INDUSTRY INNOVATIONS: PROVISIONAL HARVEST YIELD RESULTS – April Sown Wheat

2023 NSW Wallendbeen Crop Technology Centre

Sown: 20 April 2023
Harvested: 18 December 2023
Rotation position: Canola 2022, Wheat 2021, Canola 2020, Pasture 2019
Soil type & management: Red clay loam

The Germplasm Evaluation Network (GEN) is a FAR Australia Industry Innovations initiative that tests crop performance across FAR Australia's national network of Crop Technology Centres. GEN sites are situated in higher yielding regions of the country and test crop performance plus and minus fungicide. FAR Australia provides the control varieties and breeders enter their chosen lines for evaluation.

Objectives:
To assess the yield performance of a range of winter and spring wheats, managed with and without fungicide, sown in late April in the Wallendbeen (NSW) environment.

Key Points:

- There was a significant interaction between wheat variety and fungicide response ($p<0.001$) with three varieties Anapurna, V14051-165 and AGFWH010222 giving a no significant yield response to fungicide.
- In contrast Scepter and Willaura gave a 1.85t/ha and 2.17t/ha response to a three-spray fungicide programme.
- The new European winter feed wheat AGFWH010222 which exhibits shorter season phenology than RGT Accroc and Anapurna was significantly higher yielding than all other varieties/lines tested irrespective of whether it was treated or untreated.
- The drier and warmer season compared to 2020-22 put Scepter at the top of the list being significantly higher yielding than other quality milling wheats, albeit with a need for fungicide.
- LRPB Raider (long spring) yielded similar results to the two shorter season winter white wheat lines V14051-165 and V14051-172, however all were 1 – 1.5t/ha lower yielding than Scepter.
- LRPB Mowhawk a short season winter wheat, which has AH quality in western Australia, was the second highest yielding variety with and without fungicide.
- Despite there being no observable disease infection the red feed wheat AGTW005 still produced a 0.53t/ha significant response to fungicide application.
- Except for Willaura, grain quality was similar with most varieties achieving just under 76kg/hL with approximately 5% screenings.

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Table 1. Influence of fungicide on the grain yield (t/ha) of wheat cultivars plus and minus fungicide.

	Nil Fungicide		Full Fungicide		Mean	
Anapurna (w)	7.55	cd	7.77	c	**7.66**	c
Scepter (s)	6.68	fgh	8.53	b	**7.60**	c
RGT Accroc (w)	6.47	h	7.01	efg	**6.74**	e
LRPB Raider (s)	6.68	fgh	7.19	de	**6.93**	de
LRPB Mowhawk (w)	7.88	c	8.75	b	**8.31**	b
Willaura (s)	5.77	i	7.94	c	**6.85**	e
V14051-165 (w)	6.81	e-h	7.05	ef	**6.93**	de
V14051-172 (w)	6.69	fgh	7.59	cd	**7.14**	d
AGTW005 (w)	6.61	gh	7.14	e	**6.87**	de
AGFWH010222 (w)	9.48	a	9.85	a	**9.66**	a
Mean	**7.06**	**b**	**7.88**	**a**		

Fungicide	P Val	0.014	LSD (P=0.05)	0.50
Cultivar	P Val	<0.001	LSD (P=0.05)	0.29
Fung x Cultivar	P Val	<0.001	LSD (P=0.05)	0.41

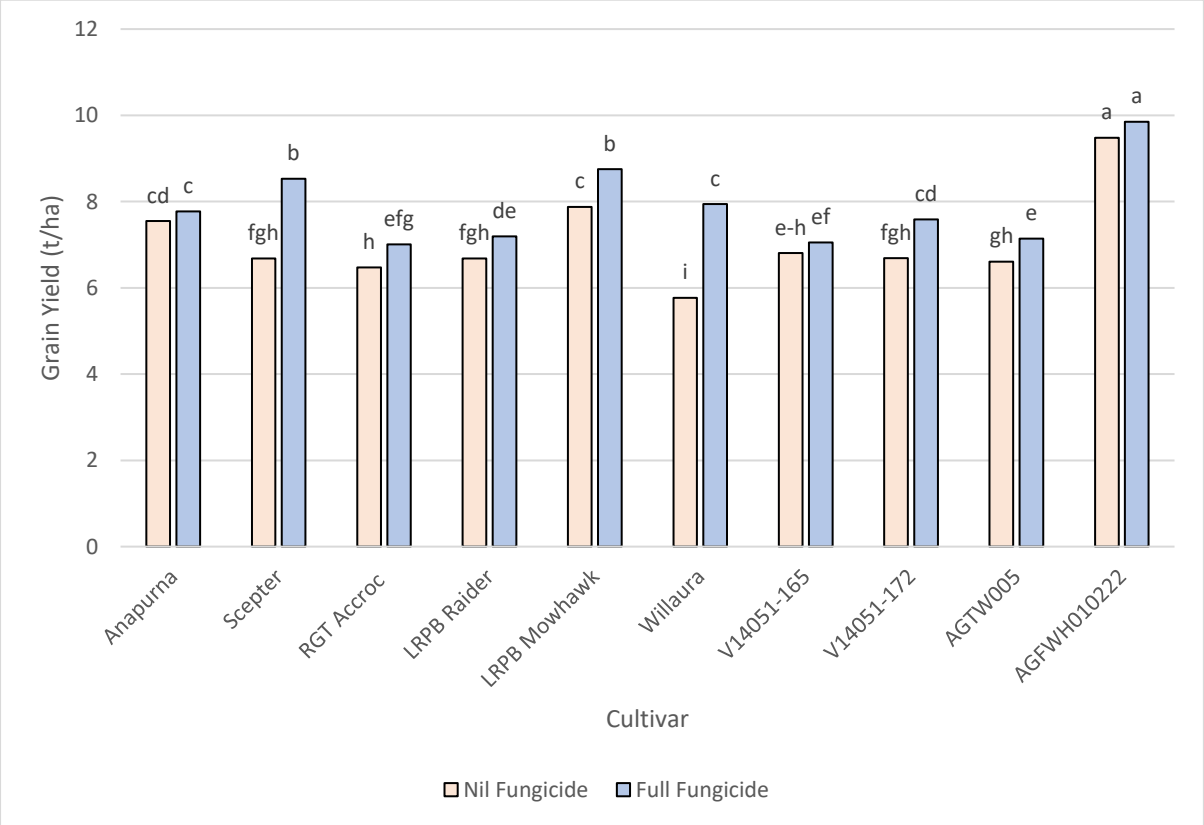

Figure 1. Influence of cultivar and fungicide application on grain yield. Bars with different letters are statistically different, P<0.001 LSD=0.41t/ha.

The highest grain yield was achieved by the coded line AGFWH010222, yielding 9.85t/ha.

Three out of the ten lines assessed did not respond to fungicide application, these were Anapurna, V14051-165, and AFGWH010222. The largest yield response to fungicide was seen in Willaura with a 2.17t/ha yield increase to fungicide application, Willaura also had the highest level of stripe rust infection of all varieties tested (table 3).

Table 2. Influence of cultivar and fungicide management on grain quality (protein, test weight, screenings and thousand seed weight (TSW)).

		Protein (%)		Test Weight (kg/hL)		Screenings (%)		TSW (g)	
	Nil Fungicide								
1	*Anapurna*	12.8	c	77.3	ab	6.3	cd	36.7	c-g
2	*Scepter*	11.2	k	76.1	b-e	4.4	ghi	41.0	b
3	*RGT Accroc*	12.1	efg	73.4	g	7.0	c	32.4	hij
4	LRPB Raider	12.0	f-i	73.2	g	5.0	fgh	35.8	d-i
5	LRPB Mowhawk	11.5	jk	76.6	a-d	3.8	ij	36.4	d-h
6	Willaura	11.8	g-j	66.4	h	14.0	a	26.7	k
7	V14051-165	12.0	f-i	75.9	b-f	4.5	ghi	35.6	d-i
8	V14051-172	12.0	fgh	75.0	c-g	5.5	d-h	34.6	e-i
9	AGTW005	13.9	a	74.6	efg	5.5	d-g	32.0	ij
10	AGFWH010222	11.5	jk	76.5	a-d	5.2	e-h	40.9	bc
	Full Fungicide								
1	*Anapurna*	13.2	b	76.8	abc	6.1	cde	36.9	b-f
2	*Scepter*	11.3	k	78.3	a	3.3	j	46.9	a
3	*RGT Accroc*	12.6	cd	74.1	fg	6.0	c-f	32.6	g-j
4	LRPB Raider	12.0	fgh	73.4	g	4.4	hij	37.0	b-f
5	LRPB Mowhawk	11.7	hij	74.5	efg	3.4	ij	37.6	b-e
6	Willaura	11.6	ijk	73.9	g	8.8	b	32.9	f-j
7	V14051-165	12.3	def	76.0	b-f	4.9	fgh	32.5	g-j
8	V14051-172	12.5	cde	76.0	b-f	5.1	e-h	34.1	e-j
9	AGTW005	13.5	b	74.7	d-g	5.4	d-h	30.4	jk
10	AGFWH010222	11.5	jk	76.5	a-d	5.3	d-h	39.8	bcd
	Mean	**12.2**		**75.0**		**5.7**		**35.6**	
	P Value	0.025		<0.001		<0.001		0.049	
	LSD (P=0.05)	0.4		1.9		1.1		4.2	

Overall, grain quality was similar with varieties sitting just under 76kg/hL with approximately 5% screenings the current minimum specifications for milling wheats. Without fungicide intervention Willaura was the exception with low test weight (66.4kg/hL) and high screenings (14%) due to the high stripe rust infection present during grain fill. With fungicide, grain quality was improved but test weight and screenings were still inferior to other varieties tested.

The milling wheat Scepter produced the largest grains with a thousand seed weight (TSW) of 46.9g when treated with fungicide and 41.0g without fungicide. The only other cultivar to see an increase in grain size due to fungicide application was Willaura.

Table 3. Influence of variety and fungicide management on disease infection (Septoria tritici blotch (STB) and stripe rust (Yr)), assessed 24 October during grain fill.

		Flag				Flag-1				Flag-2			
		STB		Yr		STB		Yr		STB		Yr	
	Nil Fungicide												
1	*Anapurna*	0.3	b	0.0	c	1.3	g	0.0	d	4.5	e	0.0	b
2	*Scepter*	66.3	a	9.5	c	96.3	a	0.3	d	100	a	0.0	b
3	*RGT Accroc*	0.0	b	7.3	c	1.3	g	18.8	a	15.3	de	6.0	a
4	LRPB Raider	5.5	b	1.0	c	70.0	b	0.3	d	100	a	0.0	b
5	LRPB Mowhawk	0.8	b	23.0	b	53.3	cd	3.8	c	100	a	0.0	b
6	Willaura	1.0	b	70.0	a	57.5	c	9.3	b	100	a	0.0	b
7	V14051-165	4.3	b	1.5	c	45.5	de	0.8	d	95.0	a	0.0	b
8	V14051-172	2.3	b	1.5	c	33.8	e	0.5	d	68.3	b	0.0	b
9	AGTW005	0.0	b	0.0	c	0.0	g	0.3	d	0.0	e	0.0	b
10	AGFWH010222	0.0	b	0.0	c	0.0	g	0.0	d	0.0	e	0.0	b
	Full Fungicide												
1	*Anapurna*	0.0	b	0.0	c	0.0	g	0.0	d	0.3	e	0.0	b
2	*Scepter*	3.5	b	0.3	c	15.3	f	0.0	d	45.0	c	0.0	b
3	*RGT Accroc*	0.0	b	0.0	c	0.8	g	0.0	d	4.3	e	0.0	b
4	LRPB Raider	0.5	b	0.3	c	4.0	fg	0.0	d	6.8	e	0.0	b
5	LRPB Mowhawk	0.0	b	0.8	c	2.0	g	0.0	d	5.5	e	0.0	b
6	Willaura	0.5	b	0.8	c	8.3	fg	0.0	d	57.0	bc	0.0	b
7	V14051-165	0.5	b	0.0	c	5.0	fg	0.0	d	23.8	d	0.0	b
8	V14051-172	0.3	b	0.0	c	1.3	g	0.0	d	4.3	e	0.0	b
9	AGTW005	0.0	b	0.0	c	0.0	g	0.0	d	0.0	e	0.0	b
10	AGFWH010222	0.0	b	0.0	c	0.0	g	0.0	d	0.0	e	0.0	b
	Mean	**4.3**		**5.8**		**19.8**		**1.7**		**36.5**		**0.3**	
	P Value	<0.001		<0.001		<0.001		<0.001		<0.001		<0.001	
	LSD (P=0.05)	9.0		11.0		12.0		2.6		16.8		1.6	

Table 4. Trial input and management details (kg, g, ml/ha).

Sowing date:		**20 April**	
Harvest date:		**18 December**	
Seed rate:		180 seeds/m2	
Basal fertiliser:	20 April	120kg/ha MAP	
Herbicide:	29 April	Sakura 118g/ha	
		Avadex Xtra 1.6L	
		Roundup 2L/ha	
	1 June	LVE MCPA 440ml/ha	
		Lontrel 60g/ha	
		Paradigm 25g/ha	
		Wetter 1000 0.2%	
	25 August	Paradigm 25g/ha	
		Chemwet 0.2%	
Insecticide:	25 August	Cyhella 18ml/ha	
Nitrogen:	2 August	100 kg N/ha	
	5 September	50 kg N/ha	
		162 kg N/ha (incl. 12 kg N/ha at sowing)	
Fungicide:		**Untreated**	**Full Protection**
	GS31-32	----	Prosaro 0.3L/ha
	GS39-41	----	Aviator Xpro 0.5L/ha
	GS61-71	----	Opus 0.5L/ha

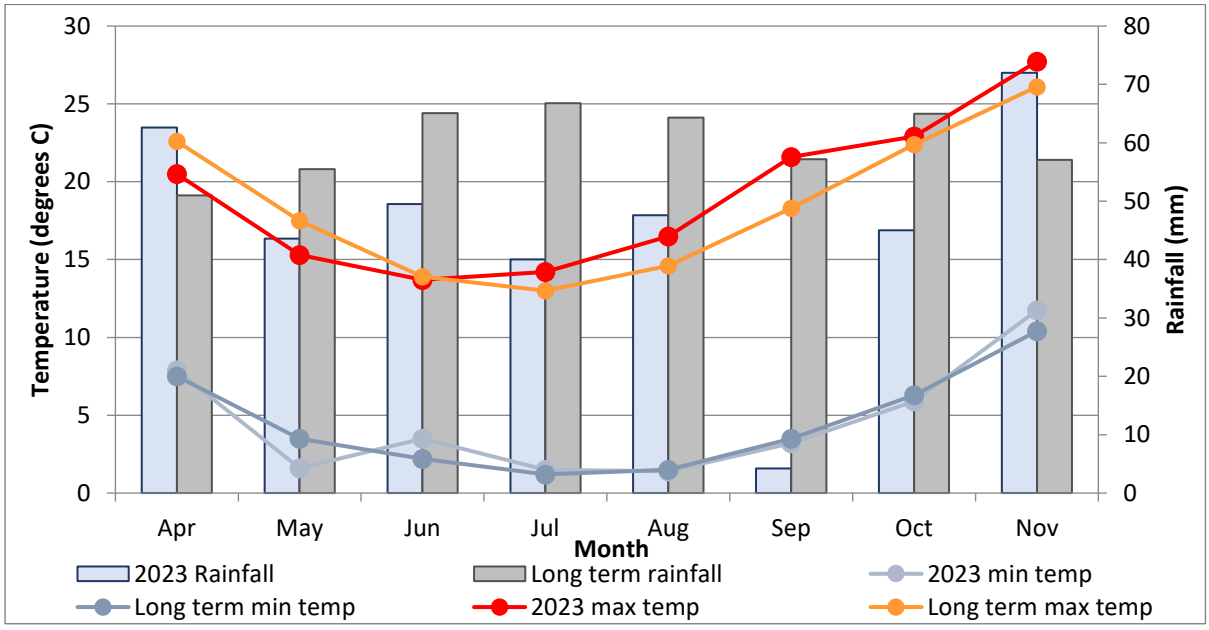

Figure 2. 2023 growing season rainfall and long-term rainfall recorded at Wallendbeen (Corang) (1914 -2023) and long-term min and max temperatures recorded at Cootamundra Airport (1995 to 2023) for the growing season (April to November). *Rainfall April to November = 364.5mm.*