GOA trial site report

Understanding the risk associated with growing wheat varieties with varying susceptibility to foliar diseases

Grain Orana Alliance

Trial code:	GADI02023-3
Season/year:	Winter 2023
Location:	Tallimba (West Wylong)
Trial partners:	Darryl Harper

Keywords

GADI020, disease, NVT, risk, stripe rust, fungicides, yield response, Tallimba, West Wylong

Take home messages

- There was no yield response to fungicides across a range of varieties with differing levels of resistance in this trial, in a low disease pressure year.
- Fungicide applications made no difference to grain quality compared with unsprayed treatments, in a low disease pressure year.
- The use of fungicides in dry, low-pressure years may not be profitable.

Background

2022 was a prolific year for fungal disease in Central West NSW, with stripe rust prevalent in many wheat crops. Grain Orana Alliance (GOA) planted 5 sentinel wheat sites to a range of varieties with the aim of early identification of pathogens. Strip rust in 2022 developed earlier in the growing season than normal, before expression of the adult plant resistance (APR) genes, which made early pathogen identification difficult (using sentinels). However, as the crop matured it was evident that some varieties were far more resistant than others and pathotype identification using the sentinels was possible. Yields were obtained from these trials and varieties with lower stripe rust resistance ratings in some cases yielded less than half of those that had the most resistance.

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Generally, varieties with lower resistance ratings perform well in National Variety Trials (NVT)[1], typically out yielding the standard varieties (i.e. Vixen[A] averaged 105 and 108% of EGA Gregory[A] in the NVT Northern East and West respectively), however in the 2022 sentinel trials the varieties with lower resistance rating had a very high yield penalty. The sentinel work indicates that the yield penalty for growing susceptible varieties might be far greater than the yield benefit reported in the NVT trials, as these are managed/treated liberally for fungal disease while the GOA sentinel work applied no fungicides.

While it is important to understand what level of yield is protected by fungicides use it is also critical to understand what level of risk has been taken on by growers in relying on fungicides to protect yields. In 2022 there were many cases where growers were unable to spray as paddocks were too wet. It also starts to illustrate the risk to growers if resistance develops and fungicides are not as effective. This knowledge may help shift growers to more resistant varieties sooner.

This trial looks to quantify the yield losses caused by foliar diseases (mainly stripe rust, septoria, and yellow leaf spot) of numerous, commonly grown varieties in the Orana Region by employing a 'full fungicide package' strategy and comparing it to untreated varieties.

Aims

- To quantify the yield penalty of a range of common wheat varieties with differing resistance ratings in the presence of fungal diseases.

Treatment descriptions

Twelve varieties commonly grown in the Orana Region with a range of disease resistance ratings were selected and were either treated with a full fungicide package or left unsprayed. The varieties and their ratings are listed in Table 1, while the fungicides applied are outlined in Table 2.

[1] NVT (National Variety Trial)

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Table 1: Varieties and their disease ratings.

Variety	2023 East Coast rating	239 rating	198 rating
Beckom	MRMS	MR	MR
Calibre	S	-	-
Coota	S	-	-
Coolah	MSS	-	-
Longsword	R/S	RMR	RMR
LRPB Hellfire	MRMS	-	-
LRPB Lancer	RMR	RMR	RMR
LRPB Raider	MR	RMR	RMR
Rockstar	S	S	MR
Sunmaster	N/A	N/A	N/A
Scepter	MSS	MRMS	MR
Vixen	SVS	-	-

Table 2: Fungicide applications list.

Date	Chemical	Active(s)	Rate (ml/ha)	Application
15/05/2023	Impact®	250 g/L flutriafol	400	On fertiliser at sowing
21/06/2023	Prestige 550	550g/L propiconazole	230	Ground rig
31/07/2023	Epoxiconazole 125	125 g/L epoxiconazole	500	Ground rig
15/08/2023	Epoxiconazole 125	125 g/L epoxiconazole	500	Ground rig
11/09/2023	Aviator Xpro	75 g/L bixafen 150 g/L prothioconazole	800	Ground rig
25/09/2023	Amistar Xtra	200 g/L azoxystrobin 80 g/L cyproconazole	800	Ground rig

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Site selection: The site is a higher rainfall area, with reports of disease outbreaks in 2022.

Rainfall: 2023 was a relatively dry season, the in-crop rainfall was approximately 139.5 mm, however there was considerable soil moisture left over from 2022. Rainfall details are in Table 3.

Table 3: West Wyalong monthly rainfall[2] (mm) and long-term average.

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2023	50	0	50	34	7	57	22	24	1	22	62	38	**367**
LTA	40	36	36	34	39	41	40	39	34	42	40	37	**458**

Results

Disease observations

- Foliar diseases were not detected.

Grain yield:

- No differences in yield between the sprayed and unsprayed treatment of each variety
- Highest yield was the fungicide treated Vixen[A]: 2.2 t/ha
- Lowest yield was unsprayed Longsword[A]: 0.27 t/ha (Figure 1).

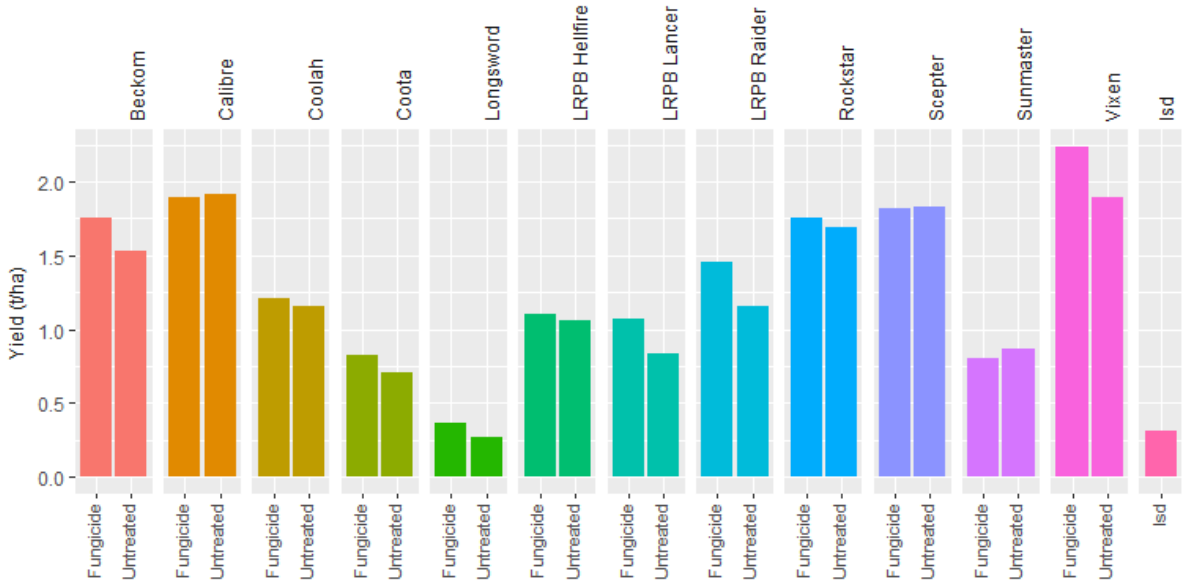

Figure 1: Wheat yield (t/ha)

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

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Grain quality

- There were no differences in grain quality between the sprayed and unsprayed treatment of each variety.
- The highest protein % was the unsprayed LRPB Hellfire[A] - 19%.
- The lowest protein % was the fungicide treated Vixen[A] - 14% (Figure 2).
- This was below the threshold for APW1. All other treatments would have made APW1, AUH2 or H2 (no treatments had protein levels high enough to make H1 or APH2).
- Screenings were <5% for all varieties.

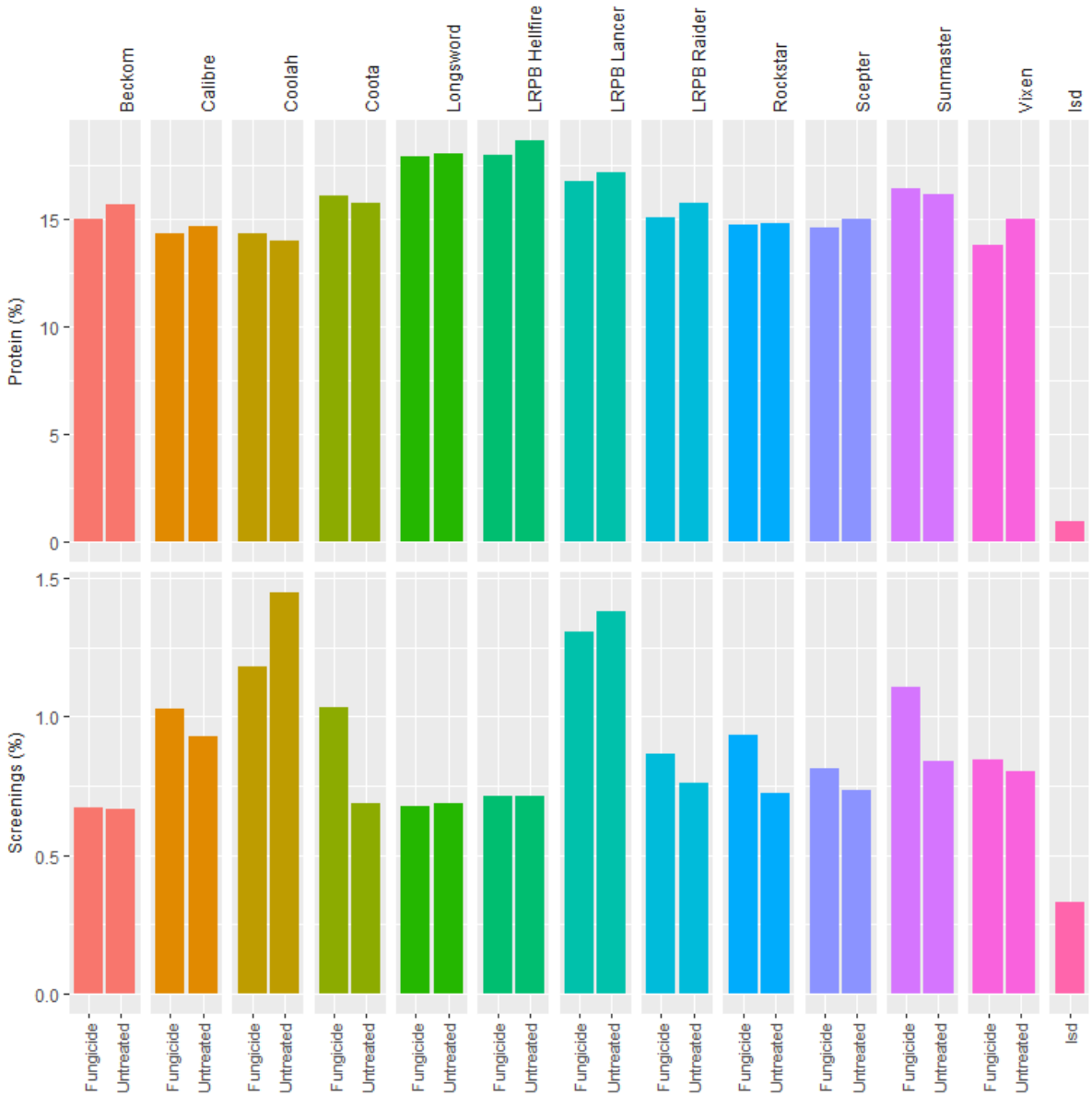

Figure 2: Protein and screenings.

Discussion

Despite rainfall in 2023 being below average, the site average yield was ~ 1.3 t/ha and the average protein was 16%. There was over 1.93 t/ha yield difference between the highest and lowest yielding varieties, in part reflecting NVT results i.e. Vixen[A] outperforms LRPB Hellfire[A3]. Some of the varietal yield differences may be due to varieties being sown out of their recommended window, for example the earlier season variety Longsword[A] , sow on the 23/05/2023, when its idea window is late March-April.

The were no significant differences in grain quality for each treated and untreated variety.

The 2023 season was very dry with the resulting disease pressure very low. This trial probably demonstrates that the use of fungicides was not necessary in this season.

Conclusions

- There was no yield response to fungicides across a range of varieties with differing levels of resistance in this trial, in a low disease pressure year.
- Yield differences occurred between varieties, consistent to those seen in NVT trials.
- The use of fungicides in dry, low disease pressure years may not be profitable.

Acknowledgements

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DISCLAIMER — TECHNICAL

[3] NSW Winter crop variety sowing guide

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Appendix

Results

Variety	Fungicide	Yield (t/ha)	Protein	Screenings (%)
Beckom	Fungicide	1.75 bc	15.00 fghi	0.67 h
	Untreated	1.53 cde	15.71 efg	0.67 gh
Calibre	Fungicide	1.89 b	14.36 hij	1.03 bdefg
	Untreated	1.91 b	14.70 hij	0.93 defgh
Coolah	Fungicide	1.21 efg	14.35 hij	1.18 abcd
	Untreated	1.15 fgh	14.02 ij	1.45 a
Coota	Fungicide	0.83 ijk	16.11 de	1.03 cdef
	Untreated	0.70 k	15.76 ef	0.69 gh
Longsword	Fungicide	0.37 l	17.95 ab	0.68 h
	Untreated	0.27 l	18.08 ab	0.69 gh
LRPB Hellfire	Fungicide	1.10 ghi	18.03 ab	0.71 gh
	Untreated	1.06 ghij	18.65 a	0.72 fgh
LRPB Lancer	Fungicide	1.07 ghij	16.81 cd	1.31 abc
	Untreated	0.83 ijk	17.18 bc	1.38 ab
LRPB Raider	Fungicide	1.46 def	15.10 fgh	0.87 efgh
	Untreated	1.15 fgh	15.74 ef	0.76 fgh
Rockstar	Fungicide	1.75 bcd	14.75 fghij	0.93 defgh
	Untreated	1.69 bcd	14.81 ghi	0.72 fgh
Scepter	Fungicide	1.82 bc	14.64 hij	0.81 efgh
	Untreated	1.82 b	15.05 fgh	0.73 fgh
Sunmaster	Fungicide	0.81 jk	16.45 cde	1.11 abcde
	Untreated	0.86 hijk	16.14 de	0.84 efgh
Vixen	Fungicide	2.24 a	13.81 j	0.85 efgh
	Untreated	1.89 b	15.00 fgh	0.80 efgh
lsd	lsd	0.31	0.96	0.33