

# HARVEST YIELD RESULTS

## Elite Screening Trials

2021 SA Crop Technology Centre

### Hyper Yielding Crops Project (FAR2004-002SAX)

A Grains Research & Development Corporation (GRDC) investment

**Sown:** 21 April & 12 May 2021

**Harvested:** 11 & 12 January 2022

**Rotation position:** 2020 Faba Beans

**Soil type & Management:** Neutral-slightly alkaline Organosol (Peat soil) – high organic matter (0-30cm)

#### Key Points:

- For the first time in HYC trials on the mainland, wheat yields exceeded 12 t/ha at the SA Crop Technology Centre.
- With a softer finish than 2020, later developing northern European winter wheats fulfilled their yield potential for the first time at the SA research site, with Reflection and Tabasco yielding over 12.5 t/ha along with a coded line AGTW005.
- Despite the HYC higher fungicide input, these two cultivars were noticeably more resistant to leaf rust in the lower Southeast SA environment.
- Of those cultivars that are commercially available in Australia, the winter feed wheat Big Red (AGFWH004718) was the highest cultivar in both 2020 (10.94 t/ha) and 2021 (11.45 t/ha) in HYC trials
- Although set up as spatially separate trials on the same research site, the winter feed wheat Anapurna gave higher yields sown on 12 May than on 21 April (11.87 t/ha v 11.30 t/ha).
- With second sowing date on 12 May, Rockstar significantly outyielded all other spring milling cultivars, however its overall yield was approximately 2 t/ha or 19% lower yielding than the feed wheat Anapurna sown at the same time.
- If Anapurna feed wheat was priced at \$275/t then Rockstar would have required a \$57/t premium to achieve the same margin using the yield differentials in the trial.
- With the earlier sowing where Big Red achieved 11.45 t/ha, the premium necessary to match the output would have dropped to \$45/t (assuming quality could have been achieved with the milling wheat).
- Protein levels (11% plus in most varieties) and test weights would indicate that optimum yields were generated with the level of nitrogen applied (120kg N/ha).

## Background

With less emphasis on breeding for the long season HRZ environments, the Hyper Yielding Crops (HYC) project has been looking at Australian and overseas candidate cultivars and coded lines to assess their suitability for growing in the lower Southeast of SA. Although yields in the two trials presented are not statistically comparable, they give a comparison of wheat yields achieved at the FAR Australia SA Crop Technology Centre in 2021 from April and May sowing.

### i) Early sown wheat trial – 21 April

#### Treatments

20 elite lines (as suggested by breeders or overseas breeder's agents) were tested under HYC full fungicide management (Foliar fungicide program based on three foliar fungicides – GS31, GS39 & GS59). All cultivars were sown on an Organosol soil with high organic matter content following faba beans.

#### Results

**Table 1.** Influence of cultivar (habit type in parentheses) and coded lines on grain yield and quality (protein (%), test weight (kg/hL) and screenings (%)) – sown 21 April, Millicent, SA

Variety	Grain Yield and Quality							
	Yield		Protein		Test wt.		Screenings	
	t/ha		%		Kg/hL		%	
1. Scepter (spring)	5.38	k	14.3	ab	79.3	def	3.3	gh
2. Trojan (spring)	6.79	jk	13.1	cde	80.7	bcd	1.8	i
3. Anapurna (winter)	11.30	abc	13.0	cde	82.1	b	4.8	de
4. RGT Accroc (winter)	10.89	cde	11.8	hi	82.1	b	3.0	h
5. BX7932-039	9.70	d-g	13.1	cde	82.3	b	3.2	gh
6. Reflection (winter)	12.74	a	11.6	hi	76.5	g	8.7	a
7. Beaufort (spring)	8.49	ghi	13.4	cd	77.6	fg	6.9	b
8. Shabras (winter)	10.89	cde	12.9	c-f	77.5	fg	6.0	c
9. Tabasco (winter)	12.56	ab	12.2	fgh	76.5	g	5.7	c
10. V10006-026	9.29	fgh	12.8	d-g	79.6	cde	4.6	ef
11. Nighthawk (facultative)	7.78	ij	13.2	cde	82.2	b	3.0	h
12. LPB16-0598	9.49	e-h	12.9	c-f	80.7	bcd	5.5	cd
13. LRPB16-0582	8.07	hij	14.4	a	77.5	fg	3.9	fg
14. SFR86-092	10.96	cd	11.4	i	78.8	ef	7.7	b
15. SFR86-085	11.53	abc	12.6	efg	80.7	bcd	5.5	cd
16. AGTW005	12.54	ab	13.5	cd	81.2	bc	1.9	i
17. AGFWH004418	10.34	c-f	12.2	fgh	80.9	bcd	6.9	b
18. AGFWH004618	10.64	c-f	13.6	bc	80.0	cde	3.8	g
19. Big Red (AGFWH004718) (winter)	11.45	abc	11.6	hi	84.2	a	4.7	e
20. AGFWH004818	11.13	bcd	12.1	ghi	81.2	bcd	5.9	c
Mean	10.10		12.8		80.1		4.8	
LSD	1.46		0.7		1.8		0.8	
P Val	<0.001		<0.001		<0.001		<0.001	
CV	8.74		3.5		1.4		10.1	

For the first time in HYC trials on the mainland, yields exceeded 12 t/ha (Table 1). With a softer finish than 2020, later developing winter wheats fulfilled their yield potential, with the northern European

wheats Reflection and Tabasco yielding over 12.5 t/ha along with a coded line AGTW005 which also yielded over 12 t/ha. These cultivars and lines did well in 2020 but yielded closer to 10 t/ha. Reflection and Tabasco produced notable cleaner crop canopies that were free from leaf rust infection that was prevalent in other later developing cultivars. Several of the cultivars and lines that did well in 2020 performed well in 2021 (approximately 11 t/ha or over) and were not considered statistically different to those wheats yielding over 12 t/ha. These were Big Red (AGFWH004718), Anapurna, SFR86-085, all of which performed well in 2020. There is evidence that the high yield of Reflection and later maturity resulted in smaller grains as screenings were significantly higher than any other cultivar tested. Of the named commercially available cultivars in the trial, the winter feed wheat Big Red (AGFWH004718) was the highest yielding (11.45 t/ha) cultivar in the trial as it was in 2020 when the then coded line achieved 10.94 t/ha.

#### i) Later sown wheat trial – 12 May

##### Treatments

12 elite named cultivars and coded lines were tested under HYC full fungicide management on the same HYC research site sown later in May. The comparison of cultivars sown in May placed greater emphasis on milling cultivars rather than feed cultivars.

##### Results

**Table 2.** Influence of cultivar (habit type in parentheses) and coded lines on grain yield and quality (protein (%), test weight (kg/hL) and screenings (%)) – harvested 12 January and **sown 12 May**, Millicent, SA

Variety	Grain Yield and Quality							
	Yield		Protein		Test wt.		Screenings	
	t/ha		%		Kg/hL		%	
1. Scepter (spring)	8.04	c	13.8	ab	82.1	a	2.1	c
2. Trojan (spring)	7.86	cd	13.3	abc	81.6	abc	2.0	c
3. Anapurna (winter)	11.87	a	13.2	abc	81.2	bcd	3.9	a
4. RGT Accroc (winter)	10.48	b	12.5	c	79.3	fg	2.2	c
5. Catapult (spring)	7.30	d	13.7	ab	81.5	abc	2.3	c
6. Rockstar (spring)	9.83	b	13.9	ab	81.1	cd	2.4	c
7. Vixen (spring)	7.67	cd	14.0	a	80.4	de	2.1	c
8. Beaufort (spring)	10.30	b	13.0	bc	79.2	g	4.0	a
9. Devil (spring)	7.91	cd	13.1	abc	80.0	efg	2.4	c
10. AGFWH004618	11.82	a	13.8	ab	80.1	ef	3.2	b
11. AGFWH004818	11.96	a	11.3	d	80.1	ef	3.7	ab
12. LPB17-5691	9.84	b	13.8	ab	81.9	ab	1.3	d
Mean	9.57		13.3		80.7		2.6	
LSD	0.65		1.0		0.8		0.6	
P Val	<0.001		0.001		<0.001		<0.001	
CV	4.03		4.5		0.6		13.8	

The later developing winter feed wheats Anapurna, AGFWH004618 and AGFWH004818 gave the highest yields in the trial despite the mid May sowing date. These feed wheats were approximately 2 t/ha higher yielding than the best of the quality milling spring wheats Rockstar. Rockstar significantly outyielded all other spring milling wheats except LPB17-5691 and the spring feed wheat Beaufort. All protein levels in the trial indicated that optimum yield had been satisfied (Table 2) since protein

levels were in excess of 12.5%. If feed wheat was costed at \$275/t then Rockstar would have needed to attract a \$57/t premium to out gross margin feed wheat sown at the same time (\$332/t).

## Appendix

The following nutrition and disease management packages were adopted for these two trials

**Supplementary Table 1. Crop nutrition** applied through the growing season on trials sown 21 April and 12 May Millicent, SA

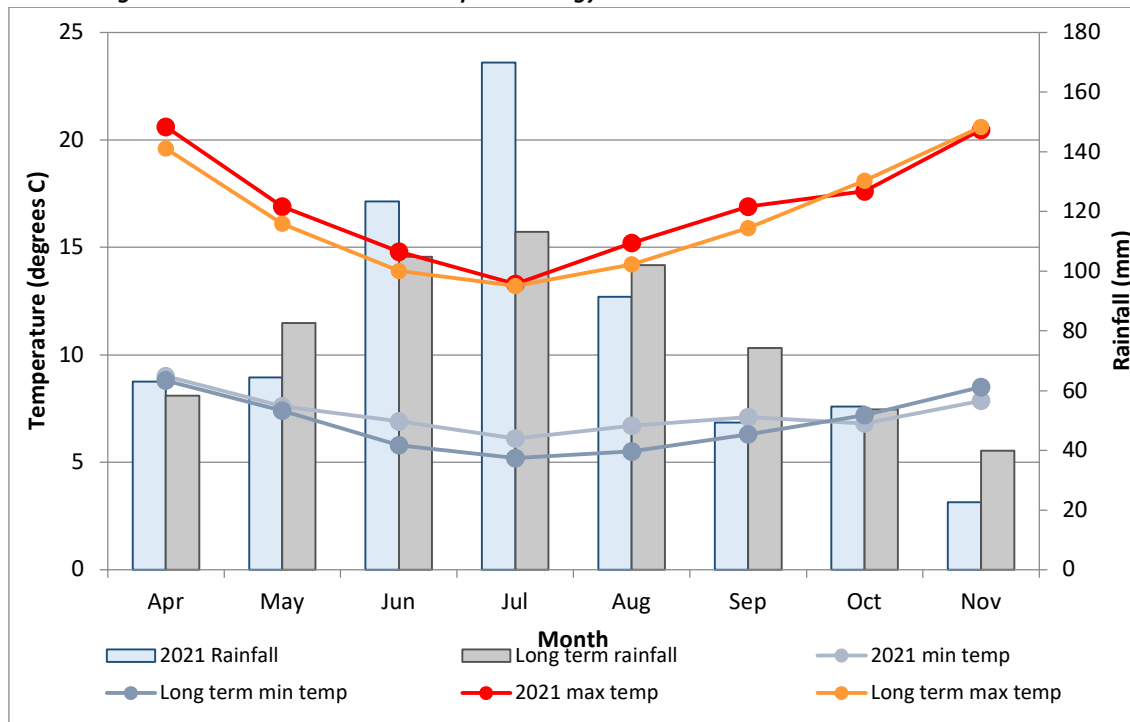
No.	Date	Product	Rate	Placement
1.	21/4/21	MAP	100 kg/ha	At sowing
2.	2/6/21	Rapisol 3-2-1	750 g/ha	Foliar
3.	4/8/21	Urea	87 kg/ha	Spreader
4.	8/8/21	Rapisol 3-2-1	700 g/ha	Foliar
5.	5/10/21	Urea	175 kg/ha	Spreader

**Supplementary Table 2. Fungicides** applied through the growing season on both trials sown 21 April and 12 May, Millicent, SA

No.	Date	Product	Rate	Placement
1.	5/8/21	Prosaro	300 mL/ha	Foliar
2.	26/9/21	Radial	840 mL/ha	Foliar
3.	21/10/21	Opus	500 mL/ha	Foliar

*Herbicides and insecticides applied as standard farm practice*

### Meteorological Data – South Australian Crop Technology Centre



**Figure 1.** 2021 growing season rainfall and long-term rainfall, 2021 min and max temperatures recorded at Millicent (1877-2021) and long-term min and max temperatures recorded at Mount Gambier Aero (1941 to 2021) for the growing season (April to November). *Rainfall April to November= 638.5mm.*

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