c	2.55	d	2.79	
Aviator® Xpro® 560 mL/ha	3.06	a	3.23	b	2.66	b	2.98	0.20
Aviator® Xpro® 680 mL/ha	2.95	c	3.21	b	2.70	a	2.95	0.17
Aviator® Xpro® 800 mL/ha	3.03	b	3.45	a	2.60	c	3.03	0.24
[a]Treatments followed by the same letter are not statistically significant.							Average	0.20

Table 5: Economic response to Aviator® Xpro®.

Treatment	Grain yield gain (t/ha) over UTC	$/ha gain over UTC (assuming canola @ $750/t)	$/ha cost of Aviator Xpro + Application cost ($6/ha)	Net profit ($/ha) for each treatment	Profit over 2000 ha canola program.
Untreated (UTC)					
Aviator® Xpro® 560 mL/ha	0.20	148	30	118	$ 235,960
Aviator® Xpro® 680 mL/ha	0.17	125	33	92	$ 183,400
Aviator® Xpro® 800 mL/ha	0.24	180	40	140	$ 280,800
	0.20	151	34	117	$ 233,387

Cost versus Value

The results from these trials show an increase in grain yield and positive economic returns for the application of Prosaro® and Aviator® Xpro® in canola (Table 6).

Investing $1/ha in Prosaro® delivered a $1.65/ha profit. Investing $1/ha in Aviator® Xpro® delivered a $3.44/ha return. Investing in Aviator® Xpro® compared to Prosaro® resulted in a 209% increase in ROI. Prosaro® is cheap on a cost basis; however, it's very expensive on a value basis. Just because a product is cheap does not mean it will deliver the best ROI.

Table 6: Grain yield and economic comparison of Prosaro® and Aviator® Xpro.

	Grain yield response (t/ha)	Application cost ($/ha)	Net profit ($/ha)	Profit over 2000 ha canola program.
Prosaro®	0.07	20	33	$ 66,527
Aviator® Xpro®	0.20	34	117	$ 233,387

Conclusion

The active ingredients in Prosaro®, prothioconazole and tebuconazole, have come off patent, increasing generic supplies in the market and causing a significant price drop. This may lead growers to choose generic prothioconazole and tebuconazole over Aviator® Xpro® based simply on cost. However, all investments, including fungicide applications on canola, should be made on an ROI basis. However, this is difficult because the economic benefits of the fungicide are mainly unknown. They're not measured, so they're unknown.

Growers have access to new chemistry Miravis® Star (fludioxonil and pydiflumetofen) and Revystar® (mefentrifluconazole and fluxapyroxad) to control canola diseases. This new chemistry is expensive compared to generic prothioconazole and tebuconazole, but what value does it deliver?

Based on this research we recommend growers focus on ROI rather than cost when making fungicide decisions this season.

About Laconik

To learn more about the value of farm-scale trials, and our dedicated software platform, LEEF®, visit our website www.laconik.com.au.

Disclaimer: Bayer is a client of Laconik. The trials reported here were run independently by Laconik in partnership with a local grower. Growers should seek their own professional advice before acting on the information presented in this paper.