HYPER YIELDING CROPS: PROVISIONAL YIELD RESULTS

Hyper Yielding Crops Project (FAR2004-002SAX)

Protocol 4a. HYC Disease Management by Germplasm Trial Series

2023 SA Millicent Crop Technology Centre

Sown: 11 May 2023
Harvested: 14 January 2024
Rotation position: 2022 Canola
Soil type & management: Organosol over grey clay

Objectives:

To assess the performance of three winter wheat varieties (red feeds) and one long season spring cultivar of wheat (white) under three different fungicide management levels sown in mid-May in the Millicent (SA) HRZ environment.

Key Points:

- There was a significant interaction between cultivar and fungicide management with cultivars responding differently to the number of fungicide units applied.
- Yields ranged from 7.34t/ha in untreated RGT Cesario, to 10.16t/ha in the newly released AGF cultivar Longford with full fungicide protection.
- Stockade (white wheat – APW) was the only cultivar to give no significant response in yield to fungicide application, although there was a trend for higher yield under full protection.
- Red wheats Longford, RGT Cesario and AGTW005 gave significantly higher yields with full protection based on 4 units of fungicide, but only RGT Cesario gave a significant response when a single fungicide was applied at GS39 (8.21t/ha vs. untreated 7.34t/ha).
- The yield response to full protection over untreated was Stockade (0.29t/ha), Longford (0.63t/ha), RGT Cesario (2.12t/ha) and AGTW005 (0.64t/ha).
- The dominant diseases were stripe rust in RGT Cesario and Septoria tritici blotch (STB) in Stockade, although drier spring conditions reduced upper canopy infection with this disease.
- There was no obvious disease in Longford and only traces of Wirrega blotch and stripe rust in AGTW005 during grain fill.
- Longford and AGTW005 retained their green leaf the longest, but 4 fungicide units were necessary to retain green leaf in RGT Cesario.
- Grain quality parameters varied slightly with the different combinations of fungicide and cultivar, but all treatments had protein at 11% or over with slightly higher test weights under more intense fungicide management.

Treatments.

Three red feed winter wheats Longford - AGF4818, RGT Cesario, AGTW005 and the white wheat Stockade (APW) were managed with three levels of fungicide, untreated, a single flag leaf spray and full protection.

- Untreated
- A single flag leaf spray (GS39) – 1 unit of fungicide
- Full protection – flutriafol-coated MAP in furrow at sowing (500 g ai/L at 200 mL/ha), Prosaro 300mL/ha at GS31, FAR F1-19 (750 mL/ha) at GS39 and Opus 500 mL/ha at GS59 – 4 units of fungicide

Table 1. Influence of management strategy and cultivar on grain yield (t/ha).

Yield (t/ha)

	Management Strategy							
	Untreated		**1 Fungicide**		**4 Fungicides**		**Mean**	
Stockade	8.68	ef	8.62	f	8.97	e	**8.76**	
RGT Cesario	7.34	h	8.21	g	9.46	cd	**8.33**	
AGTW005	9.34	d	9.55	cd	9.98	ab	**9.62**	
Longford	9.53	cd	9.69	bc	10.16	a	**9.80**	
Mean	**8.72**		**9.02**		**9.64**		**9.13**	
LSD Cultivar p = 0.05	0.18				**P val**		<0.001	
LSD Management p = 0.05	0.26				**P val**		<0.001	
LSD Cultivar x Man. P = 0.05	0.32				**P val**		<0.001	

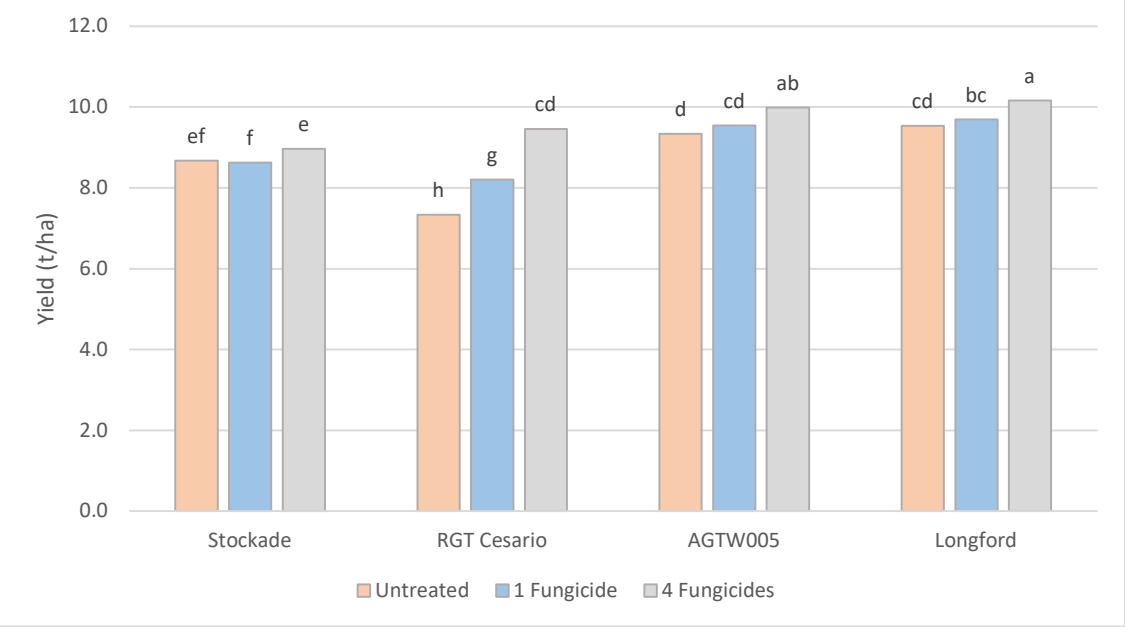

Figure 1. Interaction of cultivar and fungicide on grain yield (t/ha) ($p < 0.001$, LSD = 0.32)

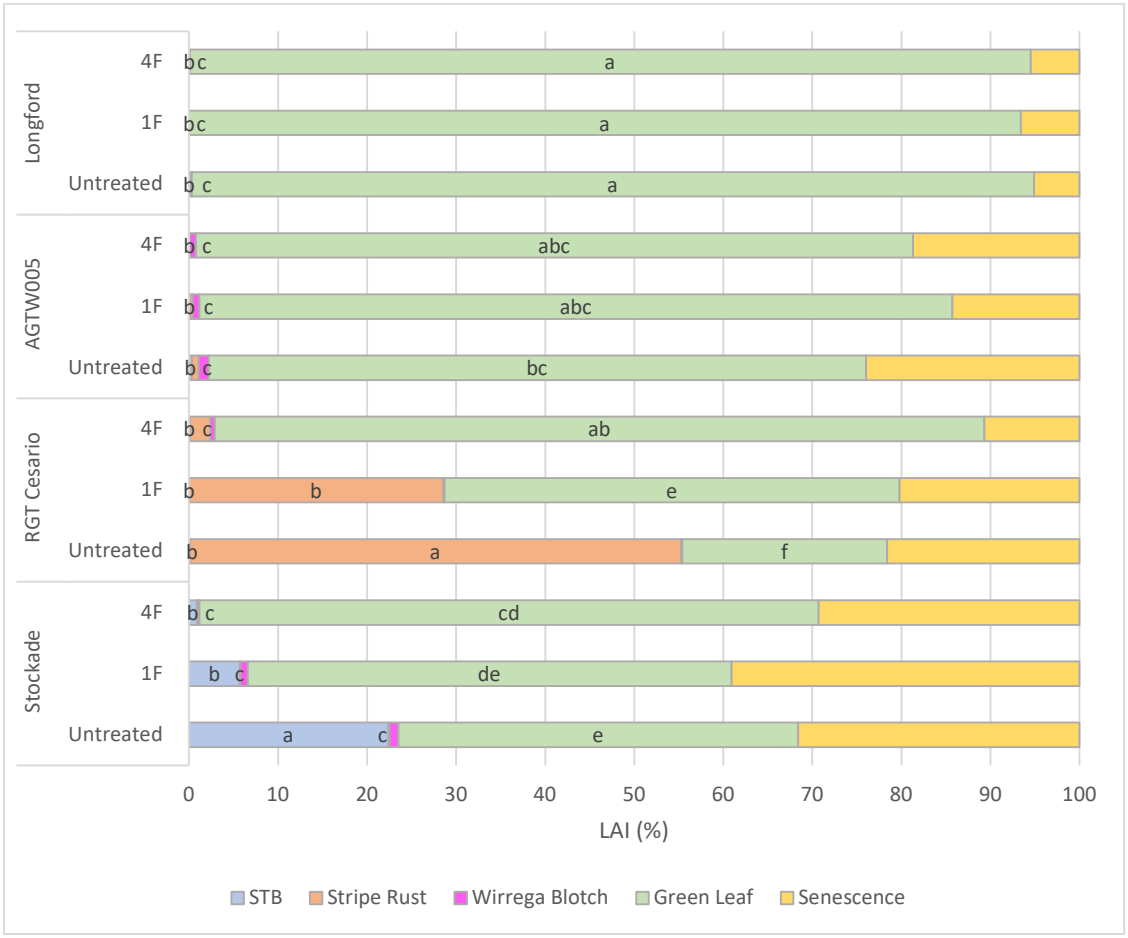

Figure 2. Influence of management strategy and cultivar on F-2 leaf area infection (%) of septoria tritici blotch (STB), stripe rust, wirrega blotch, green leaf retention, and senescence assessed 17 November (GS71). Refer to Table 2 for significance.

Table 2. Significance analysis of the influence of management strategy and cultivar on leaf area infection (%) of septoria tritici blotch (STB), stripe rust, wirrega blotch, green leaf retention, and senescence.

		LSD p = 0.05	P val
Septoria tritici blotch	**Cultivar**	5.8	0.004
	Management	ns	0.147
	Cultivar x Man.	10.0	0.037
Stripe rust	**Cultivar**	4.3	<0.001
	Management	2.9	<0.001
	Cultivar x Man.	7.5	<0.001
Wirrega blotch	**Cultivar**	0.6	0.039
	Management	ns	0.357
	Cultivar x Man.	ns	0.654
Green leaf retention	**Cultivar**	10.8	<0.001
	Management	9.5	0.005
	Cultivar x Man.	16.5	<0.001

Table 3. Influence of management strategy and cultivar on protein (%).

	Protein (%)							
	Management Strategy							
	Untreated		**1 Fungicide**		**4 Fungicides**		**Mean**	
Stockade	11.6	-	11.9	-	11.9	-	**11.8**	**a**
RGT Cesario	11.0	-	11.3	-	11.4	-	**11.2**	**b**
AGTW005	12.0	-	11.8	-	12.0	-	**11.9**	**a**
Longford	11.4	-	11.2	-	11.3	-	**11.3**	**b**
Mean	**11.5**	**-**	**11.5**	**-**	**11.6**	**-**	**11.5**	
LSD Cultivar p = 0.05	0.2				**P val**		<0.001	
LSD Management p = 0.05	ns				**P val**		0.084	
LSD Cultivar x Man. P = 0.05	ns				**P val**		0.386	

Note: 150 N kg/ha of applied nitrogen fertiliser as solid prilled 46% N urea

Table 4. Influence of management strategy and cultivar on test weight (kg/hl).

	Test weight (kg/hl)							
	Management Strategy							
	Untreated		**1 Fungicide**		**4 Fungicides**		**Mean**	
Stockade	75.3	-	76.8	-	77.1	-	**76.4**	**-**
RGT Cesario	75.0	-	76.7	-	77.1	-	**76.3**	**-**
AGTW005	77.0	-	76.2	-	77.4	-	**76.9**	**-**
Longford	77.4	-	77.0	-	77.5	-	**77.3**	**-**
Mean	**76.2**	**b**	**76.7**	**ab**	**77.3**	**a**	**76.7**	
LSD Cultivar p = 0.05	ns				**P val**		0.074	
LSD Management p = 0.05	0.7				**P val**		0.025	
LSD Cultivar x Man. P = 0.05	ns				**P val**		0.133	

Table 5. Influence of management strategy and cultivar on screenings (%).

	Screenings (%)							
	Management Strategy							
	Untreated		**1 Fungicide**		**4 Fungicides**		**Mean**	
Stockade	4.1	a	3.8	ab	3.5	bc	**3.8**	
RGT Cesario	2.0	d	1.7	de	1.4	e	**1.7**	
AGTW005	1.5	e	1.4	e	1.6	de	**1.5**	
Longford	3.2	c	3.6	b	3.5	bc	**3.4**	
Mean	**2.7**	-	**2.6**	-	**2.5**	-	**2.6**	
LSD Cultivar p = 0.05			0.3		**P val**		<0.001	
LSD Management p = 0.05			ns		**P val**		0.324	
LSD Cultivar x Man. P = 0.05			0.5		**P val**		0.034	

Table 6. Trial input and management details (kg, g, ml/ha).

Sowing date:		11 May
Harvest date:		14 January
Seed rate:		180 seeds/m2
Basal fertiliser:	11 May	100 kg/ha MAP
Nitrogen:	26 July	50 kg N/ha
	19 Sept	100 kg N/ha
Herbicides:	9 May	TriflurX 3 L/ha
	9 May	Spreadwet 0.2 L/ha
	15 Aug	Broadside 1.4 L/ha
Crop protection:	20 Jun	Metarex 3 kg/ha
	10 Nov	Alpha Scud 0.08 L/ha
	7 Jan	Metarex 3 kg/ha
Trace elements:	15 Aug	*Spray Gro 5 L/ha
	2 Sept	Spray Gro 5 L/ha
	5 Sept	Spray Gro 5 L/ha
	16 Sept	Spray Gro 5 L/ha
Fungicides:		As per treatment list

**SprayGro Smartrace Triple*

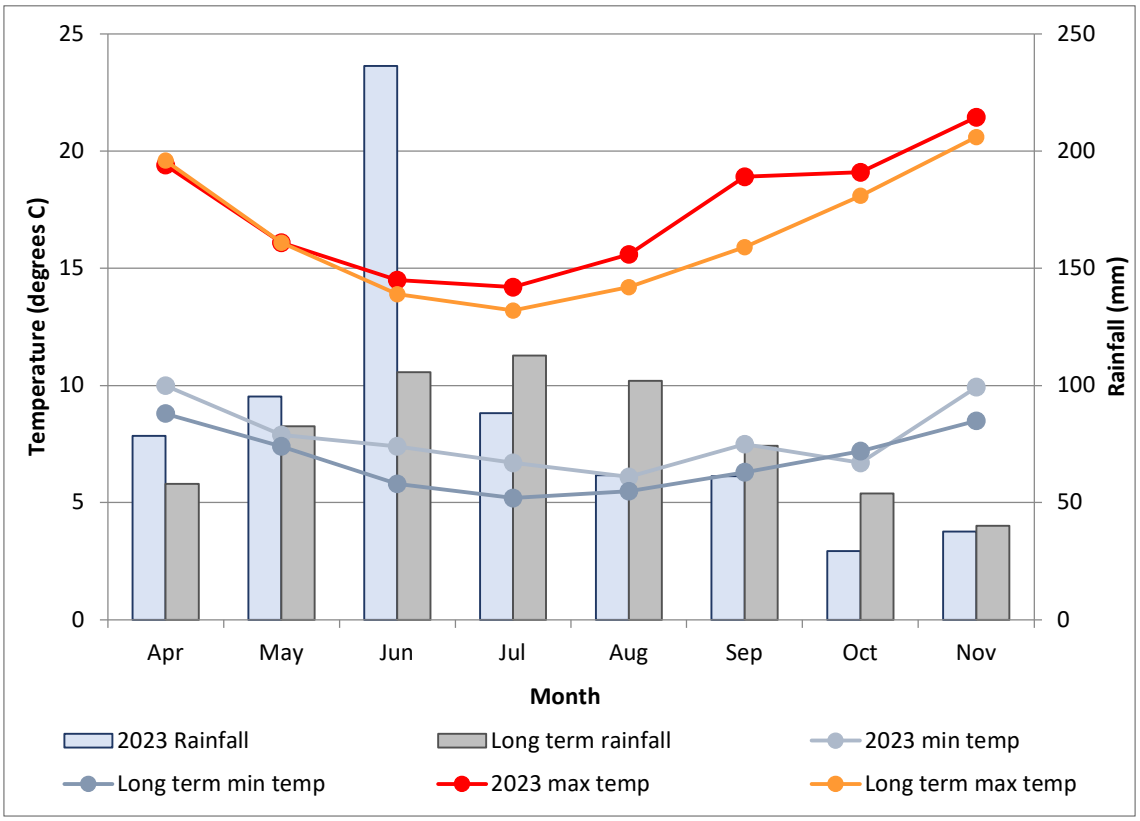

Figure 3. 2023 growing season rainfall and long-term rainfall recorded at Millicent (1878-2023). 2023 min and max temperatures, and long-term temperatures recorded at Mount Gambier (1942-2023). *Growing season rainfall April to November = 689 mm.*