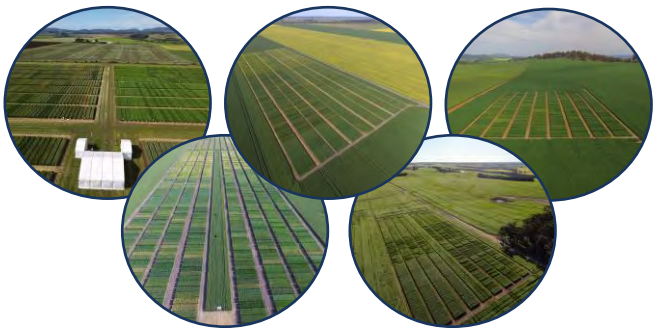
HYPER YIELDING CROPS

2022 Annual Report

OUTPUT 1



Prepared by:

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Raw data download requests available at: https://doi.org/10.5281/zenodo.7851239

2022 HYC Barley Results

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SA Crop Technology Centre
Millicent, South Australia

Time of Sowing 1: 21 April 2022
Time of sowing 2: 11 May 2022
Harvested: 18 December 2022 – 9 January 2023
Rotation position: 2021 broad beans
Soil type: Neutral-slightly alkaline Organosol (Peat soil)
Colwell P (ppm) 0-10cm: 63
pH ($CaCl_2$) 0-10cm: 7.9
Organic Carbon (%) 0-10cm: 7.4

Trial 2. HYC Barley elite screen- Time of sowing 2 (FAR SAC B22-02-2)

Objectives:
To examine the yield potential of new winter and spring germplasm grown under HYC Management packages against spring and winter controls in the traditional late April/early May sowing window.

Key points:

- The highest-yielding variety in this trial was the quick-developing, 2-row spring barley Rosalind (6.96 t/ha).
- Varieties that are more susceptible to NFNB, such as RGT Planet and AGTB0244 yielded poorly on site as disease pressure in 2022 was very high.
- Fandaga was the lowest yielding variety in this trial which contrasts with this cultivar's performance at other HYC centres. It was observed to be discoloured throughout much of the growing season leading to suggestions that it is particularly susceptible to soil conditions distinctive to the Millicent centre.
- The 6-row winter barley Pixel also yielded well and had the highest harvest index (43.4%), a significantly higher percentage than the top yielding Rosalind (32.2%).
- Due to the highly fertile soils at this site, grain protein was very high with a trial average of 14%.

Table 1. Grain Yield (t/ha) and Harvest Index (HI, %) of 10 different barley varieties.

Variety		Type	Grain Yield		Harvest Index	
			t/ha		%	
1	RGT Planet	2-Row Spring	5.22	c	39.7	abc
2	Rosalind	2-Row Spring	6.96	a	32.2	c
3	Minotaur (AGTB0213)	2-Row Spring	6.46	ab	41.1	ab
4	Laperouse	2-Row Spring	6.38	ab	----	.
5	Laureate	2-Row Spring	6.13	b	34.6	bc
6	AGTB0244	2-Row Spring	4.26	d	----	.
7	Fandaga	2-Row Spring	1.69	e	----	.
8	Newton	2-Row Winter	5.36	c	----	.
9	Pixel	6-Row Winter	6.35	ab	43.4	a
10	P-52	2-Row Spring	4.39	d	32.7	c
		Mean	5.32		37.3	
		LSD (P=0.05)	0.76		7.6	
		P-Value	<0.001		0.026	

Table 2. Grain quality parameters including protein (%), test weight (kg/hL), retention (%) and screenings (%).

Variety		Grain Quality							
		Protein		**Test Weight**		**Retention**		**Screenings**	
		%		kg/hL		%		%	
1	RGT Planet	13.8	c	67.1	b	64.0	cd	12.3	b
2	Rosalind	13.7	c	67.5	b	60.6	de	11.7	bc
3	Minotaur (AGTB0213)	14.3	b	67.0	b	80.4	ab	7.3	de
4	Laperouse	14.5	ab	71.4	a	85.7	a	4.0	f
5	Laureate	13.5	c	64.3	cd	66.5	c	13.0	b
6	AGTB0244	13.8	c	65.9	bc	61.7	cde	13.6	b
7	Fandaga	14.7	a	61.1	e	56.3	e	19.2	a
8	Newton	14.6	a	62.6	de	77.0	b	9.2	cd
9	Pixel	13.1	d	67.5	b	83.0	a	4.9	ef
10	P-52	13.7	c	64.6	cd	63.2	cd	13.3	b
	Mean	14.0		65.9		69.8		10.8	
	LSD (P=0.05)	0.4		2.1		5.6		2.9	
	P-Value	<0.001		<0.001		<0.001		<0.001	

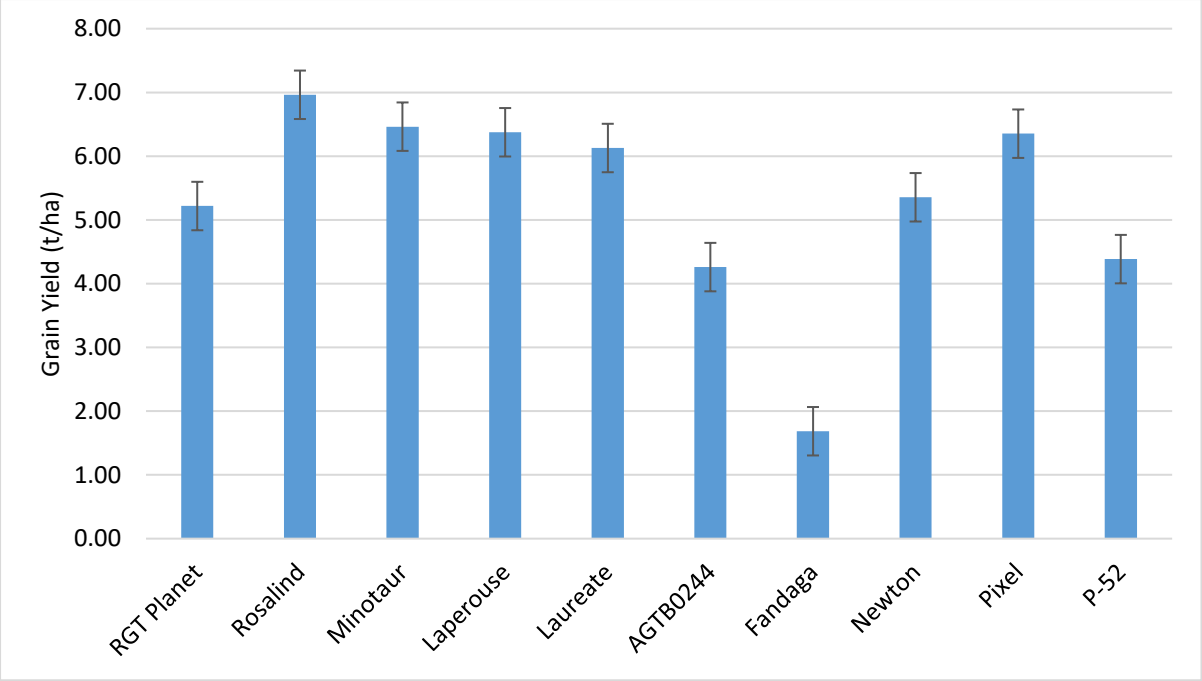

Figure 1. Interaction between variety and grain yield (t/ha). LSD = 0.76 t/ha

Table 3. Trial input and management details.

Sowing date:		**11 May**
Harvest date:		**20 December**
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	11 May	100kg MAP (10 N)
Nitrogen:	6 Jul	109 kg N/ha
	23 Aug	217 kg N/ha
PGR:	GS30	Moddus Evo 200 mL/ha
	GS37	Moddus Evo 200 mL/ha
Fungicide:	GS31	Prosaro 300 mL/ha
	GS39	Radial 840 mL/ha
	GS61	Opus 500 mL/ha

All inputs of insecticides and herbicides were standard across the trial.

Trial 3. HYC Barley G.E.M. Trial Series - Time of sowing 1 (FAR SAC B22-03-1)

Objectives:
To assess the performance of winter and spring barley germplasm managed under four different management intensities (mid-April to early May sown) at two levels of fungicides.

Key points:

- There was significant interaction in yields between canopy management and variety.
- RGT Planet yielded best under high fungicide input and plant growth regulator (PGR) management, likely due to its susceptibility to NFNB.
- Inversely Pixel, which also grew best under high fungicide and PGR management, is much more resistant to disease, however, is observed to be more susceptible to head loss and therefore benefit from PGR applications.
- Newton was overall the lowest yielding variety but grew best where there was high fungicide management and low nitrogen rates.
- There was a yield penalty for all varieties when defoliated prior to GS30 with an average of 1.17 t/ha lost compared to the highest yielding treatment.

Table 1. Fungicide package, canopy intervention and nitrogen (N) rate applied to each of the six management treatments.

Treatment ID	Fungicide	Canopy Intervention	Nitrogen (kg/ha)
Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	150N
Standard (Std) Fungicide & PGR	Standard (cheaper)[1,3]	PGR	150N
Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	150N
Higher input Fungicide & PGR	Higher input[2,3]	PGR	150N
Hyper - yield system	Higher input[2,3]	PGR	225N
Dual - purpose system	Higher input[2,4]	Defoliation	225N

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Tilt® 250 EC at 500 mL/ha) @GS31 and tebuconazole (Folicur® 430 SC 290 mL/ha) @GS39-49.
[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs with third fungicide if required.
[3] Plant growth regulators (PGR) (Moddus® Evo 200 mL/ha @GS30 & Moddus Evo 200 mL/ha @GS33-37).
[4] Defoliation was done mechanically (mower) prior to the GS30.

Table 2. Influence of management strategy and cultivar on grain yield (t/ha).

Management	Yield (t/ha)							
	Planet		**Newton**		**Pixel**		**Mean**	
Std & NI	4.16	hi	4.69	f-i	4.67	f-i	**4.51**	**c**
Std & PGR	4.03	i	4.81	e-h	5.46	b-e	**4.77**	**c**
High & NI	5.47	b-e	5.12	d-g	5.32	c-f	**5.30**	**b**
High & PGR	5.80	a-d	5.12	d-g	6.17	a	**5.69**	**a**
Hyper-yield system	6.07	ab	5.09	efg	5.84	abc	**5.67**	**a**
Dual-purpose system	4.81	e-h	4.30	hi	4.44	ghi	**4.52**	**c**
Mean	**5.06**	**ab**	**4.86**	**b**	**5.31**	**a**	**5.08**	
LSD Cultivar (P=0.05)	0.28				**P-Value**		0.008	
LSD Management (P=0.05)	0.35				**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)	0.68				**P-Value**		0.004	

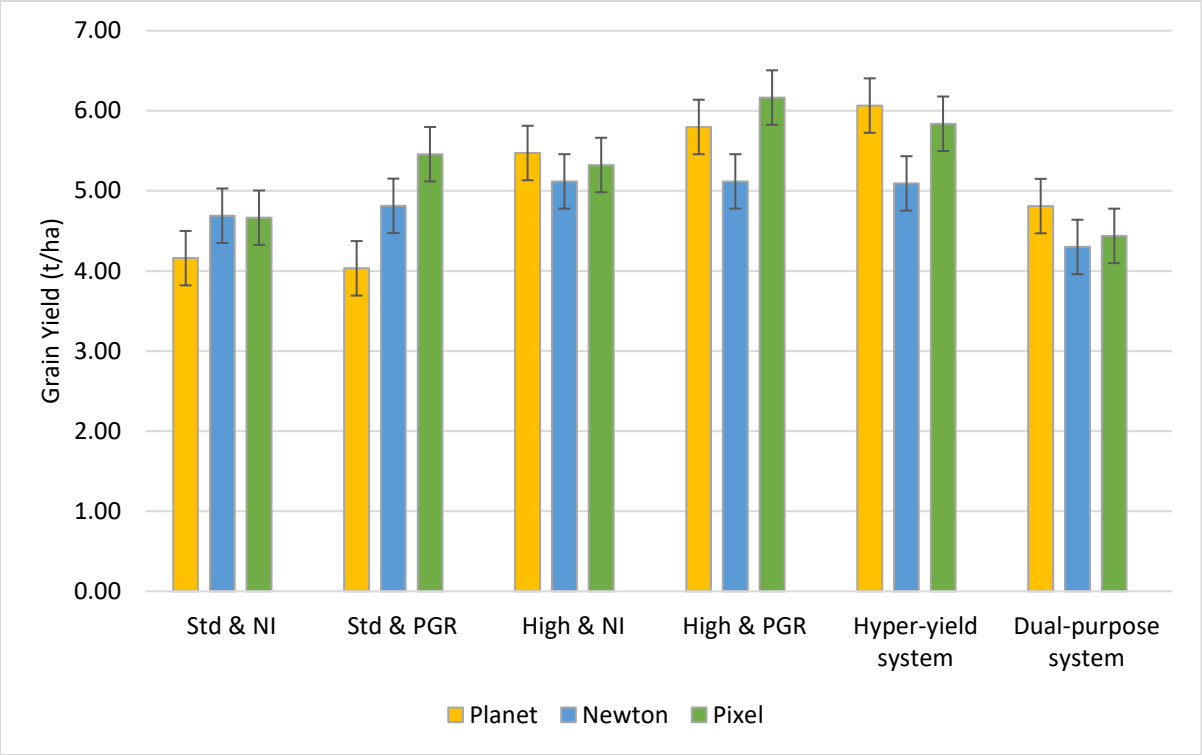

Figure 1. Influence of management strategy and cultivar on grain yield (t/ha).

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

Management	Protein (%)							
	Planet		**Newton**		**Pixel**		**Mean**	
Std & NI	14.2	-	13.6	-	4.7	f-i	**13.7**	-
Std & PGR	14.4	-	14.3	-	5.5	b-e	**13.6**	-
High & NI	14.2	-	13.4	-	5.3	c-f	**13.8**	-
High & PGR	14.6	-	13.7	-	6.2	a	**13.8**	-
Hyper-yield system	13.7	-	13.8	-	5.8	abc	**14.2**	-
Dual-purpose system	14.3	-	14.1	-	4.4	ghi	**15.0**	-
Mean	**14.2**	-	**13.8**	-	**14.0**	-	**14.0**	
LSD Cultivar (P=0.05)	ns				**P-Value**		0.130	
LSD Management (P=0.05)	ns				**P-Value**		0.292	
LSD Cultivar x Man. (P=0.05)	ns				**P-Value**		0.342	

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

Management	Test weight (kg/hL)							
	Planet		**Newton**		**Pixel**		**Mean**	
Std & NI	66.0	i	67.4	fgh	67.3	fgh	**66.9**	**d**
Std & PGR	66.2	hi	68.9	a-d	67.7	d-g	**67.6**	**c**
High & NI	67.9	c-g	67.9	c-g	68.1	b-f	**68.0**	**bc**
High & PGR	67.6	efg	69.3	ab	69.0	abc	**68.6**	**a**
Hyper-yield system	68.4	b-f	68.7	a-e	67.9	c-g	**68.3**	**ab**
Dual-purpose system	66.8	ghi	69.8	a	68.9	a-d	**68.5**	**ab**
Mean	**67.2**	**c**	**68.7**	**a**	**68.1**	**b**	**68.0**	
LSD Cultivar (P=0.05)	0.5				**P-Value**		<0.001	
LSD Management (P=0.05)	0.6				**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)	1.2				**P-Value**		0.021	

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

Management	Screenings (%)							
	Planet		**Newton**		**Pixel**		**Mean**	
Std & NI	17.5	a	8.7	de	6.4	fg	**10.8**	**a**
Std & PGR	19.1	a	6.9	efg	5.7	fgh	**10.6**	**a**
High & NI	11.4	c	7.4	ef	5.1	gh	**8.0**	**b**
High & PGR	11.6	c	5.8	fgh	4.0	h	**7.1**	**b**
Hyper-yield system	10.6	cd	7.0	efg	5.2	gh	**7.6**	**b**
Dual-purpose system	14.0	b	5.4	fgh	5.0	gh	**8.2**	**b**
Mean	**14.0**	**a**	**6.9**	**b**	**5.2**	**c**	**8.7**	
LSD Cultivar (P=0.05)	0.8				**P-Value**		<0.001	
LSD Management (P=0.05)	1.4				**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)	2.1				**P-Value**		<0.001	

Table 6. Influence of management strategy and cultivar on retention (% >2.2 mm).

Management	Retention (%)							
	Planet		**Newton**		**Pixel**		**Mean**	
Std & NI	50.2	g	78.2	cd	78.8	cd	69.1	b
Std & PGR	45.7	h	81.0	bcd	76.9	d	67.9	b
High & NI	64.6	e	82.1	abc	83.5	ab	76.7	a
High & PGR	66.0	e	83.8	ab	85.6	a	78.5	a
Hyper-yield system	67.1	e	80.7	bcd	82.4	abc	76.7	a
Dual-purpose system	58.3	f	83.5	ab	84.6	ab	75.5	a
Mean	58.6	b	81.6	a	82.0	a	**74.1**	
LSD Cultivar (P=0.05)	1.72				**P-Value**		<0.001	
LSD Management (P=0.05)	3.51				**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)	4.25				**P-Value**		<0.001	

Table 7. Trial input and management details.

Sowing date:		**21 April**	
Harvest date:		**19 December**	
Plant population:		As per treatment list	
Basal fertiliser:	21 Apr	100kg MAP (10 N)	
Nitrogen:		As per treatment list	
PGR:		**PGR**	**Untreated**
	GS30	Moddus Evo 0.20 L/ha	----
	GS33	Moddus Evo 0.20 L/ha	----
Fungicide:		**Standard Input**	**High Input**
	GS00	----	Systiva
	GS31	Tilt 0.50 L/ha	Prosaro 0.30 L/ha
	GS39	Folicur 0.29 L/ha	Aviator Xpro 0.50 L/ha
	GS59	----	Opus 0.50 L/ha

Trial 3. HYC Barley G.E.M Trial series- Time of sowing 2 (FAR SAC B22-03-2)

Key points:

- Higher resistance to NFNB in Rosalind (MR) saw it yield between 4.69 t/ha and 6.51 t/ha. Its mean yield was significantly higher yielding compared to the RGT Planet, rated SVS to the same disease.
- In contrast to TOS 1, the dual-purpose system was not significantly lower yielding compared to untreated, or in the case of RGT Planet, significantly higher yielding. It is important to note that the dual-purpose system received higher fungicide management, potentially removed inoculum and opened up the canopy at GS30 to decrease disease pressure. It may have also delayed the development of the varieties to flower later in a more optimal window in a year that was light limited, especially in the month of October.
- The higher fungicide treatments (1-4) also had a positive impact on grain quality parameters with the exception of the dual-purpose system giving higher screenings and lower test weights.

Table 1. Fungicide package, canopy intervention and nitrogen (N) rate applied to each of the six management treatments.

Treatment ID	Fungicide	Canopy Intervention	Nitrogen (kg/ha)
Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	150N
Standard (Std) Fungicide & PGR	Standard (cheaper)[1,3]	PGR	150N
Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	150N
Higher input Fungicide & PGR	Higher input[2,3]	PGR	150N
Hyper - yield system	Higher input[2,3]	PGR	225N
Dual - purpose system	Higher input[2,4]	Defoliation	225N

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Tilt® 250 EC at 500 mL/ha) @GS31 and tebuconazole (Folicur® 430 SC 290 mL/ha) @GS39-49.

[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs) with third fungicide if required.

[3]Plant growth regulators (PGR) (Moddus® Evo 200 mL/ha @GS30 & Moddus Evo 200 mL/ha @GS33-37).

[4]Defoliation was done mechanically (mower) prior to the GS30.

Table 2. Influence of management strategy and cultivar on grain yield (t/ha).

Management	Yield (t/ha)							
	Planet		Rosalind		Laureate		Mean	
Std & NI	3.19	h	4.69	ef	4.30	f	**4.06**	**d**
Std & PGR	3.75	g	5.68	b	5.04	de	**4.82**	**bc**
High & NI	4.82	e	5.52	bc	5.09	cde	**5.14**	**b**
High & PGR	5.35	bcd	6.51	a	5.68	b	**5.85**	**a**
Hyper-yield system	4.88	e	6.51	a	5.63	b	**5.67**	**a**
Dual-purpose system	3.84	g	4.95	de	4.69	ef	**4.50**	**c**
Mean	**4.30**	**c**	**5.64**	**a**	**5.07**	**b-e**	**5.01**	
LSD Cultivar (P=0.05)			0.19		**P-Value**		<0.001	
LSD Management (P=0.05)			0.43		**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)			0.46		**P-Value**		<0.001	

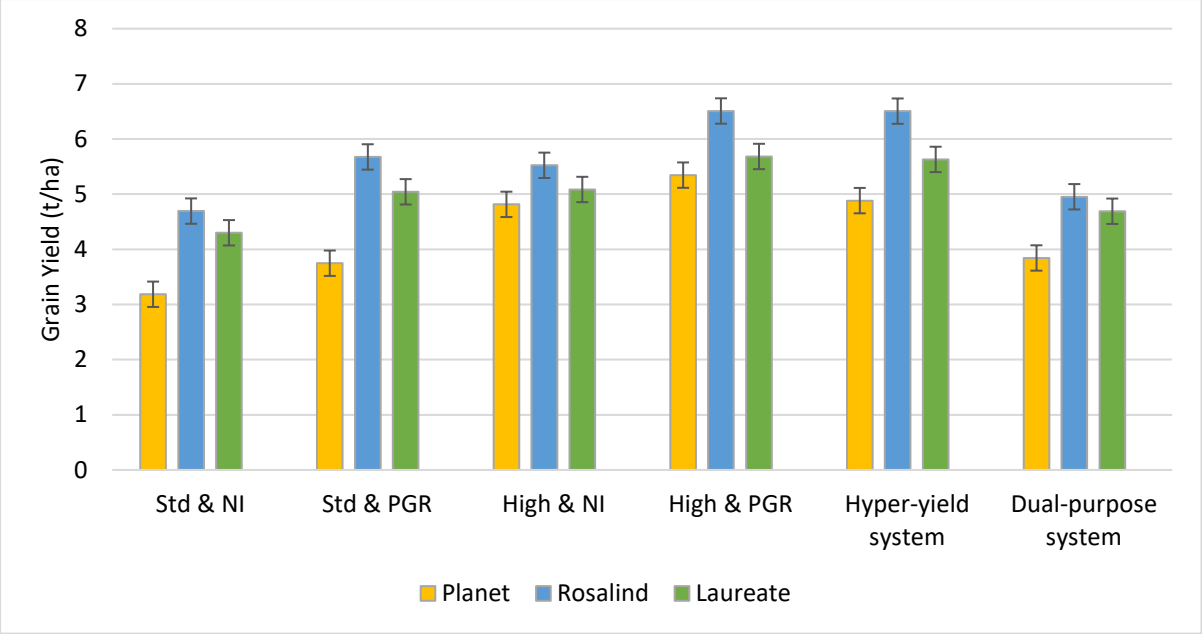

Figure 1. Influence of management strategy and cultivar on grain yield (t/ha).

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

Management	Protein (%)							
	Planet		**Rosalind**		**Laureate**		**Mean**	
Std & NI	13.9	a	13.8	ab	13.9	a	**13.8**	**a**
Std & PGR	13.9	a	13.6	bc	13.9	a	**13.8**	**a**
High & NI	13.2	e	13.6	bcd	13.5	bcd	**13.4**	**cd**
High & PGR	13.2	e	13.2	e	13.4	de	**13.3**	**d**
Hyper-yield system	13.5	cd	13.7	ab	13.9	a	**13.7**	**ab**
Dual-purpose system	13.3	de	13.4	cde	13.9	a	**13.6**	**bc**
Mean	**13.5**	**b**	**13.5**	**b**	**13.8**	**a**	13.6	
LSD Cultivar (P=0.05)			0.1		**P-Value**		<0.001	
LSD Management (P=0.05)			0.2		**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)			0.2		**P-Value**		0.001	

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

Management	Test Weight (%)							
	Planet		**Rosalind**		**Laureate**		**Mean**	
Std & NI	65.5	hi	66.6	def	66.6	def	**66.2**	**bc**
Std & PGR	66.1	f-i	66.7	c-f	65.6	ghi	**66.1**	**bc**
High & NI	67.7	ab	66.7	c-f	67.2	b-e	**67.2**	**a**
High & PGR	67.4	a-d	68.0	a	66.3	e-h	**67.3**	**a**
Hyper-yield system	66.6	ef	67.5	abc	66.4	efg	**66.8**	**ab**
Dual-purpose system	66.2	f-i	65.5	i	65.6	ghi	**65.7**	**c**
Mean	**66.6**	**ab**	**66.8**	**a**	**66.3**	**b**	66.6	
LSD Cultivar (P=0.05)			0.3		**P-Value**		0.005	
LSD Management (P=0.05)			0.9		**P-Value**		0.012	
LSD Cultivar x Man. (P=0.05)			0.8		**P-Value**		0.001	

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

Management	Screening (%)							
	Planet		**Rosalind**		**Laureate**		**Mean**	
Std & NI	19.7	a	14.5	de	13.5	e	**15.9**	**a**
Std & PGR	17.4	b	16.6	bc	15.1	cde	**16.4**	**a**
High & NI	10.2	fg	9.4	g	11.6	f	**10.4**	**b**
High & PGR	9.5	g	10.4	fg	10.8	fg	**10.3**	**b**
Hyper-yield system	11.4	f	11.7	f	11.6	f	**11.6**	**b**
Dual-purpose system	15.3	cde	15.7	bcd	14.3	de	**15.1**	**a**
Mean	**13.9**	**a**	**13.1**	**b**	**12.8**	**b**	**13.3**	
LSD Cultivar (P=0.05)			0.8		**P-Value**		0.017	
LSD Management (P=0.05)			3.1		**P-Value**		0.001	
LSD Cultivar x Man. (P=0.05)			1.9		**P-Value**		<0.001	

Table 6. Influence of management strategy and cultivar on retention (%).

Management	Retention (%)							
	Planet		**Rosalind**		**Laureate**		**Mean**	
Std & NI	47.86	ij	47.58	j	60.39	def	51.94	b
Std & PGR	51.70	hi	45.22	j	57.90	efg	51.61	b
High & NI	68.81	ab	62.21	cd	66.31	b	65.78	a
High & PGR	70.95	a	59.22	def	68.42	ab	66.20	a
Hyper-yield system	67.04	ab	56.87	fg	66.63	b	63.51	a
Dual-purpose system	61.76	cde	55.15	gh	65.55	bc	60.82	a
Mean	61.4	b	54.4	c	62.4	a		
LSD Cultivar (P=0.05)			1.62		**P-Value**		<0.001	
LSD Management (P=0.05)			6.33		**P-Value**		<0.001	
LSD Cultivar x Man. (P=0.05)			3.96		**P-Value**		<0.001	

Table 7. Trial input and management details.

Sowing date:		**11 May**	
Harvest date:		**20 December**	
Plant population:		As per treatment list	
Basal fertiliser:	11 May	100kg MAP (10 N)	
Nitrogen:		As per treatment list	
PGR:		**PGR**	**Untreated**
	GS30	Moddus Evo 0.20 L/ha	----
	GS33	Moddus Evo 0.20 L/ha	----
Fungicide:		**Standard Input**	**High Input**
	GS00	----	Systiva
	GS31	Tilt 0.50 L/ha	Prosaro 0.30 L/ha
	GS39	Folicur 0.29 L/ha	Aviator Xpro 0.50 L/ha
	GS59	----	Opus 0.50 L/ha

Trial 4. HYC Barley Disease Management (FAR SAC B22-04-2)

Objectives:
To develop profitable and sustainable approaches to disease management in HRZ barley.

Key points:

- A wetter than average spring, high inoculum in the environment and the use of susceptible varieties, NFNB pressure was extremely high in 2022.
- The use of SDHI chemistry at the second spray timing was most effective at reducing NFNB severity on flag-1, the most important yield contributing leaf in barley.
- There was no yield difference between the single spray programs and the untreated, suggesting this level of management is not appropriate for high disease pressure environments.
- There were no significant improvements in yield between the 4 fungicide units, 3 fungicide units or 2 fungicide units regardless of seed treatment/foliar spray combinations.
- The cheaper fungicide managements (untreated and single sprays) gave poorer screening and retention figures as well as increased brackling when assessed at crop maturity.

Treatments: 15 Fungicide management strategies (cultivar- RGT Planet).

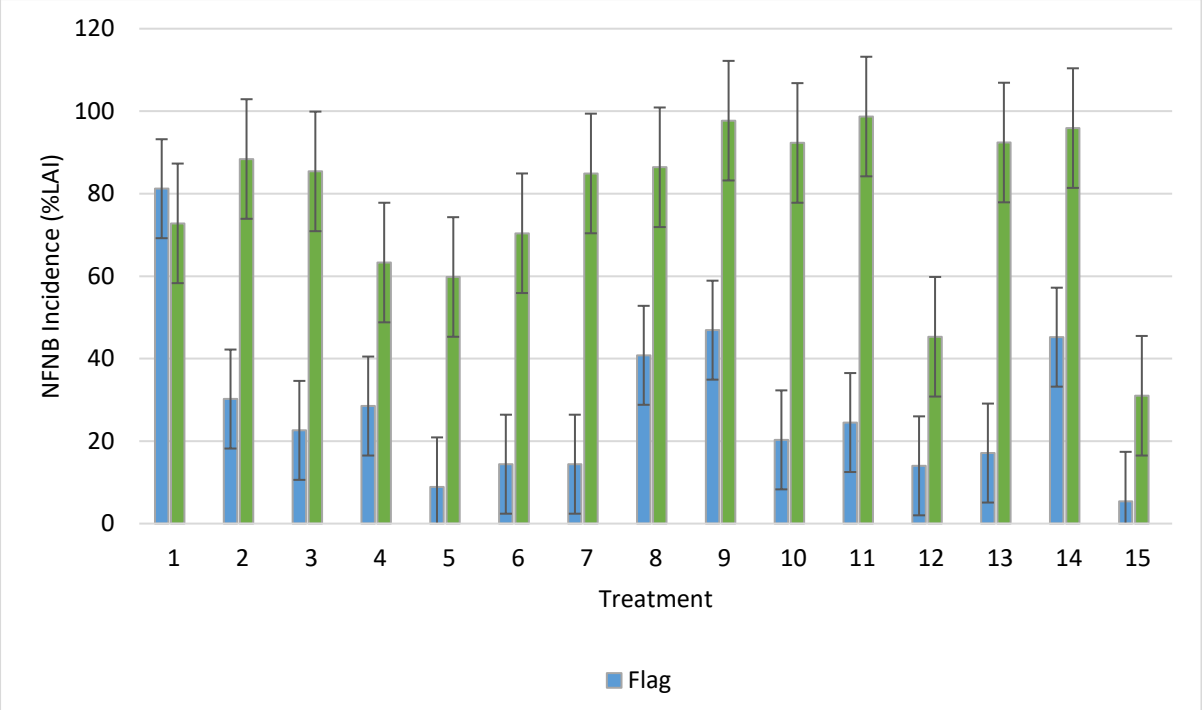

Figure 1. The incidence of Net Form Net Blotch (NFNB, %LAI) at GS79 on the Flag and Flag-1 (Treatment list as per table 1).

Table 1. Influence of fungicide management on grain yield (t/ha).

	Treatment				Yield		% of mean	
	GS00	**GS30**	**GS39-49**	**GS59**	t/ha		%	
1	---	---	---	---	3.06	e	71.1	e
2	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha		4.24	abc	98.7	abc
3	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha	Opus 500 mL/ha	4.66	ab	108.4	ab
4	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha		4.69	a	109.1	a
5	---	---	Aviator Xpro 420 mL/ha		4.63	ab	107.6	ab
6	---	Prosaro 300 mL/ha	FAR F1-19 750 mL/ha		4.82	a	112.1	a
7	---	FAR F1-19 750 mL/ha	Radial 840 mL/ha		4.66	ab	108.3	ab
8	---	Prosaro 300 mL/ha	----		3.54	cde	82.3	cde
9	--	Tilt 500 250 mL/ha	----		3.49	de	81.2	de
10	Systiva	---	Radial 840 mL/ha	---	4.43	ab	103.1	ab
11	---	Prosaro 300 mL/ha	Radial 840 mL/ha	---	4.29	ab	99.8	ab
12	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	4.90	a	114.0	a
13	---	Aviator Xpro 420 mL/ha	Radial 840 mL/ha		4.38	ab	101.8	ab
14	---	Prosaro 300 mL/ha	Radial 420 mL/ha		3.96	bcd	92.1	bcd
15	Systiva	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	4.75	a	110.4	a
				Mean	4.3		100.0	
				LSD (P=0.05)	0.72		16.7	
				P-Value	<0.001		<0.001	

Table 2. Influence of fungicide management on brackling (%) and grain quality (protein (%), test weight (kg/hL), retention (%) and screenings (%).

Trt	Brackling		Protein		Test weight		Retention		Screenings	
	(%)		(%)		(kg/hL)		(%)		(%)	
1	97.5	a	14.2	a	65.6	-	41.5	e	24.7	a
2	76.3	de	13.7	bcd	68.2	-	61.1	bcd	14.4	bc
3	78.8	cde	13.3	e	69.1	-	65.3	abc	12.4	bc
4	68.8	ef	13.6	cde	67.5	-	65.7	abc	12.2	c
5	82.5	bcd	13.3	e	68.6	-	63.0	abc	13.4	bc
6	65.0	f	13.3	de	67.7	-	65.5	abc	12.4	bc
7	77.5	de	13.5	cde	68.8	-	64.2	abc	11.6	c
8	92.5	ab	13.9	ab	67.4	-	44.4	e	22.2	a
9	93.8	a	13.9	abc	67.2	-	44.4	e	22.5	a
10	81.3	cd	13.5	de	68.7	-	60.3	cd	14.0	bc
11	76.3	de	13.5	cde	68.6	-	59.1	cd	14.9	bc
12	75.0	def	13.4	de	68.7	-	67.1	ab	11.9	c
13	77.5	de	13.4	de	68.6	-	61.7	a-d	13.9	bc
14	88.8	abc	13.6	b-e	67.6	-	55.9	d	16.6	b
15	81.3	cd	13.4	de	68.5	-	67.8	a	11.4	c
Mean	80.8		13.5		68.0		59.1		15.2	
LSD (P=0.05)	10.0		0.4		ns		6.6		4.4	
P-Value	<0.001		<0.001		0.154		<0.001		<0.001	

Table 3. Trial input and management details (kg, g, mL/ha).

Sowing date:		**11 May**
Harvest date:		**19 December**
Variety:		RGT Planet
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	28 April	100kg MAP (10 N)
Nitrogen:	6 Jul	109 kg N/ha
	23 Aug	217 kg N/ha
PGR:	GS30	Moddus Evo 200 mL/ha
	GS37	Moddus Evo 200 mL/ha
Fungicide:		As per treatment list

Trial 5. HYC PGR x harvest date trial- Time of sowing 1 (FAR SAC B22-05-1)

Objectives:
To assess the value of PGRs with delayed harvest in HRZ regions.

Key points:

- The harvest date trial in the first time of sowing was sown into plots of Pixel, a 6-row winter barley known for potential head loss at crop maturity.
- Although there was no significant interaction between PGR management and harvest date, there was a trend for a delayed harvest to decrease yield by 1.59 t/ha.
- Both a double Moddus Evo application and the 'European' PGR approach were higher yielding than the untreated, however a single application of Moddus Evo on average was higher yielding that the other PGR managements.
- The combination of Pixel with a single Moddus Evo application and harvesting on time gave the highest barley yield on site (8.43 t/ha).
- Harvest date and PGR management had very little impact on grain quality with the exception of improved test weight with an on-time harvest.

Treatments: 4 PGR management approaches applied to Pixel, to be harvested at two harvest dates. PGRs are applied at either 1, or 2 growth stages.

Table 1. Growth stage timings and rates of plant growth regulators (PGR's).

Treatment ID	GS31	GS37
Untreated	---	---
GS31 PGR	Moddus Evo 400 mL/ha	---
GS31+37	Moddus Evo 200 mL/ha	Moddus Evo 200 mL/ha
GS31+GS37 Euro PGR	Moddus Evo 200 mL/ha	Promote 1000 360 mL/ha

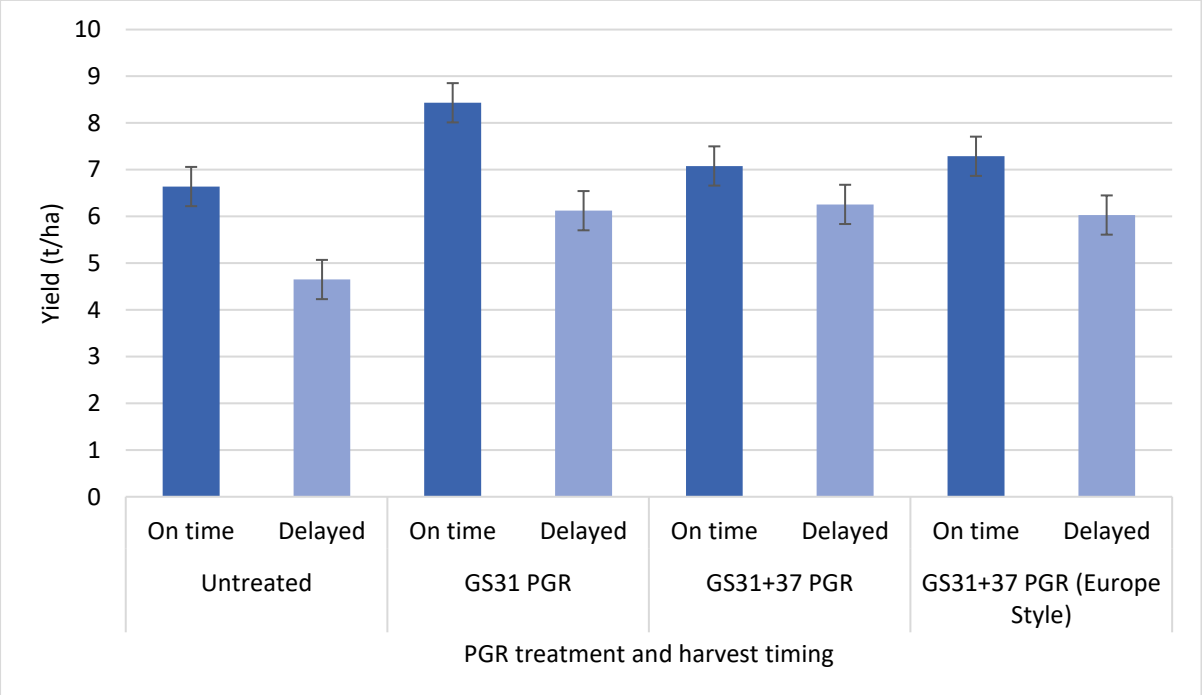

Figure 1. Influence of Harvest Date and PGRs on grain yield (t/ha) in Pixel. LSD (P=0.05) = 0.82 t/ha.

Table 2. The effect of PGRs and HD on grain yield (t/ha).

	Yield (t/ha)	
Harvest Date		
On time	7.36	a
Delayed (28 days delay)	5.77	b
Harvest Date LSD (P=0.05)	0.64	
Harvest Date P-Value	0.004	
Canopy Management Regime		
Untreated	5.65	c
GS31 PGR	7.28	a
GS31 + GS37 PGR	6.70	b
GS31 + GS37 PGR (Europe style)	6.67	b
Canopy Management Regime LSD (P=0.05)	0.58	
Variety x Canopy Mgmt Regime P-Value	<0.001	
Harvest Date. x Canopy Mgmt. Regime		
On Time		
Untreated	6.64	-
GS31 PGR	8.43	-
GS31 + GS37 PGR	7.08	-
GS31 + GS37 PGR (Europe style)	7.29	-
Delayed		
Untreated	4.65	-
GS31 PGR	6.12	-
GS31 + GS37 PGR	6.26	-
GS31 + GS37 PGR (Europe style)	6.03	-
Harvest Date x Canopy Mgmt LSD (P=0.05)	0.82	
Harvest Date x Canopy Mgmt x Variety P Val	ns	

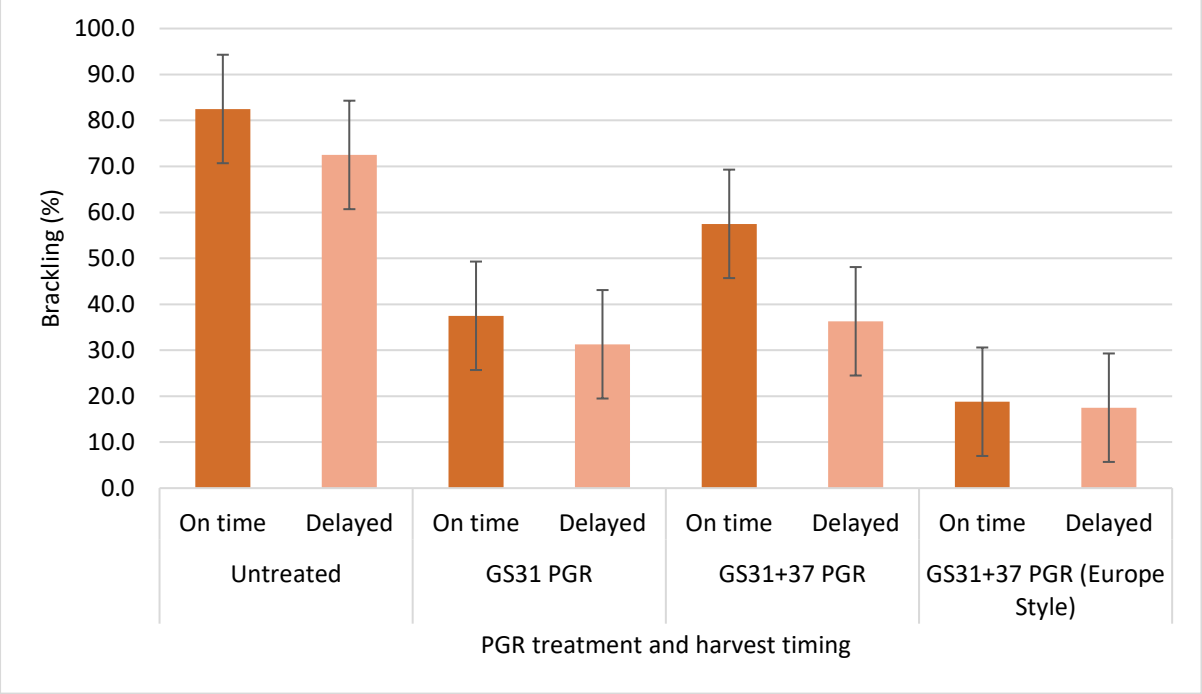

Figure 2. Influence of Harvest Date and PGR's on brackling (%) in Pixel. LSD (P=0.05) = 23.6%.

Table 3. Effect of PGRs and harvest dates on grain quality (protein (%), test weight (kg/hL), screenings (%) and retention (%)).

	Protein (%)	Test Weight (kg/hL)	Retention (%)	Screenings (%)
Harvest Date				
On time	13.4 -	67.8 a	87.3 -	3.4 -
Delayed (28 days delay)	13.5 -	66.5 b	84.9 -	3.9 -
Harvest Date LSD (P=0.05)	ns	0.9	ns	ns
Harvest Date P-Value	0.505	0.023	0.065	0.255
Canopy Management Regime				
Untreated	13.6 -	67.0 -	85.7 -	4.0 -
GS31 PGR	13.3 -	67.3 -	86.5 -	3.3 -
GS31 + GS37 PGR	13.5 -	66.8 -	84.8 -	3.6 -
GS31 + GS37 PGR (Europe style)	13.5 -	67.6 -	87.6 -	3.6 -
Canopy Management Regime LSD (P=0.05)	ns	ns	ns	ns
Variety x Canopy Mgmt Regime P-Value	0.326	0.452	0.087	0.344
Harvest Date. x Canopy Mgmt. Regime				
On Time				
Untreated	13.6 -	67.6 -	86.8 -	3.7 -
GS31 PGR	13.2 -	68.0 -	87.9 -	3.0 -
GS31 + GS37 PGR	13.6 -	67.7 -	86.0 -	3.4 -
GS31 + GS37 PGR (Europe style)	13.4 -	67.8 -	88.6 -	3.5 -
Delayed				
Untreated	13.6 -	66.5 -	84.6 -	4.3 -
GS31 PGR	13.4 -	66.6 -	85.1 -	3.7 -
GS31 + GS37 PGR	13.5 -	65.8 -	83.5 -	3.8 -
GS31 + GS37 PGR (Europe style)	13.6 -	67.3 -	86.5 -	3.7 -
Harvest Date x Canopy Mgmt LSD (P=0.05)	ns	ns	ns	ns
Harvest Date x Canopy Mgmt x Variety P Val	0.623	0.599	0.990	0.913

Table 4. Trial input and management details.

Sowing date:		**21 April**
Harvest date 1:		**18 December 2022**
Harvest date 2:		**9 January 2023**
Plant population:		180 seeds/m^2
Basal fertiliser:	21 April	100 kg MAP (10 N)
Nitrogen:	6 Jul	109 kg N/ha
	23 Aug	217 kg N/ha
PGR:		As per treatment list
Fungicide:	GS31	Prosaro 300 mL/ha
	GS39	Radial 840 mL/ha
	GS61	Opus 500 mL/ha

Trial 5. HYC PGR x harvest date trial - Time of sowing 2 (FAR SAC B22-05-2)

Key points:

- Despite a later sowing date and different cultivar, similar trial results were seen where harvesting on time was significantly higher yielding than delayed harvest, as per the same trial in TOS 1.
- Moddus Evo at GS31 or split between GS31 and GS37 were the best PGR managements across the different harvest dates.
- There were mixed results in using PGRs to manage brackling, however the split application of Moddus Evo was the most effective at reducing brackling under a delayed harvest scenario (Figure 2).

Treatments: 4 plant growth regulator (PGR) management approaches applied to RGT Planet, to be harvested at two harvest dates. PGRs are applied at either 1, or 2 growth stages.

Table 1. Growth stage timings and rates of plant growth regulators (PGRs).

Treatment ID	GS31	GS37
Untreated	---	---
GS31 PGR	Moddus Evo 400 mL/ha	---
GS31+37	Moddus Evo 200 mL/ha	Moddus Evo 200 mL/ha
GS31+GS37 Euro PGR	Moddus Evo 200 mL/ha	Promote 1000 400 mL/ha

Table 2. The effect of PGRs and harvest dates on grain yield (t/ha), test weight (kg/hL), screenings (%) and retention (%).

	Yield (t/ha)	
Harvest Date		
On time	4.45	a
Delayed (28 days delay)	3.67	b
Harvest Date LSD (P=0.05)	0.527	
Harvest Date P-Value	0.181	
Canopy Management Regime		
Untreated	3.85	b
GS31 PGR	4.41	a
GS31 + GS37 PGR	4.32	a
GS31 + GS37 PGR (Europe style)	3.65	b
Canopy Management Regime LSD (P=0.05)	0.48	
Variety x Canopy Mgmt Regime P-Value	0.004	
Harvest Date. x Canopy Mgmt. Regime		
On Time		
Untreated	4.34	-
GS31 PGR	3.37	-
GS31 + GS37 PGR	5.06	-
GS31 + GS37 PGR (Europe style)	3.76	-
Delayed		
Untreated	3.37	-
GS31 PGR	5.06	-
GS31 + GS37 PGR	3.76	-
GS31 + GS37 PGR (Europe style)	4.47	-
Harvest Date x Canopy Mgmt LSD (P=0.05)	ns	
Harvest Date x Canopy Mgmt x Variety P-Value	0.106	

Table 3. Effect of PGRs and harvest dates on grain quality (protein (%), test weight (kg/hL), screenings (%) and retention (%)).

	Protein (%)	Test Weight (kg/hL)	Retention (%)	Screenings (%)
Harvest Date				
On time	13.7 -	64.7 -	54.2 a	15.4 -
Delayed (28 days delay)	13.9 -	64.6 -	46.5 b	17.7 -
Harvest Date LSD (P=0.05)	ns	ns	4.3	ns
Harvest Date P-Value	0.230	0.968	0.011	0.052
Canopy Management Regime				
Untreated	13.8 ab	64.4 -	55.2 a	15.6 bc
GS31 PGR	13.7 b	64.6 -	49.1 b	17.2 ab
GS31 + GS37 PGR	13.7 b	65.5 -	55.5 a	14.7 c
GS31 + GS37 PGR (Europe style)	14.0 a	64.1 -	41.5 c	18.8 a
Canopy Management Regime LSD (P=0.05)	0.2	ns	4.1	2.1
Variety x Canopy Mgmt Regime P-Value	0.014	0.444	<0.001	<0.001
Harvest Date. x Canopy Mgmt. Regime				
On Time				
Untreated	13.7 -	65.1 -	60.6 a	13.7 b
GS31 PGR	13.9 -	63.8 -	49.9 c	17.8 a
GS31 + GS37 PGR	13.5 -	65.6 -	55.7 ab	14.9 b
GS31 + GS37 PGR (Europe style)	14.0 -	63.5 -	42.5 d	19.9 a
Delayed				
Untreated	13.7 -	63.8 -	49.9 c	17.8 a
GS31 PGR	13.7 -	65.6 -	55.7 ab	14.9 b
GS31 + GS37 PGR	14.1 -	63.5 -	42.5 d	19.9 a
GS31 + GS37 PGR (Europe style)	14.0 -	64.6 -	56.5 ab	14.9 b
Harvest Date x Canopy Mgmt LSD (P=0.05)	ns	ns	5.8	3.0
Harvest Date x Canopy Mgmt x Variety P Val	0.056	0.075	0.041	0.0107

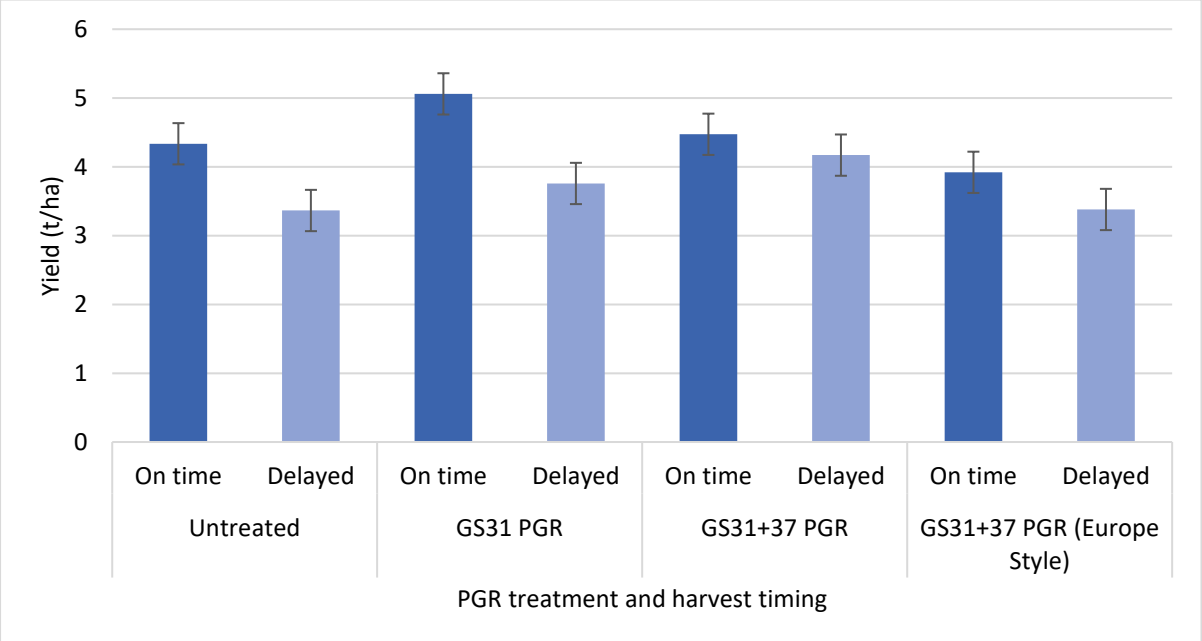

Figure 1. Influence of Harvest Date and PGRs on grain yield (t/ha) in RGT Planet. LSD (P=0.05) = 0.61.

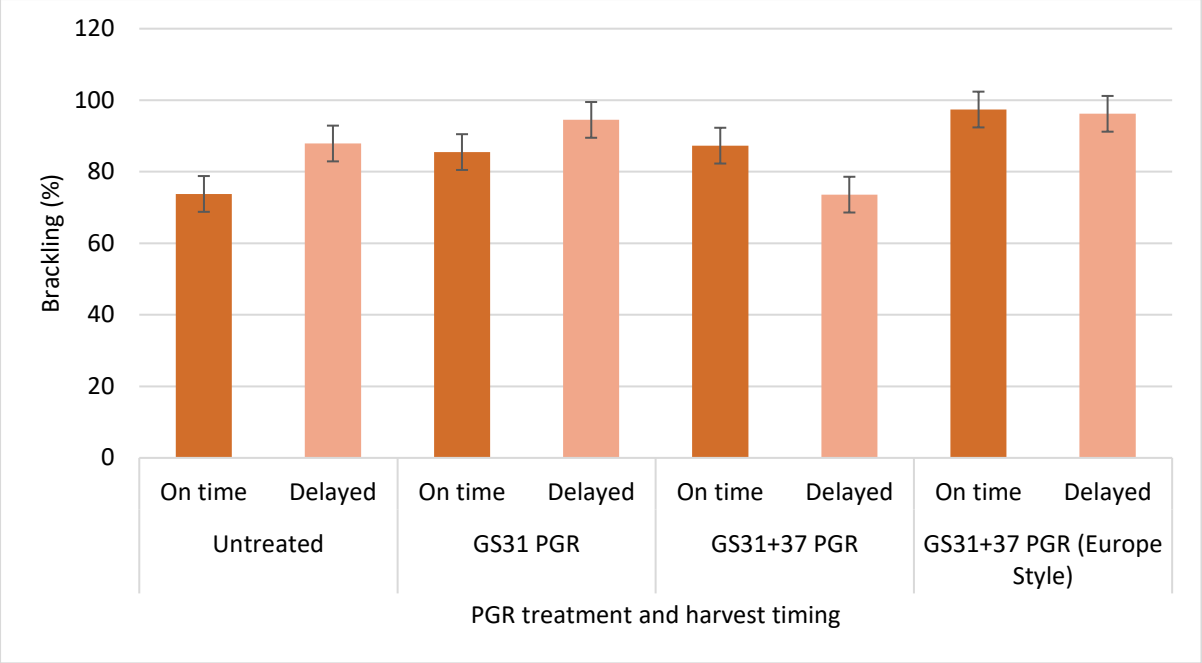

Figure 2. Influence of Harvest Date and PGR's on brackling (%) in RGT Planet. LSD (P=0.05) = 9.86 - 15.27.

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

Sowing date:		**11 May**
Harvest date 1:		**19 December 2022**
Harvest date 2:		**9 January 2023**
Plant population:		180 seeds/m^2
Basal fertiliser:	11 May	100kg MAP (10 N)
Nitrogen:	6 Jul	109 kg N/ha
	23 Aug	217 kg N/ha
PGR:		As per treatment list
Fungicide:	GS31	Prosaro 300 mL/ha
	GS39	Radial 840 mL/ha
	GS61	Opus 500 mL/ha

Trial 6. Nutrition for Hyper Yielding Barley (FAR SAC B22-06-2)

Objectives:

To assess the value of higher nutrition input for barley

Key points:

- Nitrogen rate had mixed results on harvest results where lower nitrogen rates (10N, 60N and 10N+OM) produced some of the highest yields.
- Higher rates of N, which were significantly lower yielding compared to the lower rates, were able to produce higher grain protein but not convert the applied N to extra yield.
- A 3-way split of nitrogen, which included a later GS39 application, was significantly lower yielding (4.72 t/ha) than where a 2-way split of the same N rate was used (5.39 t/ha). The treatment with the extra later timing did produce a significantly higher protein percentage but was no different for any other grain quality parameter.
- Lower N rate treatments tended to be characterised by higher harvest indexes, suggesting that they were better at converting nitrogen to grain.
- As well as having the highest harvest index, the untreated plots also had significantly lower screenings and higher retention than N rates over 110 kg N/ha.
- Through high protein, no treatment was able to achieve malting status, even when no additional N was added.

Table 1. Detailed treatment list (N, P, K and S rate) and yield.

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield	
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	
1	10N	22	---	---	5.42	a
2	60N*	22	---	---	5.41	a
3	110N*	22	---	---	4.65	b
4	160N*	22	---	---	4.45	b
5	210N*	22	---	---	5.39	a
6	260N*	22	---	---	4.19	b
7	210N**	22	---	---	4.72	b
8	160N*+OM	22	---	---	4.40	b
9	160N*+PKS	72	95	29	4.44	b
10	10N+OM	22	---	---	5.43	a
				Mean	4.85	
				LSD (P=0.05)	0.61	
				P-Value	<0.001	

Note: All treatments received 100kg/ha MAP (10N: 22P: 1.5S) which is included in the treatment details.

**Total nitrogen was spilt over two applications, <GS30 (4/7/2022) and GS32 (23/8/2022).*

***Total nitrogen was spilt over three applications, <GS30 (4/7/2022), GS32 (23/8/2022) and GS39 (28/9/2022).*

Table 2. Influence of nitrogen rate on grain quality (protein (%), test weight (kg/hL), retention (%) and screenings (%)).

Treatment		Protein		Test weight		Retention		Screenings	
		%		kg/hL		%		%	
1	10N	12.3	f	69.0	abc	75.9	a	8.0	c
2	60N	12.4	f	69.8	a	69.3	ab	10.1	bc
3	110N	12.9	de	69.0	abc	61.2	bc	14.1	a
4	160N	13.1	bcd	68.4	bcd	62.8	bc	13.2	ab
5	210N	12.8	e	69.1	abc	62.3	bc	12.5	ab
6	260N	13.5	a	67.6	d	61.4	bc	15.2	a
7	210N	13.2	abc	69.1	abc	61.2	bc	14.2	a
8	160N+OM	13.3	ab	67.8	cd	61.3	bc	14.4	a
9	160N+PKS	13.0	cde	68.1	cd	59.8	c	14.3	a
10	10N+OM	12.1	f	69.6	ab	69.3	ab	10.1	bc
	Mean	12.9		68.7		64.5		12.6	
	LSD (P=0.05)	0.3		1.4		8.7		3.6	
	P-Value	<0.001		0.024		0.011		0.003	

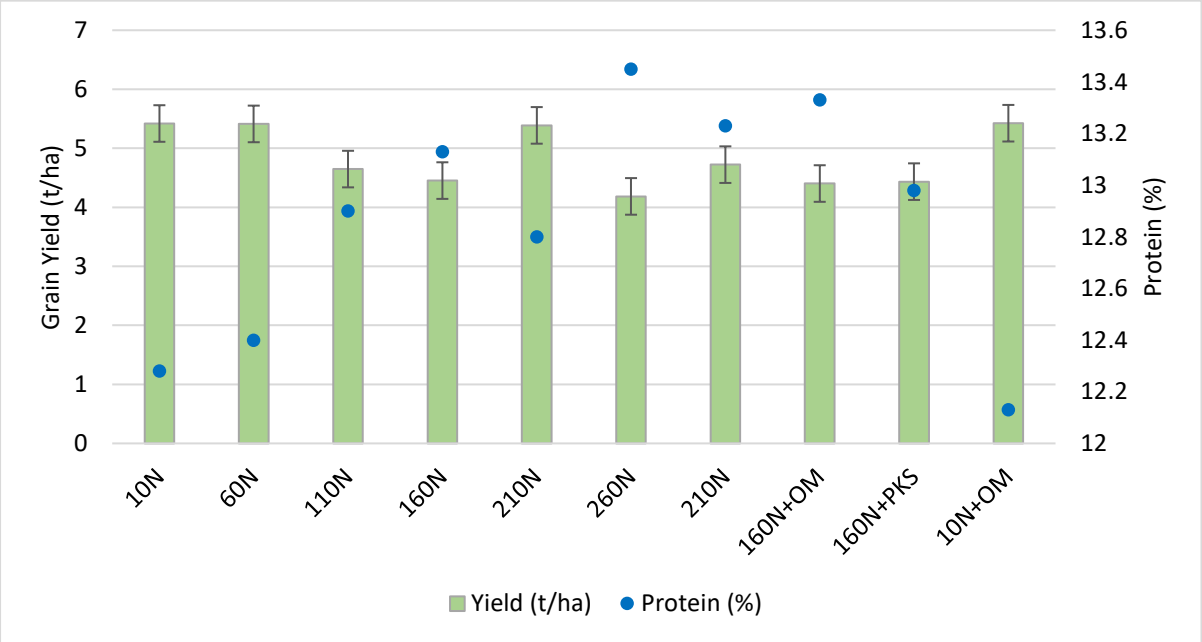

Figure 1. Relationship between nutrition, grain yield (t/ha) and protein (%).

Table 3. Influence of nitrogen rate, manure and synthetic PKS on anthesis biomass (t/ha), harvest biomass (t/ha), head count (heads/m^2) and harvest index (%).

Treatment		Anthesis Biomass		Harvest Biomass		Head count		Harvest Index	
		t/ha		t/ha		heads/m^2		%	
1	10N	7.3	-	10.8	-	655.0	b	43.8	a
2	60N	---	-	11.8	-	738.6	b	39.9	ab
3	110N	---	-	11.2	-	756.8	b	36.4	bc
4	160N	7.1	-	10.5	-	719.0	b	37.4	bc
5	210N	---	-	12.5	-	900.7	a	38.7	bc
6	260N	7.4	-	9.5	-	653.1	b	38.7	bc
7	210N	---	-	11.1	-	745.6	b	37.1	bc
8	160N+OM	7.6	-	11.1	-	741.4	b	34.8	c
9	160N+PKS	7.0	-	10.9	-	754.6	b	35.6	bc
10	10N+OM	8.0	-	12.1	-	754.5	b	39.6	ab
	Mean	7.4		11.1		741.9		38.2	
	LSD (P=0.05)	ns		ns		121.9		4.8	
	P-Value	0.410		0.127		0.025		0.032	

Table 4. Details of the management levels.

Sowing date:		**11 May**
Harvest date:		**19 December**
Variety:		RGT Planet
Seed Rate:		180 seeds/m^2
Sowing Fertiliser:	11 May	100 kg MAP
Nitrogen:		As per treatment list
Fungicide:	GS31	Prosaro 300 mL/ha
	GS65	Aviator Xpro 500 mL/ha

VIC Crop Technology Centre
Gnarwarre, Victoria

Time of Sowing 1: 28 April 2022
Tome of sowing 2: 20 May 2022
Harvested: 20-27 December 2022
Rotation position: 2021 Faba Beans
Soil type: Grey clay loam
Colwell P (ppm) 0-10cm: 110.0
pH ($CaCl_2$) 0-10cm: 5.0
Organic Carbon (%) 0-10cm: 2.4

Trial 2. HYC Barley Elite Screen- Time of sowing 1 (FAR VIC B22-02-1)

Objectives:

To examine the yield potential of new winter and spring germplasm grown under HYC Management packages against spring and winter controls in the traditional late April/early May sowing window.

Key points:

- The average yield across the trial was 7.25 t/ha with the highest yielding variety being the coded InterGrain line IGB1130 (8.45 t/ha), this was also the highest yielding treatment on site.
- There was little difference in yield in the trial with the exception of AGTB0244 which experienced high disease pressure and Newton which is a very slow developing winter barley.
- There were no significant differences in protein and test weight due to variety, however winter varieties Newton and Pixel produced significantly lower retentions and higher screenings compared to the spring varieties.

Table 1. Grain yield (t/ha) and variety type.

	Variety	Type	Grain yield		Harvest Index	
			t/ha		%	
1	RGT Planet	2-Row Spring	7.62	a	49.2	a
2	Rosalind	2-Row Spring	7.91	a	36.3	bc
3	Minotaur (AGTB0213)	2-Row Spring	7.82	a	42.5	ab
4	Laperouse	2-Row Spring	7.23	a	---	---
5	Laureate	2-Row Spring	7.95	a	44.8	ab
6	AGTB0244	2-Row Spring	5.35	b	---	---
7	Fandaga	2-Row Spring	7.79	a	---	---
8	Newton	2-Row Winter	5.31	b	29.6	c
9	Pixel	6-Row Winter	7.09	ab	35.6	bc
10	IGB1130	2-Row Spring	8.45	a	42.3	ab
		Mean	7.25		40.0	
		LSD (P=0.05)	1.87		10.2	
		P-Value	0.019		0.015	

Table 2. Grain quality parameters including protein, test weight, retention and screenings (%, kg/hL).

Variety		Grain yield and quality			
		Protein	Test weight	Retention	Screenings
		%	Kg/hL	%	%
1.	RGT Planet	12.9 -	61.5 -	89.5 a	2.5 b
2.	Rosalind	13.5 -	62.6 -	82.1 a	5.4 b
3.	Minotaur (AGTB0213)	13.0 -	65.0 -	91.0 a	2.2 b
4.	Laperouse	13.6 -	64.6 -	87.1 a	3.2 b
5.	Laureate	13.1 -	59.6 -	83.4 a	4.9 b
6.	AGTB0244	9.8 -	44.5 -	59.0 b	4.5 b
7.	Fandaga	13.2 -	61.5 -	95.5 a	1.4 b
8.	Newton	14.3 -	55.0 -	59.1 b	14.8 a
9.	Pixel	13.4 -	54.9 -	51.5 b	10.8 a
10.	IGB1130	12.2 -	57.9 -	84.0 a	4.9 b
	Mean	12.9	58.7	78.2	5.4
	LSD (P=0.05)	ns	ns	20.6	4.0
	P-Value	0.221	0.165	<0.001	<0.001

Table 3. Trial input and management details (kg, g, mL/ha).

Sowing date:		**28 April**
Harvest date:		**21 December**
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	28 April	100kg MAP (10 N)
Nitrogen:	13 July	109 kg Urea (50 N)
	5 September	217 kg Urea (100 N)
PGR:	GS30	Moddus Evo 200 mL/ha
	GS37	Moddus Evo 200 mL/ha
Fungicide:	GS31	Prosaro 300 mL/ha
	GS39	Radial 840 mL/ha
	GS61	Opus 500 mL/ha

All inputs of insecticides and herbicides were standard across the trial.

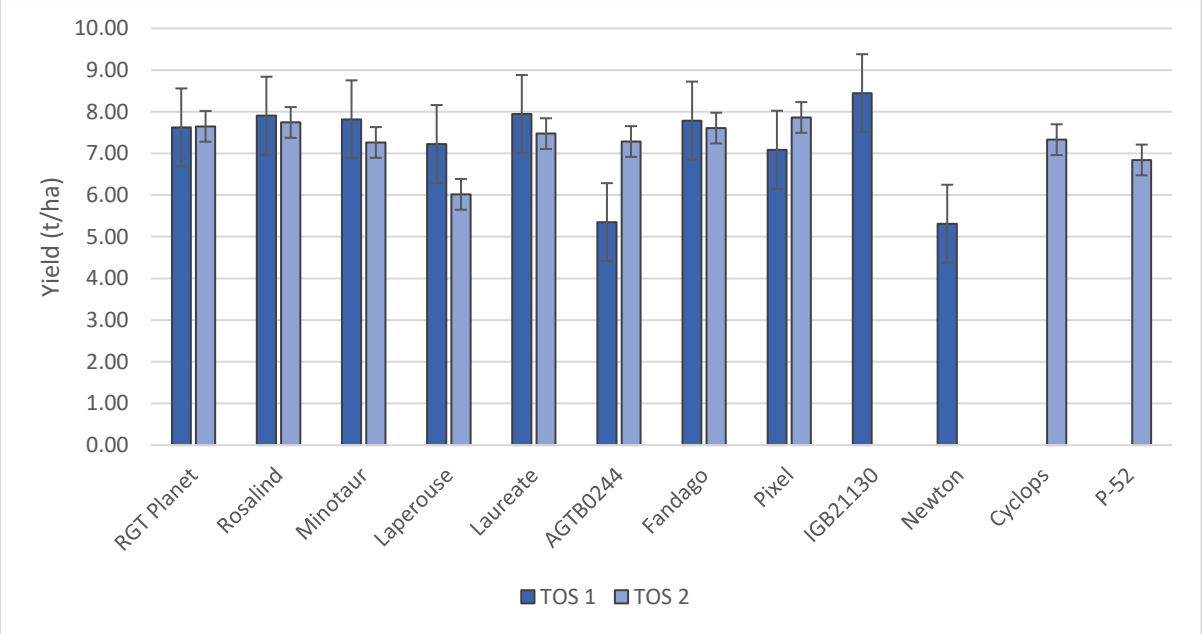

Figure 1. Influence of variety and time of sowing on final grain yield.

Trial 2. HYC Barley Elite Screen - Time of sowing 2 (FAR VIC B22-02-2)

Key points:

- There were mixed results in terms of yield with the highest yielding variety being the winter barley Pixel (7.86 t/ha) and second highest the quick developing spring barley Rosalind (7.74 t/ha) which was not significantly different.
- The high rainfall control of RGT Planet was also high yielding and not significantly different from the top yielding varieties.
- P-52 is a variety being developed to be very similar to RGT Planet with an additional gene for water logging tolerance. It was found to be lower yielding (6.84 t/ha) than the control RGT Planet (7.65 t/ha) despite the site experiencing mild water logging during the wetter than average spring.
- No variety was able to meet malt specifications due to a combination of high protein percentage (average 12.5%) and low test weights (average 61.4 kg/hL).

Table 1. Grain yield (t/ha) and variety type.

	Variety	Type	Grain yield		Harvest Index	
			t/ha		%	
1	RGT Planet	2-Row Spring	7.65	a	50.6	-
2	Rosalind	2-Row Spring	7.74	a	50.5	-
3	Minotaur (AGTB0213)	2-Row Spring	7.26	ab	49.8	-
4	Laperouse	2-Row Spring	6.02	c	---	---
5	Laureate	2-Row Spring	7.48	ab	44.4	-
6	AGTB0244	2-Row Spring	7.29	ab	---	---
7	Fandaga	2-Row Spring	7.61	a	---	---
8	Cyclops	2-Row Winter	7.33	ab	---	---
9	Pixel	6-Row Winter	7.86	a	47.9	-
10	P-52	2-Row Spring	6.84	b	45.4	-
		Mean	7.31		48.1	
		LSD (P=0.05)	0.74		ns	
		P-Value	0.001		0.283	

Table 2. Grain quality parameters including protein, test weight, retention and screenings (%, kg/hL).

Variety		Grain Quality			
		Protein	Test weight	Retention	Screenings
		%	Kg/hL	%	%
1	RGT Planet	12.0 c	61.5 bcd	86.5 abc	4.0 bcd
2	Rosalind	12.6 bc	63.6 ab	87.6 ab	3.0 cd
3	Minotaur (AGTB0213)	12.7 b	64.6 a	91.6 a	2.3 d
4	Laperouse	12.7 b	63.1 abc	85.9 abc	4.1 bcd
5	Laureate	12.6 bc	59.3 de	82.6 bc	5.7 ab
6	AGTB0244	12.1 bc	58.4 e	74.0 d	8.1 a
7	Fandaga	12.5 bc	60.7 cde	90.5 a	2.4 d
8	Cyclops	13.8 a	63.6 ab	80.3 cd	5.6 b
9	Pixel	12.0 c	60.6 cde	88.2 ab	2.1 d
10	P-52	12.2 bc	59.0 de	83.1 bc	5.3 bc
	Mean	12.5	61.4	85.0	4.3
	LSD (P=0.05)	0.6	2.5	6.7	2.5
	P-Value	<0.001	<0.001	<0.001	<0.001

Table 3. Trial input and management details (kg, g, mL/ha).

Sowing date:		**20 May**
Harvest date:		**21 December**
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	20 May	100 kg MAP (10 N)
Nitrogen:	13 July	109 kg Urea (50 N)
	5 September	217 kg Urea (100 N)
PGR:	GS30	Moddus Evo 200 mL/ha
	GS37	Moddus Evo 200 mL/ha
Fungicide:	GS31	Prosaro 300 mL/ha
	GS39	Aviator Xpro 420 mL/ha
	GS61	Radial 840 mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 3. HYC Barley G.E.M Trial Series - Time of sowing 1 (FAR VIC B22-03-1)

Objectives:

To assess the performance of winter and spring barley germplasm managed under four different management intensities (mid-April to early May sown) at two levels of fungicides.

Key points:

- There was no interaction between canopy management and variety and no significant differences between the means of any management in this trial.
- The mean yield of RGT Planet (spring barley) was significantly higher than the two winter barleys in the trial, even at the earlier time of sowing of late April.
- Mixed results were found in grain protein figures with significant differences found but little evidence to suggest it was caused by a particular nitrogen rate.
- No treatment in the trial was able to meet malt standards, especially in the winter barleys which produced particularly high protein and screenings and low test weight and retention.

Table 1. Treatment management details.

Treatment ID	Fungicide	Canopy Intervention	Kg Nitrogen
1. Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	150
2. Standard (Std) Fungicide & PGR	Standard (cheaper)[1,3]	PGR	200
3. Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	150
4. Higher input Fungicide & PGR	Higher input[2,3]	PGR	150
5. Hyper - yield system	Higher input[2,3]	PGR	Extra N 225
6. Dual - purpose system*	Higher input[2,4]	Defoliation	Extra N 225

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Tilt® 250 EC at 500 mL/ha) @GS31 and tebuconazole (Folicur® 430 SC 290 mL/ha) @GS39-49.

[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs with third fungicide if required.

[3]Plant growth regulators (PGR) (Moddus® Evo 200 mL/ha @GS30 & Moddus Evo 200 mL/ha @GS33-37).

[4]Defoliation was done mechanically (mower) prior to the GS30

Table 2. Influence of management strategy and cultivar on grain yield (t/ha).

Management	Cultivar							
	Planet		Madness		Pixel		Mean	
	Yield t/ha		Yield t/ha		Yield t/ha			
1. Std & NI	5.93	-	3.82	-	4.34	-	**4.70**	-
2. Std & PGR	5.98	-	4.13	-	3.91	-	**4.67**	-
3. High & NI	6.98	-	4.83	-	4.81	-	**5.54**	-
4. High & PGR	7.14	-	4.67	-	5.17	-	**5.66**	-
5. Hyper-yield system	6.71	-	4.44	-	4.71	-	**5.28**	-
6. Dual-purpose system	6.68	-	3.68	-	3.83	-	**4.73**	-
Mean	**6.57**	**a**	**4.26**	**b**	**4.46**	**b**		
LSD Cultivar (P=0.05)	0.32				**P-Value**		<0.001	
LSD Management (P=0.05)	ns				**P-Value**		0.272	
LSD Cultivar x Man. (P=0.05)	ns				**P-Value**		0.507	

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

Management	Cultivar							
	Planet		Madness		Pixel		Mean	
	Protein %		Protein %		Protein %			
1. Std & NI	13.6	-	14.4	-	15.7	-	**14.6**	**c**
2. Std & PGR	14.8	-	16.1	-	16.2	-	**15.7**	**a**
3. High & NI	12.7	-	13.8	-	14.2	-	**13.5**	**d**
4. High & PGR	12.6	-	14.1	-	13.7	-	**13.5**	**d**
5. Hyper-yield system	14.4	-	15.6	-	15.9	-	**15.3**	**ab**
6. Dual-purpose system	13.8	-	15.4	-	14.9	-	**14.7**	**bc**
Mean	**13.6**	**b**	**14.9**	**a**	**15.1**	**a**		
LSD Cultivar (P=0.05)	0.36		**P-Value**		<0.001			
LSD Management (P=0.05)	0.61		**P-Value**		<0.001			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.396			

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

Management	Cultivar							
	Planet		Madness		Pixel		Mean	
	Test Weight (kg/hL)		Test Weight (kg/hL)		Test Weight (kg/hL)			
1. Std & NI	56.0	-	48.4	-	36.3	-	**46.9**	**-**
2. Std & PGR	57.6	-	46.1	-	39.7	-	**47.8**	**-**
3. High & NI	59.4	-	53.4	-	43.3	-	**52.0**	**-**
4. High & PGR	59.0	-	48.5	-	46.7	-	**51.4**	**-**
5. Hyper-yield system	58.4	-	48.7	-	41.1	-	**49.4**	**-**
6. Dual-purpose system	57.9	-	44.5	-	40.8	-	**47.7**	**-**
Mean	**58.1**	**a**	**48.3**	**b**	**41.3**	**c**		
LSD Cultivar (P=0.05)	2.35		**P-Value**		<0.001			
LSD Management (P=0.05)	ns		**P-Value**		0.290			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.344			

Table 5. Influence of management strategy and cultivar on retention (% >2.2 mm).

Management	Cultivar							
	Planet		Madness		Pixel		Mean	
	Retention % >2.2 mm		Retention % >2.2 mm		Retention % >2.2 mm			
1. Std & NI	79.8	-	34.0	-	18.9	-	**44.2**	**c**
2. Std & PGR	81.9	-	28.3	-	24.9	-	**45.0**	**bc**
3. High & NI	88.4	-	50.9	-	32.5	-	**57.3**	**a**
4. High & PGR	88.7	-	44.1	-	38.4	-	**57.1**	**a**
5. Hyper-yield system	87.2	-	38.9	-	29.8	-	**52.0**	**ab**
6. Dual-purpose system	85.5	-	40.7	-	42.9	-	**56.4**	**a**
Mean	**85.2**	**a**	**39.5**	**b**	**31.2**	**b**		
LSD Cultivar (P=0.05)	4.65		**P-Value**		<0.001			
LSD Management (P=0.05)	7.36		**P-Value**		0.003			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.236			

Table 6. Influence of management strategy and cultivar on screenings (% <2.2 mm).

Management	Cultivar							
	Planet		Madness		Pixel		Mean	
	Screenings % <2.2 mm		Screenings % <2.2 mm		Screenings % <2.2 mm			
1. Std & NI	6.4	-	35.7	-	45.5	-	**29.2**	**-**
2. Std & PGR	5.6	-	40.7	-	39.7	-	**28.7**	**-**
3. High & NI	3.6	-	20.0	-	26.1	-	**16.6**	**-**
4. High & PGR	3.9	-	28.4	-	22.0	-	**18.1**	**-**
5. Hyper-yield system	4.6	-	30.4	-	34.2	-	**23.1**	**-**
6. Dual-purpose system	5.0	-	35.5	-	28.5	-	**23.0**	**-**
Mean	**4.9**	**b**	**31.8**	**a**	**32.7**	**a**		
LSD Cultivar (P=0.05)			4.75		**P-Value**		<0.001	
LSD Management (P=0.05)			ns		**P-Value**		0.065	
LSD Cultivar x Man. (P=0.05)			ns		**P-Value**		0.179	

Table 7. Trial input and management details.

Sowing date:		**28 April**	
Harvest date:		**27 December**	
Plant population:		As per treatment list	
Basal fertiliser:	28 Apr	100kg MAP (10 N)	
Nitrogen:		As per treatment list	
PGR:		**PGR**	**Untreated**
	GS30	Moddus Evo 0.20 L/ha	----
	GS33	Moddus Evo 0.20 L/ha	----
Fungicide:		**Standard Input**	**High Input**
	GS00	----	Systiva
	GS31	Tilt 0.50 L/ha	Prosaro 0.30 L/ha
	GS39	Folicur 0.29 L/ha	Aviator Xpro 0.50 L/ha
	GS59	----	Opus 0.50 L/ha

Trial 3. HYC Barley G.E.M Trial series - Time of sowing 2 (FAR VIC B22-03-2)

Key Points:

- In keeping with the earlier time of sowing, there was no interaction between canopy management and variety, however there were significant interactions in management and variety separately.
- Overall RGT Planet was the lowest yielding (6.68 t/ha) when compared to Rosalind (7.16 t/ha) and Laureate (6.69 t/ha) which were both significantly higher yielding.
- The highest yielding management practice resulted from higher fungicide inputs when used in conjunction with PGR applications, however this treatment was not significantly higher yielding to other treatments where PGRs had also been used.
- There was a yield penalty for the dual-purpose system where dry matter was removed prior to the start of stem elongation.

Table 1. Treatment management details.

Treatment ID	Fungicide	Canopy Intervention	Kg Nitrogen
1. Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	150
2. Standard (Std) Fungicide & PGR	Standard (cheaper)[1,3]	PGR	150
3. Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	150
4. Higher input Fungicide & PGR	Higher input[2,3]	PGR	150
5. Hyper - yield system	Higher input[2,3]	PGR	Extra N 225
6. Dual - purpose system*	Higher input[2,4]	Defoliation	Extra N 225

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Tilt® 250 EC at 500 mL/ha) @GS31 and tebuconazole (Folicur® 430 SC 290 mL/ha) @GS39-49.

[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs) with third fungicide if required.

[3]Plant growth regulators (PGR) (Moddus® Evo 200 mL/ha @GS30 & Moddus Evo 200 mL/ha @GS33-37).

[4]Defoliation was done mechanically (mower) prior to the GS30

Table 2. Influence of management strategy and cultivar on grain yield (t/ha).

Management	Cultivar							
	Planet		**Rosalind**		**Laureate**		**Mean**	
	Yield t/ha		**Yield t/ha**		**Yield t/ha**			
1. Std & NI	6.35	-	6.75	-	6.30	-	**6.47**	**c**
2. Std & PGR	6.68	-	7.63	-	7.14	-	**7.15**	**ab**
3. High & NI	6.62	-	6.76	-	6.98	-	**6.78**	**bc**
4. High & PGR	7.25	-	7.84	-	7.35	-	**7.48**	**a**
5. Hyper-yield system	6.78	-	7.40	-	7.26	-	**7.14**	**ab**
6. Dual-purpose system	6.43	-	6.56	-	6.74	-	**6.58**	**c**
Mean	**6.68**	**b**	**7.16**	**a**	**6.96**	**a**		
LSD Cultivar (P=0.05)	0.21		**P-Value**		<0.001			
LSD Management (P=0.05)	0.37		**P-Value**		<0.001			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.280			

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

Management	Cultivar							
	Planet		Rosalind		Laureate		Mean	
	Protein %		Protein %		Protein %			
1. Std & NI	12.9	-	13.6	-	13.1	-	**13.2**	**bc**
2. Std & PGR	12.6	-	13.3	-	13.3	-	**13.1**	**c**
3. High & NI	12.3	-	13.1	-	13.3	-	**12.9**	**c**
4. High & PGR	12.5	-	13.2	-	13.1	-	**12.9**	**c**
5. Hyper-yield system	13.8	-	14.1	-	14.1	-	**14.0**	**a**
6. Dual-purpose system	13.4	-	14.1	-	14.1	-	**13.9**	**ab**
Mean	**12.9**	**b**	**13.6**	**a**	**13.5**	**a**		
LSD Cultivar (P=0.05)	0.27		**P-Value**		<0.001			
LSD Management (P=0.05)	0.72		**P-Value**		0.014			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.861			

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

Management	Cultivar							
	Planet		Rosalind		Laureate		Mean	
	Test Weight (kg/hL)		Test Weight (kg/hL)		Test Weight (kg/hL)			
1. Std & NI	60.6	-	63.9	-	62.2	-	**62.2**	**-**
2. Std & PGR	61.3	-	64.5	-	61.2	-	**62.4**	**-**
3. High & NI	62.4	-	64.2	-	63.4	-	**63.3**	**-**
4. High & PGR	62.5	-	64.9	-	62.4	-	**63.3**	**-**
5. Hyper-yield system	61.5	-	63.9	-	61.8	-	**62.4**	**-**
6. Dual-purpose system	61.6	-	63.2	-	62.7	-	**62.5**	**-**
Mean	**61.6**	**b**	**64.1**	**a**	**62.3**	**b**		
LSD Cultivar (P=0.05)	0.90		**P-Value**		<0.001			
LSD Management (P=0.05)	ns		**P-Value**		0.536			
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.811			

Table 5. Influence of management strategy and cultivar on retention (% >2.2 mm).

Management	Cultivar							
	Planet		**Rosalind**		**Laureate**		**Mean**	
	Retention % >2.2 mm		**Retention % >2.2 mm**		**Retention % >2.2 mm**			
1. Std & NI	79.8	-	34.0	-	18.9	-	**81.9**	**-**
2. Std & PGR	81.9	-	28.3	-	24.9	-	**79.7**	**-**
3. High & NI	88.4	-	50.9	-	32.5	-	**85.4**	**-**
4. High & PGR	88.7	-	44.1	-	38.4	-	**83.6**	**-**
5. Hyper-yield system	87.2	-	38.9	-	29.8	-	**78.5**	**-**
6. Dual-purpose system	85.5	-	40.7	-	42.9	-	**80.8**	**-**
Mean	**82.0**	**-**	**80.5**	**-**	**82.5**	**-**		
LSD Cultivar (P=0.05)		ns	**P-Value**		0.394			
LSD Management (P=0.05)		ns	**P-Value**		0.136			
LSD Cultivar x Man. (P=0.05)		ns	**P-Value**		0.862			

Table 6. Influence of management strategy and cultivar on screenings (% <2.2 mm).

Management	Cultivar							
	Planet		**Rosalind**		**Laureate**		**Mean**	
	Screenings % <2.2 mm		**Screenings % <2.2 mm**		**Screenings % <2.2 mm**			
1. Std & NI	7.3	-	4.1	-	5.0	-	**5.5**	**-**
2. Std & PGR	5.6	-	5.0	-	6.6	-	**5.7**	**-**
3. High & NI	3.3	-	4.1	-	4.0	-	**3.8**	**-**
4. High & PGR	4.6	-	3.8	-	4.9	-	**4.5**	**-**
5. Hyper-yield system	6.2	-	6.1	-	6.2	-	**6.1**	**-**
6. Dual-purpose system	5.2	-	6.4	-	5.0	-	**5.5**	**-**
Mean	**5.4**	**-**	**4.9**	**-**	**5.3**	**-**		
LSD Cultivar (P=0.05)		ns	**P-Value**		0.767			
LSD Management (P=0.05)		ns	**P-Value**		0.229			
LSD Cultivar x Man. (P=0.05)		ns	**P-Value**		0.739			

Table 7. Trial input and management details (kg, g, mL/ha).

Sowing date:		**20 May**	
Harvest date:		**27 December**	
Plant population:		As per treatment list	
Basal fertiliser:	20 May	100kg MAP (10 N)	
Nitrogen:		As per treatment list	
PGR:		**PGR**	**Untreated**
	GS30	Moddus Evo 0.20 L/ha	----
	GS33	Moddus Evo 0.20 L/ha	----
Fungicide:		**Standard Input**	**High Input**
	GS00	----	Systiva
	GS31	Tilt 0.50 L/ha	Prosaro 0.30 L/ha
	GS39	Folicur 0.29 L/ha	Aviator Xpro 0.50 L/ha
	GS59	----	Opus 0.50 L/ha

Trial 4. HYC Barley Disease Management (FAR VIC B22-04-2)

Objectives:
To develop profitable and sustainable approaches to disease management in HRZ barley.

Key points:

- The dominant barley disease found on site was Net Form of Net Blotch (NFNB), to which RGT Planet is rated SVS.
- When assessed on the 12 of October, NFNB levels were highest on the Flag-1 leaf layer (the most important leaf in barley for contributing to yield) in the untreated or where only a single GS30 fungicide had been used.
- Disease scores closely corelated with final grain yields with treatments 2, 3 and 7 showing some of the best NFNB control and some of the highest yielding plots.
- The single spray treatments yielded the least out of managements with a fungicide and indicate that in high disease pressure environments with a susceptible variety, a minimum of a 2-spray program is required.

Treatments: 15 Fungicide management strategies (cultivar- RGT Planet).

Table 1. Influence of fungicide management on grain yield (t/ha).

	Treatment				Yield		% of mean
	GS00	**GS30**	**GS39-49**	**GS59**	t/ha		%
1	---	---	---	---	5.80	e	89.9
2	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha		6.96	ab	107.8
3	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha	Opus 500 mL/ha	6.83	ab	105.9
4	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha		6.76	ab	104.8
5	---	---	Aviator Xpro 420 mL/ha		6.72	b	104.2
6	---	Prosaro 300 mL/ha	FAR F1-19 750 mL/ha		6.68	b	103.5
7	---	FAR F1-19 750 mL/ha	Radial 840 mL/ha		7.13	a	110.6
8	---	Prosaro 300 mL/ha	----		6.26	cd	97.0
9	--	Tilt 500 250 mL/ha	----		6.09	de	94.3
10	Systiva	---	Radial 840 mL/ha	---	6.76	ab	104.8
11	---	Prosaro 300 mL/ha	Radial 840 mL/ha	---	6.64	bc	103.0
12	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	6.86	ab	106.4
13	---	Aviator Xpro 420 mL/ha	Radial 840 mL/ha		6.99	ab	108.3
14	---	Prosaro 150 mL/ha	Radial 420 mL/ha		6.87	ab	106.5
15	Systiva	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	6.72	b	104.1
				Mean	6.67		103.4
				LSD (P=0.05)	0.38		6.0
				P-Value	<0.001		<0.001

Table 2. Influence of fungicide management on grain quality.

Trt.	Protein	Test weight	Retention	Screenings
	%	kg/hL	%	%
1	13.3 -	57.5 f	76.5 g	8.5 a
2	12.2 -	61.3 ab	88.9 abc	3.3 e
3	12.6 -	61.1 ab	88.5 abc	3.5 de
4	12.8 -	60.5 a-d	86.2 a-e	4.7 cde
5	12.8 -	59.5 cd	84.1 cde	5.0 b-e
6	12.6 -	60.0 a-d	85.1 a-e	4.9 b-e
7	12.3 -	61.4 a	89.9 a	3.3 de
8	12.9 -	59.6 cd	83.6 de	5.1 b-e
9	12.9 -	58.0 ef	78.8 fg	6.9 ab
10	12.8 -	59.1 de	82.1 ef	5.9 bc
11	12.4 -	61.0 abc	88.0 a-d	3.6 de
12	12.7 -	60.1 a-d	84.5 b-e	5.4 bcd
13	12.6 -	61.2 ab	89.0 ab	3.5 de
14	12.5 -	60.9 abc	87.6 a-d	3.8 de
15	12.9 -	59.9 bcd	85.0 b-e	4.9 b-e
Mean	12.7	60.1	85.2	4.8
LSD (P=0.05)	ns	1.5	4.8	2.1
P-Value	0.099	<0.001	<0.001	<0.001

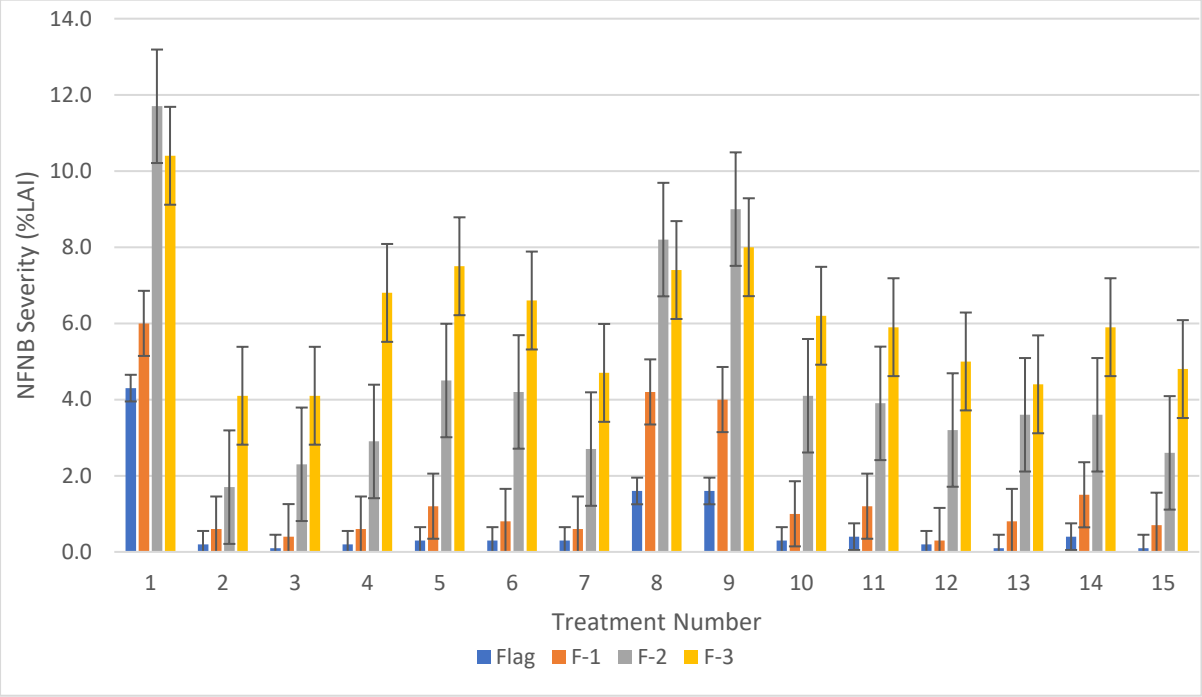

Figure 1. The severity of net form of net blotch (NFNB) 12 October, GS50.

Table 3. Details of the management levels.

Varieties:		**RGT Planet**
Sowing date:		**20 May**
Harvest date:		**20 December**
Seed Rate:		180 seeds/m^2
Sowing Fertiliser:		100 kg MAP/ha
Seed Treatment:		As per treatment list
Nitrogen:	13 July	109 kg Urea (50 N)
	5 September	217 kg Urea (100 N)
Fungicide:		As per treatment list

Trial 5. HYC PGR x harvest date trial - Time of sowing 1 (FAR VIC B22-05-1)

Objectives:
To assess the value of PGRs with delayed harvest in HRZ regions

Key points:

- Conducted in the winter barley variety Pixel, there was no interaction between harvest date and PGR management for grain harvest.
- There was significantly more lodging when the harvester returned 19 days after the first on-time harvest date.
- Where a split application recorded the lowest amount of lodging at the first harvest timing, it was significantly more lodged compared to the other PGR managements at harvest date 2.
- Ethephon (Promote 1000), a much more robust growth regulant when applied at the later GS37 timing, was the most successful management when used in conjunction with Moddus Evo at GS31 *by* reducing lodging at the second harvest date as well as crop height (Figure 1).
- In relation to brackling and head loss, although there was no interaction with PGR management, it was found that there were increased levels of both at the later harvest date.

Treatments: 4 plant growth regulator (PGR) management approaches applied to Pixel, to be harvested at two harvest dates. PGRs are applied at either 1, or 2 growth stages.
Harvest Date 1 (On time): 20 December 2022
Harvest date 2 (Delayed): 8 January 2023

Table 1. Growth stage timings and rates of plant growth regulators.

Treatment ID	GS31	GS37
Untreated	---	---
GS31 PGR	Moddus Evo 400 mL/ha	---
GS31+GS37 PGR	Moddus Evo 200 mL/ha	Moddus Evo 200 mL/ha
GS31+GS37 Euro PGR	Moddus Evo 200 mL/ha	Promote 1000 360 mL/ha

Table 2. The effect of PGRs and HD on grain yield (t/ha), lodging index (0-500), brackling (%), and head loss (heads/m^2).

	Grain Yield		Lodging Index		Brackling		Head Loss	
	t/ha		0-500		%		heads/m^2	
HD 1								
Untreated	5.26	-	45.0	cd	80.0	-	3.9	-
GS31 PGR	4.49	-	47.5	cd	75.0	-	2.2	-
GS31+GS37 PGR	5.49	-	25.0	d	66.3	-	4.5	-
GS31+GS37 Euro PGR	5.15	-	45.0	cd	81.3	-	3.9	-
Mean	**5.10**	**-**	**40.6**	**b**	**75.6**	**b**	**3.6**	**b**
HD 2								
Untreated	5.07	-	175.0	b	100.0	-	24.5	-
GS31 PGR	3.91	-	202.5	b	100.0	-	12.8	-
GS31+GS37 PGR	5.06	-	255.0	a	100.0	-	14.5	-
GS31+GS37 Euro PGR	5.03	-	95.0	c	100.0	-	15.0	-
Mean	**4.77**	**-**	**181.9**	**a**	**100.0**	**a**	**16.7**	**a**
Grand Mean	**4.93**		**111.3**		**87.8**		**10.1**	
LSD (P=0.05) PGR	ns		37.1		ns		ns	
LSD (P=0.05) Harvest Date	ns		93.3		8.8		4.4	
LSD (P=0.05) PGR x HD	ns		52.4		ns		ns	
P-Value PGR	0.081		0.006		0.077		0.256	
P-Value Harvest Date	0.171		0.017		0.003		0.003	
P-Value PGR x HD	0.947		0.001		0.077		0.356	

Table 3. The effect of PGRs and HD on grain quality parameters.

	Protein		Test Weight		Retention		Screenings	
	%		Kg/hL		%		%	
HD 1								
Untreated	14.0	-	46.3	-	33.2	-	26.0	-
GS31 PGR	14.7	-	44.0	-	28.7	-	35.2	-
GS31+GS37 PGR	13.8	-	46.5	-	34.8	-	28.4	-
GS31+GS37 Euro PGR	14.4	-	43.9	-	27.8	-	34.8	-
Mean	**14.2**	**-**	**45.2**	**b**	**31.1**	**-**	**31.1**	**-**
HD 2								
Untreated	13.3	-	50.6	-	40.2	-	20.3	-
GS31 PGR	14.5	-	46.7	-	22.9	-	37.5	-
GS31+GS37 PGR	13.6	-	50.8	-	35.7	-	25.1	-
GS31+GS37 Euro PGR	13.7	-	51.7	-	40.3	-	21.7	-
Mean	**13.8**	**-**	**49.9**	**a**	**34.8**	**-**	**26.2**	**-**
Grand Mean	**14.0**		**47.5**		**33.0**		**28.6**	
LSD (P=0.05) PGR	0.6		ns		ns		8.0	
LSD (P=0.05) Harvest Date	ns		4.7		ns		ns	
LSD (P=0.05) PGR x HD	ns		ns		ns		ns	
P-Value PGR	0.009		0.169		0.059		0.018	
P-Value Harvest Date	0.209		0.049		0.466		0.280	
P-Value PGR x HD	0.603		0.435		0.159		0.275	

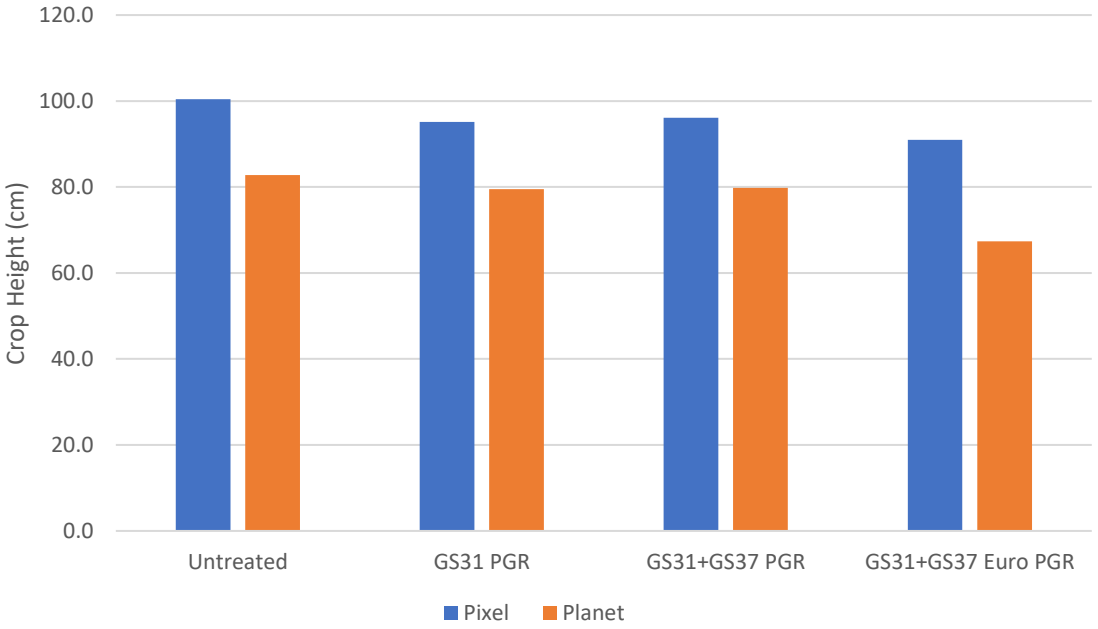

Figure 1. The impact of PGR on crop height (cm) by treatment and variety (p>0.05).

Table 4. Trial input and management details.

Sowing date:		**28 April**
Harvest date:		**20 December & 8 January**
Variety:		Pixel
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	28 April	100 kg MAP (10 N)
Nitrogen:	13 July	109 kg Urea (50 N)
	5 September	217 kg Urea (100 N)
Fungicide:	30 September	Prosaro 300 mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 5. HYC PGR x harvest date trial - Time of sowing 2 (FAR VIC B22-05-2)

Treatments: 4 plant growth regulator (PGR) management approaches applied to RGT Planet, to be harvested at two harvest dates. PGRs are applied at either 1 or 2 growth stages.

Key points:

- Unlike at the earlier sown PGR x harvest date trial, there was significant interaction between the two factors on yield.
- There were significant yield improvements with the Moddus Evo based treatments at the earlier harvest date compared to the same managements harvested 19 days later.
- There was no difference between the untreated management and the European styled management between harvest date 1 and 2, this was despite generally higher lodging and head loss at the later harvest date.
- There was no impact on any grain quality parameters from any management in this trial.

Harvest Date 1 (On time): 20 December 2022
Harvest date 2 (Delayed): 8 January 2023

Table 1. Growth stage timings and rates of plant growth regulators.

Treatment ID	GS31	GS37
Untreated	---	---
GS31 PGR	Moddus Evo 400 mL/ha	---
GS31+GS37 PGR	Moddus Evo 200 mL/ha	Moddus Evo 200 mL/ha
GS31+GS37 Euro PGR	Moddus Evo 200 mL/ha	Promote 1000 360 mL/ha

Table 2. The effect of PGRs and HD on grain yield (t/ha), lodging index (0-500) and head loss (heads/m^2).

	Grain Yield		Lodging Index		Head Loss	
	t/ha		0-500		heads/m^2	
HD 1						
Untreated	6.24	b	20.0	-	5.6	-
GS31 PGR	7.09	a	27.5	-	3.9	-
GS31+GS37 PGR	7.11	a	18.8	-	1.1	-
GS31+GS37 Euro PGR	6.89	ab	7.5	-	1.7	-
Mean	**6.83**	**a**	**18.4**	**b**	**3.0**	**b**
HD 2						
Untreated	6.73	ab	117.5	-	30.5	-
GS31 PGR	6.32	b	70.0	-	15.6	-
GS31+GS37 PGR	6.25	b	70.0	-	14.4	-
GS31+GS37 Euro PGR	6.90	ab	50.0	-	9.5	-
Mean	**6.55**	**b**	**76.9**	**a**	**17.5**	**a**
Grand Mean	6.69		47.7		10.3	
LSD (P=0.05) PGR	ns		26.8		7.0	
LSD (P=0.05) Harvest Date	0.18		31.0		5.9	
LSD (P=0.05) PGR x HD	0.68		ns		ns	
P-Value PGR	0.386		0.042		0.008	
P-Value Harvest Date	0.015		0.009		0.004	
P-Value PGR x HD	0.025		0.131		0.092	

Table 3. The effect of PGRs and HD on grain quality parameters.

	Protein		Test Weight		Retention		Screenings	
	%		Kg/hL		%		%	
HD 1								
Untreated	12.2	-	59.4	-	80.1	-	7.1	-
GS31 PGR	12.2	-	60.7	-	83.8	-	5.8	-
GS31+GS37 PGR	12.4	-	60.4	-	84.7	-	5.6	-
GS31+GS37 Euro PGR	11.9	-	61.1	-	87.6	-	4.2	-
Mean	**12.2**	**-**	**60.4**	**-**	**84.1**	**-**	**5.7**	**-**
HD 2								
Untreated	11.7	-	63.0	-	88.9	-	3.2	-
GS31 PGR	12.2	-	57.5	-	74.8	-	10.6	-
GS31+GS37 PGR	12.2	-	58.3	-	72.3	-	10.8	-
GS31+GS37 Euro PGR	12.0	-	60.4	-	85.7	-	4.8	-
Mean	**12.0**	**-**	**59.8**	**-**	**80.4**	**-**	**7.3**	**-**
Grand Mean	**12.1**		**60.1**		**82.2**		**6.5**	
LSD (P=0.05) PGR	ns		ns		ns		ns	
LSD (P=0.05) Harvest Date	ns		ns		ns		ns	
LSD (P=0.05) PGR x HD	ns		ns		ns		ns	
P-Value PGR	0.406		0.369		0.169		0.172	
P-Value Harvest Date	0.610		0.669		0.485		0.446	
P-Value PGR x HD	0.740		0.116		0.082		0.122	

Table 4. Trial input and management details.

Sowing date:		**20 May**
Harvest date:		**20 December & 8 January**
Variety:		RGT Planet
Plant population:		180 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	20 May	100 kg MAP (10 N)
Nitrogen:	13 July	109 kg Urea (50 N)
	5 September	217 kg Urea (100 N)
Fungicide:	17 August	Prosaro 300 mL/ha
	30 September	Aviator 420 mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 6. Nutrition for Hyper Yielding Barley (FAR VIC B22-06-2)

Objectives:

To assess the value of higher nutrition input for barley.

Key points:

- Nitrogen rate had no significant difference on yield with a trial average of 5.89 t/ha and plots with no in-season applications of N still averaging 5.79 t/ha.
- No treatment in the trial was able to achieve malt standards. 60N and 110N treatments were able to produce protein levels above 9% and below 12% however no treatment was able to give test weights above 65.0 kg/hL.
- There was a strong rate response of protein to nitrogen rate between 10N and 210N, however there was no increase in yield associated with this. There was also no significant response in grain protein to nitrogen rate over the 210N rate.
- Given an untreated yield of 5.79 t/ha and a grain protein of 8.7%, we can rough/y determine that 88.4 kg N/ha is found in the grain at harvest. Assuming 25% on the N at harvest is located in the straw and chaff, then a total of 117.8 kg N/ha was removed by the crop.

Table 1. Detailed treatment list, grain yield (t/ha) & % site Mean.

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield	Mean
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	%
1	10N	22	---	---	5.79 -	98.3
2	60N	22	---	---	5.96 -	101.1
3	110N	22	---	---	6.04 -	102.4
4	160N	22	---	---	5.96 -	101.2
5	210N	22	---	---	5.96 -	101.2
6	260N	22	---	---	5.36 -	91.0
7	210N-Split	22	---	---	6.12 -	103.9
8	160N+M	22	---	---	5.77 -	97.8
9	160N+PKS	72	95	29	6.02 -	102.1
10	10N+M	22	---	---	5.95 -	100.9
				Mean	5.89	100.0
				LSD (P=0.05)	ns	ns
				P-Value	0.233	0.231

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.
**Manure applied at a rate of 5 t/ha.*

Table 2. Influence of nitrogen rate on grain quality (protein (%), test weight (kg/hL) and screenings (%)).

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein	Test weight	Screenings
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	%	kg/hL	%
1	10	22	---	---	8.7 f	61.2 -	82.9 -
2	60	22	---	---	9.8 e	61.0 -	82.3 -
3	110	22	---	---	10.8 d	61.3 -	80.0 -
4	160	22	---	---	12.3 c	60.0 -	81.0 -
5	210	22	---	---	13.2 ab	60.1 -	74.3 -
6	260	22	---	---	13.7 a	59.7 -	76.8 -
7	210 Split	22	---	---	13.3 ab	61.9 -	82.6 -
8	160+M	22	---	---	13.2 ab	59.2 -	61.8 -
9	160+PKS	72	95	29	12.8 bc	60.1 -	79.3 -
10	10+M	22	---	---	9.7 e	62.1 -	78.3 -
				Mean	11.7	60.6	77.9
				LSD (P=0.05)	0.8	ns	ns
				P-Value	<0.001	0.438	0.111

Table 3. Influence of nitrogen rate, manure and synthetic PKS on harvest dry matter (t/ha), harvest index (%) and thousand seed weight (g).

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Harvest Dry Matter	Harvest Index
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	%
1	10	22	---	---	13.6 -	38.2 -
2	60	22	---	---	14.6 -	35.9 -
3	110	22	---	---	16.6 -	32.1 -
4	160	22	---	---	16.3 -	32.0 -
5	210	22	---	---	15.7 -	34.5 -
6	260	22	---	---	16.3 -	29.2 -
7	210 Split	22	---	---	15.9 -	33.8 -
8	160+M	22	---	---	15.8 -	33.5 -
9	160+PKS	72	95	29	15.7 -	35.0 -
10	10+M	22	---	---	15.3 -	34.2 -
				Mean	15.6	33.8
				LSD (P=0.05)	ns	ns
				P-Value	0.747	0.577

Table 4. Site soil test details.

Soil Tests	Level Found
EC	1.4 dS/m
Organic Carbon W&B	2.4%
pH 1:5 water	5.7
Total Mineral N*	172.7kg soil mineral N/ha
Colwell Phosphorus	110 ppm
Available Potassium	180 ppm
KCl Sulfur	14 ppm

*Mineral N 0-60cm, all other results 0-10cm depth sampled 30/5/2022

Table 5. Trial input and management details.

Sowing date:		**20 May**
Harvest date:		**27 December**
Variety:		RGT Planet
Plant population:		180 seeds/m^2
Basal fertiliser:	20 May	100 kg MAP (10 N)
Nitrogen:		As per treatment list
Fungicide:	17 August	Prosaro 300 mL/ha
	30 September	Aviator Xpro 420 mL/ha

WA Crop Technology Centre
Frankland River, Western Australia

Sown: 20th & 21st April 2022
Harvested: 22-23rd November and 20th December
Rotation position: 1st Cereal after canola
Soil type: Forest gravel loam

Table 1. Overall crop nutrition farm application.

Date	Product	Rate/ha	Placement
21 April	MAP	139 kg	IBS
31 May	Urea	120 kg	Farm spread
	MOP	40 kg	
30 June	Urea	70 kg	Farm spread

Table 2. Overall crop protection farm application.

Date	Product	Rate/ha	Placement
11 April	Logran	10 g	Farm Sprayed
	Voraxor	240 mL	
	Glyphosate	1.5 L	
15 June	Manganese	2 kg	Broadleaf
	Jaguar	1 L	
	Trojan	10 mL	
29 August	Epoxiconazole	400 mL	Farm Sprayed
	Trojan	10 mL	
	Copper	250 g	
9 November	Glyphosate	2 L	Hand Sprayed

All seed was treated with 180 mL/100kg Vibrance (66g/L difenoconazole + 16.5g/L metalaxyl-M + 13.8g/L sedaxane) and 330 mL/100kg Cruiser Opti (210g/L Thiamethoxam + 37.5g/L Lambda-Cyhalothrin) and was packed (based on germination (%) and grain weight) to sow at a rate of 200 seeds/m^2 (equivalent to 70-90kg/ha seeding rate). The trial was sown at approximately 3cm depth on 20 April 2022 into wet topsoil with 139kg/ha of a blend of MAP and MOP banded at seeding to apply a total of 11N, 24P, 20K and 2S.

Trial 2. HYC Barley Elite Screen (FAR WAA B22-02)

Objective:

To examine the yield potential of new winter and spring barley germplasm grown under HYC Management packages against spring and winter controls in the traditional Anzac Day sowing window (sown 20 April).

Key Points:

- Cultivar had a significant effect on phenology, yield, grain quality and disease resistance.
- In spring cultivars, late booting (GS49) ranged from the 23 July (Leabrook) to the 25 August (Laureate and IGB21130), with the two winter varieties flowering on the 17 September and 5 October, 74 days after Leabrook.
- Newton (a two-row winter variety) and Pixel (a six-row winter variety) were some of the top yielding germplasms, 6.09 t/ha and 5.49 t/ha respectively.
- Of the spring varieties, a new InterGrain cultivar (IGB21130) produced the highest yield of 5.77 t/ha.
- Spring barleys which flowered after mid-August produced a significantly higher yield than faster-maturing varieties.
- Protein percentage also varied greatly between cultivars, with the winters having significantly lower levels (9.1% and 9.3%), and with a trend of lower yielding varieties having a higher protein percentage.
- Net Form Net Blotch (NFNB) and Spot Form Net Blotch (SFNB) were assessed throughout the season, with RGT Planet and Zena CL having significantly higher infection levels.

Table 1. Cultivar effect on the late booting period (GS49), days after sowing (DAS) and the interaction with yield (t/ha). (S) indicates and spring cultivar and (W) indicates a winter cultivar.

Cultivar	GS49*	DAS	Yield (t/ha)	
RGT Planet (S)	2-Aug	104	4.63	fgh
Rosalind (S)	2-Aug	104	5.08	cde
Minotaur (S)	11-Aug	113	4.97	def
Laperouse (S)	9-Aug	111	4.24	hi
Laureate (S)	25-Aug	127	5.25	cd
AGTB0244 (S)	20-Aug	122	5.35	bcd
Fandaga (S)	3-Aug	105	3.85	i
Newton (W)	5-Oct	168	6.09	a
Pixel (W)	17-Sep	150	5.49	bc
Leabrook (S)	23-Jul	94	4.36	gh
Cyclops (S)	30-Jul	101	4.71	efg
IGB21130 (S)	25-Aug	127	5.77	ab
Zena Cl (S)	2-Aug	104	4.94	def
FireFoxx (S)	29-Jul	100	4.26	hi
		Mean	4.93	
		LSD (P=0.05)	0.4	
		P-Value	<0.001	

**Barley is noted to flower before the head emerges, so GS49 is considered to be a good surrogate for the start of flowering.*

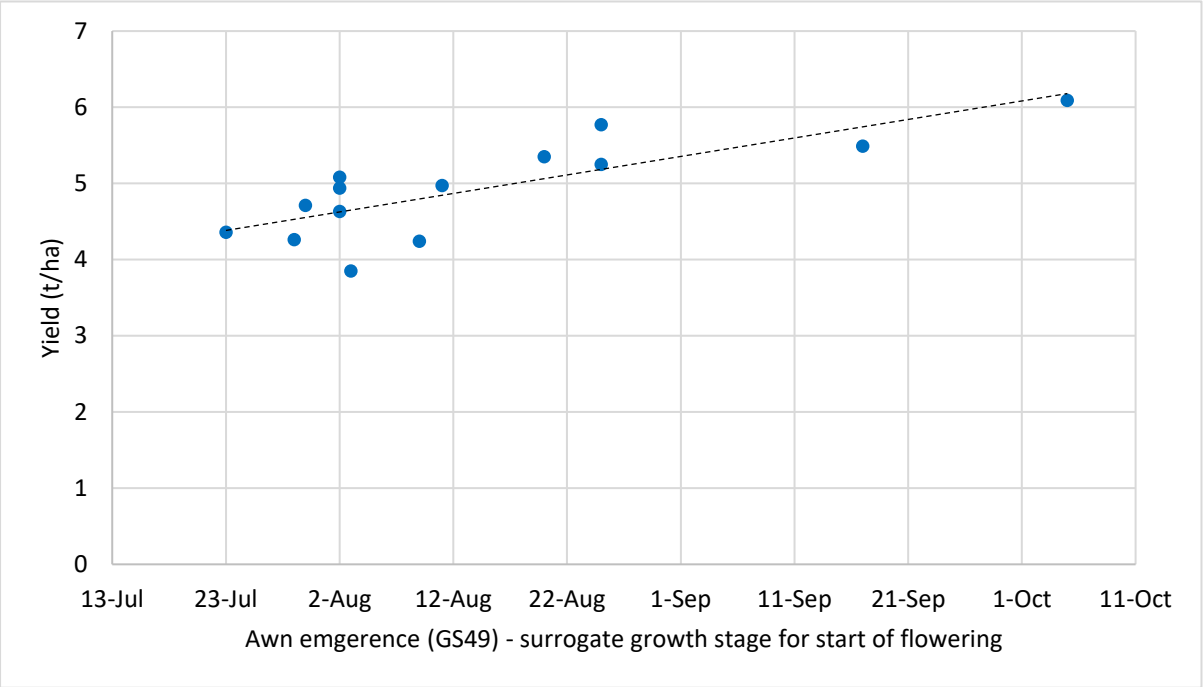

Figure 1. Relationship between the late booting stage (GS49) and yield (t/ha).

It was observed that later flowering is advantageous, with yields increasing if flowering starts after mid-August (Figure 1). Winter cultivars Newton and Pixel were some of the highest yielding varieties, 6.09 t/ha and 5.49 t/ha respectively, but due to harvesting at a high moisture of around 25%, these results may not be as accurate compared to if they were harvested on time.

All spring varieties which began flowering after the mid-August window reached over 5 t/ha, which is still two weeks before the 'sweet spot' flowering time in barley (Table 1). Of these varieties, a new InterGrain cultivar (IGB21130) produced the highest yield of 5.77 t/ha and reached GS49 on the 25 August. The fastest maturity variety was Leabrook which began flowering on the 23 July and yielded 4.36 t/ha.

Table 2. Influence of cultivar on grain protein (%), test weight (kg/hL), screenings (%) and retention (%). (S) indicates spring cultivar and (W) indicates winter cultivar.

Cultivar	Protein		Test Weight		Screenings		Retention	
	%		Kg/hL		%		%	
RGT Planet (S)	11.6	c-f	64.2	ab	0.8	f	96.3	a
Rosalind (S)	13.3	ab	62.2	bcd	1.5	cde	91.2	c
Minotaur (S)	12.2	cde	64.5	ab	0.9	ef	96.2	a
Laperouse (S)	12.5	bc	66.5	a	0.7	f	94.3	ab
Laureate (S)	10.8	fg	62.3	bcd	1.7	cd	91.7	c
AGTB0244 (S)	11.3	efg	63.0	bc	1.9	c	90.8	c
Fandaga (S)	13.6	a	63.0	bc	1.1	def	95.0	a
Newton (W)	9.3	h	58.2	e	2.5	b	82.7	d
Pixel (W)	9.1	h	60.3	de	3.2	a	71.6	e
Leabrook (S)	12.4	bcd	61.4	cd	1.2	def	94.4	ab
Cyclops (S)	12.6	abc	63.9	bc	1.3	c-f	92.3	bc
IGB21130 (S)	10.4	g	63.3	bc	1.0	ef	95.1	a
Zena Cl (S)	11.3	d-g	63.5	bc	0.8	f	96.5	a
FireFoxx (S)	12.5	bc	64.2	ab	2.6	ab	82.1	d
Mean	11.6		62.9		1.5		90.8	
LSD (P=0.05)	1.1		2.6		0.6		2.4	
P-Value	<0.001		<0.001		<0.001		<0.001	

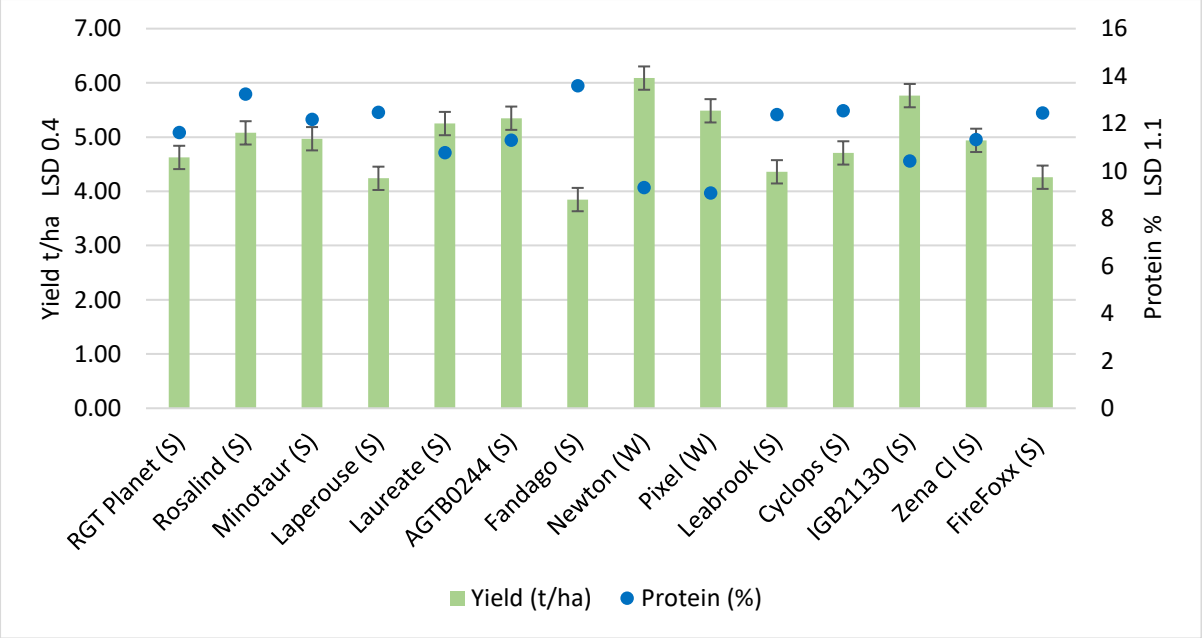

Figure 2. Influence of cultivar on grain yield (t/ha) and grain protein (%).

When comparing yield and protein content between varieties, a trend appears with higher yielding varieties in general having a lower protein percentage (Figure 2). Newton and Pixel had the significantly lowest protein percentage of 9.3% and 9.1% respectively (Table 2). Fandaga, the lowest yielding variety (3.85 t/ha) had the significantly highest protein of 13.6%.

Winter varieties had an issue with low grain quality, with significantly lower test weights (58.2 and 60.3kg/hL), higher screenings (2.5% and 3.2%) and lower retentions (82.7% and 71.6%, Table 2). Although these values wouldn't downgrade the quality from BFED1, the hectolitre weight is getting close to the minimum of 56kg/hL. There are significant differences in test weight, screenings and retention between the other cultivars, however, the effects of this are minimal.

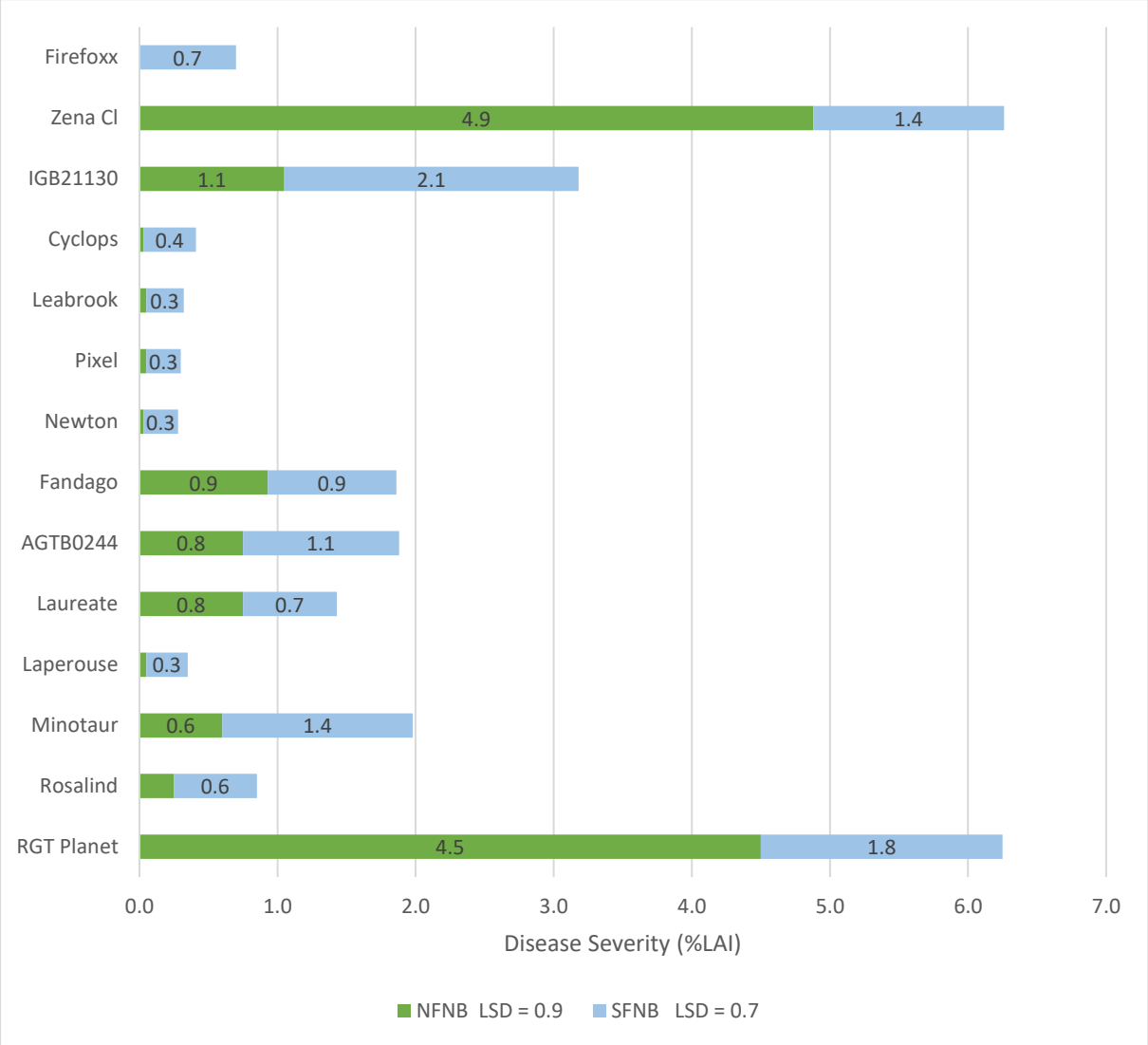

Figure 3. Net Form Net Blotch (NFNB) and Spot Form Net Blotch (SFNB) disease severity (%LAI) between cultivars.

The 2022 season presented high levels of disease pressure with SFNB being more prevalent, but NFNB having a larger impact on certain cultivars. Two fungicides were applied, 300 mL Prosaro at GS31 and 840 mL Radial at GS37-45. Due to the high volume of RGT Planet grown in the Albany and Esperance port zones, and the resistance of the fungus *Pyrenophora teres* to some DMI actives, this variety had significantly higher levels of NFNB incidence (4.5%, Figure 3). Zena Cl, a new InterGrain variety, also had significantly higher levels, with an incidence of 4.8% as this cultivar is moderately resistance to very susceptible. IGB21130 had the highest incidence of SFNB (2.3%), however many cultivars were infected by this disease. Laperouse, Newton, Pixel, Leabrook and Cyclops all had very low levels of both diseases suggesting stronger genetic resistance package.

Table 3. Details of the management levels.

Sowing date:		**20 April**
Seed Rate:		200 Seeds /m^2
Sowing Fertiliser:		139kg MAP/MOP
Seed Treatment:		Vibrance / Cruiser
Grazing:		Nil
Nitrogen:	31 May	55 kg N/ha (20K)
	30 June	32 kg N/ha
PGR:	29 June	200 mL/ha Moddus Evo
	31 July	200 mL/ha Moddus Evo
Fungicide:	29 June (GS31)	300 mL/ha Prosaro
	31 July (GS37-45)	840 mL/ha Radial

Trial 3. HYC Barley G.E.M Trial series (FAR WAA B22-03)

Aim: To increase yield of barley in the high rainfall zone with improvements in barley crop management that considers all aspects of canopy management (genotype, PGR, Fungicide, Nitrogen, and Defoliation).

Objective: To assess the performance of four spring barley germplasm managed under four different management intensities (sown 20 April) at two levels of fungicides.

Key Messages:

- In 2022, when barley was sown early (20 April) there was a significant interaction between canopy management and variety with yields ranging from 4.31- 5.86 t/ha.
- Averaged across all managements, Laureate yielded (5.35 t/ha) signifcantly higher than RGT Planet (5.02 t/ha) and Laperouse (4.53 t/ha), but not Rosalind (5.27 t/ha). Laureate grew best under the hyper yield management where it received higher fungicide input, PGRs and more nitrogen.
- There was no significant difference in yield from management on Laperouse.
- RGT Planet, Rosalind and Laureate all benefited from a better fungicide package as they produced higher yields when compared to the standard treatments, especially in a year with high disease pressure.
- Higher levels of nutrition in general did increase yield, although it was only signifcant in Laureate (5.19 t/ha to 5.86 t/ha).
- Defoliation did not reduce the yields in RGT Planet, *but* instead produced a significant increase, suggesting that delayed flowering and canopy management was potentionally advantageous.
- PGRs did significantly reduce plant height but gave varied yield results, incresing the yield of of Rosalind under high fungicide management, but reducing the yield of RGT Planet under standard fungicide input.
- The hyper yielding system, with higher inputs of nitrogen (around 150kg/ha N) *produced* a significantly higher protein content of 12.8% compared to the other treatments, but struggled to translate this into a significantly higher yield.
- Mid flowering (GS65) biomass high*l*ighted a significant reduction in dry matter volume and tiller weight in the dual purpose system compared to all the other treatments. Biomass taken at maturity (GS89) from the hyper yielding system show*ed* a significantly higher volume of dry matter from Rosalind and Laureate compared to the other varieties.
- Although all cultivars were spring varities, there was a three week delay to reach the beginning of flowering (GS49) between the fastest maturing vareity, Rosalind (28 July) and the slowest, Laureate (18 August) in the standard treatment.
- Mechanical defoliation delayed flowering across all cultivars by 10-24 days.

Trial details

The 4 varieties comprised of four two-row spring types (Rosalind, RGT Planet, Laperouse and Laureate), with six management treatments which consisted of combinations of nitrogen (N) rate, fungicides applied, plant growth regulators (PGR) and mechanical defoliation as per Table 1.

Table 1. Fungicide package, canopy intervention and nitrogen (N) rate applied to each of the six management treatments.

Trt	Management	Fungicide	Canopy Intervention	Total N applied
1	Standard fungicide & no intervention	Standard[1]	None	98 kg N/ha
2	Standard fungicide & PGR	Standard[1,3]	PGR	98 kg N/ha
3	Higher input fungicide & no intervention	Higher input[2]	None	98 kg N/ha
4	Higher input fungicide & PGR	Higher input[2,3]	PGR	98 kg N/ha
5	Hyper-yield system	Higher input[2,3]	PGR	148 kg N/ha
6	Dual-purpose system	Higher input[2,4]	Defoliation	148 kg N/ha

[1]Standard: GS31 – 500 mL/ha Tilt (500g/L propiconazole), GS39 – 500 mL/ha Opus (125 g/L Epoxiconazole).
[2]Higher input: Seed dressing – 150 mL/100kg Systiva (333g/L fluxapyroxad), GS31 – 300 mL/ha Prosaro (210g/L prothioconazole + 210g/L tebuconazole), GS39 – 500 mL/ha Aviator Xpro (Bixafen 75 g/L+Prothioconazole 150 g/L)
[3]Plant growth regulator (PGR): GS31 – 200 mL/ha Moddus Evo (250g/L trinexapac-ethyl).
[4]Defoliation: Prior to GS31 – defoliation with lawn mower to height of 6cm.

All plots recovered an initial 11N at seeding in the form of MAP with top-ups being applied as urea, with all treatments receiving 55N on 31 May and 32N applied on 30 June for a total of 98kg N/ha for the season. Management treatments 5 and 6 also received an additional 25N on 1 July and another 25N on 20 July, taking their total nitrogen applied to 148kg N/ha.

The spring barley varieties were defoliated at the start of stem elongation (GS30-31) on 1 July, ensuring that the growing points were not removed.

Table 2. Influence of cultivar on grain yield (t/ha) under different management regimes.

Canopy Management	**Cultivar (Grain yield t/ha)**									
	RGT Planet		**Rosalind**		**Laureate**		**Laperouse**		**Mean**	
Std fungicide	5.11	efg	5.02	efg	5.24	c-f	4.63	hij	5.00	-
Std fungicide, PGR	4.64	hij	5.03	efg	4.97	fgh	4.38	j	4.75	-
High Fungicide	5.36	b-e	5.14	ef	5.52	a-d	4.49	ij	5.13	-
High Fungicide, PGR	5.06	efg	5.58	abc	5.19	def	4.58	ij	5.10	-
Hyper Yielding, High N	4.79	ghi	5.69	ab	5.86	a	4.78	ghi	5.28	-
Dual-Purpose, High N	5.18	def	5.16	ef	5.30	c-f	4.31	j	4.99	-
Mean	5.02	b	5.27	a	5.35	a	4.53	c	5.04	
LSD (P=0.05) Variety				0.1		**P-Value**			<0.001	
LSD (P=0.05) Canopy Management				ns		**P-Value**			0.210	
LSD (P=0.05) Variety x Canopy Management				0.3		**P-Value**			<0.001	

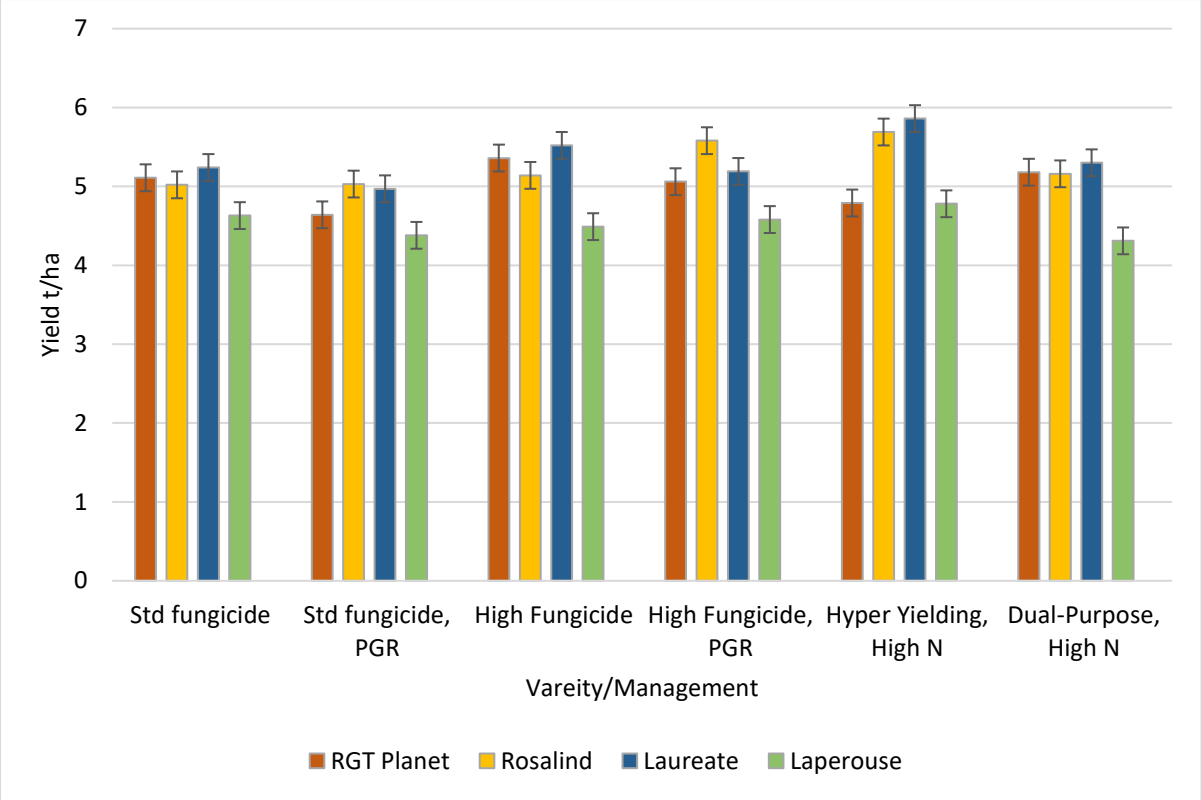

Figure 1. Influence of cultivar on grain yield (t/ha) under different canopy management regimes.

Averaged across all managements, Laureate yielded (5.35 t/ha) signifcantly higher then RGT Planet (5.02 t/ha) and Laperouse (4.53 t/ha), but not Rosalind (5.27 t/ha). It also had the largest range in yields (4.97-5.86 t/ha) suggesting it was the most responsive to treatment differences. RGT Planet, Rosalind and Laureate all benefited from a better fungicide package as they produced higher yields here when compared to the standard treatments especially in a year with high disease pressure. Due to its strong genetic resistance to disease, there was no yield difference caused by the higher fungicide package in Laperouse.

Higher levels of nutrition in general did increase yield, although it was only signifcant in Laureate (5.19 t/ha to 5.86 t/ha). In general, defoliation did reduce yield, except for RGT Planet which instead produced a significant increase, suggesting that delayed flowering and canopy management was potentionally advantageous.

Plant growth regulators (PGR) had the desired effect, producing a significantly shorter crop (data not shown), however there is evidence of its potential in decreasing yield, especially in RGT Planet and Laureate, with loses of 0.4 t/ha and 0.3 t/ha respectively. Rosalind, the shortest variety, had a yield increase with the application of PGRs, indicating that their may be a relationship between plant height and the effects of PGRs on yield.

There were no significant differences between yield when comparing different management strategies (variety yields averaged).

Table 3. Grain quality (protein (%), test weight (kg/hL), screenings (%) and retention (%)) for variety and management.

Cultivar	Protein	Test Weight	Screenings	Retention
	%	kg/hL	% <2.0mm	% > 2.5mm
RGT Planet	11.5 c	67.3 c	0.8 c	95.4 a
Rosalind	12.1 b	67.7 b	1.8 b	88.7 c
Laureate	11.0 d	65.4 d	2.1 a	88.7 c
Laperouse	12.5 a	69.6 a	0.9 c	94.2 b
P-value	<0.001	<0.001	<0.001	<0.001
LSD (P=0.05)	0.2	0.3	0.2	1.1
Management				
Std. fungicide	11.7 b	67.7 -	1.4 b	91.9 b
Std. fungicide & PGR	11.6 b	67.1 -	1.9 a	89.6 c
Higher fungicide	11.7 b	67.9 -	1.0 c	93.8 a
Higher fung. & PGR	11.3 b	67.2 -	1.2 bc	92.7 ab
Dual-purpose	12.8 a	67.4 -	1.4 b	91.3 bc
Hyper-yield	11.6 b	67.6 -	1.5 b	91.2 bc
P-value	<0.001	0.070	<0.004	0.003
LSD (P=0.05)	0.5	ns	0.4	1.8

Grain protein varied across treatments from 10.3-13.4%, which was influenced by both variety and management. On average, Laperouse had the highest grain protein (12.5%) and RGT Planet the lowest (11.5%). Management had the largest effect on protein, with values ranging from 12.8% in the hyper yielding system to 11.3% in the high input fungicide with PGR.

There was a significant interaction between screenings, variety and management, with values ranging from 0.5-3%. Although there is a large variability in the screening results, CBH receival standards have no limit on this assessment meaning this wouldn't influence the grade of the grain for any management. Hectolitre rate varied (64.8-70.4kg/hL), being particularly high in Laperouse (69.6kg/hL) and low in Laureate (65.4kg/hL). However, all treatments cleared the CBH receival standards of 56kg/hL, with no impact from management.

Phenology

Table 4. Cultivar effect on the onset of flowering (GS49), influenced by two different managements, standard and dual purpose (defoliated on 1 July).

Variety x Management	Awn Emergence (GS49)*	DAS
Std RGT Planet	1-Aug	103
Std Rosalind	28-Jul	99
Std Laureate	18-Aug	120
Std Laperouse	5-Aug	107
Dual Purpose RGT Planet	25-Aug	127
Dual Purpose Rosalind	14-Aug	116
Dual Purpose Laureate	31-Aug	133
Dual Purpose Laperouse	15-Aug	117

**Barley is noted to flower before the head emerges, so GS49 is considered to be a good surrogate for the start of flowering*

As the four varieties sown were all spring barleys, their development throughout the season didn't show high levels of variability. However, Rosalind was the fastest developing cultivar, reaching awn emergence (GS49) late July (28 July) and maturity (GS89) around by the end of October. In comparison, RGT Planet reached flowering on 1 August, Laperouse on 5 August, and the slowest of all the varieties, Laureate, on 18 August, three weeks later then Rosalind.

Mechanical defoliation of the dual-purpose system and a higher level of nutrition delayed the onset of flowering of every variety by 10-24 days.

Table 5. Net Form Net Blotch (NFNB) incidence (%) across the 6 different management treatments and 4 varieties, assessed on the 12 Sep (GS59-80).

Canopy Management	NFNB Incidence (%)									
	RGT Planet		Rosalind		Laureate		Laperouse		Mean	
Std fungicide	4.1	a	1.0	bc	0.6	b-e	0.4	cde	1.5	a
Std fungicide, PGR	3.9	a	1.3	b	0.8	bcd	0.4	cde	1.6	a
High Fungicide	1.1	b	0.0	e	0.2	de	0.1	e	0.4	b
High Fungicide, PGR	0.3	de	0.0	e	0.0	e	0.0	e	0.1	b
Hyper Yielding, High N	1.1	bc	0.0	e	0.3	de	0.1	e	0.3	b
Dual-Purpose, High N	1.3	b	0.1	e	0.1	de	0.1	de	0.4	b
Mean	1.9	a	0.4	b	0.3	b	0.2	b	0.7	
LSD (P=0.05) Variety				0.3		**P-Value**			<0.001	
LSD (P=0.05) Canopy Management				0.5		**P-Value**			<0.001	
LSD (P=0.05) Variety x Canopy Management				0.7		**P-Value**			<0.001	

Disease was assessed throughout the season, and it was observed that both forms of net blotch were posing high levels of disease pressure, especially on RGT Planet (Table 3). Net Form Net Blotch (NFNB) was significantly higher in RGT Planet (1.9%) across all treatments when compared to the other varieties. Treatments with a higher fungicide package did significantly reduce disease infection. This is highlighted once again in RGT Planet with the two standard fungicide treatments having an incidence of 4.1% and 3.9%, compared to the high fungicide treatments with disease being significantly reduced to 1.1% and 0.3%. Spot Form Net Blotch was also present, with higher levels in the two standard fungicide (2.2% and 4.3%) with lower levels in the high fungicide (0.1% and 0.1%) but with no significant difference between variety and management (data not shown).

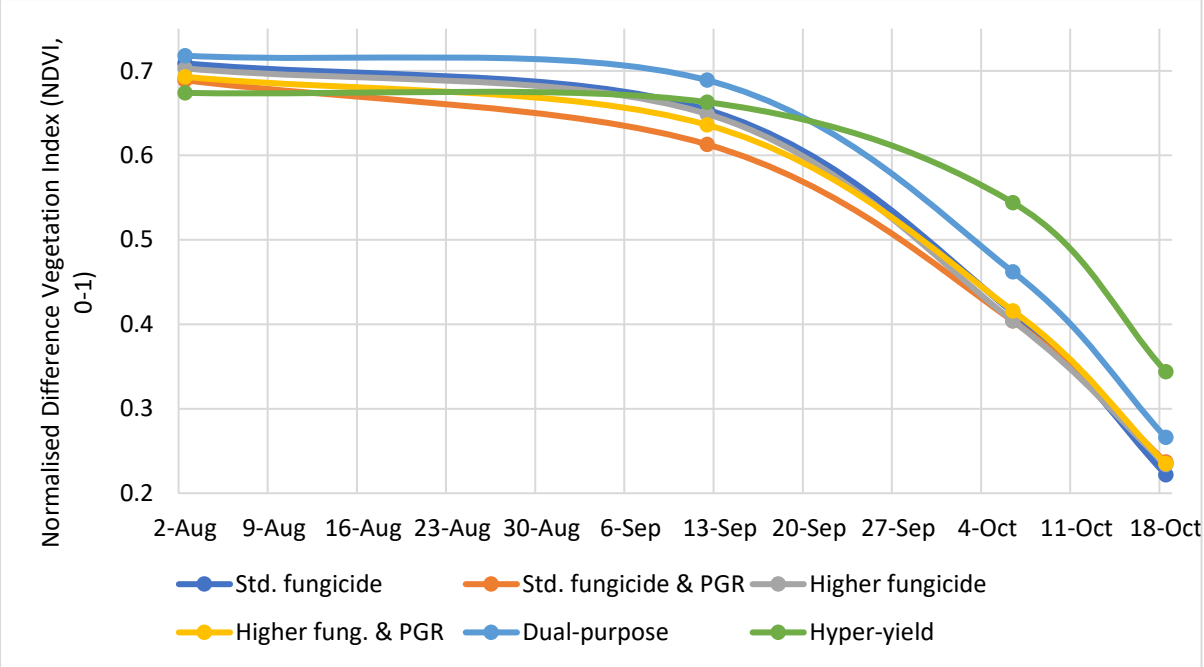

Figure 2. Measurement of Normalised Difference Vegetation Index (NDVI, 0-1) across the six different management treatments over several different dates and growth stages.

NDVI values were influenced by variety and management (Table 4), with higher values suggesting a greener, healthier plant. Higher rates of nitrogen in the hyper yielding system increased the NDVI value, especially when moving into maturity. The dual-purpose treatments had the significantly highest NDVI value at GS83 and GS85 which could be due to a delay in maturity as a result of the defoliation at GS30. There were no significant differences in green leaf retention (GLR) between the standard and high input fungicide treatments.

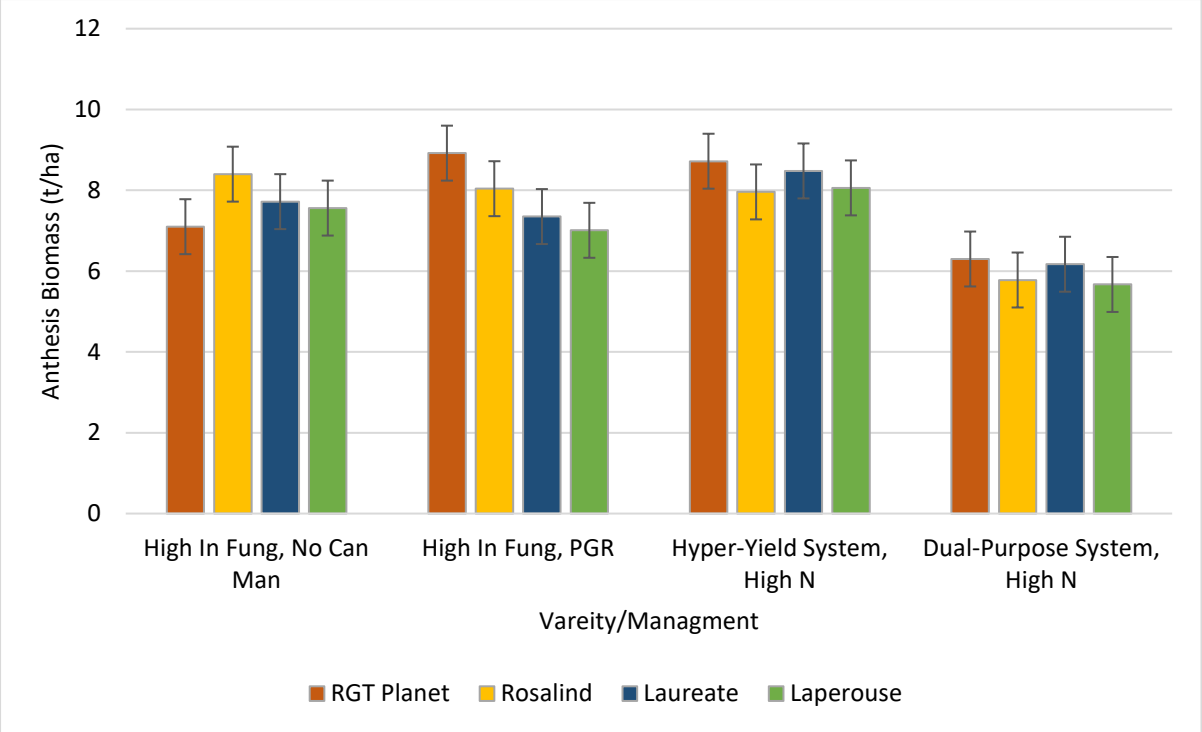

Figure 3. Variety and management effect on mid flowering (GS65) biomass (t/ha). Only measured in high fungicide input treatments (3,4,5 and 6). LSD P =0.05, 1.4.

Mid flowering (GS65) biomass was measured in all the treatments with high input fungicides applied (3, 4, 5 and 6). The only significant difference was a reduction in volume in the dual-purpose system (5.98 t/ha), which is to be expected with the defoliation earlier in the season (Figure 1). In addition, this treatment had smaller tillers (data not shown).

Table 6. Details of the management levels.

Sowing date:		**20 April**
Seed Rate:		200 Seeds/m^2
Sowing Fertiliser:		139 kg MAP/MOP
Seed Treatment:		Vibrance / Cruiser
Grazing:		Dual purpose system only
Nitrogen:	31 May	55 kg N/ha (20K)
	30 June	32 kg N/ha
	2 July	25 kg N/ha (high N treatments only)
	20 July	25 kg N/ha (high N treatments only)
PGR:	1 July	200 mL/ha Moddus Evo (PGR treatments only)
	31 July	200 mL/ha Moddus Evo (PGR treatments only)
Fungicide:	30 June (GS31)	As per treatment list
	31 July (GS37-45)	As per treatment list

Trial 4. HYC Barley Disease Management (FAR WAA B22-04)

Objective: To develop profitable and sustainable approaches to disease management in HRZ barley.

Key Points:

- Levels of Net Form Net Blotch (NFNB) and Spot Form Net Blotch (SFNB) were elevated in 2022 compared to previous years, producing a high amount of disease pressure, particularly in RGT Planet.
- Fungicide management had a significant effect on yield with a more robust program, including a seed treatment and *three* applications throughout the season, producing a significantly higher yield, *approximately* 0.42 t/ha above the average (Table 1).
- Although not reflected entirely in the yield, the untreated plots showed higher levels of NFNB and SFNB throughout the entire growing season, with a lower green leaf retention (GLR) (Table 3).
- In general, more complex fungicide programs returned a higher NDVI value throughout the season when compared to the control, indicating a healthier and greener plant (values not shown).

Treatments: 4 fungicide management levels applied to RGT Planet.

Table 1. Influence of management strategy of wheat grain yield (t/ha) and protein (%).

	Treatment				Yield		Protein	
	GS00	GS31	GS39-49	GS59	t/ha		%	
1	---	---	---	---	4.28	cd	11.2	-
2	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha		4.57	b	11.2	-
3	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha	Opus 500 mL/ha	4.50	bc	11.3	-
4	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha		4.37	bcd	11.3	-
5	---	---	Aviator Xpro 420 mL/ha		4.43	bc	11.1	-
6	---	Prosaro 300 mL/ha	FAR F1-19 750 mL/ha		4.40	bcd	11.4	-
7	---	FAR F1-19 750 mL/ha	Radial 840 mL/ha		4.52	bc	11.2	-
8	---	Prosaro 300 mL/ha	----		4.37	bcd	11.4	-
9	--	Tilt 500 250 mL/ha	----		4.16	d	11.5	-
10	Systiva	---	Radial 840 mL/ha	---	4.42	bc	11.2	-
11	---	Prosaro 300 mL/ha	Radial 840 mL/ha	---	4.43	bc	11.5	-
12	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	4.44	bc	11.5	-
13	---	Aviator Xpro 420 mL/ha	Radial 840 mL/ha		4.52	bc	11.4	-
14	---	Prosaro 150 mL/ha	Radial 420 mL/ha		4.38	bcd	11.4	-
15	Systiva	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	4.86	a	11.3	-
				Mean	**4.44**		**11.3**	
				LSD (P=0.05)	0.26		ns	
				P-Value	0.004		0.675	

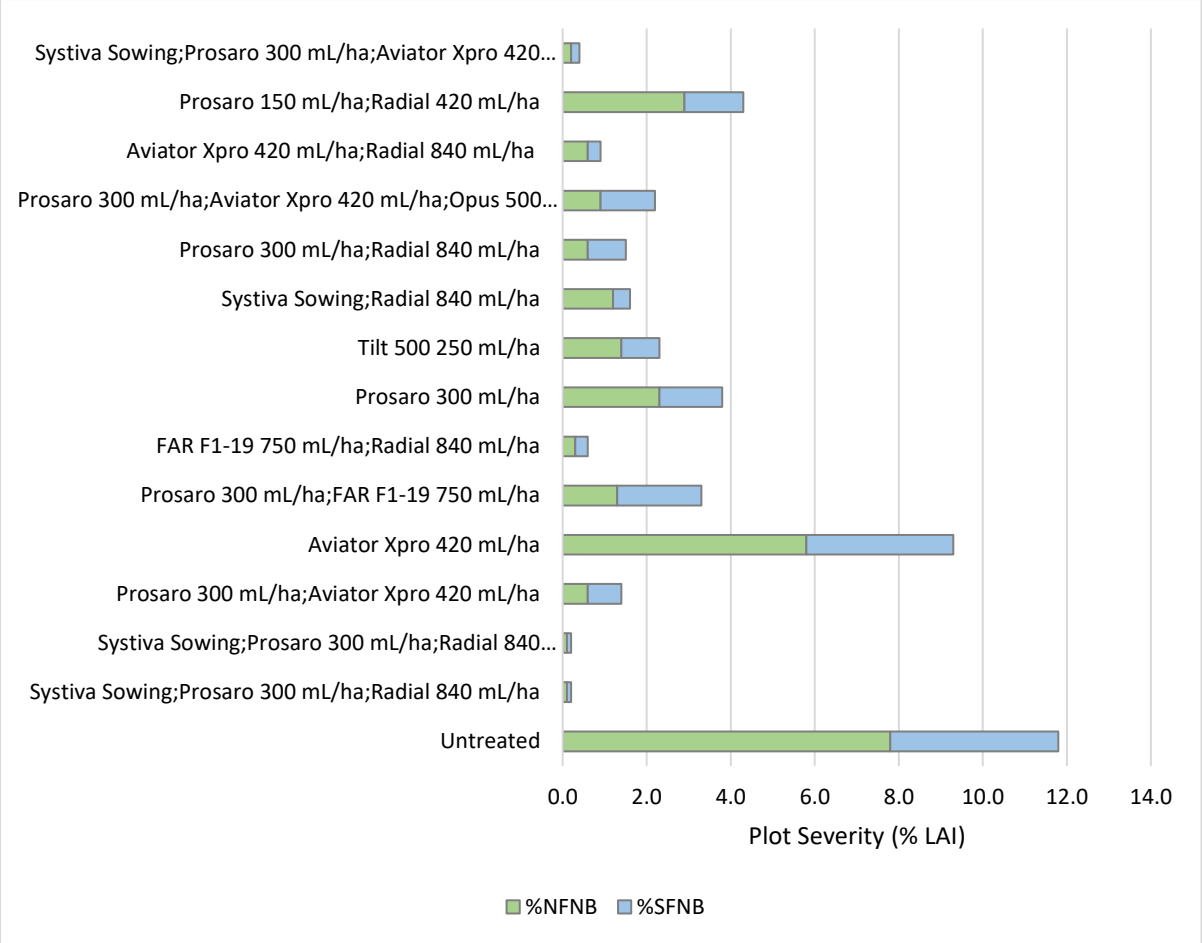

Figure 1. Net Form Net Blotch (NFNB) and Spot Form Net Blotch (SFNB) plot disease severity (% LAI), 8 August, GS48.

When looking at plot severity of Net Form Net Blotch (NFNB) and Spot Form Net Blotch (SFNB), the untreated plots had a significantly higher level of both diseases (7.8% and 4%). With the second spray timing (GS39-49) being applied at the end of July, treatments with only a single spray at this timing (treatment 5) are unlikely to reflect the full effects of the fungicide at this assessment. The half rate of 150 mL Prosaro and 420 mL Radial allowed for significantly higher levels of NFNB (2.9%) and slightly higher levels of SFNB (1.4%) when compared to treatment 11 which had the full rates. Treatments with Systiva at sowing and a fungicide application at GS31 had significantly lower levels of both diseases.

Table 2. Net Form Net Blotch (NFNB) and Sport Form Net Blotch (SFNB) severity and incidence on Flag-1, 22 September, GS78.

Treatment	NFNB		SFNB	
	Severity	Incidence (%)	Severity	Incidence (%)
1	5.1 a	96.7 a	2.7 a	93.3 a
2	1.2 bc	50.0 de	0.2 c	36.7 efg
3	1.2 bc	46.7 e	0.1 c	30.0 efg
4	1.2 bc	66.7 b-e	0.0 c	20.0 fg
5	2.2 bc	80.0 abc	0.4 bc	46.7 cde
6	1.6 bc	66.7 b-e	0.7 bc	70.0 abc
7	1.7 bc	70.0 a-e	0.2 bc	43.3 def
8	2.1 bc	76.7 a-d	1.0 b	80.0 ab
9	2.5 b	73.3 a-e	0.7 bc	70.0 abc
10	2.6 b	90.0 ab	0.3 bc	40.0 def
11	1.7 bc	83.3 abc	0.7 bc	63.3 bcd
12	1.4 bc	80.0 abc	0.1 c	23.3 efg
13	0.9 c	46.7 e	0.1 c	26.7 efg
14	2.0 bc	66.7 b-e	0.7 bc	70.0 abc
15	1.3 bc	60.0 cde	0.1 c	13.3 g
Mean	1.9	70.2	0.5	48.4
LSD (P=0.05)	1.6	29.1	0.8	24.7
P-Value	0.002	0.034	<0.001	<0.001

Similar to the plot assessment done at GS48, when looking at the Flag-1 leaf, the untreated control has the significantly highest incidence and severity of both diseases. Single application of a fungicide at any of the growth stages did control disease more than the untreated, however not to a satisfactory level.

Table 3. Green leaf retention (GLR %) on the top 4 leaves, 22 September, GS78.

Treatment	GLR (%)			
	Flag	F-1	F-2	F-3
1	60.7 -	37.5 e	12.7 f	0.8 -
2	73.0 -	60.2 a-e	32.1 cde	4.4 -
3	72.5 -	69.0 a-d	30.8 de	6.8 -
4	77.6 -	76.0 abc	46.3 a	7.6 -
5	76.7 -	72.7 a-d	41.7 abc	4.4 -
6	74.3 -	57.7 b-e	27.6 de	3.8 -
7	68.4 -	53.3 cde	29.2 de	6.5 -
8	70.9 -	50.7 de	25.7 de	5.3 -
9	71.2 -	53.5 cde	22.3 ef	2.4 -
10	72.2 -	59.5 a-e	34.6 cd	4.0 -
11	76.2 -	82.2 a	31.8 cde	4.0 -
12	74.0 -	77.7 ab	45.3 ab	4.1 -
13	67.8 -	52.8 de	34.5 cd	4.8 -
14	76.7 -	58.7 b-e	35.2 bcd	7.2 -
15	77.5 -	73.2 a-d	46.3 a	3.5 -
Mean	72.7	62.3	33.1	4.6
LSD (P=0.05)	ns	22.7	10.3	ns
P-Value	0.424	0.02	<0.001	0.842

Treatments which had three or more applications of various fungicide in general had a higher green leaf retention on Flag-1 and Flag-2. The untreated and single application treatments had significantly lower GLR.

Table 4. Details of the management levels.

Sowing date:		**20 April**
Seed Rate:		200 Seeds/m^2
Sowing Fertiliser:		139 kg MAP/MOP
Seed Treatment:		Vibrance / Cruiser
Grazing:		Nil
Nitrogen:	31 May	55 kg N/ha (20K)
	30 Jun	32 kg N/ha
PGR:	1 Jul	Moddus Evo 200 mL/ha
Fungicide:	1 Jul (GS31)	As per treatment list
	31 July (GS39-49)	As per treatment list
	12 Sep (GS71)	As per treatment list

Trial 5. HYC PGR x harvest date interaction (FAR WAA B22-05)

Objective: To assess the value of PGRs with delayed harvest in HRZ regions for its effect on grain yield losses due to harvest timing, lodging, head loss and brackling.

Key points

- There was no significant interaction between PGR management, harvest date and variety. However, when harvested on-time, a single Moddus Evo spray was lower yielding compared to the untreated management but when harvest was delayed by almost a month, the single spray became significantly higher yielding tha*n* the split Moddus Evo management.
- Cyclops produced a yield of 4.74 t/ha which was significantly higher than Leabrook 4.31 t/ha, when averaged across all treatments in the trial.
- Leabrook was shown to be more prone to head loss when harvest is delayed and no PGR intervention used, however this did not translate into significant differences in final grain yield.
- The delayed harvest date did produce a significantly higher yield but did also create higher levels of lodging and brackling in both cultivars.
- In Cyclops, the shorter variety, the untreated control yielded the highest in both the on time and delayed harvest, with the use of PGR's reducing yield. The inverse in true for Leabrook, with the application of some PGR's increasing yield when compared to the control.

Treatments: 4 PGR management approaches applied to two cultivars and harvested at two harvest dates.

Harvest dates:

1. On time harvested on 22 November
2. Delayed harvested on 20 December

Plant growth regulators (PGR) treatments:

1. Untreated
2. GS31 PGR (trinexapac ethyl based)
3. GS31 + GS37 PGR (trinexapac ethyl based)
4. European approach based on GS31 (trinexapac ethyl & GS37 of Ethepon 720 @500 mL/ha)

Table 1. Influence of PGR management strategy, variety and canopy management regime on grain yield (t/ha).

		Cyclops		Leabrook		Mean	
Variety		4.74	a	4.31	b	**4.53**	
	LSD (P=0.05)	0.1		***P-Value***		<0.001	
Harvest Date x variety							
On time		4.36	-	3.90	-	**4.13**	**b**
Delayed (28 days delay)		5.12	-	4.71	-	**4.92**	**a**
Harvest Date	***LSD***	0.1		***P-Value***		<0.001	
Harvest Date x Variety	***LSD***	ns		***P-Value***		0.567	
Canopy Management Regime x variety							
Untreated		4.92	a	4.22	c	4.57	-
GS31 PGR		4.76	ab	4.30	c	4.53	-
GS31 + GS37 PGR		4.62	b	4.31	c	4.46	-
GS31 + GS37 PGR (Europe style)		4.66	b	4.40	c	4.53	-
Canopy Management	***LSD***	ns		***P-Value***		0.554	
Variety x Canopy Mgmt	***LSD***	0.2		***P-Value***		0.023	
Harvest Date. x Canopy Mgmt. x Variery							
On Time							
Untreated		4.57	-	3.94	-	4.26	c
GS31 PGR		4.29	-	3.74	-	4.01	d
GS31 + GS37 PGR		4.28	-	3.98	-	4.13	cd
GS31 + GS37 PGR (Europe style)		4.31	-	3.92	-	4.11	cd
Delayed							
Untreated		5.27	-	4.49	-	4.88	ab
GS31 PGR		5.22	-	4.86	-	5.04	a
GS31 + GS37 PGR		4.96	-	4.62	-	4.80	b
GS31 + GS37PGR (Europe style)		5.02	-	4.88	-	4.95	ab
Harvest Date x Canopy Mgmt	***LSD***	0.2		***P-Value***		0.030	
Harvest Date x Canopy Mgmt x Variety	***LSD***	ns		***P-Value***		0.506	

Cyclops produced a yield of 4.74 t/ha which was significantly higher than Leabrook 4.31 t/ha, when averaged across all treatments in the trial. Although not significantly different, in Cyclops, a shorter variety, the untreated in both the on time and delayed yielded higher than treatments with PGRs applied. The inverse can be seen for Leabrook, a taller cultivar, where some of the PGR treatments produced a higher yield than the untreated.

Table 2. Canopy management and harvest date effect on peduncle length (mm), lodging index (0-500) and brackling (%) across two varieties (Cyclops and Leabrook).

Canopy Management x Harvest Date		Peduncle Length (mm)		Lodging Index (0-500)				Brackling %			
		Leabrook		Cyclops		Leabrook		Cyclops		Leabrook	
On Time	Untreated	200.6	a	0.8	c	3.4	bc	1.0	e	3.5	de
	GS31	167.3	ab	0.0	c	0.8	c	0.0	e	2.3	de
	GS31 + GS37	138.1	b	0.0	c	1.0	c	0.0	e	1.0	e
	European GS31	150.5	b	0.0	c	0.0	c	0.0	e	1.8	e
Delayed	Untreated	199.7	a	8.8	a	8.3	a	3.0	de	22.5	a
	GS31	173.5	ab	1.0	c	6.6	ab	1.8	e	9.5	c
	GS31 + GS37	151.6	b	1.6	c	7.6	a	0.0	e	16.3	b
	European GS31	161.1	b	0.5	c	0.5	c	0.0	e	6.8	cd
Grand Mean		167.8		2.5				4.3			
LSD (P=0.05)		36.3		4				4.6			
Treatment Prob(F)		0.035		<0.001				<0.001			

Peduncle length was measured in Leabrook to determine if the PGRs had an effect on plant growth, with results showing that two applications of Moddus Evo at GS31 and GS37 and the European approach significantly reduce the length when compared to the untreated. Although there weren't high levels of lodging in either variety, it can be seen that PGRs did reduce the severity in both varieties, with a similar trend being true for brackling.

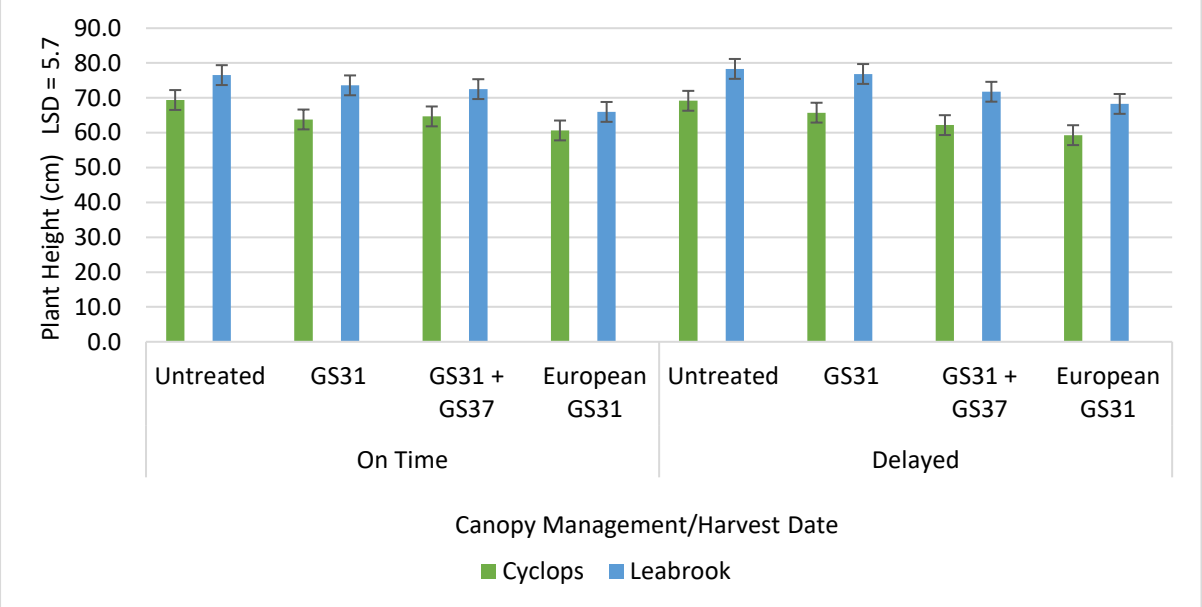

Figure 1. Canopy management and harvest date effect on plant height across two varieties (Cyclops and Leabrook) at GS99.

In general, Cyclops was significantly shorter than Leabrook, with PGRs having a significant influence on plant height. The European approach produced the shortest crops out of all treatments.

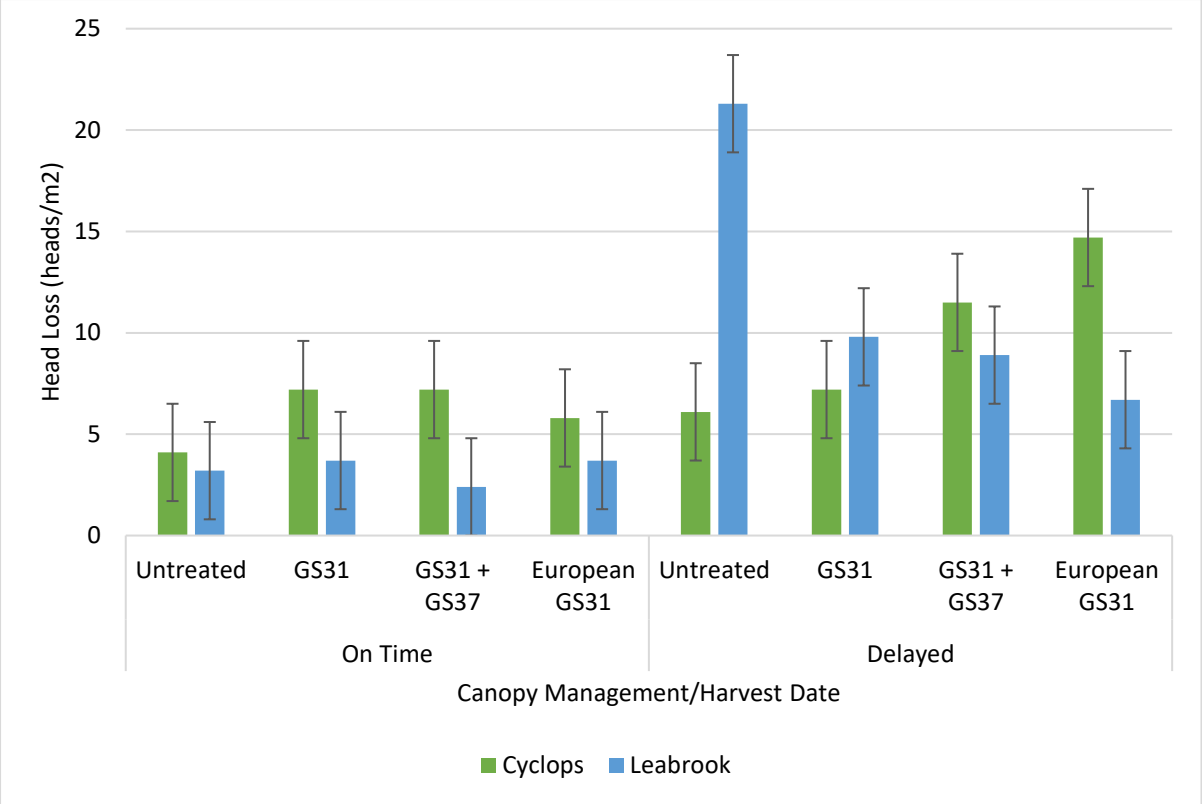

Figure 2. Canopy management and harvest date effect on head loss at harvest, across two varieties (Cyclops and Leabrook).

Table 3. Details of the management levels.

Sowing date:		**20 April**
Seed Rate:		200 Seeds/m^2
Sowing Fertiliser:		139 kg MAP/ MOP
Seed Treatment:		Vibrance / Cruiser
Grazing:		Nil
Nitrogen:	31 May	55 kg N/ha (20K)
	30 June	32 kg N/ha
PGR:	30 June (GS31)	As per treatment list
	31 July (GS37-39)	As per treatment list
Fungicide:	30 June (GS31)	300 mL/ha Prosaro

Trial 6: Nutrition for Hyper Yielding Barley (FAR WAA B22-06)

Objectives: To assess the value of higher nutrition input for barley (cv RGT Planet).

Key Points:

- Nutrition significantly influenced grain yield with values ranging from 4.94-5.55 t/ha. However, nitrogen rate did not appear to cause the differences in yield.
- Treatments with added major elements (P, K and S), by either organic or inorganic means, had a significantly higher yield when compared to treatments with the same or lower levels of nitrogen.
- Although there was a trend with higher levels of N producing higher yields, these results weren't significant.
- In treatments where only nitrogen was applied at the rate of 248kg/ha or above, higher grain proteins were achieved, indicating that the nitrogen was taken up. When this was in contrast to treatments with added manure or fertiliser, but with the same or lower rate of N, the grain protein was lower, but the yield was significantly higher, suggesting that these elements helped convert the absorbed nitrogen into yield (Table 2).
- Biomass assessment at mid-flowering (GS65) show*ed* no significant difference between treatments, however, there is a trend with the addition of P, K and S producing a higher volume of dry matter. Harvest biomass further supports this, with a significant higher volume of dry matter in added P, K and S treatments (organic or inorganic) when compared to N only treatments.
- Treatment 9 (added P, K and S by fertiliser and a rate of 248kg/ha of N) not only achieved the highest yield, but also produced 150 heads/m^2 more than the average of 662 heads/m^2 (Table 3).

Table 1. Total amount of nutrient applied throughout the season to the various nutrition treatments. Variations were made either through pig manure for the +OM treatment, or through various synthetic products (MAP, Urea, Ammonium Sulfate and Muriate of Potash) for +NPKS. Farm standard (Farm Std) include 98N, 24P, 20K and 1.65S.

Treatment		Total amount applied (kg/ha)			
		Nitrogen (N)	Phosphorous (P)	Potassium (K)	Sulphur (S)
1	Farm Std +0	98	24	20	1.65
2	Farm Std +25+25	148	24	20	1.65
3	Farm Std +50+50	198	24	20	1.65
4	Farm Std +75+75	248	24	20	1.65
5	Farm Std +100+100	298	24	20	1.65
6	Farm Std +125+125	348	24	20	1.65
7	Farm Std +75+75+50	298	24	20	1.65
8	Farm Std +75+75+OM	275	34	38	3.3
9	Farm Std +75+75+PKS	275	34	38	3.3
10	Farm Std +0+0+OM	125	34	38	3.3

Table 2. Influence of N, P, K and S rate on grain yield (t/ha), protein (%), test weight (kg/hL), screenings (%) and retention (%).

	Treatment	Yield		Protein		Test weight		Screenings		Retention	
		t/ha		%		kg/hL		%		%	
1	0+0	4.94	c	11.0	f	67.4	-	1.1	bc	93.6	-
2	25+25	5.01	c	11.5	de	67.1	-	1.0	bc	94.1	-
3	50+50	5.00	c	11.7	bcd	67.4	-	0.9	c	94.4	-
4	75+75	4.97	c	12.1	ab	67.5	-	1.2	b	93.0	-
5	100+100	5.18	bc	12.0	bc	67.6	-	1.2	bc	93.2	-
6	125+125	5.14	bc	12.1	ab	67.0	-	1.3	ab	92.4	-
7	75+75+50	5.04	c	12.5	a	67.1	-	1.2	bc	92.6	-
8	75+75+OM	5.50	a	11.7	cd	67.3	-	1.0	bc	93.6	-
9	75+75+PKS	5.55	a	11.7	bcd	66.8	-	1.6	a	91.5	-
10	0+0+OM	5.36	ab	11.2	ef	66.7	-	1.2	bc	93.3	-
	Mean	5.17		11.7		67.2		1.2		93.2	
	LSD (P=0.05)	0.3		0.4		ns		0.3		ns	
	P-Value	<0.001		<0.001		0.380		0.020		0.112	

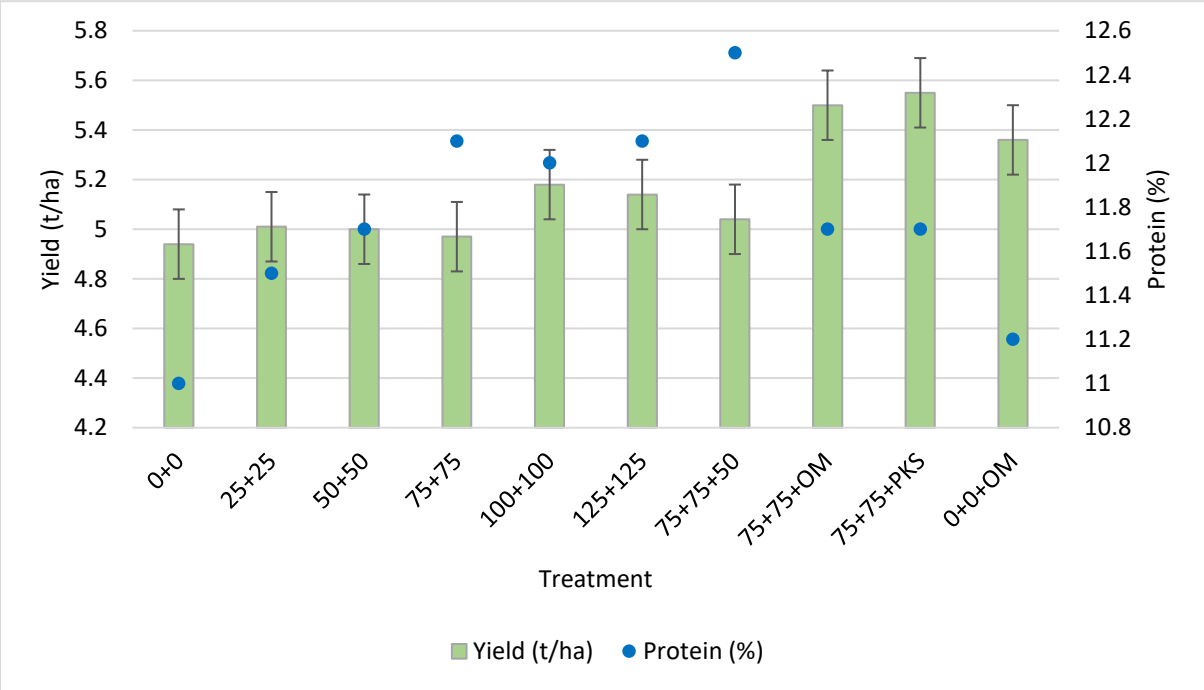

Figure 1. Treatment effect on yield (t/ha) and protein (%).

Yields ranged between the treatments with the control producing the lowest yield of 4.94 t/ha and treatments with added P, K and S through either organic (pig manure) or inorganic means (fertiliser) producing a significantly higher yield. Treatment 9, with 150 kg N/ha and added P, K, S by fertiliser produced the highest yield of 5.55 t/ha, only slightly out yielding treatment 8, which was the same in every way except added nutrients came from pig manure (5.5 t/ha). This data suggests that the addition of P, K and S is more important than where it is sourced from, and that nitrogen isn't the limiting factor, but instead other major elements are.

As expected, higher levels of nitrogen produced a significantly higher protein percentage compared to the control treatment. The highest protein of 12.5% was obtained by treatment 7, which didn't have the highest volume of nitrogen, but was the only treatment to receive 50N later in the season at GS39. When this was compared to treatments with added manure or fertiliser, the grain protein was lower, but the yield was significantly higher, suggesting that added P, K and S helped convert the absorbed nitrogen into yield (table 2).

Table 3. Treatment effect on heads per square metre taken at harvest and the total biomass (t/ha) taken at mid flowering (GS65) and Maturity (GS89).

Treatment	Mid flowering biomass (t/ha)		Maturity biomass (t/ha)		Head counts/m^2	
0+0	7.3	-	12.4	c	657.8	bc
25+25	7.3	-	12.4	c	610.5	bc
50+50	8.1	-	12.9	bc	588.5	c
75+75	7.6	-	13.2	bc	636.9	bc
100+100	8.4	-	14.1	ab	690.3	b
125+125	7.9	-	13.0	bc	638.6	bc
75+75+50	8.3	-	13.2	bc	607.2	bc
75+75+OM	8.6	-	14.1	ab	693.0	b
75+75+PKS	9.1	-	14.7	a	814.6	a
0+0+OM	8.3	-	13.9	ab	686.4	b
Mean	8.1		13.4		662.4	
LSD (P=0.05)	ns		1.3		93.7	
P-Value	0.218		0.020		0.002	

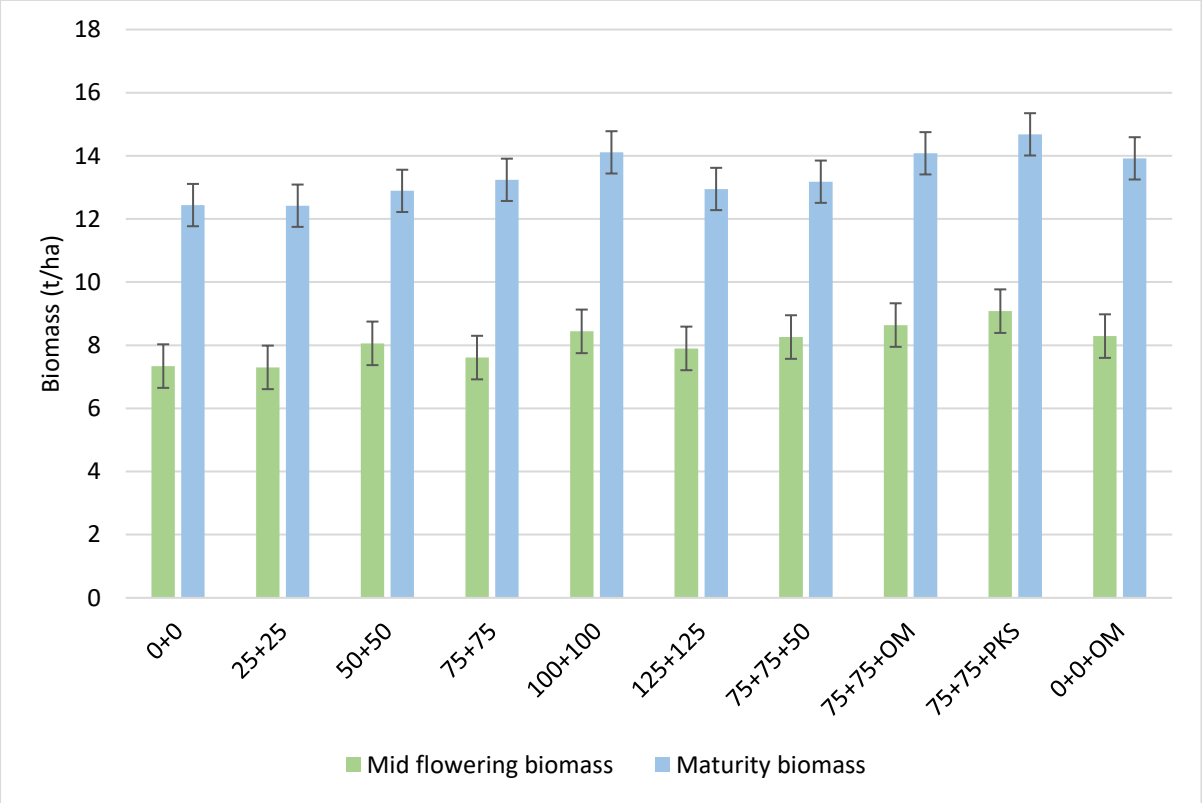

Figure 2. Treatment effect on mid flowering (GS65) biomass (LSD 1.373) and maturity (GS89) biomass (LSD 1.34).

Biomass taken at mid flowering (GS65) shows no significant difference between treatments, however there is a trend with the addition of P, K and S producing a higher volume of dry matter. Harvest biomass further supports this, with a significant higher volume of dry matter in added P, K and S treatments (organic or inorganic) when compared to N only treatments. Treatment 9 (added P, K and S by fertiliser and a rate of 248kg/ha of N) not only achieved the highest yield, harvest biomass, but also produced 150 heads/m^2 more than the average of 662 heads/m^2 (Table 3).

Throughout the growing season there was also a visual difference between plots, with treatments with added P, K and S having a denser canopy and were generally taller (Figure 3).

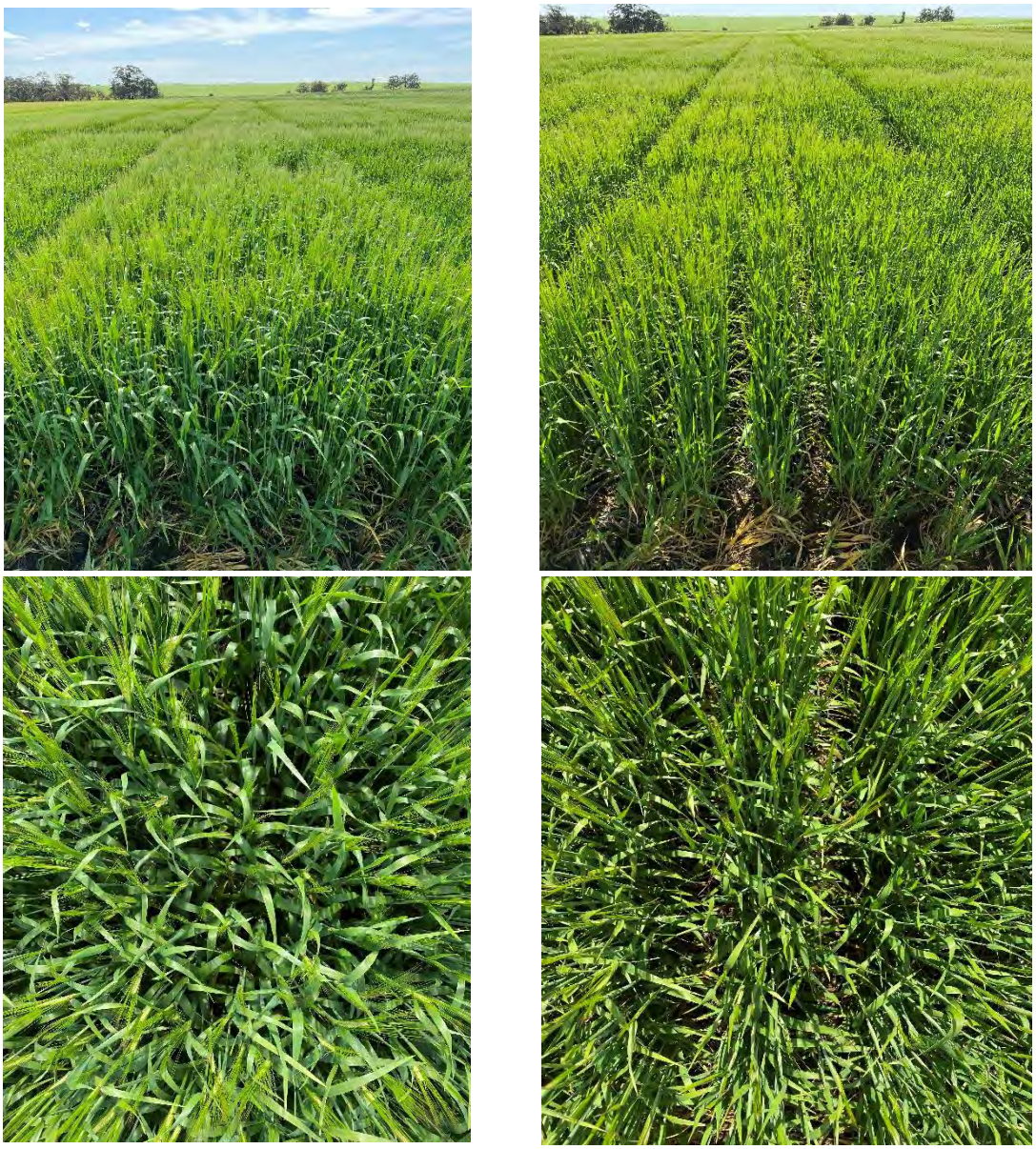

Figure 3. Effect of treatment on overall biomass and health of the crop at GS65. Pictured left is a plot that received an additional 177 units of N and PKS, pictured right is the control which didn't receive any additional nutrition.

Table 4. Details of the management levels.

Sowing date:		**20 April**
Seed Rate:		200 Seeds/m^2
Sowing Fertiliser:		139 kg MAP / MOP
Seed Treatment:		Vibrance / Cruiser
Grazing:		Nil
Nitrogen:	31 May	55 kg N/ha (20K)
	16 June	As per treatment list
	30 June	32 kg N/ha
	20 July	As per treatment list
PGR:	30 June	200 mL/ha Moddus Evo
Fungicide:	30 June (GS32)	300 mL/ha Prosaro
	31 July (GS39-49)	840 mL/ha Radial

Tasmania Crop Technology Centre
Hagley, Tasmania

Sown: 7 September 2022
Harvested: 30 January – 6 February 2023
Rotation position: 2021 Carrot seed
Soil type: Chromosol
Colwell P (ppm) 0-10 cm: 302.0
pH ($CaCl_2$) 0-10 cm: 6.66
Organic Carbon (%) 0-10 cm: 2.03

Trial 2. HYC Barley Elite Screen (FAR TAS B22-02-2)

Objectives:
To examine the yield potential of new winter and spring germplasm grown under HYC Management packages against spring and winter controls in the traditional late April/early May sowing window.

Key Points:

- The highest yielding variety was IGB22102T which yielded 12.35 t/ha, a new record for spring sown barley in the HYC project.
- The top yielding variety was also significantly higher yielding than the control variety RGT Planet (11.57 t/ha) and older varieties such as Westminster (9.35 t/ha).
- Grain protein was difficult to maintain with over half *of* the varieties producing protein over 12%.
- Other grain quality parameters were generally favourable across the whole trial with a mean test weight of 69.9 kg/hL, retention of 95.1% and screening of 1.5%.

Table 1. Grain yield (t/ha) and quality parameters including protein, test weight, retention and screenings (%, kg/hL).

	Variety	Grain Yield		Grain Quality					
		Yield		Protein		Test Weight		Retention		Screenings	
		t/ha		%		Kg/hL		%		%	
1.	**RGT Planet**	11.57	bcd	11.5	fgh	70.6	bc	95.6	abc	1.1	fg
2.	**Rosalind**	10.46	f	13.2	b	69.9	cde	94.8	cde	1.5	c-f
3.	**Minotaur**	9.68	g	13.5	ab	70.0	bcd	92.4	fg	2.8	a
4.	**Laperouse**	9.41	g	14.0	a	69.9	cde	96.8	a	1.0	fg
5.	**Laureate**	10.93	def	11.9	def	70.0	bcd	97.0	a	1.1	efg
6.	**AGTB0244**	11.61	bcd	11.1	h	68.5	g	91.4	g	2.0	b
7.	**Fandaga**	11.06	c-f	12.4	c	69.5	def	95.9	abc	1.4	c-g
8.	**IGB22102T**	12.35	a	11.3	gh	70.7	b	96.5	ab	1.0	g
9.	**Firefoxx**	10.77	ef	12.3	cd	69.0	fg	95.9	abc	1.5	c-f
10.	**Sanette**	10.65	ef	12.3	cd	69.4	def	95.3	bcd	1.7	bc
11.	**GSP-18-44-B**	11.02	c-f	11.7	efg	70.4	bc	94.0	de	1.6	cde
12.	**Westminster**	9.35	g	13.2	b	71.9	a	95.6	abc	1.3	c-g
13.	**Sure**	11.30	b-e	12.1	cde	69.2	efg	96.3	ab	1.2	d-g
14.	**FAR SB1**	10.83	ef	12.3	cd	70.1	bcd	96.0	abc	1.3	c-g
15.	**FAR SB2**	11.37	b-e	11.4	gh	70.1	bcd	94.7	cde	1.2	c-g
16.	**FAR SB3**	10.70	ef	12.0	cde	70.3	bc	96.6	ab	1.2	c-g
17.	**FAR SB4**	11.70	abc	11.7	efg	70.5	bc	93.8	ef	1.6	cde
18.	**FAR SB5**	11.81	ab	11.4	gh	69.0	fg	94.0	de	1.6	bcd
	Mean	10.92		12.2		69.9		95.1		1.5	
	LSD (P=0.05)	0.73		0.5		0.8		1.5		0.4	
	P-Value	<0.001		<0.001		<0.001		<0.001		<0.001	

Table 2. Trial input and management details.

Sowing date:		**7 September**
Harvest date:		**6 February**
Plant population:		300 seeds/m^2
Seed treatment:		Systiva
Basal fertiliser:	28 April	100 kg MAP (10 N)
Nitrogen:	20 October	200 kg Urea (92 N)
	10 November	87 kg Urea (40 N)
Fungicide:	GS30	Radial 840 mL/ha
	GS49	Prosaro 300 mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 3. HYC Barley G.E.M Trial Series (FAR TAS B22-03-2)

Objectives:

To assess the performance of four varieties of spring barley and wheat germplasm managed under six different management strategies (sown early September).

Key points:

- There was no significant interaction between cultivar and management when measuring yield, however there was significant interaction with grain quality (protein, test weight and screenings).
- On average RGT Planet was the highest variety (11.41 t/ha) and as seen in previous years spring sown wheat failed to perform well averaging a yield less than half that of RGT Planet (5.12 t/ha).
- Despite the low disease pressure seen in barley under spring sown conditions, Rockstar wheat developed very high stripe rust infection.
- Protein in this trial were again high with Rosalind averaging 14.2%, Laureate 13.0% and RGT Planet 12.6%. The highest figures coming from where crops were grown with the higher N rate and low seed rate. The barley varieties were uniform in this respect however there was little influence from management on the protein levels of the Rockstar wheat.
- The quickest developing and lowest yielding barley variety Rosalind also suffered from the lowest retention (92.8%) and highest screening (2.3%), as well as the highest protein. However, being grown under lower N and high seed rates did improve it from the average.

Table 1. Treatment management details.

Treatment ID	Fungicide	Seed Rate Seeds /m^2	Canopy Intervention	Kg Nitrogen
1. Low N Input Low SR	Standard (cheaper)[1]	150	Untreated	80
2. Low N Input High SR	Standard (cheaper) [1]	360	Untreated	80
3. High N Input Low SR	Standard (cheaper) [1]	150	Untreated	160
4. High N Input High SR	Standard (cheaper) [1]	360	Untreated	160
5. Planet Spring Barley system	Higher input[2]	360	Untreated	160
6. Hyper - yield system	Higher input[2,3]	360	PGR	160

[1] Standard Management Control – 2 x cheaper foliar fungicide propiconazole (Opus at 500 mL/ha) @GS31 and prothioconazole & tebuconazole (Prosaro @ 300 mL/ha) @GS39-49.

[2] Increased disease management – Systiva® seed treatment, 2 x foliar fungicides including QoI (strobilurin) & SDHI combinations with DMIs) with third fungicide if required.

[3]Plant growth regulators (PGR) (Moddus® Evo 200 mL/ha @GS30 & Moddus Evo 200 mL/ha @GS33-37).

Table 2. Influence of management strategy and cultivar on grain yield (t/ha).

Management	Cultivar									
	RGT Planet		Rosalind		Laureate		Rockstar (wheat)		Mean	
	t/ha		t/ha		t/ha		t/ha		t/ha	
1. Low N Input Low SR	10.49	-	9.00	-	10.31	-	4.04	-	**8.46**	**c**
2. Low N Input High SR	11.78	-	10.74	-	11.64	-	5.42	-	**9.89**	**ab**
3. High N Input Low SR	10.34	-	9.54	-	10.23	-	3.80	-	**8.47**	**c**
4. High N Input High SR	11.76	-	10.89	-	11.24	-	5.41	-	**9.82**	**b**
5. Planet Spring Barley system	12.16	-	11.04	-	11.45	-	5.96	-	**10.15**	**a**
6. Hyper - yield system	11.94	-	11.26	-	11.48	-	6.12	-	**10.20**	**a**
Mean	**11.41**	**a**	**10.41**	**c**	**11.06**	**b**	**5.12**	**d**	**9.50**	
LSD Cultivar (P=0.05)	0.26		**P-Value**		<0.001					
LSD Management (P=0.05)	0.32		**P-Value**		<0.001					
LSD Cultivar x Man. (P=0.05)	ns		**P-Value**		0.374					

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

Management	Cultivar									
	RGT Planet		Rosalind		Laureate		Rockstar (wheat)		Mean	
	%		%		%		%		%	
1. Low N Input Low SR	12.7	fgh	14.5	b	13.0	efg	11.8	kl	**13.0**	**b**
2. Low N Input High SR	11.9	jkl	13.2	de	12.3	hi	11.5	l	**12.2**	**c**
3. High N Input Low SR	13.5	d	15.0	a	13.4	de	11.9	ijk	**13.5**	**a**
4. High N Input High SR	12.4	hi	14.2	bc	13.0	efg	11.9	jkl	**12.9**	**b**
5. Planet Spring Barley system	12.4	h	14.0	c	13.1	ef	12.4	hi	**13.0**	**b**
6. Hyper - yield system	12.6	gh	14.0	c	13.1	de	12.3	hij	**13.0**	**b**
Mean	**12.6**	**c**	**14.2**	**a**	**13.0**	**b**	**11.9**	**d**	**12.9**	
LSD Cultivar (P=0.05)	0.20		**P-Value**		<0.001					
LSD Management (P=0.05)	0.22		**P-Value**		<0.001					
LSD Cultivar x Man. (P=0.05)	0.44		**P-Value**		<0.001					

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

Management	Cultivar									
	RGT Planet		Rosalind		Laureate		Rockstar		Mean	
	kg/hL		kg/hL		kg/hL		kg/hL		kg/hL	
1. Low N Input Low SR	69.8	abc	68.3	c	69.0	bc	66.0	d	**68.3**	**b**
2. Low N Input High SR	70.7	ab	69.7	abc	69.4	abc	70.3	ab	**70.0**	**a**
3. High N Input Low SR	70.4	ab	69.4	abc	69.2	abc	64.9	d	**68.5**	**b**
4. High N Input High SR	70.3	ab	70.0	abc	69.3	abc	69.7	abc	**69.8**	**a**
5. Planet Spring Barley system	70.6	ab	69.7	abc	69.6	abc	70.9	a	**70.2**	**a**
6. Hyper - yield system	70.8	a	70.2	ab	69.5	abc	69.4	abc	**70.0**	**a**
Mean	**70.4**	**a**	**69.5**	**b**	**69.3**	**bc**	**68.6**	**c**	**69.5**	
LSD Cultivar (P=0.05)	0.82		**P-Value**		0.004					
LSD Management (P=0.05)	0.94		**P-Value**		<0.001					
LSD Cultivar x Man. (P=0.05)	1.88		**P-Value**		0.002					

Table 5. Influence of management strategy and cultivar on retention (% >2.2 mm).

Management	Cultivar									
	RGT Planet		**Rosalind**		**Laureate**		**Rockstar (wheat)**		**Mean**	
	% >2.2 mm		% >2.2 mm		% >2.2 mm		% >2.2 mm		% >2.2 mm	
1. Low N Input Low SR	94.8	-	91.4	-	95.2	-	NA	-	**93.8**	**bc**
2. Low N Input High SR	94.9	-	94.0	-	95.9	-	NA	-	**94.9**	**a**
3. High N Input Low SR	94.4	-	91.2	-	95.2	-	NA	-	**93.6**	**c**
4. High N Input High SR	94.3	-	93.1	-	96.7	-	NA	-	**94.7**	**a**
5. Planet Spring Barley system	94.4	-	94.0	-	96.0	-	NA	-	**94.8**	**a**
6. Hyper - yield system	95.2	-	93.2	-	95.5	-	NA	-	**94.6**	**ab**
Mean	**94.7**	**b**	**92.8**	**c**	**95.8**	**a**	**NA**	**-**	**69.5**	
LSD Cultivar (P=0.05)			0.76			**P-Value**			<0.001	
LSD Management (P=0.05)			0.82			**P-Value**			0.030	
LSD Cultivar x Man. (P=0.05)			ns			**P-Value**			0.124	

Table 6. Influence of management strategy and cultivar on screenings (% <2.2 mm).

Management	Cultivar									
	RGT Planet		**Rosalind**		**Laureate**		**Rockstar (wheat)**		**Mean**	
	% <2.2 mm		% <2.2 mm		% <2.2 mm		% <2.2 mm		% <2.2 mm	
1. Low N Input Low SR	1.7	fgh	2.8	de	2.3	d-g	10.3	a	**4.3**	**a**
2. Low N Input High SR	1.5	gh	1.7	fgh	1.5	gh	8.3	b	**3.3**	**b**
3. High N Input Low SR	1.6	fgh	2.8	d	2.4	def	11.1	a	**4.5**	**a**
4. High N Input High SR	1.7	fgh	2.3	d-g	1.4	h	8.7	b	**3.5**	**b**
5. Planet Spring Barley system	1.4	h	2.2	d-h	1.5	gh	7.3	c	**3.1**	**b**
6. Hyper - yield system	1.5	gh	2.0	e-h	1.6	fgh	7.4	c	**3.1**	**b**
Mean	**1.6**	**c**	**2.3**	**b**	**1.8**	**c**	**8.9**	**a**	**3.6**	
LSD Cultivar (P=0.05)			0.33			**P-Value**			<0.001	
LSD Management (P=0.05)			0.41			**P-Value**			<0.001	
LSD Cultivar x Man. (P=0.05)			0.82			**P-Value**			<0.001	

Table 7. Trial input and management details.

Sowing date:		**7 September**	
Harvest date:		**1 February**	
Plant population:		As per treatment list	
Basal fertiliser:	28 Apr	100 kg MAP (10 N)	
Nitrogen:		As per treatment list	
PGR:		**PGR**	**Untreated**
	GS30	Moddus Evo 0.20 L/ha	----
	GS33	Moddus Evo 0.20 L/ha	----
Fungicide:		**Standard Input**	**High Input**
	GS00	----	Systiva
	GS31	Opus 500 mL/ha	Radial 840 mL/ha
	GS39	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha

Trial 4. HYC Barley Disease Management (FAR TAS B22-04-2)

Objectives:

To develop profitable and sustainable approaches to disease management in HRZ barley.

Key points:

- There was no significant response in yield to the use of fungicides. This result is in line with those in 2021 and 2020. This again demonstrates that intensive fungicide management (multiple applications and expensive chemistry) may not be needed to grow barley in spring sown systems.
- There was no influence of fungicides on grain quality with the exception of retention, with untreated (92.6%) significantly lower than most other treatments (average 94.2%).
- Despite no significant differences in yield, low amounts of NFNB and scald were recorded in this trial.

Treatments: 15 Fungicide management strategies (cultivar- RGT Planet)

Table 2. Influence of fungicide management on grain yield (t/ha).

	Treatment				Yield	% of mean
	GS00	**GS30**	**GS39-49**	**GS59**	t/ha	%
1	---	---	---	---	11.98 -	100.2
2	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha		12.02 -	100.5
3	Systiva	Prosaro 300 mL/ha	Radial 840 mL/ha	Opus 500 mL/ha	12.01 -	100.4
4	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha		11.78 -	98.5
5	---	---	Aviator Xpro 420 mL/ha		11.77 -	98.5
6	---	Prosaro 300 mL/ha	FAR F1-19 750 mL/ha		11.83 -	99.0
7	---	FAR F1-19 750 mL/ha	Radial 840 mL/ha		12.05 -	100.8
8	---	Prosaro 300 mL/ha	----		11.77 -	98.4
9	--	Tilt 500 250 mL/ha	----		11.96 -	100.0
10	Systiva	---	Radial 840 mL/ha	---	11.94 -	99.9
11	---	Prosaro 300 mL/ha	Radial 840 mL/ha	---	12.12 -	101.4
12	---	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	12.07 -	100.9
13	---	Aviator Xpro 420 mL/ha	Radial 840 mL/ha		11.87 -	99.3
14	---	Prosaro 150 mL/ha	Radial 420 mL/ha		12.11 -	101.2
15	Systiva	Prosaro 300 mL/ha	Aviator Xpro 420 mL/ha	Opus 500 mL/ha	12.09 -	101.1
				Mean	11.96	100.0
				LSD (P=0.05)	ns	ns
				P-Value	0.329	0.332

Table 2. Influence of fungicide management on grain quality (treatment number as per table 1).

Trt.	Protein	Test weight	Retention	Screenings
	%	kg/hL	%	%
1	11.8 -	68.9 -	92.6 d	2.2 -
2	11.7 -	69.4 -	94.1 bc	2.0 -
3	11.6 -	69.7 -	94.5 bc	1.7 -
4	11.6 -	69.4 -	94.6 bc	1.9 -
5	11.4 -	69.8 -	93.6 cd	2.0 -
6	11.7 -	69.3 -	94.8 ab	1.8 -
7	11.5 -	69.0 -	94.5 bc	1.9 -
8	11.5 -	69.6 -	93.8 bc	1.9 -
9	11.7 -	69.1 -	93.8 bc	2.0 -
10	11.6 -	69.7 -	94.7 ab	1.7 -
11	11.5 -	69.2 -	94.3 bc	1.7 -
12	11.6 -	69.6 -	94.1 bc	1.9 -
13	11.6 -	69.9 -	95.7 a	1.5 -
14	11.5 -	69.4 -	94.3 bc	1.8 -
15	11.6 -	69.3 -	93.8 bc	2.1 -
Mean	11.6	69.4	94.2	1.9
LSD (P=0.05)	ns	ns	1.1	ns
P-Value	0.460	0.200	0.004	0.080

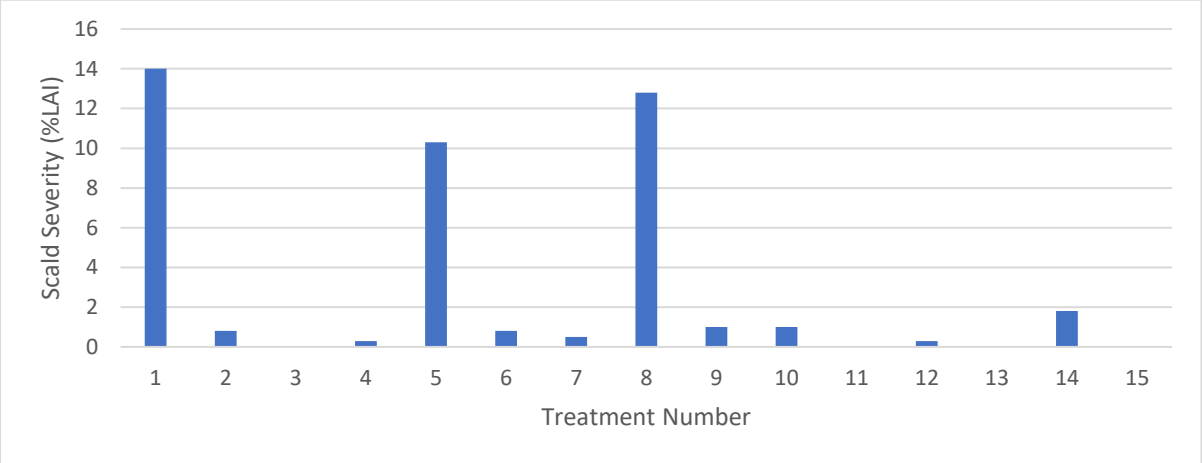

Figure 1. The severity of scald at GS71- non-significant (treatment number as per table 1).

Table 3. Details of the management levels.

Varieties:		**RGT Planet**
Sowing date:		**7 September**
Harvest date:		**21 January**
Seed Rate:		180 seeds/m^2
Sowing Fertiliser:		100 kg MAP/ha
Seed Treatment:		As per treatment list
Nitrogen:	20 October	200 kg Urea (92 N)
	10 November	87 kg Urea (40 N)
Fungicide:		As per treatment list

Trial 5. HYC PGR x harvest date interaction (FAR TAS B22-05-2)

Objectives:
To assess the value of PGRs with delayed harvest in HRZ regions.

Treatments: 4 PGR management approaches applied to two cultivars and harvested at two harvest dates.

Key points:

- There was no significant interaction between PGR, harvest date and variety however generally speaking a delayed harvest decreased yield by 0.36 t/ha and there was a yield penalty associated with the "European" PGR approach.
- For both RGT Planet and Laureate, a double application of Moddus Evo (GS31 f.b GS37) significantly reduced peduncle length compared to the untreated and it was again shortened significantly when Moddus Evo was used in conjunction with Ethepon 720.
- As per results in 2021, brackling responses to PGR were again variable and did not produce a significant difference between treatments.

Harvest dates:

1. Ontime harvested on the 30 January 2022
2. Delayed harvested on the 6 February 2023

Plant growth regulators (PGR) treatments:

1. Untreated
2. GS31 PGR trinexapac ethyl based (Single Moddus Evo)
3. GS31 + GS37 PGR trinexapac ethyl based (Double Moddus Evo)
4. European approach based on GS31 (trinexapac ethyl & GS37 of Ethepon 720 @500 mL/ha)

Table 1. Influence of fungicide management strategy, variety and canopy management regime on grain yield (t/ha).

			RGT Planet		Laureate		Mean	
Variety			11.30	a	11.04	b	**11.17**	
	LSD (P=0.05)		0.13		***P-Value***		0.003	
Harvest Date								
On time			11.50	-	11.20	-	11.35	a
Delayed (28 days delay)			11.10	-	10.88	-	10.99	b
Harvest Date Management	***LSD***		0.27		***P-Value***		0.024	
Harvest Date x Variety	***LSD***		ns		***P-Value***		0.436	
Canopy Management Regime								
Untreated			11.38	-	11.27	-	11.33	a
GS31 PGR			11.51	-	11.16	-	11.34	a
GS31 + GS37 PGR			11.41	-	11.40	-	11.40	a
GS31 + GS49 PGR (Europe style)			10.90	-	10.34	-	10.62	b
Canopy Management Regime	***LSD***		0.31		***P-Value***		<0.001	
Variety x Canopy Mgmt Regime	***LSD***		ns		***P-Value***		0.267	
Harvest Date. x Canopy Mgmt. Regime								
On Time								
Untreated			11.60	-	11.60	-	11.60	-
GS31 PGR			11.80	-	11.19	-	11.49	-
GS31 + GS37 PGR			11.65	-	11.58	-	11.61	-
GS31 + GS49 PGR (Europe style)			10.96	-	10.44	-	10.70	-
Delayed								
Untreated			11.16	-	10.95	-	11.05	-
GS31 PGR			11.23	-	11.14	-	11.18	-
GS31 + GS37 PGR			11.16	-	11.23	-	11.20	-
GS31 + GS49 PGR (Europe style)			10.84	-	10.23	-	10.54	-
Harvest Date x Canopy Mgmt	***LSD***		ns		***P-Value***		0.640	
Harvest Date x Canopy Mgmt x Variety	***LSD***		ns		***P-Value***		0.630	

Table 2. Canopy management and harvest date effect on peduncle length (mm), lodging index (0-500) and brackling (%) across two varieties (Cyclops and Leabrook).

Canopy Management x Harvest Date		**Head Loss (heads/m^2)**				**Brackling %**			
		RGT Planet		**Laureate**		**RGT Planet**		**Laureate**	
On Time	Untreated	3.8	-	2.5	-	62.5	-	70.0	-
	GS31	4.4	-	1.3	-	65.0	-	42.5	-
	GS31 + GS37	3.1	-	0.0	-	67.5	-	40.0	-
	European GS31	0.0	-	0.6	-	30.0	-	42.5	-
Delayed	Untreated	6.3	-	14.4	-	82.5	-	52.5	-
	GS31	11.9	-	3.1	-	77.5	-	63.8	-
	GS31 + GS37	5.0	-	3.8	-	67.5	-	50.0	-
	European GS31	5.0	-	1.3	-	35.0	-	30.0	-
Grand Mean		4.1				54.9			
LSD (P=0.05)		ns				ns			
P-Value		0.066				0.156			

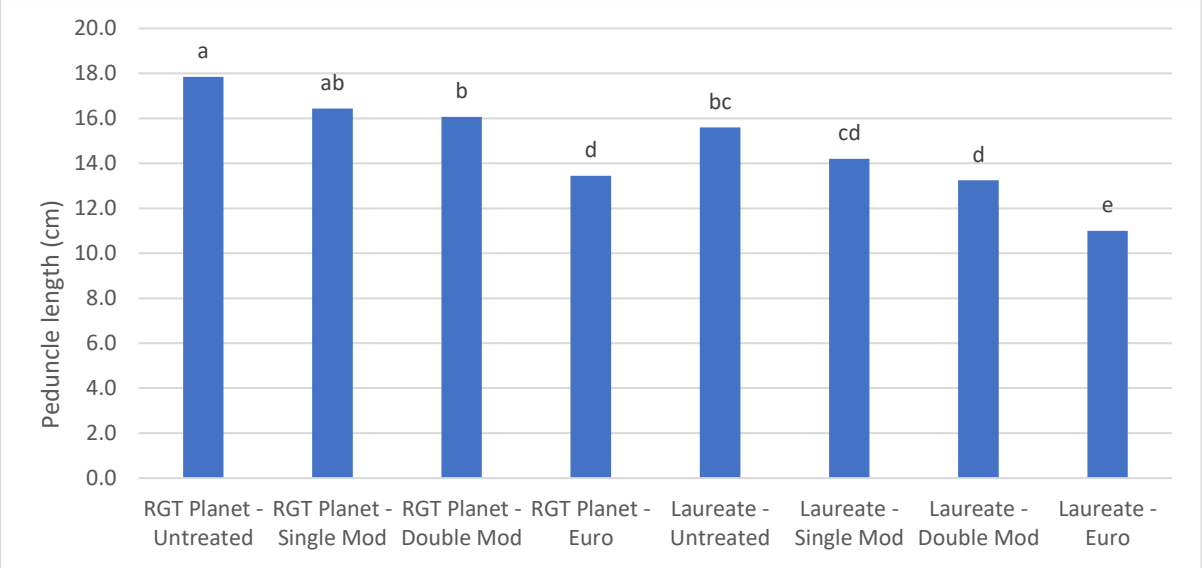

Figure 1. Canopy management effect on peduncle length (cm) across two varieties (RGT Planet and Laureate).

Table 3. Trial input and management details.

Sowing date:		**7 September**
Harvest date:		**30 January / 6 February**
Plant population:		300 seeds/m^2
Basal fertiliser:	28 April	100 kg MAP (10 N)
Nitrogen:	20 October	200 kg Urea (92 N)
	10 November	87 kg Urea (40 N)
Fungicide:	GS30	Radial 840 mL/ha
	GS49	Aviator Xpro 420 mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 6. Nutrition for Hyper Yielding Barley (FAR TAS B22-06-2)

Objectives:

To assess the value of higher nutrition input for barley

Key points:

- There was no significant yield difference in response to nitrogen or added nutrients (through fertiliser or manure).
- The high yields achieved despite varying N rates suggest that the N supply coming from the soil is very important for achieving higher grain yields.
- Despite only 10 kg N/ha from MAP at sowing being applied to the "0N" treatment, a yield of 11.91 t/ha was still achieved.
- There was a statistically significant trend for protein to increase with higher N rates.
- Screenings also rose with N rate with 0N having 0.9% versus 250N at 1.7%.

Table 1. Detailed treatment list, grain yield (t/ha) & % site Mean.

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield	Mean
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	%
1	0+0	22	42	19	11.91 -	103.6
2	25+25	22	42	19	11.45 -	99.6
3	50+50	22	42	19	11.26 -	97.9
4	75+75	22	42	19	11.48 -	99.9
5	100+100	22	42	19	11.45 -	99.6
6	125+125	22	42	19	11.21 -	97.5
7	75+75+50	22	42	19	11.70 -	101.8
8	75+75+5 t/ha Manure	22	42	19	11.31 -	98.4
9	75+75+PKS	65	83	37	11.38 -	99.0
10	5 t/ha Manure	22	42	19	11.79 -	102.6
				Mean	11.49	100.0
				LSD (P=0.05)	ns	ns
				P-Value	0.232	0.226

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.
**Manure applied at a rate of 5 t/ha, see nutrient breakdown in table 4.*

Table 2. Influence of nitrogen rate on grain quality, protein (%), test weight (kg/HL) and screenings (%).

Trt	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein	Test weight	Retentions	Screenings
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	%	kg/hL	%	%
1	0	22	42	19	10.8 e	72.0 -	94.5 -	0.9 c
2	50	22	42	19	11.2 d	70.3 -	94.4 -	1.0 bc
3	100	22	42	19	11.6 c	69.5 -	95.8 -	1.3 bc
4	150	22	42	19	12.1 b	70.6 -	95.8 -	1.1 bc
5	200	22	42	19	12.4 ab	70.3 -	94.8 -	1.4 ab
6	250	22	42	19	12.8 a	70.0 -	94.4 -	1.7 a
7	210 Split	22	42	19	12.3 b	70.5 -	94.9 -	1.3 ab
8	150+M	22	42	19	12.1 b	70.5 -	95.2 -	1.3 ab
9	150+PKS	65	83	37	12.3 b	70.2 -	95.3 -	1.3 ab
10	M	22	42	19	10.7 e	70.5 -	96.1 -	1.0 bc
				Mean	11.7	60.6	95.1	77.9
				LSD (P=0.05)	0.8	ns	2.4	ns
				P-Value	<0.001	0.438	0.821	0.111

Table 3. Site soil test details

Soil Tests	Level Found
EC	0.17 dS/m
Organic Carbon W&B	3.02 %
pH 1:5 water	7.05
Total Mineral N*	164.7 kg soil mineral N/ha
Colwell Phosphorus	311 ppm
Colwell Potassium	588 ppm
KCl Sulfur	5.60 ppm

*Mineral N 0-60cm, all other results 0-10cm depth sampled 21/5/2022

Table 4. Trial input and management details.

Sowing date:		**7 September**			
Harvest date:		**6 February**			
Plant population:		300 seeds/m^2			
Basal fertiliser:	28 April	100kg MAP (10 N)			
	5 tonnes manure:	N	P	K	S
	Kg/ha	5.5	50	90	26
Nitrogen:		As per treatment list			

All inputs of insecticides, fungicides, and herbicides were standard across the trial

2022 HYC Canola Results

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2022 NSW Crop Technology Centre
Wallendbeen, New South Wales

Winter canola sown: April 6
Spring canola sown: April 19
Winter canola harvested: January 4
Spring canola harvested: December 21
2021 Crop: Wheat
2020 Crop: Canola
2019 Crop: Pasture
Soil type: Red Ferrosol
Available Nitrogen (kg/ha) 0-60cm: 180
Colwell P 0-10cm: 35mg/kg
pH ($CaCl_2$) 0-10cm: 5.4
Organic Carbon 0-10cm: 3.1

Trial 1. HYC Winter Canola Screen Ungrazed (FAR NSW C22-01)

Objectives: To examine the suitability of elite commercial and unreleased winter canola cultivars for hyper-yielding regions in an ungrazed/grain only situation

Key points:

- *RGT Nizza CL was the highest yielding canola variety in this trial and had the highest oil concentration (Table 1).*
- *Lodging had a large impact on yield with all varieties that yielded above 4 t/ha having a lodging score of <3. Hyola Feast CL lodged very early (early flowering) and had the lowest yield in the trial.*
- *Captain CL (previously AGFCA014120) and Hyola Feast CL were the fastest varieties to reach the start of flowering on 30 September. There was a narrow range between varieties, with RGT Clavier starting to flower five days later on 5 October.*

Treatments: 8 winter canola hybrid varieties sown in a randomised complete block design.

Table 1. Yield, oil and lodging of eight winter canola varieties sown on 6 April at Wallendbeen, 2022.

Variety	Grain yield (t/ha)	Oil (%)	*Lodging 11 October	*Lodging 27 October
Captain CL	3.79	45.7	3.25	4.0
Hyola Feast CL	3.22	44.4	5.5	7.5
Hyola 970 CL	3.65	45.2	2.5	3.25
Phoenix CL	4.37	45.6	2.5	3.0
RGT Clavier CL	4.51	44.7	1.25	2.25
RGT Nizza CL	4.80	46.1	1.75	3.5
CL222167	4.08	44.5	1.75	2.75
CL222170	4.42	45.3	1.75	2.0
Mean	*4.1*	*45.18*	*2.53*	*3.5*
l.s.d. p=0.05	*0.46*	*0.82*	*1.33*	*1.14*
p value	*<0.001*	*0.002*	*<0.001*	*<0.001*

Lodging – 1 = no lodging, 9 = flat/fully lodged

Table 2. Start of flowering date of eight winter cultivars sown on 6 April at Wallendbeen, 2022.

Variety	Start of flowering date
Captain CL	30 September
Hyola Feast CL	30 September
Hyola 970 CL	4 October
Phoenix CL	2 October
RGT Clavier CL	5 October
RGT Nizza CL	2 October
CL222167	1 October
CL222170	3 October

Trial 1. HYC Winter Canola Screen Grazed. (FAR NSW C22-01 (G))

Objectives: To examine the suitability of a small selection of elite winter canola varieties for their vegetative biomass production and recovery for grain yield after simulated grazing.

Key points:

- Captain CL produced more vegetative biomass (5.55 t/ha) than all other varieties (Table 1).
- Phoenix CL was the highest yielding variety in the grazed winter screen, with similar yield achieved to where it was ungrazed nearby (4.26 t/ha versus 4.37 t/ha grazed).
- Grazing slightly reduced lodging (when compared with the ungrazed trial) but lodging still appeared to have an impact on grain yield outcomes.
- Phoenix CL had the highest oil concentration.
- Grazing only had small effects on phenology, with all varieties flowering within a few days of the ungrazed trial nearby.

Treatments: 8 winter canola hybrid varieties sown in a randomized complete block design.

Table 1. Yield, oil and lodging of eight winter canola varieties sown on 6 April at Wallendbeen, 2022.

Variety	Vegetative Biomass (t/ha) 28 July	Grain yield (t/ha)	Oil (%)	*Lodging 11 October	*Lodging 27 October
Captain CL	5.55	3.36	45.6	3.5	4.5
Hyola Feast CL	4.45	3.46	44.8	3.25	5.25
Hyola 970 CL	4.47	3.39	45.4	2.0	2.5
Phoenix CL	4.82	4.26	46.5	1.25	2.0
Mean	*4.82*	*3.62*	*45.6*	*2.5*	*3.56*
LSD(P=0.05)	0.71	0.22	0.88	1.36	1.51
P Value	0.021	<0.001	0.012	0.014	0.002

Lodging – 1 = no lodging, 9 = flat/fully lodged

Table 2. Start of flowering date of eight winter cultivars sown on 6 April at Wallendbeen, 2022

Variety	Start of flowering date
Captain CL	29 September
Hyola Feast CL	27 September
Hyola 970 CL	5 October
Phoenix CL	1 October

Figure 1- Winter canola trial after grazing on 28 July 2022.

Table 3. Trial management details for winter variety screen, grazed and Ungrazed.

Sowing date:		**6 April**
Target plant density:		45 plants/m^2
Sowing Fertiliser:		130kg MAP (in-furrow) & 170 kg single super (broadcast pre-sowing).
Nitrogen:	6 Leaf	113kg N/ha
	Bud Visible	113kg N/ha
Fungicide:	Seed	Saltro Duo
	20% Bloom	Aviator Xpro 0.80L/ha
	50% Bloom	Prosaro 0.45 L/ha

Trial 2. Spring Canola YieldMax Trial (FAR NSW C22-02)

Objectives: To determine the response of increased crop nutrition across a range of elite commercial canola varieties.

Key points:

- Grain yield in 2022 was lower than what was achieved in 2021. The highest yield was from High input management of 45Y93 CL and 45Y95 CL at 4.05 t/ha (Table 2), but this compares to 6.4 t/ha with high input 45Y95 CL in 2021.
- A combination of very low light (15% lower than average in the crop critical period) and slightly elevated temperatures (5% higher than average, mostly due to elevated minimum temperatures) meant that environmental yield potential was lower than 2021 by 20%, but periods of waterlogging likely impacted yield as well.
- Maturity biomass and harvest index were both lower than 2021. The high yielding plots of 45Y95 CL in 2021 had maturity biomass of ~18 t/ha and harvest index ~0.36, compared with 2022 where 45Y95 CL maturity biomass was 12.8 t/ha and harvest index 0.31 (Figure 1).
- As expected, yield components were also much lower in 2022 than 2021. On average pods/m² and seeds/pod were down 25 and 20% respectively. Seed was larger in 2022 than 2021 by 11% (Table 4).
- There was a 0.23 t/ha benefit of the high input management strategy which included high rates of P, N and 3 t/ha (dry basis) chicken manure (Table 2).
- Triazine tolerant varieties were lower yielding than non-TT varieties.
- 45Y28 RR, Condor TF and Hyola Blazer TT all had relatively high oil concentration (Table 3).

Treatments: 6 canola varieties with two nutrition input strategies, high and low input. Sown as a split-plot design, blocked by herbicide tolerance.

Table 1. Start of flowering date of six varieties in YieldMax trial at Wallendbeen 2022.

Variety	Start of flowering date
45Y28 RR	1 September
Condor TF	23 August
45Y93 CL	30 August
45Y95 CL	29 August
Hyola Blazer TT	24 August
HyTTec Trifecta	30 August

Table 2. Influence of nutrient input strategy and variety on grain yield (t/ha).

Cultivar	Low input	High input	Mean
	Grain yield (t/ha)		
45Y28 RR	3.77	4.01	*3.89*
Condor TF	3.46	3.57	*3.52*
45Y93 CL	3.95	4.05	*3.99*
45Y95 CL	3.43	4.05	*3.74*
Hyola Blazer TT	2.90	3.20	*3.05*
HyTTec Trifecta	3.26	3.28	*3.27*
Mean	*3.46*	*3.69*	
LSD Input	0.18	*p* value	0.016
LSD Variety	0.32	*p* value	<0.001
LSD Variety * Input	n.s.	*p* value	n.s.

Table 3. Influence of nutrient input strategy and variety on oil concentration (%).

Cultivar	Low input	High input	Mean
		Oil concentration (%)	
45Y28 RR	48.3	47.4	*47.8*
Condor TF	47.8	47.3	*47.6*
45Y93 CL	45.9	45.2	*45.6*
45Y95 CL	46.2	45.2	*45.7*
Hyola Blazer TT	46.0	45.6	*47.8*
HyTTec Trifecta	45.9	45.3	*45.6*
Mean	3.46	3.69	
LSD Input	n.s.	*p* value	n.s.
LSD Variety	0.48	*p* value	<0.001
LSD Variety x Input	n.s.	*p* value	n.s.

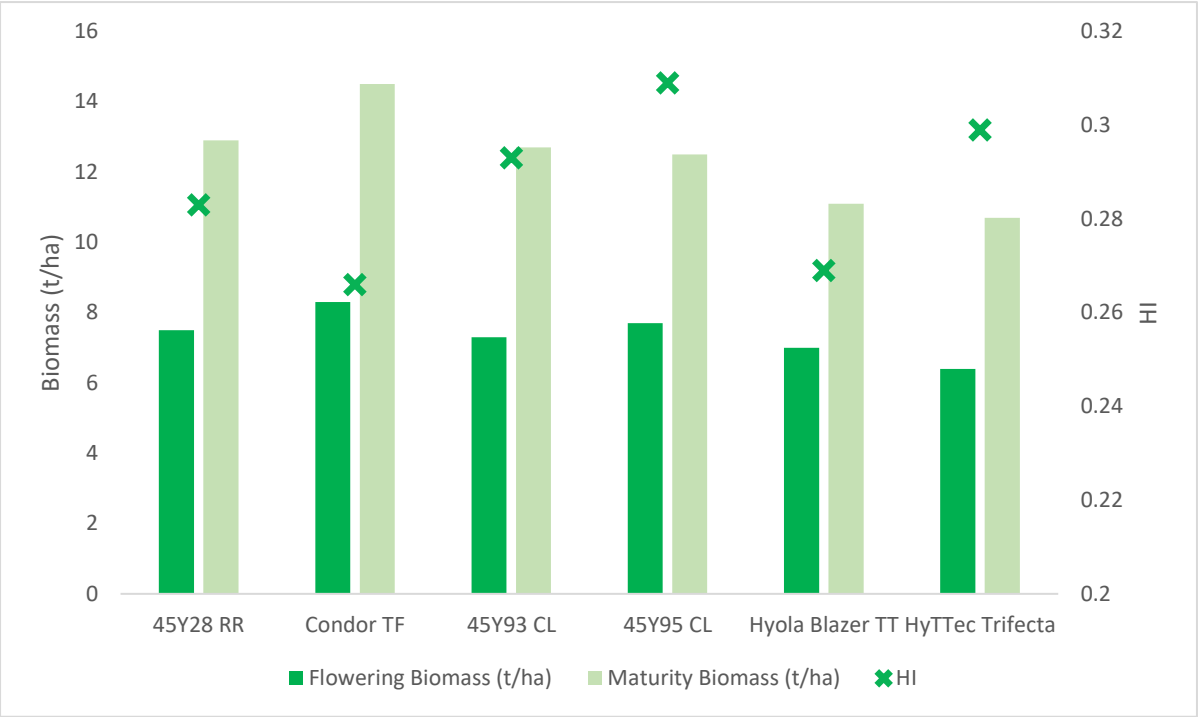


Figure 1. Influence of variety choice on flowering biomass (t/ha), maturity biomass (t/ha) and harvest index (HI).

Table 4: Canola yield components in 2021 and 2022 at Wallendbeen HYC site.

	2021				2022			
Variety	**TGW (g)**	**Seeds/pod**	**Pods/m2**	**Seeds/m2**	**TGW (g)**	**Seeds/pod**	**Pods/m2**	**Seeds/m2**
45Y28 RR	3.7	18	7628	140284	4.4	17	5635	93115
45Y93 CL	3.8	18	8692	154713	4.5	16	5832	91708
45Y95 CL	3.9	21	8422	174226	4.2	16	5940	96342
ATR Wahoo	3.6	21	5240	108277				
HyTTec Trifecta	4.1	17	8003	138627	4.5	14	5518	75565
Condor TF	4	15	8263	123960	4.5	12	6654	80631
Hyola Blazer TT					4.6	14	5181	73066

Table 5. Trial management details.

Sowing date:		**19 April**			
Target plant density:		45 plants/m^2			
Nutrition input treatments					
High input: 45 kg P, 225 kg N, 3 t/ha chicken manure		*Single Super*	**Chicken Manure*	*MAP*	*Urea*
	Pre-sowing	170 kg/ha	3 t/ha	-	-
	Sowing	-	-	130 kg/ha	-
	6-leaf	-	-	-	245 kg/ha
	Bud visible	-	-	-	245 kg/ha
Low input: 15 kg P, 150 kg N		*Single Super*	**Chicken Manure*	*MAP*	*Urea*
	Pre-sowing	170 kg/ha	-	-	-
	Sowing	-	-	-	-
	6-leaf	-	-	-	163 kg/ha
	Bud visible	-	-	-	163 kg/ha
Fungicide:	Seed	Saltro Duo			
	6-leaf	Prosaro 0.45 L/ha			
	20% Bloom	Aviator Xpro 0.80L/ha			
	50% Bloom	Prosaro 0.45 L/ha			

*See table X for chicken manure analysis

Table 6. Analysis of chicken manure used at Wallendbeen 2022 (rates and nutrients reported on a dry basis).

Nutrient	**Concentration in chicken manure**
Nitrogen	3.5%
Phosphorus	1.8%
Potassium	1.8%
Sulfur	0.5%
Calcium	3.2%
Magnesium	0.09%
Silicon	0.021%
Carbon	34%
Iron	0.2%
Manganese	0.05%
Copper	0.009%
Zinc	0.04%
Boron	0.003%
Molybdenum	0.0008%
Cobalt	0.0004%

Trial 4. Plant Density for Hyper-Yielding Spring Canola (FAR NSW C22-04)

Objectives: To determine optimum plant density for hyper-yielding spring canola

Key points:

- For the third consecutive year there was no response to plant density ranging from target densities of 15 to 75 plants/m² (achieved density in 2022 of 17 to 82 plants/m²).
- There was no significant lodging in 45Y28 RR even at the highest plant densities.
- There was no effect of plant density on grain quality.
- Plant density achieved was higher than targeted. The assumed canola establishment was 65% but establishment achieved was just over 70%.

Treatments: 45Y28 RR canola sown at four seeding rates to target 15, 30, 50 and 75 plants/m².

Table 1: Effect of plant density on grain yield, oil and protein of 45Y28 RR.

Target Plant Density	Sowing Rate (kg/ha)	Achieved Plant Density	Grain Yield (t/ha)	Oil (%)	Protein (%)
15 plants/m²	1.2	17.1 plants/m²	4.75	48.5	18.3
30 plants/m²	2.4	33.8 plants/m²	4.78	48.2	18.9
50 plants/m²	4.0	55.2 plants/m²	4.83	48.5	18.8
75 plants/m²	6.0	82.2 plants/m²	4.62	48.7	18.9
LSD (p<0.05)			*n.s.*	*n.s.*	*n.s.*

Table 2. Trial management details

Sowing date:		**19 April**
Variety:		45Y28 RR
Target plant density:		As per treatments
Sowing Fertiliser:		130 kg/ha MAP (in-furrow) & 170 kg/ha Single Super (broadcast pre-sow).
Nitrogen:	6 Leaf	113kg N/ha
	Bud Visible	113kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45L/ha
	20% Bloom	Aviator Xpro 0.80L/ha
	50% Bloom	Prosaro 0.45 L/ha

Trial 5. Nutrition for Hyper-Yielding Winter Canola (Grazed) (FAR NSW C22-05(G))

Objectives: To determine optimum nutrient management for hyper yielding grazed winter canola.

Key Messages:

- The winter nutrition trial was grazed on 28 July (all plots). Higher nutrition rates increased biomass compared with lower nutrition rates from 3.4 t/ha to a maximum of 5.2 t/ha.
- Lodging of Hyola Feast CL increased with increasing nutrition input. Grain yield was lower with high nutrition compared to where no nutrition was applied (except basal application).

Treatments: Five nitrogen rates applied as urea with an equal split at 6-leaf and bud visible stage. A sixth treatment had 3 t/ha of chicken manure applied.

Table 1: Effect of nutrient management on grain yield, oil, protein, test weight and lodging of Hyola Feast CL.

Nutrition treatment^	Vegetative biomass (28 July) t/ha	Grain Yield (t/ha)	Oil (%)	Protein (%)	Lodging 27-10 (1=standing, 9=flat)
Nil	3.44	3.64	46.3	19.0	2.75
75 kg/ha	4.14	3.63	44.8	20.5	2.75
150 kg/ha	4.66	3.67	45.7	19.8	4.5
225 kg/ha	4.71	3.36	45.4	20.4	5.5
300 kg/ha	5.23	2.90	45.2	20.0	8.5
225 kg/ha + 3 t/ha Manure*	5.18	3.22	43.8	20.9	7.0
LSD (p<0.05)	*0.56*	*0.42*	*n.s.*	*n.s.*	*1.24*

*See table x for manure analysis. ^Nitrogen applied 50% 6-leaf stage and 50% bud visible stage. Manure applied pre-sowing.

Table 2. Trial management details.

Sowing date:		**6 April**
Variety:		Hyola Feast CL
Target plant density:		45 plants/m^2
Sowing Fertiliser:		130 kg/ha MAP (in-furrow) & 170 kg/ha Single Super (broadcast pre-sow).
Nitrogen:		As per treatment list
Fungicide:	Seed	Saltro Duo
	6 Leaf	Prosaro 0.45L/ha
	20% Bloom	Aviator Xpro 0.80L/ha
	50% Bloom	Prosaro 0.45 L/ha

All inputs of insecticides and herbicides were standard across the trial.

Table 3. Analysis of chicken manure used at Wallendbeen 2022 (rates and nutrients reported on a dry basis).

Nutrient	Concentration in chicken manure
Nitrogen	3.5%
Phosphorus	1.8%
Potassium	1.8%
Sulfur	0.5%
Calcium	3.2%
Magnesium	0.09%
Silicon	0.021%
Carbon	34%
Iron	0.2%
Manganese	0.05%
Copper	0.009%
Zinc	0.04%
Boron	0.003%
Molybdenum	0.0008%
Cobalt	0.0004%

Trial 5. Nutrition for Hyper-Yielding Spring Canola (FAR NSW C22-05)

Objectives: To determine optimum nutrient management for hyper-yielding spring canola.

Key Messages:

- Nitrogen response plateaued at 75kg N/ha, with no further yield increases as N rates increased to 300kg/ha.
- The application of 3 t/ha chicken manure lifted grain yield by 0.69 t/ha where nil N was applied and 0.52 t/ha where 225kg N/ha was applied.
- Where Inorganic nutrition was applied at the equivalent NPKS rates (plus trace elements) as supplied by 3 t/ha (dry basis) chicken manure, there was a further lift in grain yield above chicken manure (both with 225kg N/ha).
- There was no effect of increasing nutrition inputs on grain quality but lodging increased with higher nutrition input.
- The very high rates of Inorganic nutrition may not be economic but it is highlights that canola yield is still being limited by nutrition even at very high commercial rates of N, P and S (225kg N, 47kg P and 20kg S).

Treatments: Five nitrogen rates applied as urea with an equal split at 6-leaf and bud visible stage. Two manure treatments, applied at 3 t/ha (dry basis) with nil N and 225kg N/ha, plus an eighth treatment where inorganic nutrition (NPKS + trace elements) was applied to the same level as supplied in manure.

Table 1: Effect of nutrient management on grain yield, oil, protein, test weight and lodging of Hyola Feast CL.

Nutrition treatment^	Grain Yield (t/ha)	Oil (%)	Protein (%)	Lodging 27-10 (1=standing, 9=flat)
Nil	2.98	44.8	22.1	2.75
75 kg/ha	3.56	45.9	21.8	3.25
150 kg/ha	3.67	44.2	23.1	3.75
225 kg/ha	3.49	45.3	21.7	3.75
300 kg/ha	3.50	44.6	22.7	3.5
Nil + 3 t/ha Manure	3.67	44.7	22.5	2.5
225 kg/ha + 3 t/ha Manure*	4.01	45.4	21.5	4.75
225 kg/ha + Inorganic Nutrition	4.38	45.0	22.1	4.5
LSD (p<0.05)	*0.30*	*n.s.*	*n.s.*	*1.39*

***See table x for manure analysis. ^Nitrogen applied 50% 6-leaf stage and 50% bud visible stage. Manure applied pre-sowing.

Table 2. Treatment details.

	Treatment	Manure	Nitrogen rate*	Phosphorus rate	Potassium rate	Sulfur rate	Zn	Cu	Mo	Bo
Trt.			**kg/ha**	**kg/ha**	**kg/ha**	**kg/ha**	**g/ha**	**g/ha**	**g/ha**	**g/ha**
1	Nil N	Nil	Nil	47	-	20				
2	75 N	Nil	75	47	-	20				
3	150 N	Nil	150	47	-	20				
4	225 N	Nil	225	47	-	20				
5	300 N	Nil	300	47	-	20				
6	Nil N + Chicken manure	3 t/ha	Nil	47	-	20				
7	225 N + Chicken manure	3 t/ha	225	47	-	20				
8	225 N + Inorganic* Nutrition	Nil	330	101	54	35	480	240	240	400

***Extra Inorganic nutrition applied broadcast pre-sowing except trace elements which were applied as foliar sprays at 6-leaf and bud visible stage.

Table 3. Trial management details.

Sowing date:		**6 April**
Variety:		45Y95 CL
Target plant density:		45 plants/m^2
Sowing Fertiliser:		130 kg/ha MAP (in-furrow) & 170 kg/ha Single Super (broadcast pre-sow).
Nitrogen:		As per treatment list
Fungicide:	Seed	Saltro Duo
	6 Leaf	Prosaro 0.45L/ha
	20% Bloom	Aviator Xpro 0.80L/ha
	50% Bloom	Prosaro 0.45 L/ha

All inputs of insecticides and herbicides were standard across the trial

Table 4. Analysis of chicken manure used at Wallendbeen 2022 (rates and nutrients reported on a dry basis).

Nutrient	Concentration in chicken manure
Nitrogen	3.5%
Phosphorus	1.8%
Potassium	1.8%
Sulfur	0.5%
Calcium	3.2%
Magnesium	0.09%
Silicon	0.021%
Carbon	34%
Iron	0.2%
Manganese	0.05%
Copper	0.009%
Zinc	0.04%
Boron	0.003%
Molybdenum	0.0008%
Cobalt	0.0004%

Trial 6. Disease management for Hyper-Yielding Spring Canola (FAR NSW C22-06)

Objectives: Determine the key timings for fungicide protection and the value of varietal resistance for blackleg management in hyper yielding Canola.

Treatments

Table 1. Detailed treatment list

Treatment	Seed Treatment	4-6 Leaf Spray	20% Bloom Spray	50% Bloom Spray
Nil	Maxim XL	Nil	Nil	Nil
Late	Maxim XL	Nil	Aviator Xpro 0.8 L/ha	Prosaro 0.45 L/ha
Complete	Saltro Duo	Prosaro 0.45 L/ha	Aviator Xpro 0.8 L/ha	Prosaro 0.45 L/ha

The treatments were designed to protect key growth stages from fungal diseases. The Late treatment was designed to only control upper canopy diseases such as upper canopy blackleg and sclerotinia stem rot. The Complete treatment controls crown canker blackleg as well as the upper canopy diseases. Grain yield difference between Complete and Late can be attributed to the control of crown canker blackleg.

Sub trial 1. Glyphosate tolerant canola

Key points:

- The complete fungicide treatment was higher yielding than nil and late fungicide in both 45Y28 RR and Condor TF.
- The benefit of the Complete treatment is from the extra protection provided by Saltro on the seed and Prosaro at 4-6 leaf stage to protect crown canker blackleg.
- When counted at maturity, there were more plants in the Complete treatment in 45Y28 RR compared to Nil and Late, but fungicide had no effect on plant numbers in Condor TF.
- The Complete treatment reduced crown canker blackleg infection (proportion of cross section of stem infected with blackleg at maturity) in both varieties.
- There were small effects of fungicide treatment on both upper canopy blackleg and sclerotinia stem rot (data not shown) but despite the wet year these diseases were both at surprisingly low levels. Sclerotinia stem rot averaged only 2% of plants infected with no fungicide treatment.

Table 1. Influence of fungicide management strategy plant number at maturity, blackleg at the crown (% of stem cross section infected), grain yield (t/ha) and oil concentration in two GT canola varieties at Wallendbeen in 2022.

Variety	Fungicide	Plants/m² at maturity	*Crown Canker %	Grain Yield (t/ha)	Oil %
45Y28 RR	Nil	36.7	5.7	3.64	46.9
	Late	32.7	6.7	3.77	47.6
	Complete	47.7	2.2	4.10	47.6
Condor TF	Nil	41.0	3.2	3.58	46.7
	Late	44.2	3.2	3.59	46.7
	Complete	42.7	1.2	3.97	47.5
l.s.d. (p<0.05)		*7.4*	*1.8*	*0.33*	*n.s.*

Sub trial 2. Triazine tolerant canola

Key points:

- There was a grain yield response of approximately 0.6 t/ha in ATR Wahoo where the complete fungicide management strategy was used compared with the late and full strategy, but there was no yield response in the more resistant variety HyTTec Trifecta. This response shows that the key timing for disease control in this trial was for early crown infection rather than later upper canopy diseases e.g. sclerotinia stem rot and upper canopy blackleg.
- The complete fungicide treatment had higher plant numbers at maturity in ATR Wahoo and lower crown canker infection.
- Upper canopy disease levels were low overall, with 4% infection of main stems with sclerotinia stem rot (untreated).

Table 2. Influence of fungicide management strategy plant number at maturity, blackleg at the crown (% of stem cross section infected), grain yield (t/ha) and oil concentration in two GT canola varieties at Wallendbeen in 2022.

Variety	Fungicide	Plants/m² at maturity	*Crown Canker %	Grain Yield (t/ha)	Oil %
ATR Wahoo	Nil	37.5	9.5	2.11	44.2
	Late	40.8	13.2	2.08	44.6
	Complete	52.8	4.7	2.69	44.4
HyTTec Trifecta	Nil	52.8	4.0	3.53	45.7
	Late	46.5	3.0	3.31	46.0
	Complete	56.0	0.5	3.56	45.9
l.s.d. (p<0.05)		*9.5*	*2.8*	*0.46*	*n.s.*

Table 3. Trial management details.

Sowing date:		**25 April**
Variety:		45Y28RR & HyTTec Trifecta
Target plant density:		45 plants/m^2
Sowing Fertiliser:		130 kg/ha MAP (in-furrow) & 180 kg/ha Single Super (broadcast pre-sow).
Nitrogen:	6 Leaf	113kg N/ha
	Bud Visible	113kg N/ha
Fungicide:		As per treatment list

2022 SA Crop Technology Centre
Millicent, South Australia

Sown: 10 May 2022
Harvested: 17 December 2022 (Spring), 12 January 2023 (Winter)
Rotation position: 2021 broad beans
Soil type: Neutral-slightly alkaline Organosol (Peat soil)
Available mineral N (0-30cm): 112.2kg/ha
Colwell P (ppm) 0-10cm: 63
pH (CaCl2) 0-10cm: 7.9
Organic Carbon (%) 0-10cm: 7.4

Table 1. Site soil test details

	Level Found
ECEC	0.28 dS/m
Organic Carbon W&B	7.4 %
pH 1:5 water	7.9 pH
Total Mineral N*	112.2 kg/ha
Colwell Phosphorus	63 mg/kg
Available Potassium	300 mg/kg
KCl Sulfur	38 mg/kg

*Mineral N 0-30cm, all other results 0-10cm depth sampled 14/7/2022

Note: Hail damaged the trial site in the early hours of Monday 12 December, leading to considerable pod damage and seed loss in the ripe spring types. Winter types still had green pods and were not affected.

Trial 1. HYC Winter Screen Ungrazed (FAR SAC C22-01-W)

Objectives:

To examine the suitability of elite commercial and unreleased winter canola cultivars for hyper-yielding regions and compare performance in a grazed and an ungrazed situation.

Key findings:

- Two unreleased winter canola varieties were the highest yielding varieties in this trial, Captain CL (tested previously as AGFCA014120) and CL222167, both yielding close to 4.5 t/ha.
- Captain CL also had the highest oil concentration at 44.4%.
- Protein was generally inverse of oil, where high oil concentration usually meant low protein concentration and vice versa.

Table 1. Influence of cultivar on flowering date.

	Phenology
Variety	Start of flowering
	50% of plants with 1 or more open flowers
Hyola Feast CL	2-Oct
Hyola 970CL	8-Oct
Phoenix CL	4-Oct
Captain CL	8-Oct
AGFCA014420	2-Oct
AGFCA014820	8-Oct
CL222167	4-Oct
CL222170	11-Oct

Table 2. Yield of the Ungrazed winter variety evaluation trial (t/ha, % site mean) and grain quality results at Millicent, SA in 2022.

	Yield	Grain Quality		
Variety	Yield	Oil	Test wt	Protein
	(t/ha)	%	kg/HL	%
Hyola Feast CL	3.27 -	41.8 c	67.8 ab	20.5 a
Hyola 970CL	3.81 -	42.6 bc	67.7 ab	19.6 ab
Phoenix CL	4.18 -	43.6 ab	67.8 ab	18.8 bc
Captain CL	4.57 -	44.4 a	65.6 c	18.1 c
AGFCA014420	3.83 -	42.0 c	66.6 bc	19.5 ab
AGFCA014820	3.68 -	42.2 bc	68.5 a	19.9 ab
CL222167	4.49 -	42.4 bc	68.6 a	19.1 bc
CL222170	3.89 -	42.0 c	68.5 a	18.7 bc
Mean	3.96	42.6	67.6	19.3
LSD 0.05	0.84	1.5	1.4	1.3
P Val	0.069	0.022	0.003	0.029

Table 3. Trial management details.

Sowing Date		**10 May 2022**
Sowing Rate:		60 Seeds/m^2
Seed Treatment:		Saltro Duo
Basal Fertiliser:	11 May	145 kg/ha MAP
		(15 kg N/ha, 32 kg P/ha)
Nitrogen:	22 Jun	17 kg N/ha (37 kg/ha urea)
	6 Jul	95 kg N/ha (205 kg/ha urea)
	23 Aug	112 kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.8 L/ha

Trial 1. HYC Winter Screen Grazed (FAR SAC C22-01-W(G))

Key findings:

- The Grazed Winter Screen had simulated grazing (mechanical) applied on 9 August with 1-1.5 t/ha biomass removed from each variety.
- Captain CL had the highest yield and oil in the grazed winter screen.
- Compared to the Ungrazed trial, the impact of grazing ranged from a yield penalty of 0.2 t/ha to a benefit of 0.7 t/ha.

Table 1. Influence of cultivar on flowering date.

	Phenology
Variety	Start of flowering
	50% of plants with 1 or more open flowers
Hyola Feast CL	7-Oct
Hyola 970CL	14-Oct
Phoenix CL	7-Oct
Captain CL	14-Oct

Table 2. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

	Yield	Grain Quality		
Variety	Yield (t/ha)	Oil %	Test wt kg/HL	Protein %
Hyola Feast CL	3.94 -	41.9 bc	68.32 a	21.2 -
Hyola 970CL	4.23 -	41.5 c	68.36 a	20.6 -
Phoenix CL	3.92 -	43.5 ab	68.83 a	19.3 -
Captain CL	4.84 -	43.6 a	66.72 b	18.6 -
Mean	4.24	42.6	68.06	19.9
LSD 0.05	0.87	1.6	0.76	2.1
P Val	0.128	0.034	<0.001	0.076

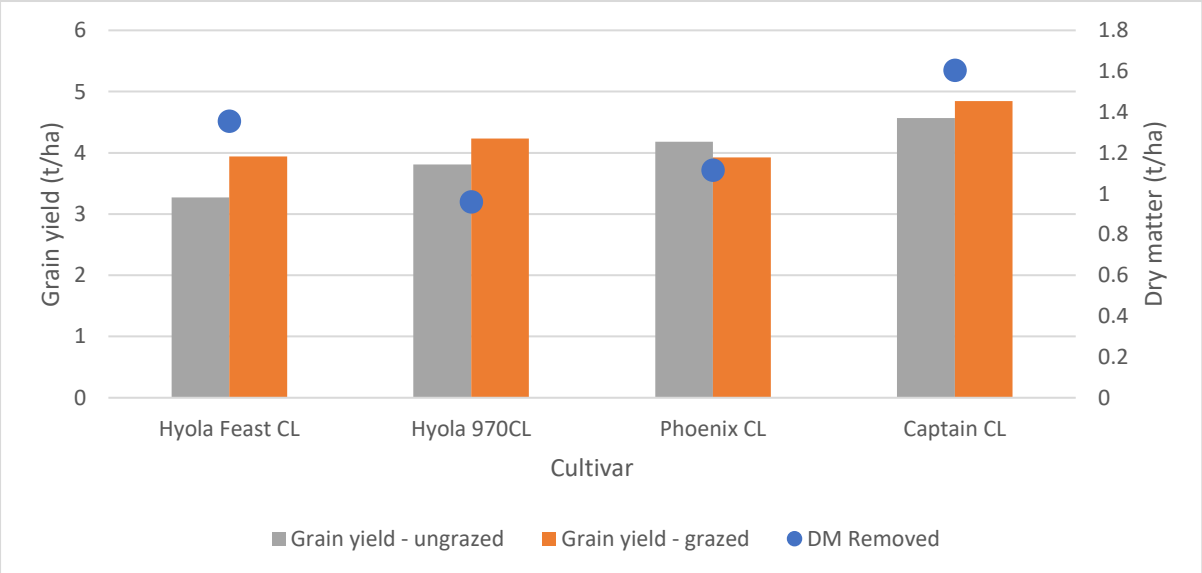


Figure 1. Influence of variety and grazing on grain yield and dry matter removed at the late vegetative growth stage.

Table 3. Trial management details.

Sowing Date		**10 May 2022**
Sowing Rate:		60 Seeds/m^2
Seed Treatment:		Saltro Duo
Grazing	9 Aug	Late Vegetative
Basal Fertiliser:	10 May	145 kg/ha MAP
		(15 kg N/ha, 32 kg P/ha)
Nitrogen:	22 Jun	17 kg N/ha (37 kg/ha urea)
	6 Jul	95 kg N/ha (205 kg/ha urea)
	23 Aug	112 kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.8 L/ha

Trial 2. Canola YieldMax (FAR SAC C22-02)

Objectives:

To determine the response to increased crop nutrition and to determine yield potential of leading commercial spring canola varieties.

Key findings:

- Yield potential in this trial was limited by a hailstorm on 12 December.
- High input management (including high rates of mineral fertiliser plus 5 t/ha pig manure) increased grain yield by 0.29 t/ha compared with low input (modest rates of mineral fertiliser only).
- The Clearfield varieties 45Y93 CL and 45Y95 CL had the highest yield at approximately 3.8 t/ha. The glyphosate and triazine tolerant varieties all yielded less than 3 t/ha.
- The high input management strategy had a small negative effect on grain value, dropping oil concentration by 0.8%. There were larger oil concentration differences between varieties ranging from 42.9% for 45Y95 CL to 45.9% for 45Y28 RR.
- Assuming a grain price of $700/tonne, gross income of 45Y95 CL was $2674 and the gross income of 45Y28 RR was $2015, highlighting the importance of yield over oil for income.

Treatments: High and low Nutrient Input strategies applied to six spring canola varieties.

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

	Management Level		
	Low Input 150 kg/ha N	**High Input 225 kg/ha N + M**	**Mean**
Cultivar	**Yield t/ha**	**Yield t/ha**	**Yield t/ha**
45Y93 CL	3.71 -	3.91 -	**3.81 a**
45Y95 CL	3.58 -	3.96 -	**3.77 a**
45Y28 RR	2.50 -	2.94 -	**2.72 bc**
Condor TF	2.80 -	3.13 -	**2.97 b**
Hyola Blazer TT	2.42 -	2.70 -	**2.56 c**
HyTTec Trifecta	2.75 -	2.87 -	**2.81 bc**
Mean	**2.96 b**	**3.25 a**	**3.11**
LSD Cultivar p = 0.05	0.32	**P val**	<0.001
LSD Management p=0.05	0.12	**P val**	<0.001
LSD Cultivar x Man. P=0.05	ns	**P val**	0.642

Table 2. Grain quality assessment- oil (%), test weight (kg/HL) & protein (%).

	Grain quality assessments		
Cultivar	**Oil (%)**	**Test Weight (kg/hL)**	**Protein (%)**
1. 45Y93 CL	43.6 cd	66.5 ab	19.8 b
2. 45Y95 CL	42.9 d	66.2 b	20.2 ab
3. 45Y28 RR	45.9 a	65.6 c	18.3 c
4. Xseed Condor RR	44.6 b	66.2 b	19.6 b
5. Blazer TT	43.8 c	66.4 b	20.5 a
6. HyTTec Trifecta	43.2 cd	66.9 a	20.4 a
LSD = 0.05	0.75	0.46	0.57
Cultivar p-Value	<0.001	0.001	<0.001
Nutrition			
1. Low Input	44.4 a	66.2 -	19.6 b
2. High Input	43.6 b	66.4 -	20.0 a
LSD = 0.05	0.36	ns	0.32
Nutrition p-Value	0.001	0.317	0.005

Table 2. Trial management details.

Sowing date:		10 May	
Plant population:		60 plants/m²	
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N)	
		Low Input	**High Input**
Nitrogen:	Basal		5 t/ha pig manure
	3-4-Leaf (22 Jun)	84 kg/ha ammonium sulfate	84 kg/ha ammonium sulfate
	6-leaf (5 Jul)	66.4 kg N/ha	104 kg N/ha
	Stem elongation/start of flower (28 Aug)	66.4 kg N/ha	104 kg N/ha
Total N Applied:		**165 kg N /ha**	**240 kg N/ha + Manure**
Fungicide:	Seed trt:	Saltro Duo	
	6 - Leaf	Prosaro 450mL/ha	
	20% Bloom	Aviator Xpro 800mL/ha	

All inputs of insecticides and herbicides were standard across the trial

Trial 3. Canola Plant Density (Winter) (FAR SAC C22-03-W)

Objectives:

To determine optimum plant density for hyper-yielding winter canola.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

	Establishment	**Yield**	**Grain Quality**		
Target plant density	Plants/m^2	Yield	Oil	Test wt	Protein
		(t/ha)	%	kg/HL	%
15 plants/m²	13.6 b	4.11 -	42.9 -	68.4 -	19.1 -
30 plants/m²	20.3 b	4.30 -	43.0 -	68.6 -	18.0 -
50 plants/m²	32.2 a	4.37 -	40.8 -	68.3 -	20.1 -
75 plants/m²	33.9 a	4.50 -	43.7 -	68.0 -	18.6 -
Mean	25.0	4.32	42.6	68.3	19.0
LSD 0.05	8.9	0.49	2.7	1.2	2.8
P Val	0.002	0.384	0.172	0.742	0.426

Table 2. Trial management details.

Sowing Date		**10 May 2022**
Sowing Rate:		As per treatment list
Seed Treatment:		Saltro Duo
Basal Fertiliser:	11 May	145 kg/ha MAP
Nitrogen:	22 Jun	17 kg N/ha
	6 Jul	95 kg N/ha
	23 Aug	112 kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.80 L/ha

Trial 5. HYC spring canola nutrition (FAR SAC C22-05-S)

Objectives:

To determine optimum nutrient management for hyper-yielding spring canola.

Key findings

- Yield potential and treatment effects in this trial were limited by a hailstorm on 12 December.
- There was no response to yield at p=0.05, but there was a trend to increasing grain yield with higher nutrient inputs at p=0.1.

Treatments: Five nitrogen rates applied split between 6-leaf stage and bud visible stage, plus manure treatments (with nil and 225 kg N/ha) and an inorganic nutrition treatment where the nutrition of manure was matched with fertiliser (NPKS) inputs.

Table 1. Yield of the Nutrition trial (t/ha) and grain quality results.

	Yield		Grain Quality	
Applied Nitrogen in Crop	Yield	Oil	Test Weight	Protein
	t/ha	%	Kg/hL	%
Nil	3.42 -	42.9 -	66.5 -	19.1 -
75 N	3.52 -	43.5 -	65.8 -	19.2 -
150 N	3.52 -	43.6 -	66.5 -	19.1 -
225 N	3.84 -	43.9 -	66.2 -	19.0 -
300 N	3.70 -	43.2 -	66.5 -	19.5 -
225 N + 5 t/ha Pig Manure	3.98 -	43.2 -	65.9 -	19.4 -
225 N + Inorganic Nutrition	4.05 -	42.7 -	66.2 -	19.7 -
Nil N + 5 t/ha Pig Manure	3.41 -	43.5 -	66.1 -	19.1 -
Mean	3.68	43.3	66.2	19.3
LSD 0.05	0.50	1.6	0.7	1.6
P Val	0.077	0.828	0.341	0.988

Table 2. Treatment details.

	Treatment	Manure	Nitrogen rate*	Phosphorus rate	Potassium rate	Sulfur rate
Trt.			**kg N/ha**	**kg P/ha**	**kg K/ha**	**kg S/ha**
1	Nil N	Nil	Nil	30	---	20
2	75 N	Nil	75	30	---	20
3	150 N	Nil	150	30	---	20
4	225 N	Nil	225	30	---	20
5	300 N	Nil	300	30	---	20
6	225 N + 5 t/ha Manure	5 t/ha	225	30	---	20
7	225 N + Inorganic Nutrition	Nil	309	80	95	49
8	Nil N + 5 t/ha Manure	5 t/ha	Nil + 5 t/ha Manure	30	---	20

*Nitrogen rates applied in addition to basal application rates of MAP and ammonium sulfate.

Table 3. Details of the overall management levels.

Sowing date:		**10 May**
Plant population:		60 plants/m²
		45Y95 CL
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N)
2-Leaf:		84 kg/ha ammonium sulfate (17 kg N/ha, 20 kg S/ha)
Fungicide:	Seed trt:	Saltro Duo
	6 - Leaf	Prosaro 450mL/ha
	20% Bloom	Aviator Xpro 800mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 5. HYC winter canola nutrition (FAR SAC C22-05-W)

Objectives:

To determine optimum nutrient management for hyper-yielding winter canola.

Key findings

- There was no grain yield or grain quality response to increasing nutrient input at this site with a highly fertile background soil nutrition level.

Treatments: Five nitrogen rates applied split between 6-leaf stage and bud visible stage. One treatment of 5 t/ha pig manure (applied pre-sowing) applied with the 225kg/ha nitrogen rate.

Table 1. Yield of the nutrition trial (t/ha) and grain quality results.

	Yield	Grain Quality		
Applied Nitrogen in Crop	Yield	Oil	Test Weight	Protein
	t/ha	%	Kg/hL	%
Nil	3.95 -	44.8 -	68.2 -	17.6 -
75 kg N /ha	4.11 -	44.8 -	68.5 -	17.4 -
150 kg N /ha	4.47 -	44.4 -	68.2 -	18.0 -
225 kg N /ha	4.40 -	44.4 -	68.9 -	18.3 -
300 kg N /ha	4.23 -	44.4 -	68.6 -	18.3 -
225 kg N /ha + 5 t/ha Pig Manure	4.32 -	44.0 -	68.5 -	18.4 -
Mean	4.25	44.5	68.5	18.0
LSD 0.05	0.53	0.8	0.7	1.1
P Val	0.374	0.398	0.288	0.350

Table 2. Treatment details.

	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate
Trt.	**kg N/ha**	**kg P/ha**	**kg P/ha**	**kg S/ha**
1	Nil	30	---	20
2	75	30	---	20
3	150	30	---	20
4	225	30	---	20
5	300	30	---	20
6	225 + Manure	30	---	20

Table 3. Details of the overall management levels.

Sowing date:		**10 May**
Plant population:		60 plants/m²
		Phoenix CL
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N)
6-Leaf		84 kg Gran-am
Fungicide:	Seed trt:	Maxim XL
	6 - Leaf	Prosaro 450mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 6. Disease Management for Hyper-Yielding Canola (FAR SAC C22-06-S)

Objectives:

To determine the impacts of cultivar choice and fungicide management for disease infection and grain yield of hyper-yielding canola.

Key findings:

- 45Y95 CL was the highest yielding variety across all fungicide treatments, averaging 3.65 t/ha.
- The Flowering and complete fungicide treatments yielded similarly, both yielding more than where no fungicide was applied. This indicated that the fungicide response was due to the control of late foliar diseases (upper canopy blackleg and/or sclerotinia stem rot).
- Varietal crown canker blackleg response to fungicide application varied but there was no interaction between fungicide treatment and variety for yield or quality.
- Hyola Solstice CL had very low incidence of crown canker blackleg but was the lowest yielding variety overall. 45Y95 CL had the most crown canker blackleg infection where nil fungicide was applied but this was greatly reduced where fungicide was applied. Yield did not appear to be affected by the level of blackleg in 45Y95 CL.
- 45Y28 RR had the highest oil concentration of the varieties but there was no impact of fungicide strategy on oil concentration.

Treatments: Three fungicide strategies applied to four varieties. Flowering treatment set to control late foliar diseases only (sclerotinia and upper canopy blackleg); Complete treatment set to control early crown canker blackleg and late foliar diseases.

Table 3. Influence of fungicide strategy and variety of canola yield (t/ha).

	Condor TF		45Y28 RR		45Y95 CL		Hyola Solstice CL		Mean	
Treatment	**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**	
Nil	3.02	-	2.79	-	3.34	-	2.01	-	**2.75**	**b**
Flowering	3.16	-	2.62	-	3.93	-	2.24	-	**3.03**	**a**
Complete	3.51	-	2.95	-	3.68	-	2.20	-	**3.09**	**a**
Mean	**3.23**	**b**	**2.79**	**c**	**3.65**	**a**	**2.15**	**d**		
LSD Variety P=0.05						0.23	**P val**			0.010
LSD Fungicide P=0.05						0.26	**P val**			<0.001
LSD Variety x Fungicide P=0.05						0.45	**P val**			0.544
CV						10.34				

Table 2. Grain quality assessment- oil (%), test weight (kg/HL) & protein (%).

		Grain quality assessments					
	Cultivar	**Oil (%)**		**Test Weight (kg/hL)**		**Protein (%)**	
1.	Condor TF	44.5	b	67.0	a	19.8	ab
2.	45Y28 RR	45.4	a	66.2	b	18.8	c
3.	45Y95 CL	43.1	c	66.3	b	20.3	a
4.	Hyola Solstice CL	44.3	b	66.5	ab	19.4	bc
	LSD = 0.05	0.64		0.57		0.70	
	Cultivar p-Value	<0.001		0.042		0.006	
	Disease Management						
1.	Nil	44.4	-	66.4	b	19.4	-
2.	Flowering	44.4	-	66.4	b	19.5	-
3.	Complete	44.1	-	66.8	a	19.9	-
	LSD = 0.05	ns		0.34		ns	
	Disease Management p-Value	0.258		0.043		0.226	

Table 3. Details of the management levels.

Sowing date:		**10 May**		
Plant population:		60 plants/m²		
Fungicide Management:		**Nil**	**Flowering**	**Complete**
	Seed trt:	Maxim XL	Maxim XL	Saltro Duo
	6 - Leaf	---	---	Aviator Xpro 800mL/ha
	20% Bloom	---	Aviator Xpro 800mL/ha	Prosaro 450mL/ha
Fertiliser:	Basal	145 kg MAP		
	2-Leaf	84 kg Gran-am		
	6-Leaf	226 kg Urea		
	Green Bud Visible	226 kg Urea		

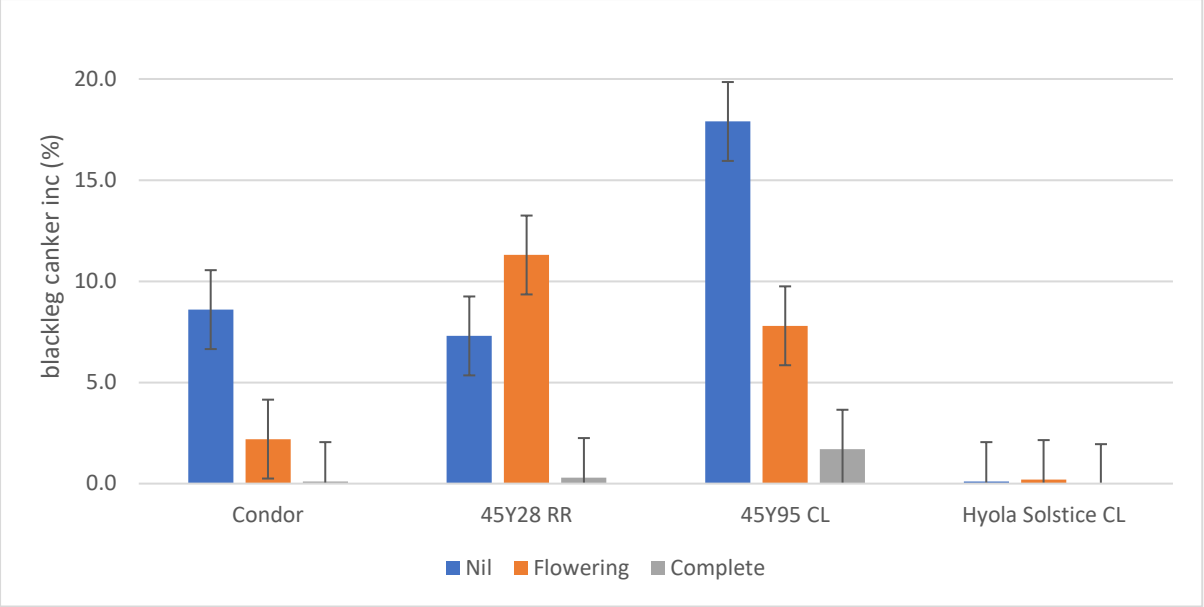


Figure 1. Incidence of blackleg canker in 4 varieties with 3 fungicide management techniques (± LSD = 0.05).

2022 VIC Crop Technology Centre
Gnarwarre, Victoria

Sown: 8 April 2022 (spring), 26 April 2022 (winter)
Harvested: 19 December 2022 (Spring), 4 January 2023 (Winter)
Rotation position: 2021 Wheat
Soil type: Grey clay loam
Available mineral N (0-30cm): 112.2kg/ha
Colwell P (ppm) 0-10cm: 110.0
pH (CaCl2) 0-10cm: 5.0
Organic Carbon (%) 0-10cm: 2.4

Table 1. Site soil test details.

	Level Found
ECEC	1.2 dS/m
Organic Carbon W&B	2.3 %
pH 1:5 water	7.3 pH
Total Mineral N*	150.1 kg soil mineral N/ha
Colwell Phosphorus	42 ppm
Available Potassium	330 ppm
KCl Sulfur	8 ppm

*Mineral N 0-60cm, all other results 0-10cm depth sampled 30/5/2022

Trial 1. HYC Winter Screen Ungrazed (FAR VIC C22-01-W)

Objectives:

To examine the suitability of elite commercial and unreleased winter canola cultivars for hyper-yielding regions and compare performance in a grazed and an ungrazed situation.

Key findings:

- *Captain CL was the highest yielding variety in the ungrazed winter screen trial, the only variety yielding above 3 t/ha. Trial mean yield was 2.53 t/ha.*
- *There was no difference between varieties for oil concentration.*

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

	Yield		Grain Quality		
Variety	Yield (t/ha)	Site Mean (%)	Oil %	Test wt kg/HL	Protein %
Hyola Feast CL	2.97 ab	117 ab	41.3 -	62.8 -	19.7 abc
Hyola 970CL	2.23 cd	88 cd	39.9 -	66.1 -	20.1 ab
Phoenix CL	2.59 a-d	102 a-d	41.0 -	66.9 -	19.3 bc
Captain CL	3.23 a	128 a	41.8 -	63.8 -	18.8 c
AGFCA014420	1.95 d	77 d	37.7 -	62.2 -	20.6 a
AGFCA014820	2.09 cd	82 cd	38.5 -	67.1 -	20.7 a
CL222167	2.78 abc	110 abc	38.9 -	65.2 -	20.4 ab
CL222170	2.42 bcd	96 bcd	37.4 -	64.3 -	20.1 ab
Mean	2.53	100	39.6	64.8	19.9
LSD 0.05	0.71	28.14	ns	ns	1.2
P Val	0.015	0.014	0.148	0.05	0.040

Table 2. Trial management details.

Sowing Date		**8 April 2022**
Sowing Rate:		60 Seeds/m^2
Seed Treatment:		Saltro Duo
Basal Fertiliser:	11 May	145 kg/ha MAP
Nitrogen:		84 kg/ha Ammonium sulfate
	25 May	17kg N/ha & 20kg S/ha
	14 Jun	110kg N/ha (240 kg/ha urea)
	5 Sep	113kg N/ha (245 kg/ha urea)
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.80 L/ha

Trial 1. HYC Winter Screen Grazed (FAR VIC C22-01-W(G))

Key findings:

- The Winter grazed screen trial was grazed on 17 June then allowed to recover for grain yield.
- The grazed trial yielded approximately 0.5 t/ha less than the ungrazed trial, with waterlogged conditions in spring limiting the ability to recover from grazing. Each of the four varieties entered were lower yielding that in the ungrazed trial.

Table 1. Yield of the variety Grazed winter screen trial (t/ha, % site mean) and grain quality results.

	Grazing DM	Yield		Grain Quality		
Variety	17 June (t/ha removed)	Yield (t/ha)	Site Mean (%)	Oil %	Test wt kg/HL	Protein %
Hyola Feast CL	0.73	2.05 -	100.28 -	32.6 -	57.3 -	27.4 -
Hyola 970CL	0.81	1.87 -	91.69 -	37.1 -	59.6 -	21.1 -
Phoenix CL	0.84	1.95 -	95.40 -	33.2 -	58.5 -	21.9 -
Captain CL	1.04	2.30 -	112.64 -	34.1 -	57.1 -	26.3 -
Mean	0.86	2.04	100.00	34.2	58.1	24.2
LSD 0.05	ns	ns	ns	ns	ns	ns
P Val	0.868	0.420	0.426	0.734	0.663	0.537

Table 2. Trial management details.

Sowing Date		**8 April 2022**
Sowing Rate:		60 Seeds/m^2
Seed Treatment:		Saltro Duo
Grazed	17 Jun	Late Vegetative
Basal Fertiliser:	11 May	145 kg/ha MAP
Nitrogen:	25 May	17kg N/ha & 20kg S/ha
	14 Jun	110kg N/ha
	5 Sep	113kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.80 L/ha

Trial 2. HYC YieldMax trial (FAR VIC C22-02)

Objectives:

To determine the response to increased crop nutrition inputs in a range of high potential spring canola varieties.

Key findings:

- The high input management strategy yielded 0.54 t/ha more than low input management but there were no yield differences between varieties.
- There were oil differences observed between varieties with 45Y28 RR the highest at 45.8% and HyTTec Trifecta the lowest at 43.4%.
- Increasing crop inputs from low to high management decreased oil concentration by 1.5%.

Treatments: High and low nutrient Input strategies applied to six spring canola varieties.

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

	Management Level		
	Low Input	**High Input**	**Mean**
Cultivar	**Yield t/ha**	**Yield t/ha**	**Yield t/ha**
45Y28 RR	3.46 -	3.74 -	**3.60 -**
Condor TF	3.15 -	3.88 -	**3.51 -**
Hyola Blazer TT	3.35 -	4.00 -	**3.68 -**
HyTTec Trifecta	3.14 -	3.63 -	**3.38 -**
Mean	**3.27 b**	**3.81 a**	
LSD Cultivar p = 0.05	ns	**P val**	0.119
LSD Management p=0.05	0.29	**P val**	0.010
LSD Cultivar x Man. P=0.05	ns	**P val**	0.296

Table 2. Grain quality assessment- oil (%), test weight (kg/HL) & protein (%).

	Grain quality assessments		
Cultivar	**Oil (%)**	**Test Weight (kg/hL)**	**Protein (%)**
1. 45Y28 RR	45.8 a	65.2 b	17.1 b
2. Condor TF	44.9 ab	65.6 ab	18.5 a
3. Hyola Blazer TT	44.2 bc	66.7 a	19.6 a
4. HyTTec Trifecta	43.4 c	66.4 a	19.2 a
LSD = 0.05	1.42	1.06	1.13
Cultivar p-Value	0.016	0.039	0.001
Nutrition			
1. Low Input	45.3 a	65.6 -	18.1 -
2. High Input	43.8 b	66.4 -	19.2 -
LSD = 0.05	1.15	ns	ns
Nutrition p-Value	0.025	0.085	0.079

Table 3. Details of the management levels.

Sowing date:		**26 April**	
Plant population:		60 plants/m²	
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N)	
		Low Input	**High Input**
Nitrogen:	Basal		5 t/ha Manure
	2-Leaf	84 kg/ha ammonium sulfate	84 kg/ha ammonium sulfate
	6-leaf	75 kg N/ha	112.5 kg N/ha
	Bud visible	75 kg N/ha	112.5 kg N/ha
Total N Applied:		**150 kg N /ha**	**225 kg N/ha + Manure**
Fungicide:	Seed trt:	Saltro Duo	
	6 - Leaf	Prosaro 450mL/ha	
	20% Bloom	Aviator Xpro 800mL/ha	

All inputs of insecticides and herbicides were standard across the trial

Trial 3. Canola Plant Density (Winter) (FAR VIC C22-03-W)

Objectives:

To determine optimum plant density for hyper-yielding canola.

Table 1. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

	Establishment	**Yield**	**Grain Quality**		
Target plant density	Plants/m^2	Yield	Oil	Test wt	Protein
		(t/ha)	%	kg/HL	%
15 plants/m²	4.2 d	2.53 c	42.5 -	68.3 -	18.2 -
30 plants/m²	10.0 c	2.94 bc	43.1 -	66.2 -	17.9 -
50 plants/m²	14.7 b	3.73 a	42.7 -	67.5 -	19.3 -
75 plants/m²	20.3 a	3.51 ab	43.0 -	69.0 -	18.3 -
Mean	12.3	3.18	42.8	67.8	18.4
LSD 0.05	3.4	0.72	ns	ns	ns
P Val	<0.001	0.024	0.972	0.223	0.621

Table 2. Yield of the variety evaluation trial (t/ha, % site mean) and grain quality results.

		Lodging	
Target plant density	Lodge severity	Lodge severity	Lodge index
	0-5	0-5	0-500
15 plants/m²	1.8 -	43.8 -	93.8 -
30 plants/m²	2.3 -	52.5 -	157.5 -
50 plants/m²	0.8 -	75.0 -	37.5 -
75 plants/m²	2.0 -	90.0 -	170.0 -
Mean	1.7	65.3	114.7
LSD 0.05	ns	ns	ns
P Val	0.286	0.198	0.376

Table 3. Trial management details.

Sowing Date		**8 April 2022**
Sowing Rate:		As per treatment list
Seed Treatment:		Saltro Duo
Basal Fertiliser:	11 May	145 kg/ha MAP
Nitrogen:	25 May	17kg N/ha & 20kg S/ha
	14 Jun	110kg N/ha
	5 Sep	113kg N/ha
Fungicide:	6 Leaf	Prosaro 0.45 L/ha
	20% Flower	Aviator Xpro 0.80 L/ha

Trial 5. HYC Spring Canola Nutrition (FAR VIC C22-05-S)

Objectives:

To determine optimum nutrient management for hyper-yielding spring canola.

Key findings:

- There was a strong response to increasing nutrient inputs in this trial from 1.8 t/ha where nil N was applied (with basal P and S) to 5.1 t/ha with the application of 225kg N/ha with inorganic nutrition (NPKS) equivalent to 5 t/ha pig manure.
- The highest yielding treatment was where 225kg N/ha was applied with the addition of Inorganic NPKS as fertiliser (urea, potassium sulfate and MAP) to the equivalent amount supplied in 5 t/ha pig manure. This was the only treatment to yield > 5/ha. The Inorganic treatment was 1.2 t/ha higher yielding than where 225k N/ha was applied with basal P and S only.
- The response to nitrogen was strong with 1.8 t/ha where nil N was applied and up to 4.4 t/ha with the application of 300 kg N/ha.
- The manure applied alone at 5 t/ha (with nil N) did not increase grain yield compared to nil N (no manure) and yielded less than where 75kg N/ha was applied, suggesting that the benefit of animal manure may not be due to its N content.
- There was no effect of nutrition application on oil concentration.
- While it is difficult to pinpoint the exact nutrient responsible for the yield increase in the Inorganic treatment, it at least shows that the benefit of animal manure for yield that was widely observed in 2021 may simply be due to the nutrition supplied in manure rather than a biological effect.

Treatments: Five nitrogen rates applied split between 6-leaf stage and bud visible stage, plus manure treatments (with nil and 225kg N/ha) and an inorganic nutrition treatment where the nutrition of manure was matched with fertiliser (NPKS) inputs.

Table 1. Yield of the Nutrition trial (t/ha) and grain quality results.

	Yield		**Grain Quality**	
Applied Nitrogen in Crop	Yield	Oil	Test Weight	Protein
	t/ha	%	Kg/hL	%
Nil	1.82 e	47.6 -	63.8 b	15.4 e
75 N	2.88 d	47.5 -	66.3 a	16.5 cd
150 N	3.71 c	47.7 -	66.0 a	16.2 cde
225 N	3.90 bc	46.8 -	65.5 a	17.0 abc
300 N	4.41 abc	46.2 -	65.4 a	17.6 ab
225N + Manure	4.52 ab	46.5 -	65.8 a	16.8 bc
225 + Inorganic	5.07 a	45.8 -	66.3 a	17.9 a
0 + Manure	2.04 e	47.3 -	65.0 ab	15.5 de
Mean	3.54	46.9	65.5	16.6
LSD 0.05	0.74	ns	1.4	1.1
P Val	<0.001	0.1512	0.030	<0.001

Table 2. Treatment details.

Trt.	Treatment	Manure	Nitrogen rate* kg N/ha	Phosphorus rate kg P/ha	Potassium rate kg P/ha	Sulfur rate kg S/ha
1	Nil N	Nil	Nil	30	---	20
2	75 N	Nil	75	30	---	20
3	150 N	Nil	150	30	---	20
4	225 N	Nil	225	30	---	20
5	300 N	Nil	300	30	---	20
6	225 N + 5 t/ha Manure	5 t/ha	225	30	---	20
7	225 N + Inorganic Nutrition	Nil	245	80	95	49
8	Nil N + 5 t/ha Manure	5 t/ha	Nil + 5 t/ha Manure	30	---	20

*Nitrogen rates applied in addition to basal application rates of MAP and ammonium sulfate.

Table 3. Details of the overall management levels.

Sowing date:		**26 April**
Target plant density:		60 plants/m²
		45Y28 RR
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N, 32 kg/ha P)
2-Leaf:		84 kg Gran-am (17 kg/ha N, 20 kg/ha S)
Fungicide:	Seed trt:	Saltro Duo
	6 - Leaf	Prosaro 450mL/ha
	20% Bloom	Aviator Xpro 800mL/ha

All inputs of insecticides and herbicides were standard across the trial

Trial 5. HYC Winter Canola Nutrition (FAR VIC C22-05-W)

Objectives:

To determine optimum nutrient management for hyper-yielding winter canola.

Key findings

- There was an increase in grain yield from increasing N rate, with 1.9 t/ha yield with nil N applied to 3.5 t/ha where 300kg N/ha was applied.
- The application of 5 t/ha Pig Manure with 225kg N/ha did not increase yield compared to where the same N rate was applied alone.

Treatments: Five nitrogen rates applied split between 6-leaf stage and bud visible stage. One treatment of 5 t/ha pig manure (applied pre-sowing) applied with the 225kg/ha nitrogen rate.

Table 1. Yield of the nutrition trial (t/ha) and grain quality results.

	Yield	**Grain Quality**		
Applied Nitrogen in Crop	Yield	Oil	Test Weight	Protein
	t/ha	%	Kg/hL	%
Nil	1.86 d	45.3 -	65.7 -	15.8 c
75 kg N /ha	2.30 cd	44.4 -	65.5 -	16.8 bc
150 kg N /ha	2.84 bc	43.3 -	66.0 -	18.0 ab
225 kg N /ha	2.89 b	41.9 -	64.2 -	18.9 a
300 kg N /ha	3.49 a	43.5 -	66.8 -	18.4 a
225 kg N /ha + Manure	3.01 ab	43.2 -	67.1 -	18.2 a
Mean	2.73	43.6	65.9	17.7
LSD 0.05	0.55	ns	ns	1.4
P Val	<0.001	0.207	0.309	0.002

Table 2. Treatment details.

	Nitrogen rate*	**Phosphorus rate**	**Potassium rate**	**Sulphur rate**
Trt.	**kg N/ha**	**kg P/ha**	**kg P/ha**	**kg S/ha**
1	Nil	30	---	20
2	75	30	---	20
3	150	30	---	20
4	225	30	---	20
5	300	30	---	20
6	225 + 5 t/ha Manure	30	---	20

*Nitrogen rates applied over and above basal application N in MAP and ammonium sulfate.

Table 3. Details of the overall management levels.

Sowing date:		**8 April**
Plant population:		60 plants/m²
		Phoenix CL
Basal Fertiliser:		145 kg/ha MAP (15 kg/ha N, 32 kg P)
6-Leaf		84 kg ammonium sulfate (17 kg N, 20 kg S)
Fungicide:	Seed trt:	Saltro Duo
	6 - Leaf	Prosaro 450mL/ha
	20% Bloom	Aviator Xpro 800mL/ha

All inputs of insecticides and herbicides were standard across the trial

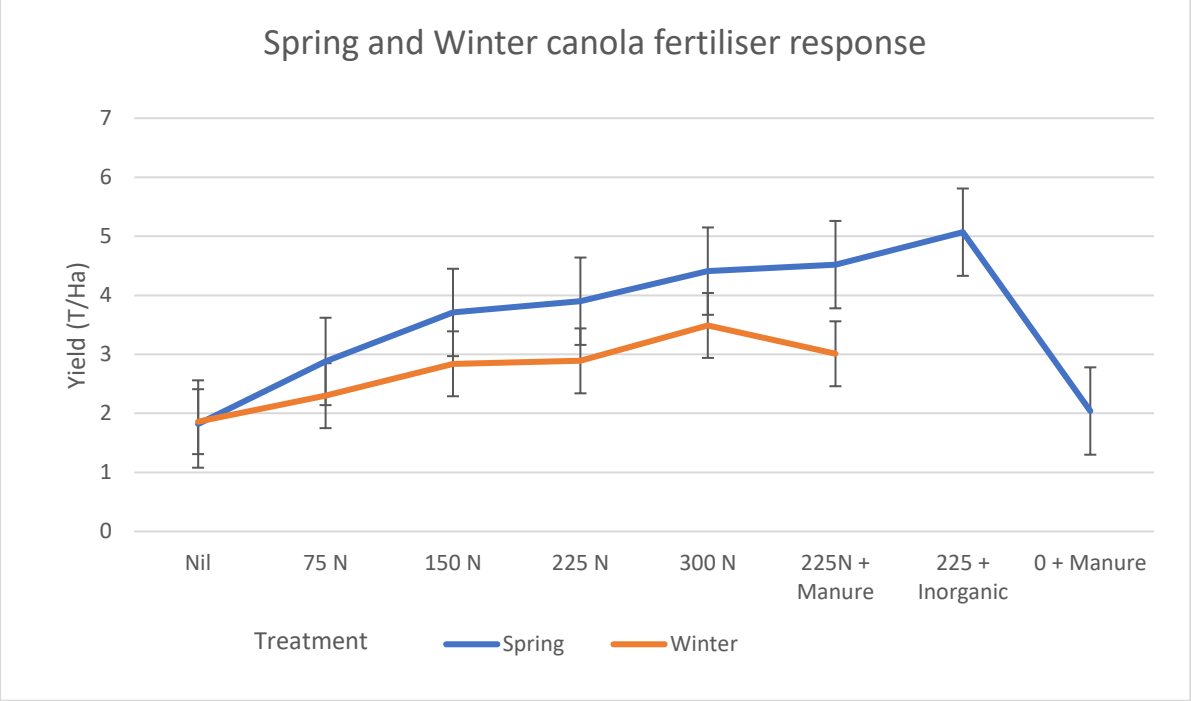


Figure 1. Yield response (± LSD=0.05) of spring and winter canola under a range of fertiliser applications. *(note these are separate trials for winter and spring canola that cannot be compared statistically)*

Trial 6. HYC Disease Management Trial (FAR VIC C22-06-S)

Objectives:

To determine the impacts of cultivar choice and fungicide management for disease infection and grain yield of hyper-yielding canola.

Key findings:

- The application of flowering fungicide Aviator Xpro at 20% bloom increased yield across all varieties compared to where no fungicide was used by 0.42 t/ha. This treatment was designed to determine the effect of late foliar diseases (sclerotinia and upper canopy blackleg) on canola yield.
- The addition of Saltro Duo to seed and Prosaro at 6-leaf stage (Complete treatment) increased yield by a further 0.23 t/ha.
- Despite differences in blackleg resistance ratings in this trial, all varieties responded to fungicide inputs in the same way.
- Oil concentration wasn't affected by fungicide input but there were differences between varieties. Highest oil came from 45Y28 RR with 45.9% and lowest oil from ATR Wahoo with 40.5%.

Treatments: Three fungicide strategies applied to four varieties. Flowering treatment set to control late foliar diseases only (sclerotinia and upper canopy blackleg); Complete treatment set to control early crown canker blackleg and late foliar diseases.

Table 4. Influence of fungicide strategy and variety of canola yield (t/ha).

	HyTTec Trifecta		ATR Wahoo		45Y28 RR		Eagle TF		Mean	
Treatment	**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**		**Yield (t/ha)**	
Nil	3.20	-	2.68	-	3.65	-	3.43	-	**3.24**	**c**
Flowering	3.92	-	2.99	-	3.89	-	3.84	-	**3.66**	**b**
Complete	4.21	-	3.20	-	4.11	-	4.06	-	**3.89**	**a**
Mean	**3.77**	**a**	**2.95**	**b**	**3.88**	**a**	**3.78**	**a**		
LSD Variety P=0.05						0.26	**P val**			<0.001
LSD Fungicide P=0.05						0.17	**P val**			<0.001
LSD Variety x Fungicide P=0.05						ns	**P val**			0.277
CV						6.31				

Table 2. Grain quality assessment- oil (%), test weight (kg/HL) & protein (%).

		Grain quality assessments					
	Cultivar	**Oil (%)**		**Test Weight (kg/hL)**		**Protein (%)**	
1.	HyTTec Trifecta	41.9	c	66.3	b	20.5	a
2.	ATR Wahoo	40.5	d	67.3	a	21.6	a
3.	45Y28RR	45.9	a	65.6	bc	17.5	c
4.	NCH20Q732	44.1	b	65.0	c	18.9	b
	LSD = 0.05	1.38		0.89		1.25	
	Cultivar p-Value	<0.001		0.002		<0.001	
	Disease Management						
1.	Nil	42.7	-	66.5	a	19.8	-
2.	Flowering	43.4	-	65.7	b	19.3	-
3.	Complete	43.2	-	65.9	ab	19.7	-
	LSD = 0.05	1.21		0.64		1.07	
	Disease Management p-Value	0.459		0.041		0.634	

Table 3. Details of the management levels.

Sowing date:		**26 April**		
Target plant density:		60 plants/m²		
Fungicide Management:		**Nil**	**Flowering**	**Complete**
	Seed trt:	Maxim XL	Maxim XL	Saltro Duo
	6 - Leaf	---	---	Aviator Xpro 800mL/ha
	20% Bloom	---	Aviator Xpro 800mL/ha	Prosaro 450mL/ha
Fertiliser:	Basal	145 kg MAP		
	2-Leaf	84 kg ammonium sulfate		
	6-Leaf	238 kg Urea		
	Green Bud Visible	245 kg Urea		

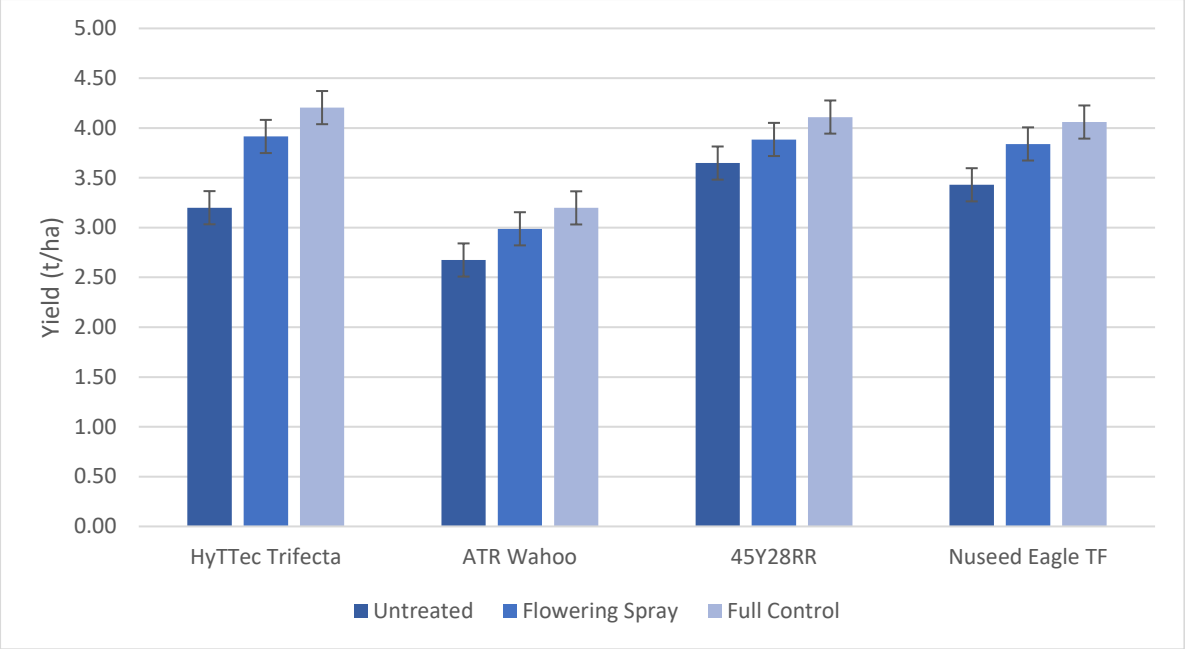


Figure 1. Yield (t/ha) response to fungicide management by variety (± LSD = 0.05).

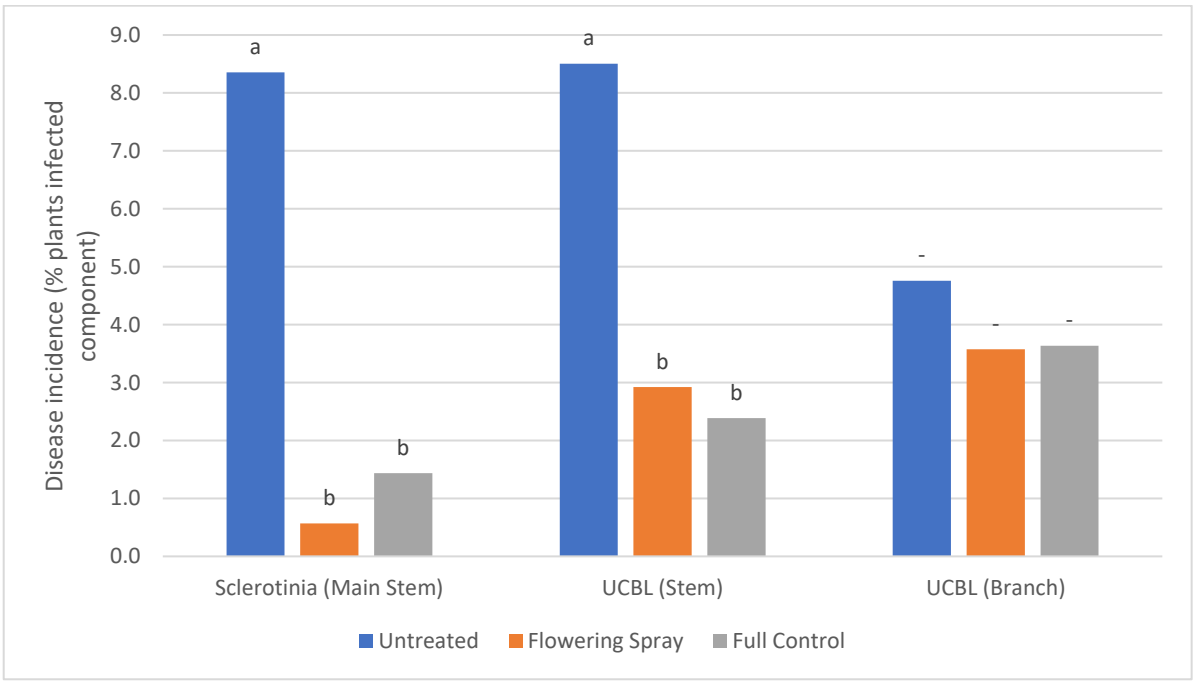


Figure 2. Disease infection of different segments of the canopy structure (% plants with infect component) in response to treatment (± LSD 0.05).

2022 WA Crop Technology Centre
Kojonup, Western Australia

Sown: April 20, 2022
Harvested: November 29 (spring canola) and 23 December (winter canola)
2021 Crop: Wheat
Soil type & management: Sandy loam duplex
Available Nitrogen (kg/ha) 0-40cm: 77kg/ha
Colwell P 0-10cm: 27.7 mg/kg
pH ($CaCl_2$) 0-20cm: 5.6
Organic Carbon 0-20cm: 2.9%

Trial 2. HYC Spring Canola YieldMax Trial (FAR WAK C22-02)

Objectives: To determine the response to increased crop inputs (nitrogen and manure) of a range of spring canola variety types.

Key points:

- Hybrid Clearfield canola (45Y95 CL and 45Y93 CL) produced a higher yield than hybrid glyphosate tolerant (GT) (45Y28 RR and Condor TF) and TT canola (HyTTec Trifecta and Hyola Blazer TT); Hybrid GT canola produced 2% higher oil than hybrid Clearfield and TT canola.
- Highest yield overall was from the Clearfield variety 45Y95 CL, with a yield of 4.3 t/ha.
- There was no difference in yield between high and low input treatments.
- TT canola had a higher harvest index than Clearfield and GT canola
- No significant upper canopy blackleg and sclerotinia diseases were observed.

Treatments: Six spring varieties (two glyphosate-tolerant, two Clearfield and two Triazine tolerant) with two different management levels.

Table 1. Yield, harvest index (HI), and oil concentration in spring canola YieldMax trial.

Treatment	Yield (t/ha)	Oil (%)	HI
Herbicide groups			
CLF	4.22 a	46.8 a	0.33 a
GT	3.77 ab	48.8 b	0.33 a
TT	3.59 b	47.0 a	0.364 b
LSD 0.05	0.54	0.49	0.023
P Val	0.05	0.01	0.05
Management			
Low input (150 kg N/ha +15 kg P/ha)	3.92 a	47.5 a	0.343
High input (225 kg N/ha +30 kg P/ha + 3 t/ha Chicken manure)	3.81 a	47.5 a	0.351
LSD 0.05	0.88	0.57	0.013
P Val	ns	ns	ns
Variety			
45Y95 CL	4.29	46.8	0.344
45Y93 CL	4.16	46.8	0.332
45Y28 RR	3.64	48.9	0.343
Condor TF	3.91	48.6	0.333
HyTTec Trifecta	3.71	46.6	0.369
Hyola Blazer TT	3.48	47.5	0.359

Table 2. Trial management details.

Sowing date:		**20 April**	
Varieties:		RR/Truflex - Condor TF & 45Y28 RR TT – HyTTec Trifecta and ATR Wahoo CLF – 45Y93 CL and 45Y95 CL	
Target plant density		45 plants/m^2	
		Low Input	**High Input**
Basal Fertiliser:		80 kg/ha MAP + 50 kg Urea/ha (31 kg N/ha, 17 kg P/ha, 12 kg S/ha)	160 kg/ha MAP + 100 kg Urea/ha (62 kg N/ha, 34 kg P/ha, 24 kg S/ha)
Chicken manure		**Nil**	**3 t/ha**
Nitrogen:	6-leaf	83 kg N/ha + 13 kg S/ha (Urea + SOA)	83 kg N/ha + 13 kg S/ha (Urea + SOA)
	Bud visible	67 kg N/ha (Flexi-N)	113 kg N/ha
Total N Applied:		**150kg N/ha**	**225kg N/ha**
Fungicide:	Seed	Saltro Duo	Saltro Duo
	20% Bloom	Aviator Xpro 0.80L/ha	Aviator Xpro 0.80L/ha

Table 3. Chicken manure chemical analysis.

Characteristic & Unit	Typical Analysis
Phosphorus, soluble mg/L	20.0
Phosphorus, total %	0.80
Ammonium-N mg/L	250.0
Nitrate-N mg/L	10.0
Nitrogen, total %	2.8
Total Organic Carbon %	35.0
Organic matter content %	59.5
Carbon:Nitrogen Ratio (C:N) %	12.5
Potassium K %	1.4
Calcium Ca %	3.0
Magnesium Mg %	0.43
Sulphur S %	0.20
Iron Fe mg/kg	2200.0
Manganese Mn mg/kg	320.0

Trial 3. Canola Plant Density for Hyper-Yielding Canola (FAR WAK C22-03)

Objectives: To determine optimum plant density for hyper-yielding spring canola.

Key points:

- Plant density achieved was generally higher than the target plant density.
- There was no effect of plant density on canola grain yield or oil concentration.
- 23 -32 plants/m^2 was enough to achieve a similar yield to high seeding rates and at much lower cost.

Treatments: 45Y28 RR canola sown at four seeding rates to target 15, 30, 50 and 75 plants/m^2.

Table 1. Grain yield (t/ha), % site mean, protein (%), test weight (kg/hl) and screenings (%).

		Yield and quality		
Target Seed Rate (m^2)	**Plants** (m^2)	**Yield (t/ha)**	**Oil %**	**Protein %**
15	23	3.25 a	49.6 a	17.4 a
30	32	3.43 a	49.5 a	17.9 a
50	63	3.47 a	49.2 ab	17.8 a
75	96	3.47 a	48.9 b	18.0 **a**
Mean		3.40	48.8	17.8
LSD 0.05		0.56	0.42	0.67
P Val		n.s.	n.s.	n.s.
CV		10.6		

Table 2. Trial management details.

Sowing date:		**20 April 2022**
Variety:		45Y28 RR
Target plant density:		As per treatments
Sowing Fertiliser:		80 kg/ha MAP + 50 kg Urea/ha (31 kg N/ha, 17 kg P/ha, 12 kg S/ha)
Nitrogen:	6 Leaf	83 kg N/ha + 13 kg S/ha (Urea + SOA)
	Bud Visible	67 kg N/ha (Flexi-N)
Fungicide:	20% Bloom	Aviator Xpro 0.80L/ha

Trial 4. Spring Canola Nutrition Trial for Hyper-Yielding Canola (FAR WAK C22-04)

Objectives: To determine optimum nitrogen nutrient management for hyper-yielding spring canola and seek alternative nitrogen fertiliser to replace manure.

Key Messages:

- The highest grain yield of 3.78 t/ha was achieved when a high rate of 225kg N/ha nitrogen fertiliser was combined with the application of 3 t/ha chicken manure to replicate high soil fertility.
- Replacing 3 t/ha chicken manure with mineral nitrogen fertiliser achieved a similar yield to 225kg N/ha plus 3 t/ha chicken manure. This indicates that the response to manure observed across sites in 2021 was likely due to a nutrition effect rather than a biological effect.
- The manure alone increased yield by 0.28 t/ha. The high rate of manure applied may not always be profitable but shows that yield is being limited by nutrition beyond just fertiliser nitrogen application.
- Yield responses to applied nitrogen fertiliser plateaued at 75kg N/ha and similar yields were achieved between 75, 150, 225, and 300 kg/ha of applied N (urea).
- Yield response could be attributed to an increase in crop biomass with no clear pattern of nutrition effects on harvest index (HI).
- Oil concentration was very high (up to 50%), which is surprising given the amount of nutrition applied.

Treatments: Five nitrogen rates applied as urea with an equal split at 6-leaf and bud visible stage, plus two treatments of 3 t/ha chicken manure (applied with nil or 225kg N/ha and one treatment where the NPKS quantity of manure was applied as Inorganic nutrition (with the 225kg N/ha rate).

Table 1. Yield, harvest index (HI) and Oil (%) of the Nutrition trial (t/ha) in Canola (45Y28RR).

Applied Nitrogen in Crop	Yield (t/ha)	Biomass (t/ha)	HI	Oil (%)
0 kg N/ha	3.16 b	9.36 b	0.338 ab	49.9 b
75 kg N/ha	3.45 ab	10.69 a	0.323 b	49.9 b
150 kg N/ha	3.50 ab	10.17 ab	0.345 a	49.0 a
225 kg N/ha	3.50 ab	10.20 ab	0.343 a	49.0 a
300 kg N/ha	3.54 ab	10.43 ab	0.340 ab	48.6 a
0 kg N/ha + 3 t/ha Manure	3.68 a	10.85 a	0.340 ab	50.0 b
225 kg N/ha + 3 t/ha Manure	3.78 a	10.94 a	0.345 a	48.7 a
225kg N/ha + Inorganic nutrition	3.78 a	11.39 a	0.331 ab	48.4 a
Mean	3.55	10.50	0.34	49.2
LSD 0.05	0.43	1.30	0.02	0.85
P Val	0.05	0.05	0.05	ns

*****Chicken Manure expressed dry matter basis (3.0% Nitrogen, and 0.9% Phosphorus) = additional 100 kg N/ha and 27kg P/ha to replicate high fertility soils. The full chemical analysis can be referred in Table 3 in Trial 2.

Table 2. Trial management details.

Sowing date:		**20 April**	
Target plant density:		45 plants/m²	
Canola Variety		Pioneer 45Y28 RR	
Nitrogen:	Base application	Six-leaf stage	Bud-visible stage
0 kg N/ha	30 kg N/ha	0 kg N/ha	0 kg N/ha
75 kg N/ha	30 kg N/ha	41 kg N/ha	34 kg N/ha
150 kg N/ha	30 kg N/ha	72 kg N/ha	68 kg N/ha
225 kg N/ha	30 kg N/ha	90 kg N/ha	135 kg N/ha
300 kg N/ha	30 kg N/ha	120 kg N/ha	180 kg N/ha
0 kg N/ha + 3 t/ha Manure	30 kg N/ha + 3 t/ha Manure	0 kg N/ha	0 kg N/ha
225 kg N/ha + 3 t/ha Manure	30 kg N/ha + 3 t/ha Manure	90 kg N/ha	135 kg N/ha
225kg N/ha + Inorganic nutrition	30 kg N/ha + 100 kg N/ha	90 kg N/ha	135 kg N/ha
Fungicide	Seed	Saltro Duo	
	6 - Leaf	Prosaro 450mL/ha	
	20% Bloom	Aviator Xpro 800mL/ha	

Trial 6. Disease Management for Hyper-Yielding Spring Canola (FAR WAK C22-06)

Objectives: Determine the effect of fungicide management strategies on disease control (primarily blackleg and sclerotinia), grain yield and profitability in 45Y28 RR (moderately resistant, blackleg group BC) and Nuseed Eagle TF (resistant) and HyTTec Trifecta (Resistant, blackleg group ABD) and ATR Wahoo.

Key points:

- No yield difference was observed between the nil, late protection and full protection fungicide treatments in either the TT or GT trials.
- In the GT trial, there was a difference in yield between the resistant (Nuseed Eagle TF) and the moderately resistant variety (45Y2 8RR). Similarly in the TT trial there was a difference between HyTTec Trifecta and ATR Wahoo.
- No difference in the stem cross-section blackleg infection was observed between the three fungicide treatments and between the resistance and moderately resistant varieties in both RR and TT canola trials.
- There was minimal upper canopy blackleg and sclerotinia disease in both trials.

Table 1. Influence of management strategy on TT canola (HyTTec Trifecta and ATR Wahoo) grain yield (t/ha).

Trt.	Seed	6 Leaf	20% Bloom	Yield (t/ha)	Oil%	Stem cross-section blackleg infection (%)
Fungicide treatment						
Nil	Maxim XL	---	---	3.25 a	46.7 a	18 a
Late protection	Maxim XL	---	Aviator Xpro 800 mL/ha	3.46 a	46.9 a	29 a
Full protection	Saltro Duo	Prosaro 450ml/ha	Aviator Xpro 800 mL/ha	3.27 a	46.8 a	25 a
Mean				3.33	46.8	24
LSD 0.05				0.24	0.50	22
P Val				n.s.	n.s.	n.s.
Variety						
Nuseed Eagle TF				3.53	47.5	36.6
45Y28 RR				3.17	49.0	47.7
LSD 0.05				0.20	0.20	16.1
P Value				<0.01	<0.01	n.s.

Table 2. Influence of management strategy on RR (45Y28 RR) and Truflex canola (Nuseed Eagle TF) canola grain yield (t/ha), oil (%) and stem cross-section blackleg infection (%).

Trt.	Seed	6 Leaf	20% Bloom	Yield (t/ha)	Oil%	Stem cross-section blackleg infection (%)
Nil	Maxim XL	---	---	3.36 a	48.4 a	42 a
Late protection	Maxim XL	---	Aviator Xpro 800 mL/ha	3.28 a	48.2 a	47 a
Full protection	Saltro Duo	Prosaro 450ml/ha	Aviator Xpro 800 mL/ha	3.40 a	48.1 a	35 a
Mean				3.35	48.2	42
LSD 0.05						16
P Value				n.s.	n.s.	n.s.
Variety						
HyTTec Trifecta				3.73	46.5	25
ATR Wahoo				2.92	47.1	14
LSD 0.05				0.16	0.36	
P Value				<0.01	<0.05	n.s.

Table 3. Trial management details

Sowing date:		**20 April**
Variety:		45Y28RR & HyTTec Trifecta
Target plant density:		45 plants/m^2
Sowing Fertiliser:		80 kg/ha MAP + 50 kg Urea/ha (31 kg N/ha, 17 kg P/ha, 12 kg S/ha)
Nitrogen:	6 Leaf	83 kg N/ha + 13 kg S/ha (Urea + SOA)
	Bud Visible	67 kg N/ha (Flexi-N)
Fungicide:		As per treatment list

Trial 1 Winter Canola Screening Trial (FAR WAK C22-01 (W))

Objective: To examine the suitability of elite commercial and unreleased winter canola cultivars for Hyper-yielding regions.

Key points:

- Winter canola yielded less than spring canola at the same site. On average, winter canola produced 2.08 t/ha compared to spring canola of 3.5-3.9 t/ha.
- Captain CL was the highest yielding variety with a yield of 2.3 t/ha.
- Oil content ranged from 44.5 to 47.5% with Captain CL also ranked high for oil concentration.

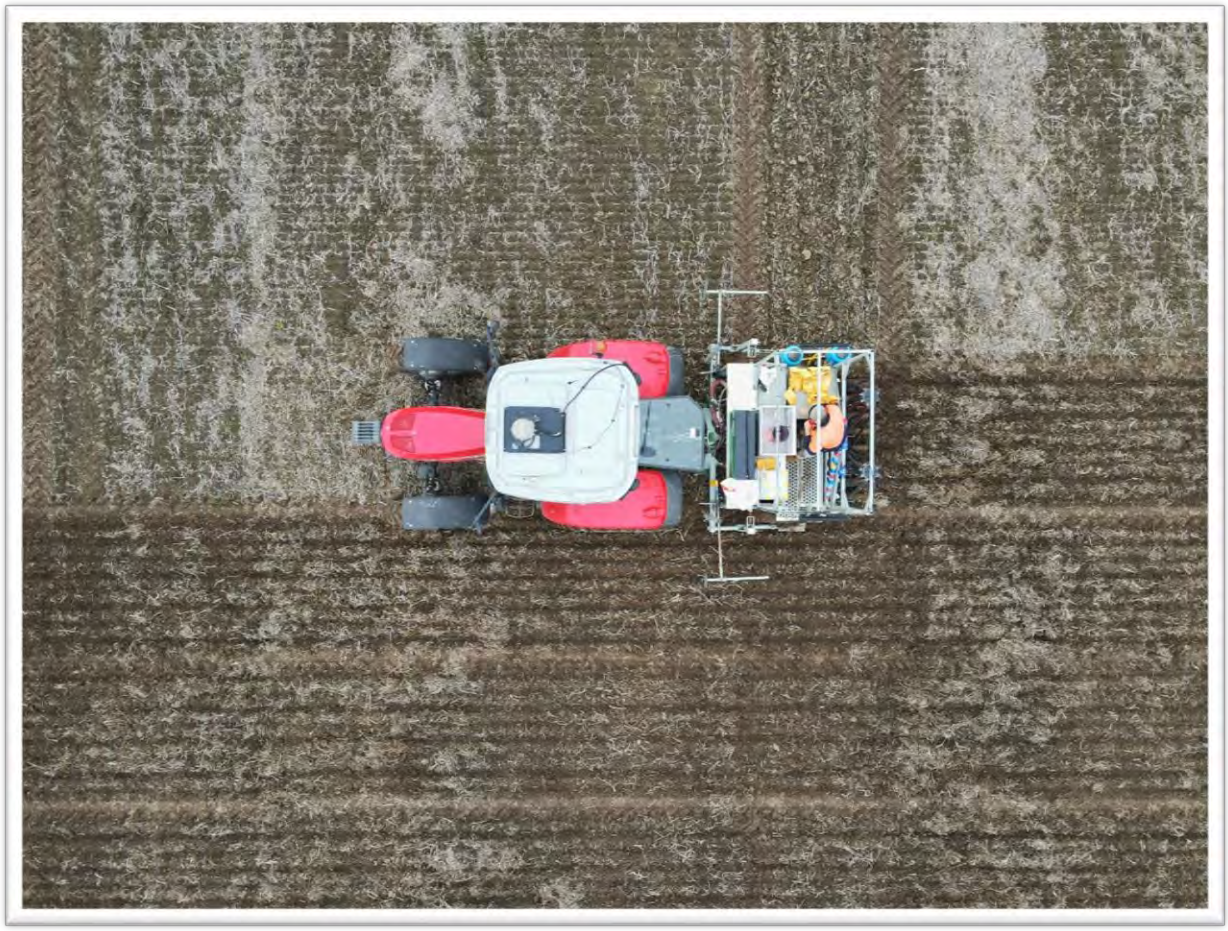
Table 1. Yield and Oil (%) of the Nutrition trial (t/ha) in winter canola screening trial.

Variety	Yield (t/ha)	Oil (%)
Captain CL	2.39 a	47.3 ab
Hyola 970CL	2.24 ab	46.3 bc
RGT Nizza CL	2.15 ab	47.5 a
Hyola Feast CL	2.09 ab	45.9 c
CL222168	2.06 ab	45.7 c
RGT Clavier CL	2.00 ab	45.5 cd
Phoenix CL	1.99 ab	45.8 c
CL222170	1.79 b	44.5 d
Mean	2.08	46.1
LSD 0.05	0.47	1.14
P Val	0.05	0.05

Table 2. Trial management details.

Sowing date:		**20 April 2022**
Variety:		As listed in the entry
Target plant density:		40 plant/m2
Sowing Fertiliser:		80 kg/ha MAP + 50 kg Urea/ha (31 kg N/ha, 17 kg P/ha, 12 kg S/ha)
Nitrogen:	6 Leaf	83 kg N/ha + 13 kg S/ha (Urea + SOA)
	Bud Visible	67 kg N/ha (Flexi-N)
Fungicide:	20% Bloom	Aviator Xpro 0.80L/ha

2022 HYC Wheat Results



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Website: http://www.faraustralia.com.au **ABN:** 33159209480

NSW Crop Technology Centre
Wallendbeen, NSW

Time of Sowing: 21 April 2022
Harvested: 5 January 2023
Rotation position: 2021 Canola, 2020 Grazing Wheat, 2019 Canola (Cut for silage), 2018-13 Pasture (Fescue/Lucerne/Clover)
Soil type: Red clay loam
Nitrogen 0-60 cm: 142kg N/ha (sampled 2 June)
Colwell P (ppm) 0-10 cm: 88.0
pH (CaCl2) 0-10 cm: 4.9
Organic Carbon (%) 0-10 cm: 2.1

Trial 2. HYC Wheat Elite Screen (FAR RRC W22-02)

Key Points:

- Grain yields ranged from 2.11 t/ha (untreated Bennett) to 11.0 t/ha (AGFWH004818 treated).
- AGFWH004818 has been tested in HYC trials for three seasons and is stiffer strawed and more disease resistant than its "sister line" Big Red, but until the very high disease pressure of 2022, has been slightly lower yielding than Big Red.
- All varieties gave an economic response to fungicide application with the exception of the red wheat AGT00005 which was the only variety to show no statistically significant yield response to fungicide.
- The principal diseases in the trial were stripe rust and Septoria tritici blotch (STB) with the latter disease more severe than in 2020 and 2021 and affecting more varieties.
- Beaufort gave almost 4 t/ha yield response from the control of STB, a disease that also significantly affected RGT Accroc, Scepter, Stockade, Anapurna and Bennett.
- The greater the recorded impact of disease on yield, the greater the reduction in grain quality (test weight and increased screenings).
- None of the milling wheats achieved 76kg/hL in this trial, although treated Stockade and Scepter achieved over 74kg/hL.

Treatments:
11 elite lines selected from HYC screening were tested under both untreated and HYC high input fungicide management (high input fungicide program = 3 foliar fungicides – GS31, GS39, GS61, Systiva seed treatment). An additional three lines were tested only with a full fungicide programme.

Table 1. Influence of fungicide management and variety on grain yield (t/ha).

	Cultivar	Yield (t/ha)	Protein (%)	Test Weight (Kg/hL)	Screenings (%)
High Input Fungicide	Scepter	7.11 h	13.3 a	74.2 c-g	1.3 hi
	Scout	7.27 h	12.9 a	73.9 d-g	1.5 ghi
	Tabasco*	5.39 k	10.2 j	66.1 kl	4.8 cde
	Trojan	6.45 ij	13.1 a	71.2 ghi	2.4 e-i
	RGT Accroc*	9.82 cde	10.8 gh	75.4 b-f	1.6 ghi
	Reflection*	8.24 g	10.4 hij	67.3 jk	6.8 bc
	Beaufort*	9.08 f	11.7 bcd	69.6 ij	3.0 d-i
	SFR86-085 (RGT Waugh)	10.68 ab	10.8 fg	76.8 a-e	1.7 ghi
	Anapurna*	10.86 ab	11.2 ef	78.9 a	2.0 f-i
	AGTW0005*	10.06 cde	11.5 cde	73.4 fgh	1.0 hi
	Big Red*	10.36 bc	10.8 fg	77.4 abc	1.1 hi
	AGFWH004818*	11.00 a	10.3 ij	78.1 ab	1.7 ghi
	LRPB16-0598 (Stockade)	9.46 ef	11.4 de	75.9 a-f	3.7 d-h
No Fungicide	DS Bennett	4.67 l	10.8 gh	71.2 ghi	4.0 d-g
	RGT Accroc	6.21 j	11.4 de	69.7 ij	5.3 bcd
	Reflection	6.83 hi	10.2 j	68.5 ijk	7.8 b
	Beaufort	5.29 k	13.1 a	63.4 lm	4.6 c-f
	SFR86-085	8.86 f	11.4 de	73.7 e-h	1.7 ghi
	Anapurna	8.01 g	12.0 b	75.9 a-f	4.2 c-g
	AGTW0005	9.74 de	11.5 de	76.9 a-e	0.9 i
	Big Red	8.19 g	10.7 ghi	74.6 c-f	1.6 ghi
	AGFWH004818	10.28 bcd	10.4 hij	76.9 a-d	1.9 ghi
	LRPB16-0598	6.48 ij	12.1 b	70.5 hij	7.8 b
	DS Bennett	2.21 m	12.0 bc	61.9 m	14.6 a
Grand Mean		8.021	11.41	72.55	3.63
Treatment Prob(F)		<0.001	<0.001	<0.001	<0.001
LSD P=.05		0.60	0.4	3.3	2.7

* Red wheat

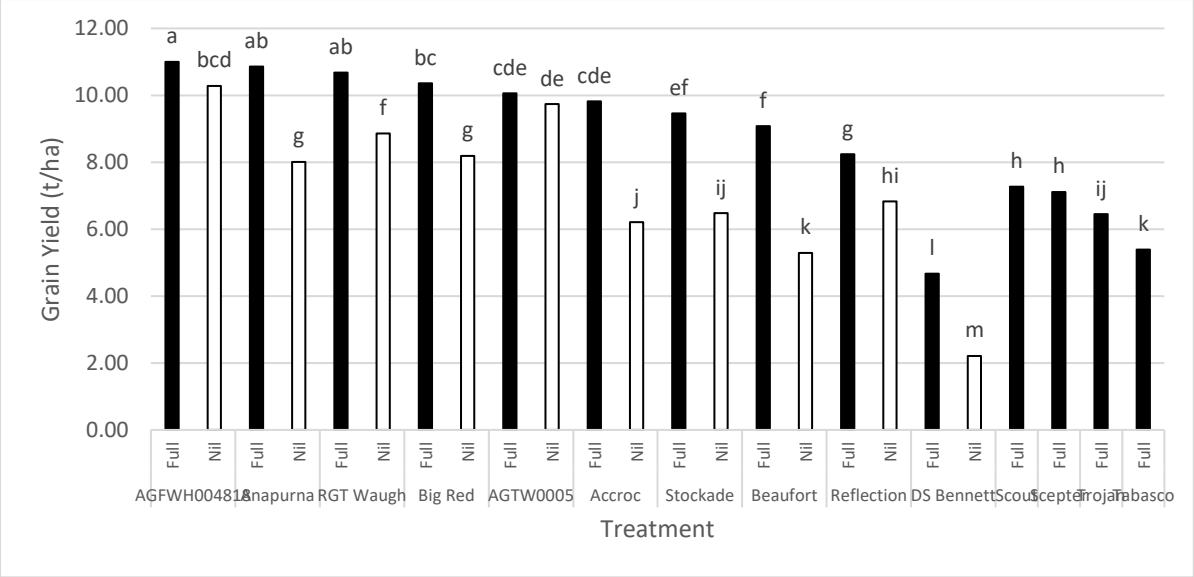

Figure 1. Grain yield (t/ha) in rank order plus and minus fungicide.

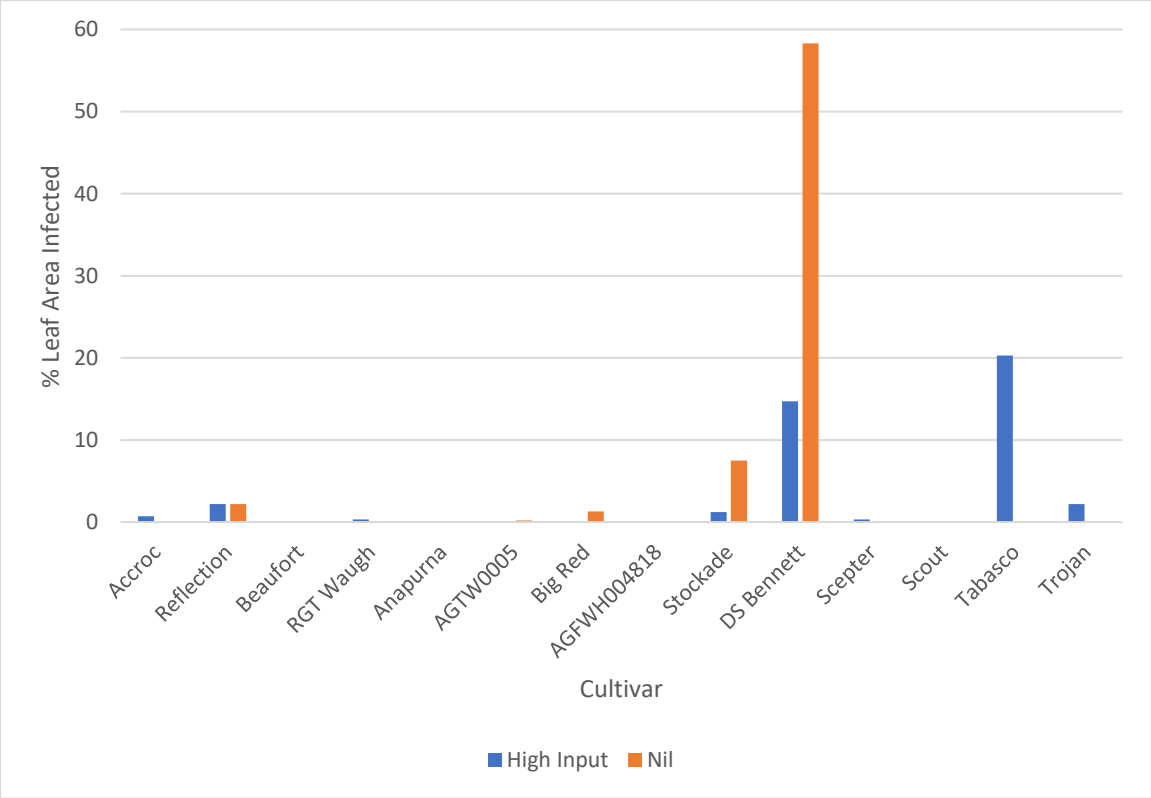

Figure 2. Stripe rust, assessed 15 November. (Scepter, Scout, Tabasco, and Trojan were only assessed under high input fungicide as untreated crops had been totally defoliated).

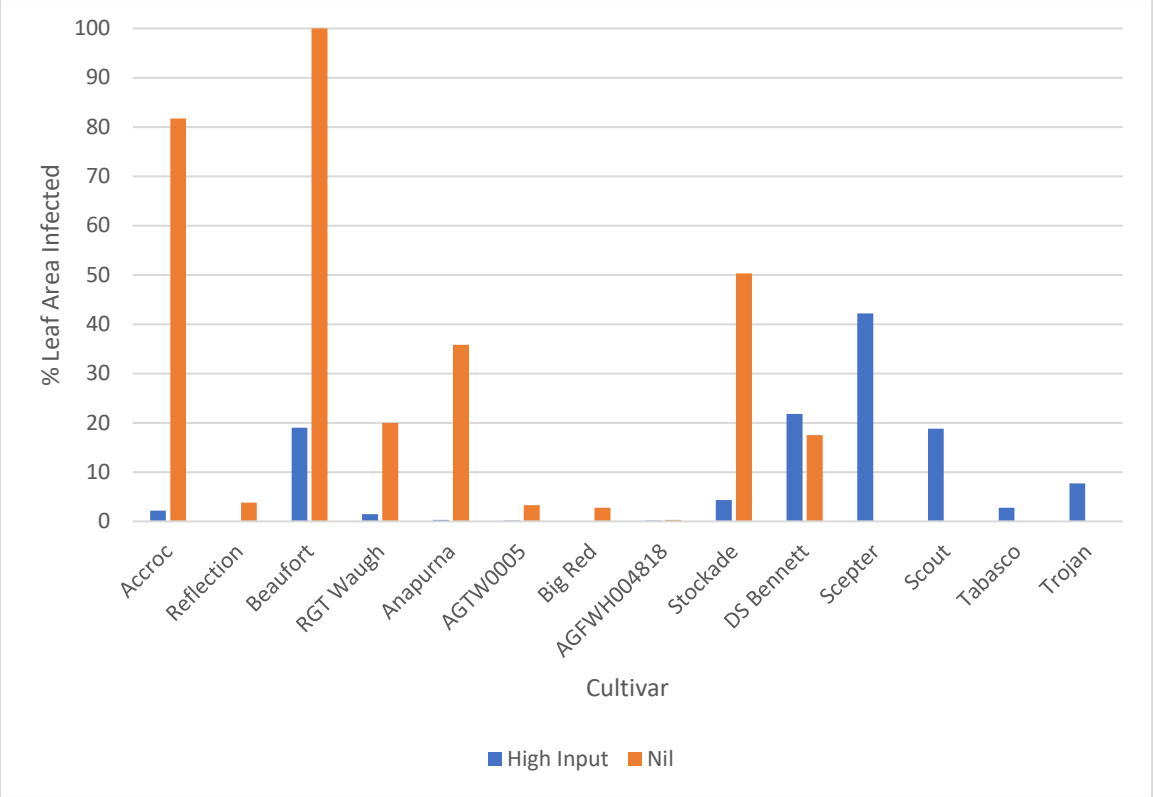

Figure 3. Septoria tritici blotch, assessed 15 November. (Scepter, Scout, Tabasco, and Trojan were only assessed under high input fungicide as untreated crops had been totally defoliated).

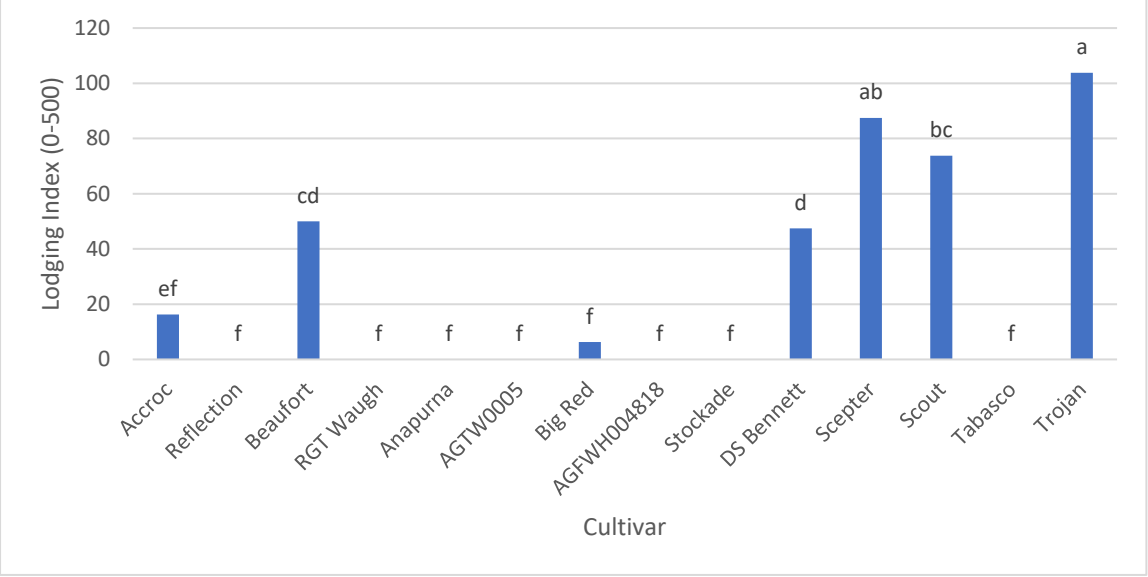

Figure 4. Lodging index, high input only assessed 15 Nov.

Table 2. Sowing details and Crop Inputs.

Sowing date:		**21 April 2022**
Plant population:		180 seeds/m²
Basal Fertiliser:		120 kg/ha MAP
Nitrogen:	**21 June**	50kg N/ha
	9 Aug	100kg N/ha
Fungicide:	**GS00**	Systiva
	GS31	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS61	Opus125 500ml/ha

Trial 3. HYC Wheat Germplasm x Environment x Management (GEM)(FAR RRC W22-03)

Key Points:

- Grain yields of RGT Accroc, RGT Cesario and Scepter were consistently higher yielding under a 3-spray full fungicide programme irrespective of a canopy management strategy with RGT Cesario giving a mean increase of 0.58 t/ha, RGT Accroc 0.94 t/ha and Scepter 3.4 t/ha over the single spray fungicide approach.
- The two red wheats RGT Cesario and RGT Accroc under full fungicide protection and optimum canopy management were 2.35 t/ha and 2.99 t/ha respectively higher yielding than Scepter (Figure 1).
- There were significant interactions between variety and fungicide strategy but not between fungicide management and canopy management meaning all canopy management approaches benefited from increased fungicide input.
- The range in grain yield as a result of fungicide input and canopy management was 4.15 t/ha with Scepter compared to 1.87 t/ha and 3.68 t/ha with RGT Cesario and RGT Accroc.
- The largest management effects on grain yield were result of fungicide input and defoliation.
- Additional yield response to N was only significant with RGT Accroc and only if combined with PGR, this being the highest yielding cultivar/management tested.
- All grain proteins exceeded 12% for Scepter (except mechanical defoliation), but test weights were significantly lower than standard unless a full fungicide programme was applied with figures ranging from 75.3 – 76.5 kg/hL. The lowest recorded with a single fungicide was 64.5kg/hL.
- There was a low level of lodging in the trial that was most significant in RGT Accroc and Scepter. The mechanical defoliation and PGR management approaches both gave control of this issue.
- The optimum level of management financially with RGT Cesario and Scepter was 150kg N/ha and three fungicides with no economic benefit from additional applied N or PGR.
- With RGT Accroc, which is weaker straw, additional N was cost effective provided a PGR was applied, but the benefit over 150kg N/ha and a three-fungicide approach was small (based on $300/t for feed grain and $900/t for urea).
- RGT Cesario (709) had significantly more heads/m^2 than RGT Accroc (625) as a result of slightly later development with both winter wheats having significantly more heads than the spring wheat Scepter (460).
- Harvest biomass reflected the same trends as head numbers with RGT Cesario achieving a mean of over 21.6 t/ha (with 3 sprays) compared to 19.2 t/ha (with 1 spray) however on average harvest indices were higher with RGT Accroc (33.9% vs. 38.7%).
- Fungicide management increased final harvest biomass by between 1.7 t/ha – 4 t/ha depending on cultivar, with Scepter having the greatest increase.
- Defoliation reduced harvest biomass by between 3.4 t/ha – 3.7 t/ha compared to other canopy management practices resulting in no statistical difference.

Treatments:

Three cultivars (RGT Cesario, Scepter and RGT Accroc) were tested under 2 fungicide programs (single spray at flag leaf (GS39) and high input GS31, GS39 & GS59) and four canopy management strategies (Standard N 150kg N/ha, High N 225kg N/ha, High N defoliation, High N plus PGR). Mechanical defoliation was carried out at late tillering prior to GS30 before stem elongation defined. The single timed application of PGR was based on Moddus 0.2 + Errex 1.3 applied at GS31.

Management treatments

Treatment ID	Fungicide*	Canopy Intervention	Nitrogen (kg N/ha)
1. Standard (Std) Fungicide & no intervention (NI)	Standard (1 spray))	Untreated	150
2. Standard (Std) Fungicide & no intervention (NI) + N	Standard (1 spray)	Untreated	225
3. Standard (Std) Fungicide & Grazing	Standard (1 spray)	Defoliation	225
4. Standard (Std) Fungicide & PGR + N	Standard (1 spray)	PGR	225
5. Higher input Fungicide & no intervention (NI)	High input (3 spray)	Untreated	150
6. Higher input Fungicide & PGR + N	High input (3 spray)	Untreated	225
7. Dual Purpose System	High input (3 spray)	Defoliation	225
8. Hyper Yield System	High input (3 spray)	PGR	225

Standard Fungicide – Foliar fungicides FAR F1/19 (DMI/SDHI mix) at GS 39

HYC high input fungicide – 3 x foliar fungicides including Prosaro GS31, FAR F1/19 GS39, and Radial GS61.

Table 5. *Influence of variety (mean of canopy management) and canopy management (mean of fungicide management) strategy on grain yield (t/ha).*

	Cultivar							
Fungicide Strategy	RGT Cesario		Scepter		RGT Accroc		**Mean**	
Single Spray	7.75	b	2.91	d	7.48	b	**6.05**	**b**
Full Fungicide	8.33	a	6.31	c	8.42	a	**7.69**	**a**
Canopy Management								
Standard	8.27	b	4.46	e	8.2	b	**6.98**	**b**
Additional N	7.94	bc	4.49	e	7.94	bc	**6.79**	**b**
Defoliation	7.31	cd	4.64	e	6.61	d	**6.19**	**c**
PGR	8.63	ab	4.86	e	9.05	a	**7.51**	**a**
Mean	**8.04**	**a**	**4.61**	**b**	**7.95**	**a**		
Fungicide x Cultivar	P- Value		<0.001		LSD (P=0.05)		0.52 t/ha	
Canopy x Cultivar	P- Value		0.006		LSD (P=0.05)		0.73 t/ha	
Cultivar	P- Value		<0.001		LSD (P=0.05)		0.37 t/ha	
Canopy Management	P- Value		<0.001		LSD (P=0.05)		0.44 t/ha	
Fungicide Strategy	P- Value		0.001		LSD (P=0.05)		0.39 t/ha	

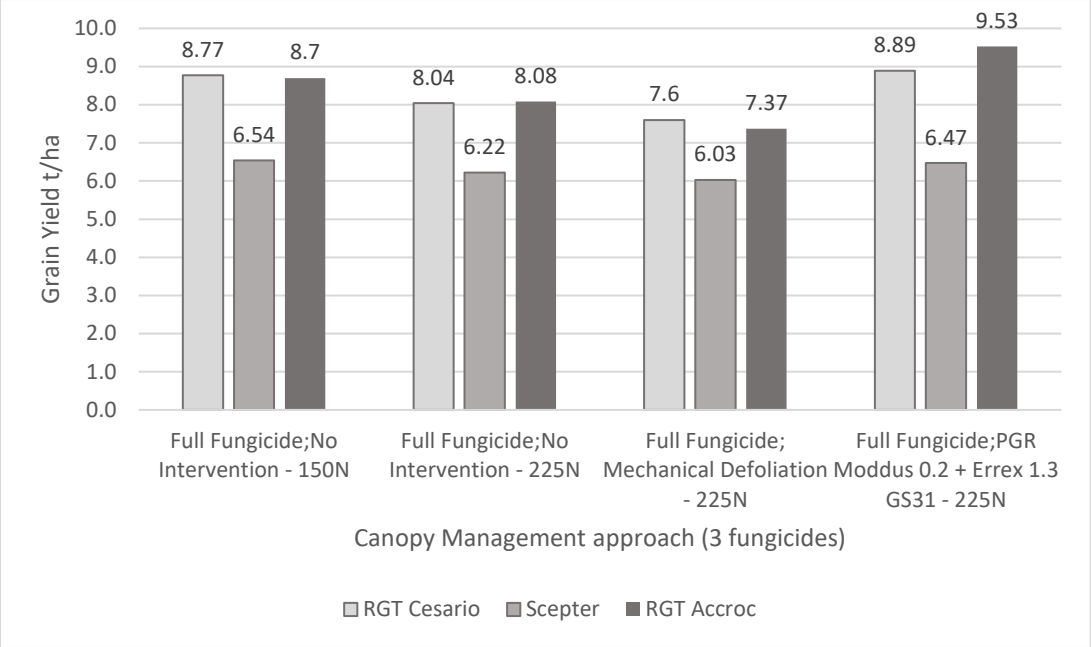

Figure 6. Influence of variety and canopy management strategy under a **full fungicide programme** on grain yield (t/ha).

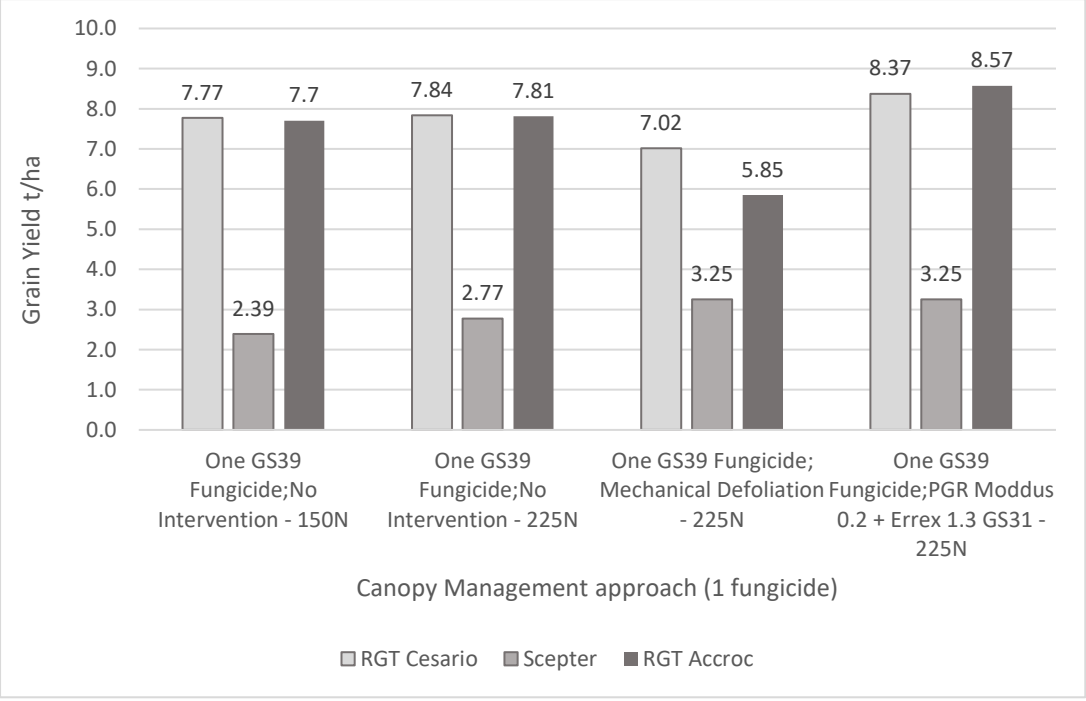

Figure 2. Influence of variety and canopy management strategy under a **single GS39 fungicide programme** on grain yield (t/ha).

Table 2. Influence of variety (mean of canopy management) and canopy management (mean of fungicide management) strategy on grain protein (%).

		Cultivar		
Fungicide Strategy	RGT Cesario	Scepter	RGT Accroc	**Mean**
Single Spray	12 b	14.2 a	11.9 b	**12.7 -**
Full Fungicide	12 b	12.6 b	11.9 b	**12.2 -**
Canopy Management				
Standard	11.6 -	13.8 -	11.4 -	**12.2 -**
Additional N	12.3 -	13.8 -	12.1 -	**12.8 -**
Defoliation	11.9 -	11.8 -	11.8 -	**11.8 -**
PGR	12.2 -	14 -	12.3 -	**12.8 -**
Mean	**12 b**	**13.4 a**	**11.9 b**	
Fungicide x Cultivar	P-Value	0.031	LSD (P=0.05)	0.01%
Canopy x Cultivar	P-Value	0.187	LSD (P=0.05)	ns
Cultivar	P-Value	<0.001	LSD (P=0.05)	0.01%
Canopy Management	P-Value	0.087	LSD (P=0.05)	ns
Fungicide Strategy	P-Value	0.195	LSD (P=0.05)	ns

Table 7. Influence of variety (mean of canopy management) and canopy management (mean of fungicide management) strategy on test weight (kg/hL).

		Cultivar		
Fungicide Strategy	RGT Cesario	Scepter	RGT Accroc	**Mean**
Single Spray	73.8 b	67.3 c	73.9 b	**71.6 b**
Full Fungicide	74.8 ab	75.8 a	75.4 ab	**75.3 a**
Canopy Management				
Standard	75.2 -	72.2 -	75.2 -	**74.2 a**
Additional N	74 -	69.9 -	74.4 -	**72.8 b**
Defoliation	72.9 -	71.9 -	72.9 -	**72.6 b**
PGR	75.1 -	72.2 -	76.1 -	**74.4 a**
Mean	**74.3 a**	**71.6 b**	**74.6 a**	
Fungicide x Cultivar	Pval	<0.001	LSD p=0.05	1.6kg/hL
Canopy x Cultivar	Pval	0.38	LSD p=0.05	ns
Cultivar	Pval	<0.001	LSD p=0.05	1.2kg/hL
Canopy Management	Pval	0.013	LSD p=0.05	1.3kg/hL
Fungicide Strategy	Pval	0.006	LSD p=0.05	1.6kg/hL

Table 8. Influence of variety (mean of canopy management) and canopy management (mean of fungicide management) strategy on screenings (%).

	Cultivar						
Fungicide Strategy	RGT Cesario		Scepter		RGT Accroc		**Mean**
Single Spray	3.9	-	1.1	-	3.0	-	**2.6 a**
Full Fungicide	3.1	-	0.7	-	2.2	-	**2 b**
Canopy Management							
Standard	2.8	c	0.7	e	2.4	cd	**1.9 b**
Additional N	3.5	b	1.1	e	2.5	cd	**2.4 b**
Defoliation	4.7	a	0.8	e	3.5	b	**3 a**
PGR	3.0	bc	0.9	e	1.9	d	**1.9 b**
Mean	**3.5**	**a**	**0.9**	**c**	**2.6**	**b**	
Fungicide x Cultivar	Pval		0.458		LSD p=0.05		ns
Canopy x Cultivar	Pval		<0.001		LSD p=0.05		0.7%
Cultivar	Pval		<0.001		LSD p=0.05		0.4%
Canopy Management	Pval		0.001		LSD p=0.05		0.5%
Fungicide Strategy	Pval		0.013		LSD p=0.05		0.4%

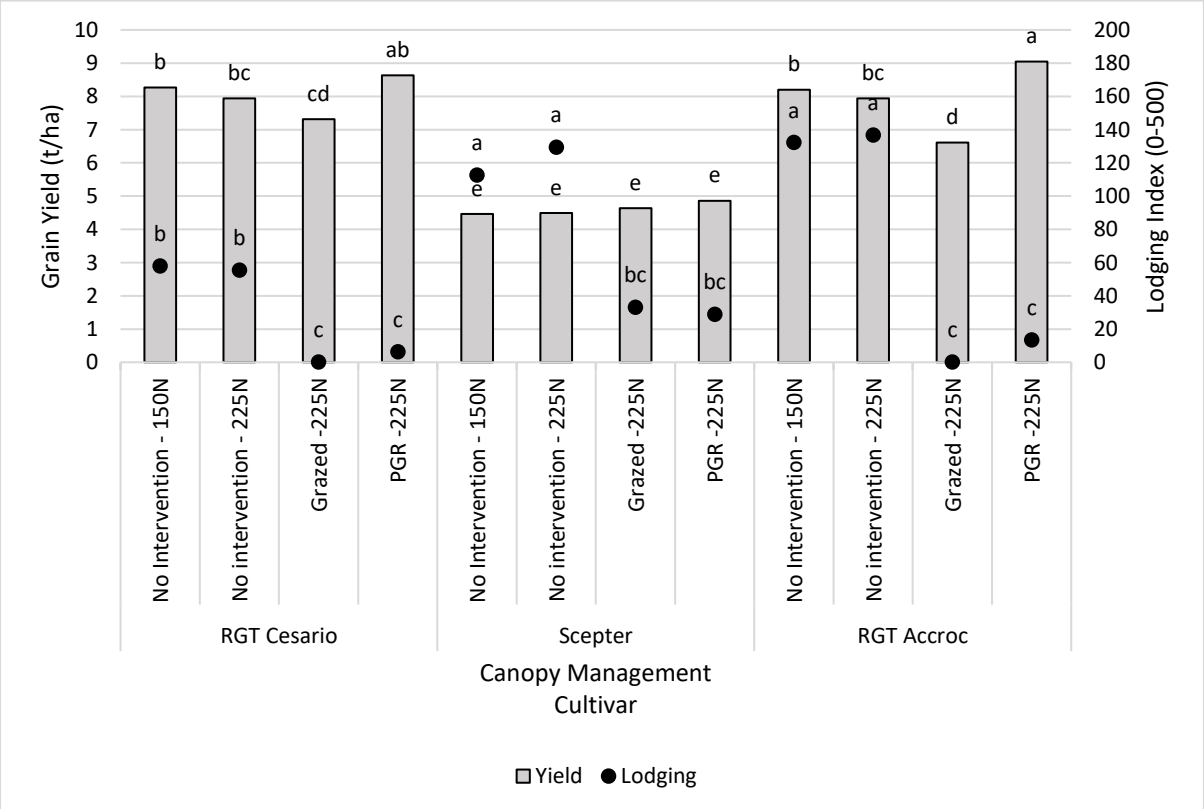

Figure 2. Influence of cultivar and canopy management (mean of fungicide strategy) on grain yield (t/ha).

Table 9. Influence of cultivar and canopy management (mean of fungicide strategy) on head number (heads/m^2).

	Cultivar			
Fungicide Strategy	RGT Cesario	Scepter	RGT Accroc	**Mean**
Single Spray	662 -	441 -	591 -	**565 b**
Full Fungicide	757 -	479 -	659 -	**631 a**
Canopy Management				
Standard	730 -	500 -	654 -	**628 -**
Additional N	751 -	479 -	636 -	**622 -**
Defoliation	668 -	400 -	585 -	**551 -**
PGR	688 -	461 -	626 -	**591 -**
Mean	**709 a**	**460 c**	**625 b**	
Fungicide x Cultivar	Pval	0.387	LSD p=0.05	ns
Canopy x Cultivar	Pval	0.956	LSD p=0.05	ns
Cultivar	Pval	<0.001	LSD p=0.05	42
Canopy Management	Pval	0.084	LSD p=0.05	ns
Fungicide Strategy	Pval	0.001	LSD p=0.05	18

Table 10. Influence of cultivar and canopy management (mean of fungicide strategy) on harvest biomass (t/ha).

	Cultivar			
Fungicide Strategy	RGT Cesario	Scepter	RGT Accroc	**Mean**
Single Spray	19.3 b	11.9 e	17.5 c	**16.2 b**
Full Fungicide	21.6 a	15.9 d	19.2 b	**18.9 a**
Canopy Management				
Standard	21.7 -	14.6 -	19.4 -	**18.6 a**
Additional N	21.6 -	14.8 -	19 -	**18.5 a**
Defoliation	18.2 -	11.5 -	15 -	**14.9 b**
PGR	20.4 -	14.6 -	20 -	**18.3 a**
Mean	**20.5 a**	**13.9 c**	**18.4 b**	
Fungicide x Cultivar	Pval	0.0368	LSD p=0.05	1.29
Canopy x Cultivar	Pval	0.4071	LSD p=0.05	ns
Cultivar	Pval	0.0001	LSD p=0.05	0.91
Canopy Management	Pval	0.0001	LSD p=0.05	1.07
Fungicide Strategy	Pval	0.0003	LSD p=0.05	0.45

Table 7. Influence of fungicide strategy, cultivar and canopy management on net margin ($/ha, Total income from grazing and grain minus variable cost of fungicides and application, nitrogen, and PGRs)

Fungicide	Canopy Management	Cultivar	Total Cost	Grazing Income	Grain Income	Total Income	Net Margin
					$/ha		
Single Spray	Standard 150kg N/ha	RGT Cesario	497		2448	2448	1951
Single Spray	Standard 150kg N/ha	Scepter	497		801	801	304
Single Spray	Standard 150kg N/ha	RGT Accroc	497		2426	2426	1929
Single Spray	Extra N – 225Kg N/ha	RGT Cesario	722		2470	2470	1748
Single Spray	Extra N – 225Kg N/ha	Scepter	722		873	873	151
Single Spray	Extra N – 225Kg N/ha	RGT Accroc	722		2460	2460	1739
Single Spray	Extra N + Defoliation	RGT Cesario	722	326	2211	2538	1816
Single Spray	Extra N + Defoliation	Scepter	722	251	1089	1340	619
Single Spray	Extra N + Defoliation	RGT Accroc	722	538	1843	2380	1659
Single Spray	Extra N + PGR	RGT Cesario	775		2637	2637	1862
Single Spray	Extra N + PGR	Scepter	775		1089	1089	314
Single Spray	Extra N + PGR	RGT Accroc	775		2700	2700	1925
Full Fungicide	Standard 150kg N/ha	RGT Cesario	589		2763	2763	2174
Full Fungicide	Standard 150kg N/ha	Scepter	589		2505	2505	1916
Full Fungicide	Standard 150kg N/ha	RGT Accroc	589		2741	2741	2152
Full Fungicide	Extra N – 225Kg N/ha	RGT Cesario	814		2533	2533	1719
Full Fungicide	Extra N – 225Kg N/ha	Scepter	814		2196	2196	1382
Full Fungicide	Extra N – 225Kg N/ha	RGT Accroc	814		2545	2545	1731
Full Fungicide	Extra N + Defoliation	RGT Cesario	814	332	2394	2726	1912
Full Fungicide	Extra N + Defoliation	Scepter	814	176	2309	2486	1672
Full Fungicide	Extra N + Defoliation	RGT Accroc	814	389	2322	2711	1897
Full Fungicide	Extra N + PGR	RGT Cesario	852		2800	2800	1948
Full Fungicide	Extra N + PGR	Scepter	852		2478	2478	1626
Full Fungicide	Extra N + PGR	RGT Accroc	852		3002	3002	2150

Costings based on Urea - $1380/t, Prosaro – $26.10/ha, Aviator Xpro - $30.45/ha, Radial - $37.21/ha, Moddus Evo - $16.65/ha, Errex - $21.52/ha, Boom application cost $15/ha.

Income based on Grazing – $0.25/kg DM, FED1 - $315/t, AGP - $335/t, AUH - $353/t, APH - $383/t

Table 8. Sowing details and Crop Inputs.

Sowing date:		**21 April 2022**
Plant population:		180 seeds/m²
Basal Fertiliser:		120 kg/ha MAP
Nitrogen:	**Tillering**	50kg N/ha
	GS31	100kg N/ha (125kg N/ha High N)
	GS33	50kg N/ha High N only
PGR:	**GS31**	Moddus Evo 200ml/ha
		Errex 1300ml/ha
Fungicide:	**GS31**	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS61	Radial 600ml/ha

Trial 4. HYC Wheat Disease Management x Germplasm Interaction (FAR RRC W22-04)

Key Points:

- Grain yield varied between less than 0.5 t/ha with the untreated crop of Catapault to 10.45 t/ha with Anapurna grown with four fungicide units.
- There was a significant interaction between cultivar and fungicide management with no statically significant yield differences between one, two and four units of fungicide with RGT Cesario (0.36 t/ha difference), Big Red (0.17 t/ha) and Anapurna (0.32 t/ha).
- However, in terms of economics the greatest financial return was secured with 2 units of fungicide with RGT Cesario and one single flag spray with Anapurna and Big Red. It is the third year at this site that Big Red and Anapurna have given the best return with a single flag spray.
- All other cultivars tested 4 units of fungicide resulted in significantly higher yields and net margins ($ return after input costs removed) than other fungicide strategies.
- The influence of fungicide management on test weight was very large, particularly where Septoria tritici blotch (STB) and/or stripe rust was severe.
- In RGT Accroc, Anapurna and Beckom STB was the main disease, whilst in Scepter and Catapult it was stripe rust. Big Red and RGT Cesario showed little disease other than low levels of stripe rust in RGT Cesario earlier in the season.

Treatments:

Seven cultivars evaluated under four levels of fungicide management:

1. Nil – untreated control.
2. A single flag leaf fungicide applied at GS39 – SDHI/DMI mixture.
3. A two-spray approach at GS33 (3rd node) SDHI/DMI mixture & GS59 (head emergence) Opus® 500mL/ha .
4. A four-unit approach combining at sowing flutriafol on the MAP with three foliar sprays – GS31 Prosaro® 300mL/ha, GS39 and GS59 (as stated above).

Table 1. Influence of variety and number of fungicide units on grain yield (t/ha)

	Untreated		**1 Fungicide**		**2 Fungicides**		**4 Fungicides**		**Mean**	
	Yield (t/ha)		Yield (t/ha)		Yield (t/ha)		Yield (t/ha)			
Scepter	0.96	k	2.60	i	4.31	h	6.68	ef	**3.64**	**e**
RGT Cesario	7.00	e	8.62	bcd	8.97	bc	8.88	bc	**8.37**	**b**
Anapurna	6.90	e	10.37	a	10.13	a	10.45	a	**9.46**	**a**
RGT Accroc	5.54	g	8.07	d	8.51	cd	9.25	b	**7.85**	**c**
Catapult	0.31	k	0.41	k	1.83	j	3.74	h	**1.57**	**f**
Beckom	2.95	i	5.93	g	6.03	fg	7.26	e	**5.54**	**d**
Big Red	7.28	e	8.91	bc	8.78	bc	8.95	bc	**8.48**	**b**
Mean	**4.42**	**d**	**6.42**	**c**	**6.94**	**b**	**7.89**	**a**		
P val Cultivar				<0.001	LSD p=0.05				0.34	
P val Fungicide				<0.001	LSD p=0.05				0.49	
P val Cultivar x Fungicide				<0.001	LSD p=0.05				0.68	

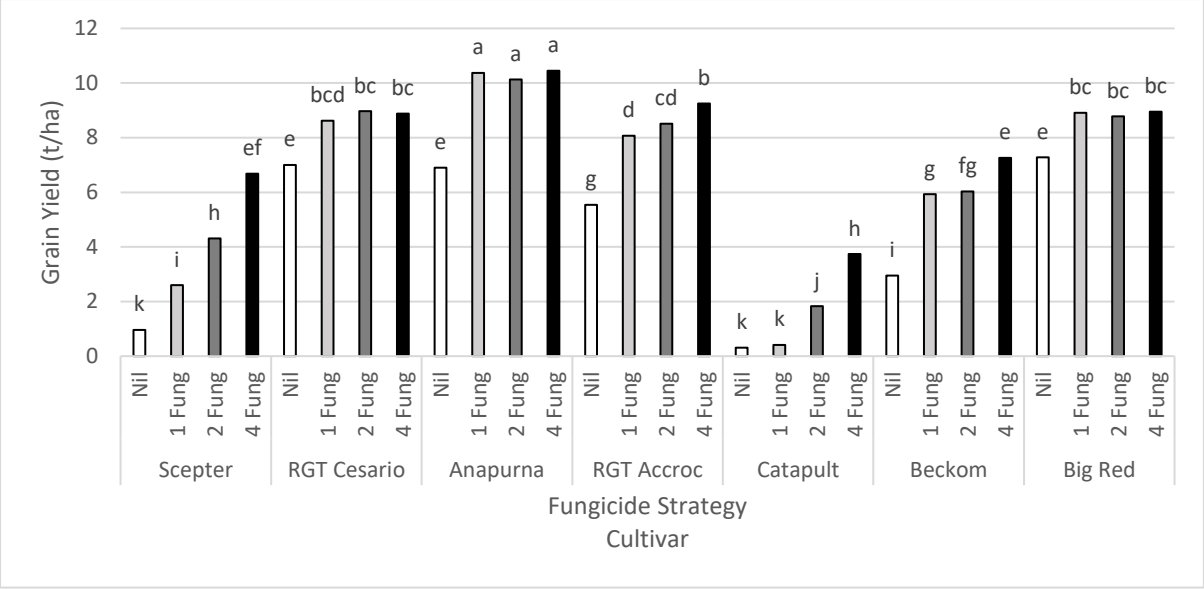

Figure 1. Influence of variety and number of fungicide units on grain yield (t/ha).

Table 2. Influence of variety and number of fungicide units on grain protein (%).

	Untreated	1 Fungicide	2 Fungicides	4 Fungicides	Mean
	Protein %	Protein %	Protein %	Protein %	
Scepter	14.9 ab	14.3 bc	13.6 c	13.5 cd	**14 a**
RGT Cesario	11.5 fgh	11.1 h	11.2 gh	11.4 fgh	**11.3 d**
Anapurna	12.6 de	11.8 e-h	11.8 e-h	12 e-h	**12.1 c**
RGT Accroc	11.9 e-h	11.1 h	11.2 h	12.2 ef	**11.6 cd**
Catapult	15.3 a	15.1 ab	14 c	13.4 cd	**14.4 a**
Beckom	14 c	12.5 de	12.6 de	12.2 efg	**12.8 b**
Big Red	11.7 e-h	11.4 fgh	11.5 fgh	11.5 fgh	**11.5 d**
Mean	**13.1 a**	**12.5 b**	**12.2 b**	**12.3 b**	
P val Cultivar	<0.001		LSD p=0.05		0.5
P val Fungicide		0.022	LSD p=0.05		0.6
P val Cultivar x Fungicide		0.031	LSD p=0.05		0.9

Table 3. Influence of variety and number of fungicide units on grain yield (kg/hL).

	Untreated	1 Fungicide	2 Fungicides	4 Fungicides	Mean
	Test Weight (kg/hL)	Test Weight (kg/hL)	Test Weight (kg/hL)	Test Weight (kg/hL)	
Scepter	55.0 hij	46.1 kl	59.6 f-i	66.4 def	**56.8 d**
RGT Cesario	65.0 def	71.3 a-d	72.0 a-d	72.0 a-d	**70.1 b**
Anapurna	70.6 bcd	77.2 ab	77.3 ab	78.0 a	**75.7 a**
RGT Accroc	59.6 f-i	71.8 a-d	70.6 bcd	69.5 cd	**67.9 b**
Catapult	43.9 l	50.9 jk	55.8 g-j	61.6 e-h	**53.0 e**
Beckom	53.8 ij	65.0 def	62.0 efg	66.8 de	**61.9 c**
Big Red	71.2 a-d	75.0 abc	74.1 abc	75.3 abc	**73.9 a**
Mean	**59.9 c**	**65.3 b**	**67.3 ab**	**69.9 a**	
P val Cultivar	<0.001		LSD p=0.05		3.5
P val Fungicide	<0.001		LSD p=0.05		2.7
P val Cultivar x Fungicide		0.003	LSD p=0.05		7.0

Table 4. Influence of variety and number of fungicide units on grain screenings (%).

	Untreated		1 Fungicide		2 Fungicides		4 Fungicides		Mean	
	Screenings (%)		Screenings (%)		Screenings (%)		Screenings (%)			
Scepter	4.5	fgh	5.3	efg	2.6	i-m	1.6	m	**3.5**	**d**
RGT Cesario	6	ef	3.3	h-l	3.4	hij	3.1	h-m	**4**	**cd**
Anapurna	6.4	de	2.9	h-m	3.3	h-l	2.8	h-m	**3.8**	**cd**
RGT Accroc	8.3	c	3.1	h-m	3.2	h-m	2.8	h-m	**4.4**	**c**
Catapult	12.5	b	8.5	c	7.8	cd	3.9	ghi	**8.2**	**a**
Beckom	18.9	a	3.7	ghi	3.3	h-k	2.6	i-m	**7.1**	**b**
Big Red	2.3	i-m	1.6	lm	1.9	j-m	1.7	klm	**1.9**	**e**
Mean	**8.4**	**a**	**4.1**	**b**	**3.6**	**b**	**2.6**	**c**		
P val Cultivar			<0.001			LSD p=0.05			0.8	
P val Fungicide			<0.001			LSD p=0.05			0.8	
P val Cultivar x Fungicide			<0.001			LSD p=0.05			1.7	

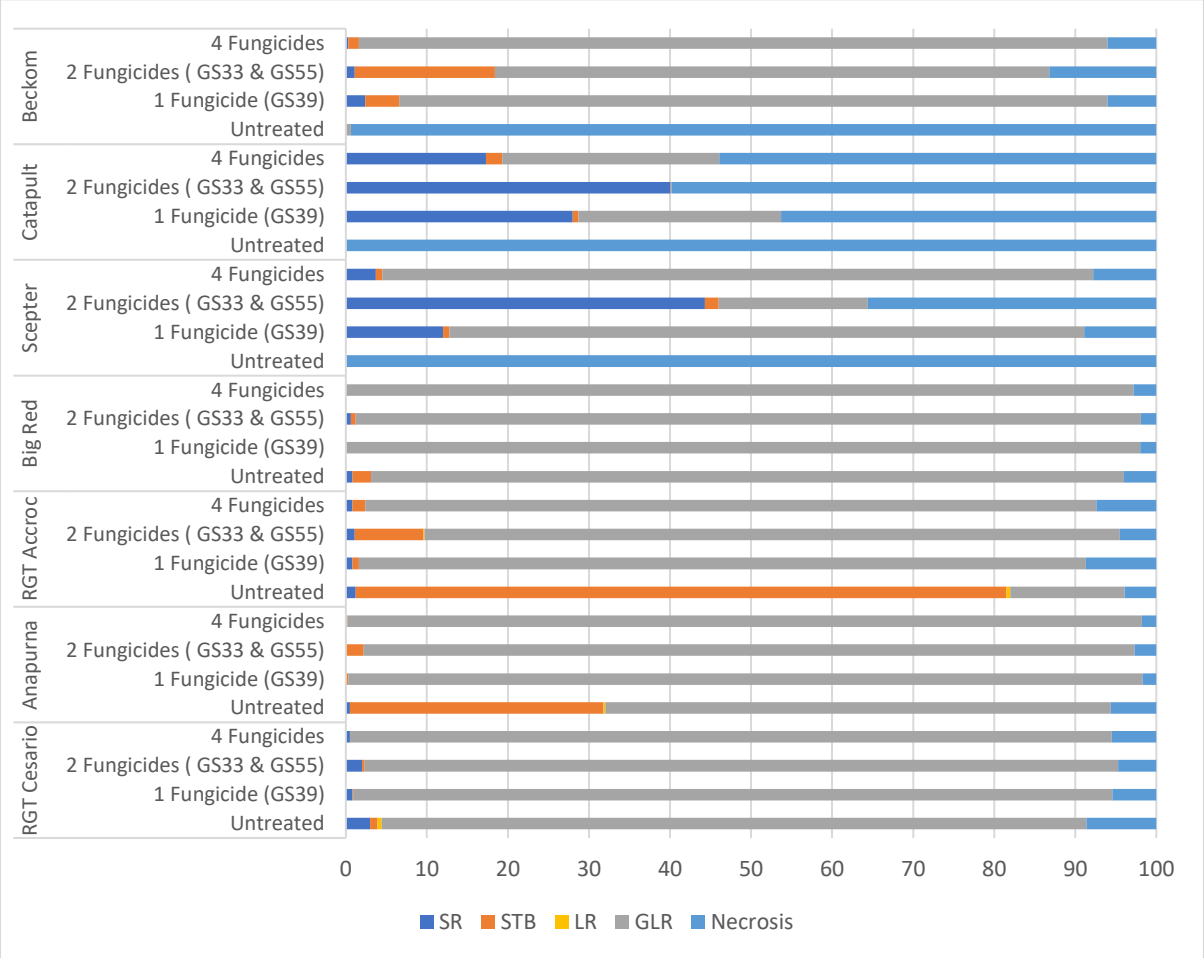

Figure 2. Influence of variety and number of fungicide units on disease levels on **flag leaf** in the crop during grain fill (GS75) (%)*SR – Stripe rust, STB – Septoria tritici blotch, LR – Leaf Rust, GLR – Green Leaf Area & Necrosis.*

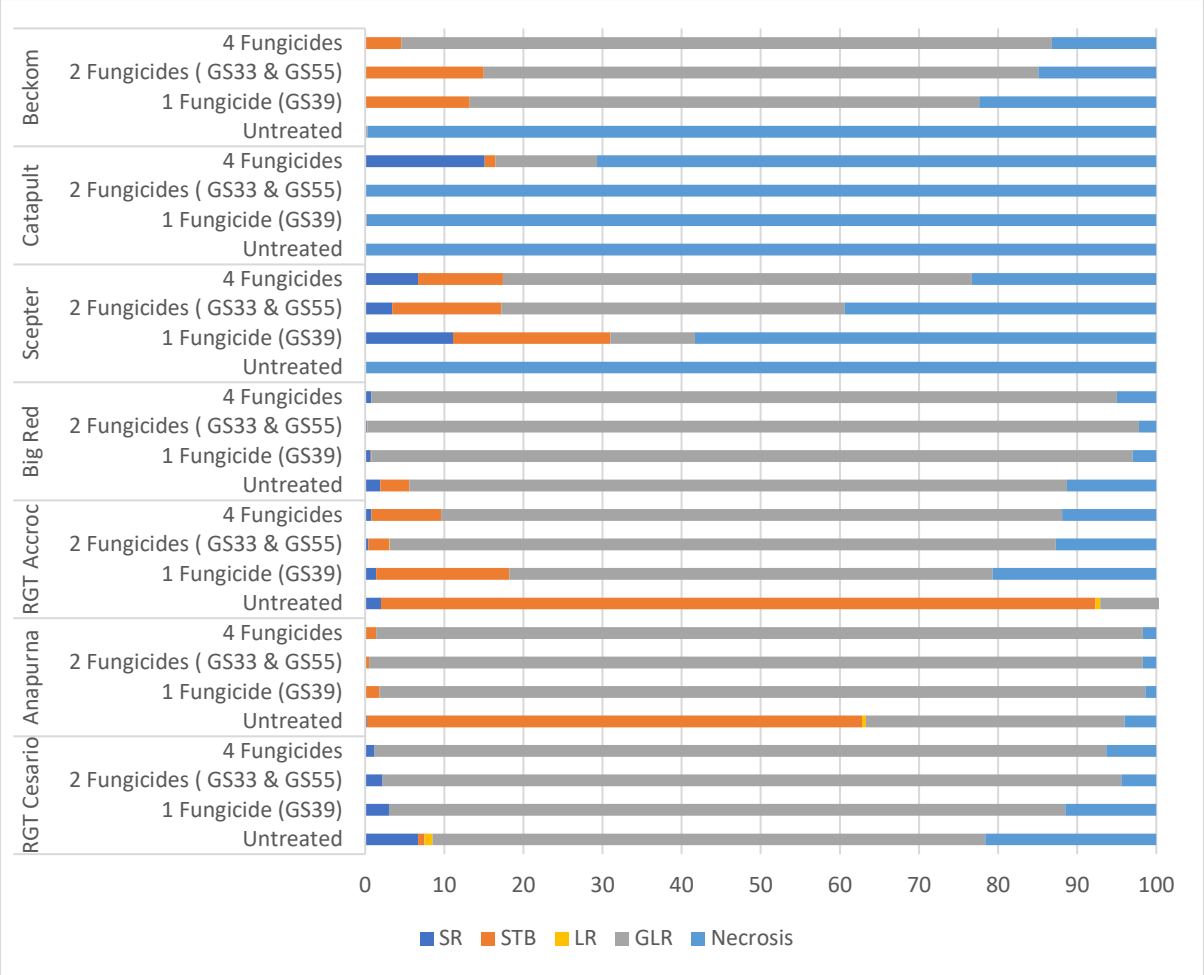

Figure 3. Influence of variety and number of fungicide units on disease levels on **flag -1 leaf** in the crop during grain fill (GS75) (%)*SR – Stripe rust, STB – Septoria tritici blotch, LR – Leaf Rust, GLR – Green Leaf Area & Necrosis.*

Table 5. Influence of variety and number of fungicide units on net margin ($/ha income return after fungicide cost).

			Price	Income	Total Cost	Net Margin
	Yield (t/ha)	Bin Grade	$/t	$/ha	$/ha	$/ha
Untreated; Catapult	0.31	UNDL	150	46.5	0	46.5
1 Fungicide; Catapult	0.41	UNDL	150	61.5	40	21.5
2 Fungicides; Catapult	1.83	UNDL	150	274.5	69	205.5
4 Fungicides; Catapult	3.74	FED1	315	1178.1	118	1060.1
Untreated; Scepter	0.96	UNDL	150	144	0	144
1 Fungicide; Scepter	2.60	UNDL	150	390	40	350
2 Fungicides; Scepter	4.31	UNDL	150	646.5	69	577.5
4 Fungicides; Scepter	6.68	FED1	315	2104.2	118	1986.2
Untreated; Beckom	2.95	UNDL	150	442.5	0	442.5
1 Fungicide; Beckom	5.93	FED1	315	1867.95	40	1827.95
2 Fungicides; Beckom	6.03	FED1	315	1899.45	69	1830.45
4 Fungicides; Beckom	7.26	FED1	315	2286.9	118	2168.9
Untreated; RGT Accroc	5.54	UNDL	150	831	0	831
1 Fungicide; RGT Accroc	8.07	SFW1	335	2703.45	40	2663.45
2 Fungicides; RGT Accroc	8.51	SFW1	335	2850.85	69	2781.85
4 Fungicides; RGT Accroc	9.25	SFW1	335	3098.75	118	2980.75
Untreated; RGT Cesario	7.00	FED1	315	2205	0	2205
1 Fungicide; RGT Cesario	8.62	SFW1	335	2887.7	40	2847.7
2 Fungicides; RGT Cesario	8.97	SFW1	335	3004.95	69	2935.95
4 Fungicides; RGT Cesario	8.88	SFW1	335	2974.8	118	2856.8
Untreated; Big Red	7.28	SFW1	335	2438.8	0	2438.8
1 Fungicide; Big Red	8.91	SFW1	335	2984.85	40	2944.85
2 Fungicides; Big Red	8.78	SFW1	335	2941.3	69	2872.3
4 Fungicides; Big Red	8.95	SFW1	335	2998.25	118	2880.25
Untreated; Anapurna	6.90	SFW1	335	2311.5	0	2311.5
1 Fungicide; Anapurna	10.37	SFW1	335	3473.95	40	3433.95
2 Fungicides; Anapurna	10.13	SFW1	335	3393.55	69	3324.55
4 Fungicides; Anapurna	10.45	SFW1	335	3500.75	118	3382.75

NB. Other costs for input costs e.g. seeds, nitrogen, herbicides etc. have not been accounted for in this calculation of net margin (only fungicide and application costs $/ha).

Table 6. Sowing details and Crop Inputs.

Sowing date:		**21 April 2022**
Plant population:		180 seeds/m²
Basal Fertiliser:		120 kg/ha MAP
Nitrogen:	**Tillering**	50kg N/ha
	GS31	100kg N/ha
	GS33	50kg N/ha
PGR:	**GS31**	Nil
Fungicide:		See Trt list

Trial 5. HYC Wheat Nutrition (FAR RRC W22-05)

cv RGT Accroc

Key Points:

- Following six years of pasture legume 2013-18 inc. (Fescue/Lucerne/Clover) and three years of cropping (canola 2019 (cut for forage), grazing wheat 2020 and canola 2021, there was no yield response to applied nitrogen (80-280kg N/ha).
- With 142kg N/ha in the soil 0 – 60cm on 2 June the zero N treatment (only 12kg N/ha MAP applied) yielded 9.26 t/ha with a protein of 9.5% indicating the presence of 154kg N/ha in grain.
- If 75% of the N is assumed to be in the grain and 25% in the straw residue, then the total N uptake at harvest in zero N plots would be 205kg N/ha indicating approximately 63kg N/ha coming from the soil via 163mineralization.
- If straw residue was returned to the paddock the nitrogen balance would indicate that 142 kg N/ha was available in the soil in the winter (12N from MAP) and 142kg N/ha removed in the grain at harvest.
- All N applications as urea applied as 2 or 3 split applications only served to increase protein but not yield.
- Despite the application of a PGR at GS31 (Moddus/Errex), increasing N served to increase head number and lodging pressure.
- Applying N as a three split at 200kg N/ha applied moderated the lodging pressure slightly but the difference was not significant.
- Applying manure or the equivalent macro nutrients carried in the manure on top of 160kg N/ha gave no yield benefit, and where the equivalent macro nutrients were applied, significantly reduced yield as a result of increased crop lodging.
- There were no significant differences in harvest dry matter as a result of N application.
- The zero N treatment had the highest test weight and lowest screening.

Treatments:

RGT Accroc feed red wheat was subjected to 10 nutrition treatments of varying nitrogen and manure rates. The 5 t/ha manure (chicken manure pellets) treatments were applied on top of 160kg N/ha applied as a two split, 50% at tillering and 50% at GS31. The manure pellets had an analysis of N 3.5%, P 1.8%, K 1.8% and S 0.5%. The available soil N was measured on 2 June with 0-10cm 39kg N/ha, 10-30cm 56kg N/ha and 30-60cm 46kg N/ha. Note this was applied following a 120kg/ha MAP application. The trial site had an organic carbon content of 2.1% in the 0 – 10cm.

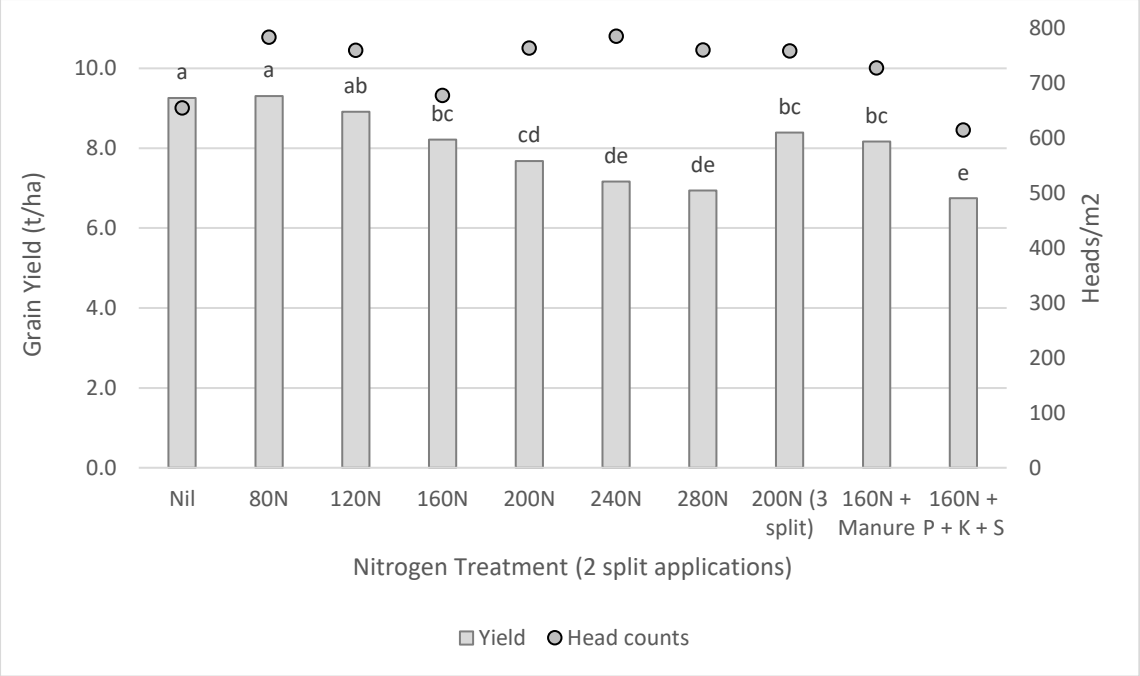

Figure 1. Influence of nutrition strategy on grain yield (t/ha) and final harvest head number (heads/m^2).

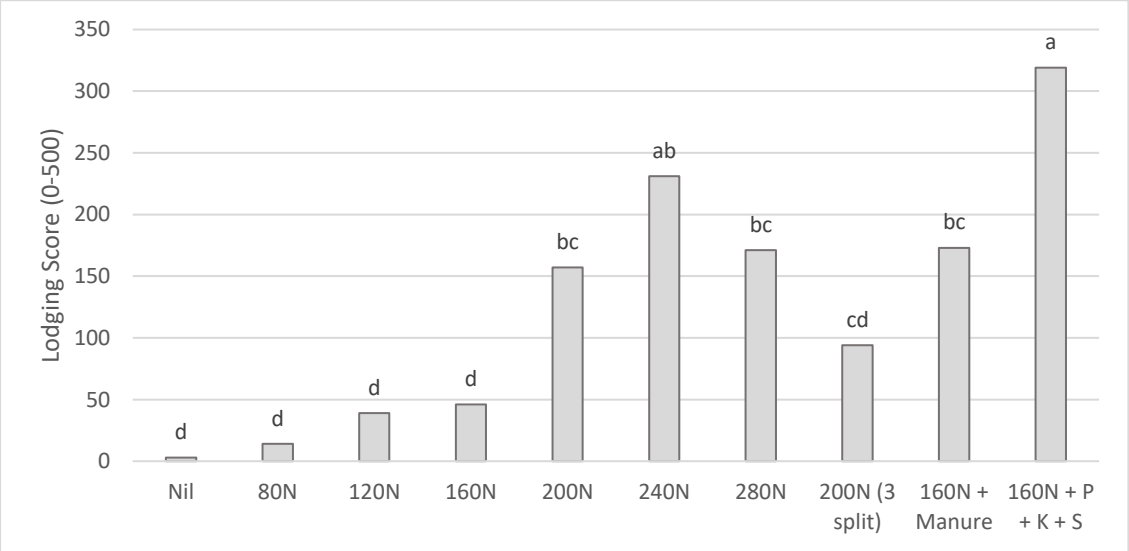

Figure 2. Influence of nutrition strategy on crop lodging (lodging index 0 - 500 scale).

Table 2. Influence of nutrition strategy on crop biomass (dry matter) at GS31, GS71 and harvest.

	GS31	GS71	Harvest
	Biomass (t/ha)	Biomass (t/ha)	Biomass (t/ha)
Nil	3.8 -	17.5 -	20.5 -
80N		16.8 -	21.8 -
120N		18.2 -	19.9 -
160N		18.0 -	20.2 -
200N		18.8 -	19.6 -
240N		18.5 -	20.0 -
280N		19.2 -	19.6 -
200N (3 split)		17.8 -	21.6 -
160N + Manure	4.6 -	17.6 -	20.8 -
160N + P + K + S	4.7 -	19.1 -	17.5 -
Grand Mean	**4.3**	**18.1**	**20.1**
P val	0.076	0.344	0.099
LSD P=0.05	ns	ns	ns

Table 3. Influence of nutrition strategy on grain yield and quality.

Treatment	Grain Yield	Protein	Test Weight	Screenings
kg N/ha	t/ha	%	kg/hL	%
Nil	9.26 a	9.5 e	73.6 a	1.3 f
80N	9.31 a	10.5 d	73.3 a	1.6 ef
120N	8.91 ab	11.1 c	72.2 a	1.9 de
160N	8.22 bc	11.2 bc	70.3 ab	2.2 cde
200N	7.68 cd	11.9 a	70.1 ab	2.4 bcd
240N	7.17 de	12.1 a	68.2 b	2.7 abc
280N	6.94 de	11.8 a	67.8 b	3.2 a
200N (3 split)	8.39 bc	11.8 a	70.4 ab	2.1 de
160N + Manure	8.17 bc	11.7 ab	71.8 a	2 de
160N + P + K + S	6.75 e	12 a	67.6 b	2.8 ab
Grand Mean	**8.08**	**11.4**	**70.5**	**2.2**
P val	<0.001	<0.001	0.009	<0.001
LSD P=0.05	0.79	0.6	3.5	0.6

Table 4. Sowing details and Crop Inputs.

Sowing date:		**21 April 2022**
Plant population:		180 seeds/m²
Basal Fertiliser:		120 kg/ha MAP
Nitrogen:		See Trt list
PGR:	**GS31**	Moddus Evo 200ml/ha
		Errex 1300ml/ha
Fungicide:	**GS31**	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS61	Epoxiconazole 125 500ml/ha

SA Crop Technology Centre
Millicent, South Australia

Sown: 20-21 April 2022 (Time of sowing one), 11 May 2022 (Time of sowing two)
Harvested: 10-11 January 2023 (Spring wheat), 9/12 January 2023 (Winter wheat)
Rotation position: 2021 Canola
Soil type: Neutral-slightly alkaline Organosol (Peat soil) – high organic matter (0-30cm)
Colwell P (ppm) 0-10cm: 65.0
pH ($CaCl_2$) 0-10cm: 7.6
Organic Carbon (%) 0-10cm: 11.0

Trial 2. HYC Wheat Elite Screen – April sown (FAR SAC W22-02-1)

Key Points:

- There was significant interaction between cultivar and fungicide programme with yield response to fungicide ranging from 0.8 t/ha (AGFWH004818) to 4.39 t/ha (RGT Accroc).
- Grain yields ranged from 1.44 t/ha (untreated RGT Accroc) to 8.67 t/ha (AGFWH004818 treated).
- The highest yielding white wheat was the new cultivar long season winter wheat RGT Waugh which gave a 2.73 t/ha yield response to the fungicide programme.
- The other white wheat seen as a longer season replacement for Trojan was Stockade which gave a 2.64 t/ha response with Septoria tritici blotch (STB) primarily and intermediate levels of stripe rust.
- The most resistant varieties were AGFWH004818 (0.8 t/ha response to fungicide), AGTW0005 (0.97 t/ha) and Reflection (1.03 t/ha). These varieties have been consistently high yielding and very disease resistant at the SA site.
- All three are stiffer strawed and AGFWH004818 has been more disease resistant than Big Red over three seasons but until the very high disease pressure of 2022 has been slightly lower yielding than Big Red and RGT Cesario, although Reflection and AGTW0005 were the two highest yielding wheats in 2021 at Millicent.
- All varieties gave an economic response to the four-unit fungicide application. No varieties were profitable without fungicide applied.
- When either fungicide treated or untreated, there was no statistical difference amongst the top three highest yielding cultivars with AGFWH004818, AGTW0005 and Reflection.
- The principal diseases in the trial were STB and stripe rust with the latter disease more severe than in 2020 and 2021 due to a new pathotype (239).
- RGT Accroc slipped in its disease resistance as a result of poorer performance against STB infection and its new susceptibility to stripe rust.
- Test weights and screenings reflected fungicide response with large increases in test weights where there were greater yield responses to fungicide.

Treatments: Nine elite lines were tested under both untreated and HYC High input fungicide management based on a full foliar fungicide program, (3 foliar fungicides – GS31, GS39, GS59-61 and Systiva seed treatment and PGR management – split application Moddus 0.1 + Errex 0.65 – GS30 & GS32).

Table 1. Yield (t/ha) and grain quality assessment- protein (%), test weight (kg/hL) & screenings (%).

		Yield	Grain quality assessments		
	Cultivar	**Yield (t/ha)**	**Protein (%)**	**Test Weight (kg/hL)**	**Screenings (%)**
1.	RGT Accroc	3.63 e	12.7 d	69.0 f	8.0 b
2.	Reflection	7.59 a	11.5 e	72.6 e	2.7 d
3.	Beaufort	4.66 d	14.2 b	68.4 f	3.8 cd
4.	SFR86-085 (RGT Waugh)	6.20 b	12.8 d	76.0 cd	2.0 d
5.	GS-18-105-W	3.34 e	15.1 a	67.2 f	12.8 a
6.	AGTW0005	7.84 a	12.9 d	78.0 ab	1.8 d
7.	Big Red	5.58 bc	12.9 d	77.6 bc	2.7 d
8.	AGFWH004818	8.27 a	11.7 e	79.9 a	2.7 d
9.	LRPB16-0598 (Stockade)	5.28 cd	13.2 c	74.6 d	5.9 bc
	LSD 0.05	0.75	0.33	1.94	3.07
	p-Value	<0.001	<0.001	<0.001	<0.001
	Disease Pressure				
1.	Full Fungicide Program	6.95 a	12.8 b	76.4 a	3.2 b
2.	No Fungicide	4.69 b	13.2 a	70.9 b	6.2 a
	LSD 0.05	1.43	0.18	0.95	2.39
	p-Value	0.015	0.006	<0.001	0.027
Disease Pressure x Cultivar					
	Full Fungicide Program				
1.	RGT Accroc	5.83 fg	12.7 d	75.8 cde	2.2 d
2.	Reflection	8.11 abc	11.6 e	71.2 hi	2.2 d
3.	Beaufort	6.09 ef	14.1 bc	72.3 ghi	2.9 d
4.	SFR86-085 (RGT Waugh)	7.56 bcd	12.9 d	78.4 abc	1.9 d
5.	GS-18-105-W	4.72 h	14.1 bc	72.7 f-i	8.8 b
6.	AGTW0005	8.33 ab	12.9 d	78.5 ab	1.7 d
7.	Big Red	6.67 def	12.8 d	80.0 ab	2.3 d
8.	AGFWH004818	8.67 a	11.6 e	80.5 a	2.6 d
9.	LRPB16-0598 (Stockade)	6.60 def	12.7 d	78.5 abc	3.9 cd
	No Fungicide				
1.	RGT Accroc	1.44 j	12.8 d	62.2 jk	13.8 a
2.	Reflection	7.08 cde	11.5 e	74.0 efg	3.1 d
3.	Beaufort	3.23 i	14.4 b	64.5 j	4.7 bcd
4.	SFR86-085 (RGT Waugh)	4.83 gh	12.8 d	73.5 e-h	2.0 d
5.	GS-18-105-W	1.97 j	16.1 a	61.6 k	16.8 a
6.	AGTW0005	7.36 bcd	12.9 d	77.5 bcd	2.0 d
7.	Big Red	4.48 h	12.9 d	75.3 def	3.0 d
8.	AGFWH004818	7.87 abc	11.7 e	79.2 ab	2.9 d
9.	LRPB16-0598 (Stockade)	3.96 hi	13.8 c	70.6 i	7.9 bc
	LSD 0.05	1.06	0.47	2.75	4.34
	p-Value	<0.001	<0.001	<0.001	0.002

Table 2. Details of the management levels.

Sowing date	21 April	
Plant population		180 seeds/m²
Basal fertiliser		100 kg/ha MAP
Nitrogen	06 July	50kg N/ha
	23 August	100kg N/ha
PGR	GS30	Moddus Evo 100ml/ha + Errex 650ml/ha
	GS32	Moddus Evo 100ml/ha + Errex 650ml/ha
Fungicide	GS00	Systiva
	GS31	Prosaro 300ml/ha
	GS39	FAR F1-19 750ml/ha
	GS59-61	Opus 500ml/ha

All inputs of insecticides and herbicides were standard across the trial.

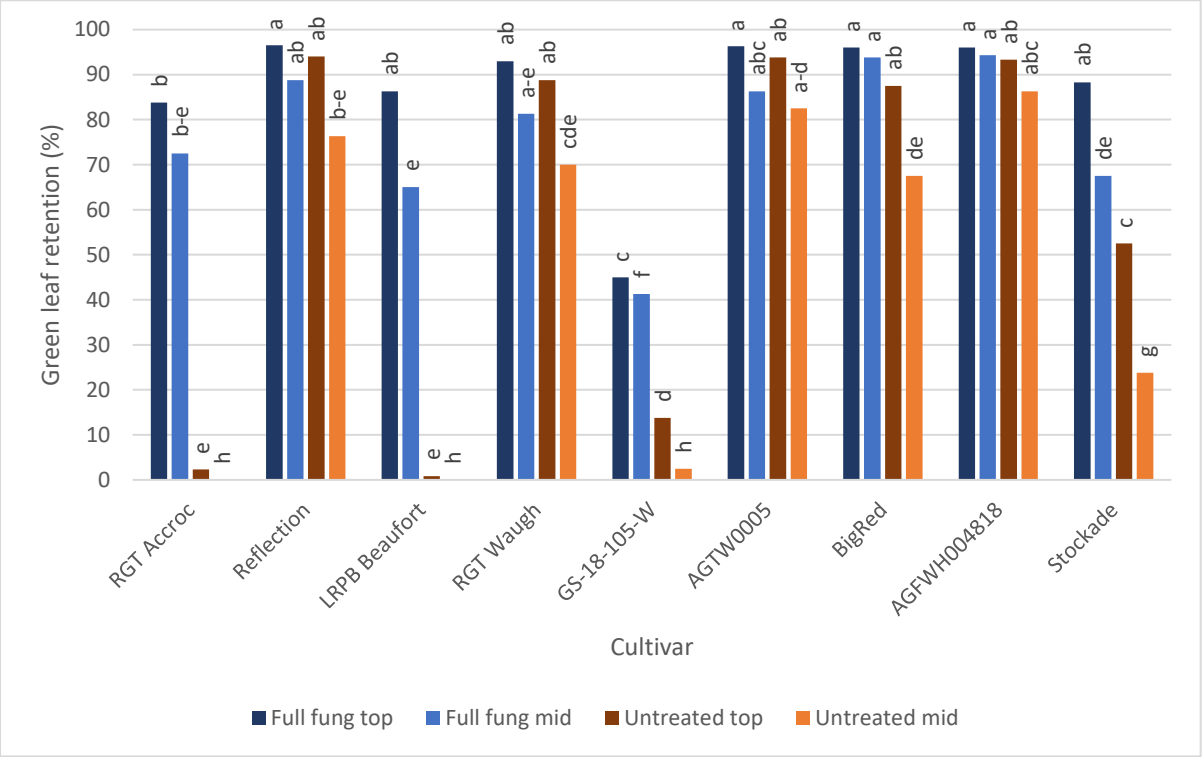

Figure 1. Green leaf retention (%) in the top and middle of the crop canopy for each cultivar and fungicide management assessed 16/11/2022.

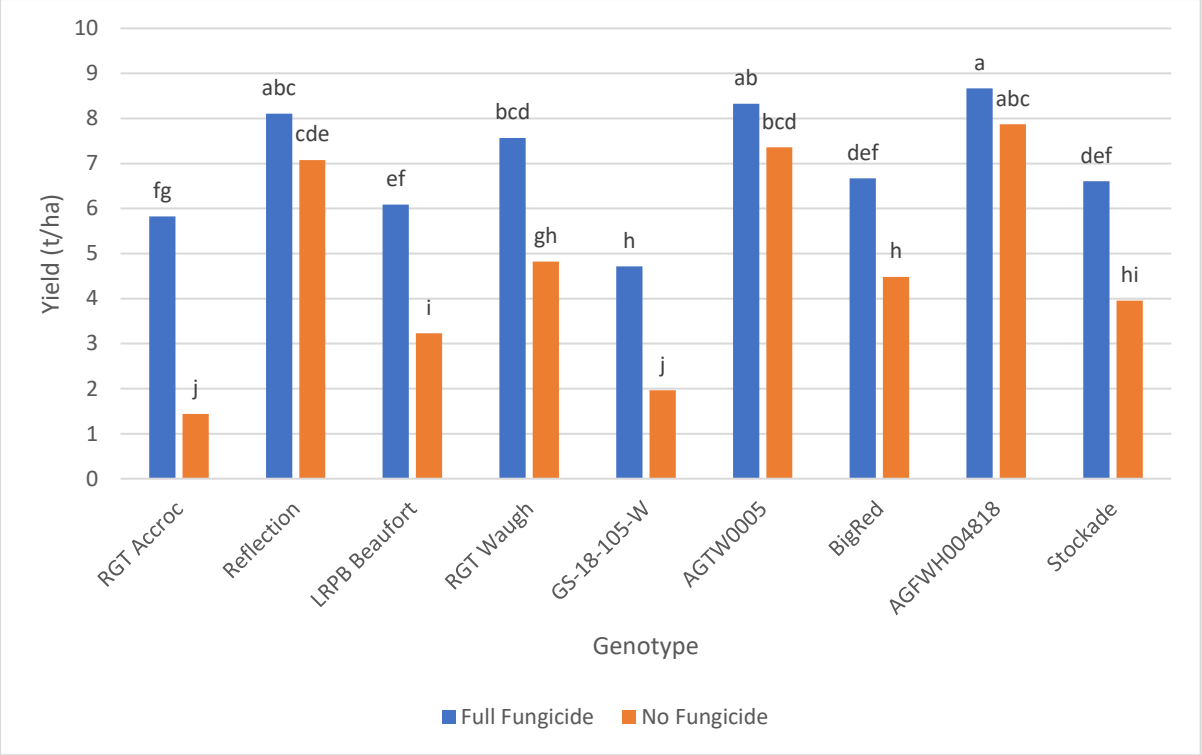

Figure 2. Grain yield (t/ha) for each variety plus and minus fungicide management.

Trial 2: HYC Wheat Elite Screen – May sown (FAR SAC W22-02-2)

Key Points:

- A set of 10 varieties were tested sown in May under a full foliar fungicide programme based on three sprays.
- The highest yield was achieved with the feed wheats RGT Cesario (7.46 t/ha), Anapurna (7.20 t/ha) and Big Red (7.17 t/ha) which also gave the best green leaf retention during grain fill.
- The highest yielding white wheat was Stockade at 6.66 t/ha with no differences in yield amongst the quality milling wheats Scepter (4.91 t/ha), Rockstar (5.18 t/ha) and Willaura (5.24 t/ha) none of which achieved 76kg/hL test weights.
- The test weight of Stockade was significantly superior to those of Rockstar, Scepter and Willaura.
- As was the case with the April sowing, the principal diseases in the trial were Septoria tritici blotch (STB) and stripe rust with the latter disease more severe than in 2020 and 2021 due to a new pathotype (239). This affected Rockstar and Scepter but less so Willaura.

Treatments: 10 cultivars tested for yield and quality assessments under HYC High input fungicide management (foliar application– GS31, GS39, GS59-61).

Table 1: Yield (t/ha), % of mean yield and grain quality, protein (%), test weight (kg/hL) & screenings (%).

		Yield		Quality		
	Variety	**Yield (t/ha)**	**% Of Mean yield**	**Protein (%)**	**Test Weight (kg/hL)**	**Screenings (%)**
1.	Scepter	4.91 e	80.5	12.5 c	73.9 d	1.9 e
2.	Anapurna	7.20 a	118.1	12.9 b	80.6 a	3.4 bc
3.	RGT Accroc	6.71 bc	109.9	12.0 d	77.7 abc	1.9 e
4.	Rockstar	5.18 e	84.9	12.5 c	75.9 cd	2.2 de
5.	LRPB Beaufort	6.15 d	100.8	13.5 a	75.3 cd	3.4 bc
6.	RGT Cesario	7.46 a	122.3	11.6 e	76.3 cd	2.9 bcd
7.	BigRed	7.17 ab	117.6	12.2 d	80.3 a	2.7 cde
8.	Stockade	6.66 c	109.2	12.2 cd	79.4 ab	3.5 b
9.	Willaura	5.24 e	86.0	12.2 cd	74.4 d	4.5 a
10.	SUN1087I	4.30 f	70.5	12.3 cd	76.8 bcd	2.3 de
	Mean	6.10	100.0	12.4	77.1	2.9
	LSD 0.05	0.48	7.8	0.3	3.0	0.8
	p-value	<0.001	<0.001	<0.001	<0.001	<0.001
	CV	5.40	5.4	1.8	2.7	19.9

Table 2: Details of the management levels.

Sowing date	11 May	
Plant population		180 seeds/m²
Basal fertiliser		100 kg/ha MAP
Nitrogen	06 July	50kg N/ha
	23 August	100kg N/ha
Fungicide	GS31	Prosaro 300ml/ha
	GS39	FAR F1-19 750ml/ha
	GS59-61	Opus 500ml/ha

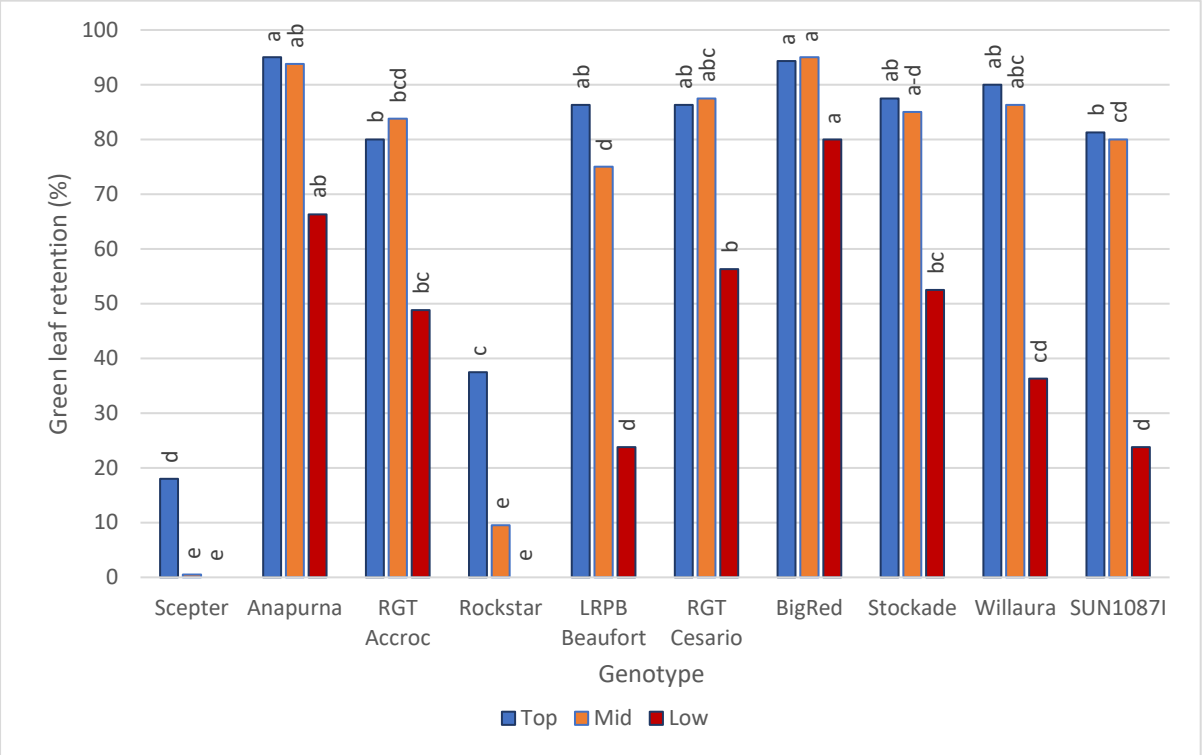

Figure 1. Green leaf retention (%) in the top, middle and bottom of the crop canopy for each variety assessed 22/11/2022.

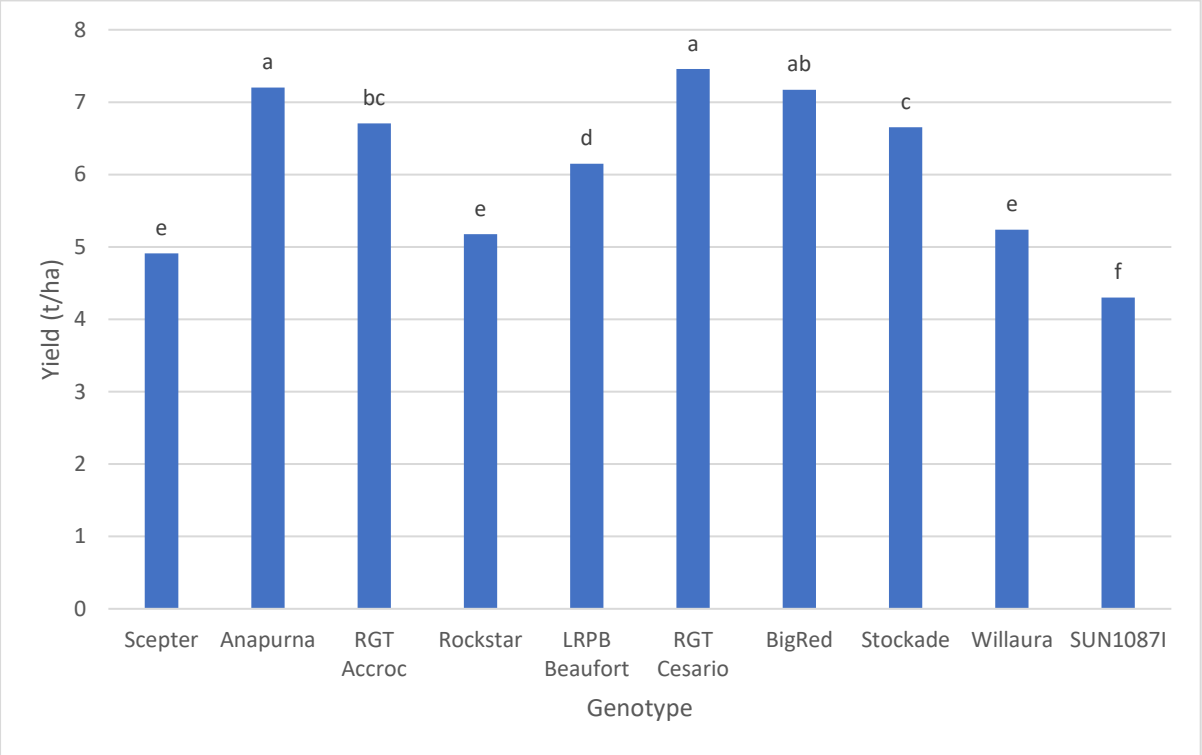

Figure 2. Grain yield (t/ha) for each variety sown in mid-May.

Trial 3: HYC Wheat Germplasm x Environment x Management GEM – April sown (FAR SAC W22-03-1)

Key Points:

- Grain yields in this season's GEM (April sown) trial were very low. Investigations revealed that grain sites were set but that grains were shriveled and poorly filled.
- Although disease played a significant role in reducing grain yields, the effects were common in both disease susceptible and resistant varieties indicating that the issues were more than just disease.
- Indications from the site were that yield potential was initially reduced by poor solar radiation and then compounded by very wet anaerobic soils with higher water tables which in turn restricted the crop during grain fill.
- Grain yields of RGT Accroc, RGT Cesario and Big Red were consistently higher yielding under a 3-spray full fungicide programme irrespective of a canopy management strategy with RGT Cesario being the highest yielding cultivar.
- There was significant interaction between cultivar and fungicide strategy with RGT Accroc giving a greater response to the 3-spray fungicide (0.96 t/ha) than RGT Cesario (0.69 t/ha) and Big Red (0.3 t/ha) over the single spray fungicide approach at flag leaf.
- The highest yielding canopy management approach was 225N with defoliation however there was no statistical advantage over the plus PGR application or extra N alone. However, the defoliation and PGR approach were significantly better than the standard 150 kg N/ha approach.
- Economics (not shown) illustrated that if a low fungicide input (1 spray) was used then cultivars with a "grazed" management and the extra 75kg N/ha were optimal.
- When a full fungicide programme was employed, it did not change the optimal canopy management approach in terms of economics with RGT Accroc and RGT Cesario, however with Big Red, the extra N and PGR became more equivalent to the economics of defoliation with the extra N (depending on the value of the grazing).

Management treatments

	Treatment ID	Fungicide	Canopy Intervention	Kg Nitrogen (N)
1.	Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	150
2.	Standard (Std) Fungicide & no intervention (NI) + N	Standard (cheaper) [1]	Untreated	225
3.	Standard (Std) Fungicide & PGR	Standard (cheaper) [1,4]	Defoliation	225
4.	Standard (Std) Fungicide & PGR + N	Standard (cheaper) [1,3]	PGR	225
5.	Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	150
6.	Higher input Fungicide & PGR + N	Higher input[2]	Untreated	225
7.	Dual - purpose system	Higher input[2,4]	Defoliation	225
8.	Hyper - yield system	Higher input[2,3]	PGR	225

Notes on treatments.

[1] *Single/Standard spray program – 1 X foliar fungicide: Aviator Xpro 500ml/ha at GS39.*

[2] *Increased disease management – 3 x foliar fungicides: Prosaro 300ml/ha, Aviator Xpro 500ml/ha and Radial 600ml/ha at GS31, 39 and 59-61 respectively.*

[3] *Plant Growth Regulators (PGR) (Moddus® Evo 200 mL/ha + Errex 1300mL/ha at GS30).*

[4] *Defoliation was done mechanically (mower with leaf material removed) at GS30.*

Table 11: Influence of cultivar, management strategy and fungicide application on grain yield (t/ha).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		5.45	a	5.12	b	3.43	c	**4.67**	
	LSD		0.20			***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		5.10	bc	4.97	c	*2.95*	*e*	**4.34**	b
Full Fungicide Program		5.79	a	5.27	b	*3.91*	*d*	**4.99**	a
Fungicide	***LSD***		0.20			***p-Value***		0.002	
Fungicide x Cultivar	***LSD***		0.29			***p-Value***		0.007	
Canopy Management									
No Intervention - 150N		4.94	d	4.53	e	3.23	g	**4.23**	b
No intervention – 225N		5.28	bcd	5.04	cd	3.55	fg	**4.63**	ab
Mechanical Defoliation GS30		6.05	a	5.38	bc	3.67	f	**5.03**	a
PGR Moddus 0.2 + Errex 1.3 GS30		5.52	b	5.52	b	3.28	fg	**4.77**	a
Canopy Management	***LSD***		0.54			***p-Value***		0.039	
Cultivar x Canopy Mgmt	***LSD***		0.40			***p-Value***		0.014	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		4.09	-	4.28	-	2.54	-	**3.63**	-
No intervention – 225N		5.02	-	4.94	-	3.04	-	**4.33**	-
Mechanical Defoliation GS30		6.00	-	5.35	-	3.38	-	**4.91**	-
PGR Moddus 0.2 + Errex 1.3 GS30		5.32	-	5.31	-	2.85	-	**4.49**	-
Full Fungicide Program									
No Intervention - 150N		5.79	-	4.78	-	3.93	-	**4.83**	-
No intervention – 225N		5.55	-	5.15	-	4.06	-	**4.92**	-
Mechanical Defoliation GS30		6.10	-	5.41	-	3.96	-	**5.16**	-
PGR Moddus 0.2 + Errex 1.3 GS30		5.73	-	5.73	-	3.71	-	**5.06**	-
Disease Pressure x Canopy Mgmt	***LSD***		*ns*			***p-Value***		0.333	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***		*ns*			***p-Value***		0.396	

Table 2. Influence of cultivar, management strategy and fungicide application on protein (%).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		12.6	c	13.5	a	12.8	b	13.0	
	LSD	0.09				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		12.7	-	13.5	-	12.8	-	13.0	-
Full Fungicide Program		12.6	-	13.5	-	12.8	-	13.0	-
Fungicide	***LSD***	*ns*				***p-Value***		0.521	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.513	
Canopy Management									
No Intervention - 150N		12.7	-	13.4	-	12.8	-	13.0	b
No intervention – 225N		12.9	-	13.9	-	12.9	-	13.2	ab
Mechanical Defoliation GS30		12.2	-	13.0	-	12.4	-	12.5	c
PGR Moddus 0.2 + Errex 1.3 GS30		12.8	-	13.8	-	13.0	-	13.2	a
Canopy Management	***LSD***	0.26				***p-Value***		<0.001	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.055	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		12.9	-	13.7	-	13.0	-	13.2	-
No intervention – 225N		12.9	-	13.8	-	12.8	-	13.2	-
Mechanical Defoliation GS30		12.1	-	12.9	-	12.4	-	12.4	-
PGR Moddus 0.2 + Errex 1.3 GS30		12.9	-	13.8	-	13.0	-	13.2	-
Full Fungicide Program									
No Intervention - 150N		12.5	-	13.2	-	12.6	-	12.8	-
No intervention – 225N		12.8	-	13.9	-	13.0	-	13.2	-
Mechanical Defoliation GS30		12.3	-	13.2	-	12.5	-	12.6	-
PGR Moddus 0.2 + Errex 1.3 GS30		12.8	-	13.9	-	13.1	-	13.2	-
Disease Pressure x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.097	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.700	

Table 3. Influence of cultivar, management strategy and fungicide application on test weight (kg/hL).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		75.9	b	78.1	a	70.5	c	74.8	
	LSD	0.65				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		75.3	c	77.7	a	67.9	e	73.7	b
Full Fungicide Program		76.6	b	78.5	a	73.0	d	76.0	a
Fungicide	***LSD***	1.20				***p-Value***		0.008	
Fungicide x Cultivar	***LSD***	0.91				***p-Value***		<0.001	
Canopy Management									
No Intervention - 150N		75.5	b	78.0	a	70.9	cd	74.8	-
No intervention – 225N		75.8	b	78.4	a	71.6	c	75.3	-
Mechanical Defoliation GS30		76.6	b	78.1	a	69.4	e	74.7	-
PGR Moddus 0.2 + Errex 1.3 GS30		75.9	b	78.1	a	69.9	de	74.6	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.237	
Cultivar x Canopy Mgmt	***LSD***	1.29				***p-Value***		0.036	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		74.6	-	77.9	-	68.9	-	73.8	-
No intervention – 225N		75.2	-	78.1	-	69.5	-	74.3	-
Mechanical Defoliation GS30		75.9	-	77.2	-	66.1	-	73.1	-
PGR Moddus 0.2 + Errex 1.3 GS30		75.6	-	77.7	-	67.3	-	73.5	-
Full Fungicide Program									
No Intervention - 150N		76.3	-	78.1	-	73.0	-	75.8	-
No intervention – 225N		76.4	-	78.7	-	73.7	-	76.3	-
Mechanical Defoliation GS30		77.4	-	79.0	-	72.6	-	76.3	-
PGR Moddus 0.2 + Errex 1.3 GS30		76.2	-	78.4	-	72.6	-	75.7	-
Disease Pressure x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.232	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.804	

Table 4. Influence of cultivar, management strategy and fungicide application on screenings (%).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		2.7	b	2.4	c	3.6	a	2.9	
	LSD	0.24				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		3.0	b	2.4	cd	4.4	a	3.3	a
Full Fungicide Program		2.5	cd	2.4	d	2.8	bc	2.6	b
Fungicide	***LSD***	0.34				***p-Value***		0.007	
Fungicide x Cultivar	***LSD***	0.35				***p-Value***		<0.001	
Canopy Management									
No Intervention - 150N		2.9	bc	2.4	cd	3.9	a	3.1	-
No intervention – 225N		2.8	bc	2.4	cd	3.3	b	2.8	-
Mechanical Defoliation GS30		2.7	cd	2.6	cd	3.2	b	2.8	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.6	cd	2.2	d	4.1	a	3.0	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.592	
Cultivar x Canopy Mgmt	***LSD***	0.49				***p-Value***		0.007	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		3.2	-	2.3	-	4.9	-	3.5	-
No intervention – 225N		3.0	-	2.4	-	4.1	-	3.2	-
Mechanical Defoliation GS30		3.1	-	2.8	-	3.9	-	3.3	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.6	-	2.2	-	4.8	-	3.2	-
Full Fungicide Program									
No Intervention - 150N		2.6	-	2.5	-	2.8	-	2.6	-
No intervention – 225N		2.7	-	2.4	-	2.4	-	2.5	-
Mechanical Defoliation GS30		2.3	-	2.4	-	2.5	-	2.4	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.6	-	2.2	-	3.4	-	2.7	-
Disease Pressure x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.746	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.579	

Table 5. Details of the management levels.

Sowing date:	**21 April**	
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:	**06 July**	50kg N/ha
	23 August	100kg N/ha
	24 August	+ 25kg N/ha
	28 September	+50kg N/ha
Fungicide:	**GS31**	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS59-61	Radial 600ml/ha
Canopy intervention:	**GS30**	Moddus Evo 100ml/ha + Errex 650ml/ha
	GS30	Defoliation

Trial 3: HYC Winter Wheat GEM – May sown (FAR SAC W22-03-2)

Key Points:

- Grain yields in this season's GEM May sown trial were no better than the results collected from the earlier time of sowing with Scepter and Rockstar yielding similarly under the different management approaches.
- Investigations again revealed that grain sites were set but that grains were shriveled and poorly filled.
- The most significant management effects were observed due to fungicide management with all three cultivars giving a response to three sprays compared to one flag leaf spray with an average 0.7 t/ha increase over the three varieties.
- Milling wheat quality (protein, test weight and screenings) was only achieved with the full fungicide three spray programme, since reduced input (flag leaf only) only served to bring test weights below 76kg/hL.
- There were no significant differences in yield and protein levels comparing 150 and 225kg N/ha.
- The only quality criteria affected by management was fungicide input.
- The most profitable management approach with all three varieties was using 150kg N/ha and three fungicides.

Management treatments

Treatment ID	**Fungicide**	**Kg Nitrogen** (N)
1. Standard (Std) Fungicide	Standard (cheaper)[1]	150
2. Standard (Std) Fungicide + N	Standard (cheaper) [1]	225
3. Higher input Fungicide	Higher input[2]	150
4. Higher input Fungicide + N	Higher input[2]	225

[1] *Single/Standard spray program – 1 x foliar fungicide: FAR F1-19 750ml/ha at GS39.*

[2] *Increased disease management –3 x foliar fungicides: Prosaro 300ml/ha, FAR F1-19 750ml/ha and Radial 600ml/ha at GS31, 39 and 59-61 respectively.*

Table 1. Influence of treatment on grain yield (t/ha).

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		4.32	b	4.53	b	6.14	a	**5.00**	
	LSD	0.31				***p-Value***		<0.001	
Disease Pressure (Fungicide application)									
Single Spray Program		3.76	-	3.95	-	5.34	-	**4.35**	b
Full Fungicide Program		4.88	-	5.12	-	6.94	-	**5.65**	a
Fungicide	***LSD***	0.19				***p-Value***		<0.001	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.240	
Canopy Management									
No Intervention - 150N		4.41	-	4.59	-	6.08	-	**5.03**	-
No intervention – 225N		4.23	-	4.48	-	6.21	-	**4.97**	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.689	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.573	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		3.83	-	4.10	-	5.28	-	**4.40**	-
No intervention – 225N		3.69	-	3.80	-	5.41	-	**4.30**	-
Full Fungicide Program									
No Intervention - 150N		4.99	-	5.09	-	6.89	-	**5.65**	-
No intervention – 225N		4.77	-	5.15	-	7.00	-	**5.64**	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.741	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.730	

Table 2. Influence of treatment on grain protein %.

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		12.4	a	12.3	a	11.9	b	**12.2**	
	LSD	0.16				***p-Value***		<0.001	
Disease Pressure (Fungicide application)									
Single Spray Program		12.4	a	12.3	a	11.7	c	**12.2**	-
Full Fungicide Program		12.3	a	12.2	ab	12.0	b	**12.2**	-
Fungicide	***LSD***	*ns*				***p-Value***		0.700	
Fungicide x Cultivar	***LSD***	0.23				***p-Value***		0.007	
Canopy Management									
No Intervention - 150N		12.3	-	12.3	-	11.8	-	**12.1**	-
No intervention – 225N		12.4	-	12.3	-	11.9	-	**12.2**	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.089	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.632	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		12.4	-	12.3	-	11.6	-	**12.1**	-
No intervention – 225N		12.5	-	12.4	-	11.8	-	**12.2**	-
Full Fungicide Program									
No Intervention - 150N		12.3	-	12.3	-	12.0	-	**12.2**	-
No intervention – 225N		12.3	-	12.2	-	12.1	-	**12.2**	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.494	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.941	

Table 3. Influence of treatment on grain test weight (Kg/hL).

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		74.6	b	75.5	a	76.0	a	75.4	
	LSD	0.66				***p-Value***		<0.001	
Disease Pressure (Fungicide application)									
Single Spray Program		72.7	-	73.8	-	74.4	-	73.6	b
Full Fungicide Program		76.4	-	77.2	-	77.7	-	77.1	a
Fungicide	***LSD***	1.31				***p-Value***		0.004	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.800	
Canopy Management									
No Intervention - 150N		74.6	-	74.9	-	76.0	-	75.2	-
No intervention – 225N		74.5	-	76.0	-	76.1	-	75.5	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.298	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.151	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		73.0	-	72.8	-	74.2	-	73.3	-
No intervention – 225N		72.4	-	74.8	-	74.5	-	73.9	-
Full Fungicide Program									
No Intervention - 150N		76.2	-	77.1	-	77.7	-	77.0	-
No intervention – 225N		76.6	-	77.3	-	77.7	-	77.2	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.586	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.104	

Table 4. Influence of treatment on grain screening %.

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		1.1	a	1.1	a	0.8	b	1.0	
	LSD	0.18				***p-Value***		0.011	
Disease Pressure (Fungicide application)									
Single Spray Program		1.2	-	1.4	-	1.0	-	1.2	a
Full Fungicide Program		0.9	-	0.9	-	0.7	-	0.8	b
Fungicide	***LSD***	0.36				***p-Value***		0.032	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.636	
Canopy Management									
No Intervention - 150N		1.0	-	1.2	-	0.8	-	1.0	-
No intervention – 225N		1.1	-	1.1	-	0.9	-	1.0	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.785	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.368	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		1.1	-	1.5	-	1.1	-	1.2	-
No intervention – 225N		1.4	-	1.3	-	1.0	-	1.3	-
Full Fungicide Program									
No Intervention - 150N		0.9	-	0.9	-	0.6	-	0.8	-
No intervention – 225N		0.8	-	0.8	-	0.7	-	0.8	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.692	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.238	

Table 5. Details of the management levels.

Sowing date:	**11 May**	
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:	**06 July**	50kg N/ha
	23 August	+ 25kg N/ha
	23 August	100kg N/ha
	28 Sept	+50kg N/ha
Fungicide:	**GS31**	Prosaro 300ml/ha
	GS39	FAR F1-19 750ml/ha
	GS59-61	Radial 600ml/ha

Trial 4a: HYC Wheat IDM Disease Management Germplasm Interaction (FAR SAC W22-04a-1)

- In a variable trial there was no significant yield effect of using Septoria tritici blotch (STB) infected wheat stubble or flutriafol on the basal fertiliser over the paddock canola stubble (standard).
- There was a significant interaction between the number of fungicide units applied and variety with the STB susceptible variety Revenue giving positive increases in yield as fungicide input increased from untreated (2.58 t/ha) to 4 units of fungicide producing 5.22 t/ha.
- The response to fungicide was less than a 1 t/ha increase with RGT Cesario and Anapurna with the latter giving its optimum response to four units of fungicide whilst RGT Cesario gave optimum response to 2 units of fungicide.
- The most prevalent disease in Revenue and Accroc was STB with low levels of stripe rust in the latter.
- Lower levels of disease were experienced in Anapurna and RGT Cesario with Anapurna suffering from low to intermediate levels of STB and RGT Cesario suffering from stripe rust and very low levels of STB.

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

		RGT Cesario		Anapurna		RGT Accroc		Revenue		*Mean*	
Cultivar		6.20	a	5.60	b	4.36	c	4.22	c	***5.09***	
	LSD	**0.35**						***p-Value***		**<0.001**	
Disease Pressure											
Flutriafol		6.47	-	5.90	-	4.35	-	4.57	-	**5.32**	-
Standard		5.83	-	4.94	-	4.05	-	3.59	-	**4.60**	-
Stubble		6.32	-	5.96	-	4.66	-	4.50	-	**5.36**	-
Disease Pressure	***LSD***	*ns*						***p-Value***		***0.483***	
Disease Pressure x Cultivar	***LSD***	*ns*						***p-Value***		***0.627***	
Fungicide Management Regime											
Untreated		5.58	bc	5.21	cde	3.16	g	2.58	g	**4.13**	**c**
1 Fungicide Unit		6.22	ab	5.44	cd	4.37	f	4.24	f	**5.07**	**b**
2 Fungicide Units		6.55	a	5.58	bc	5.18	cde	4.84	def	**5.54**	**a**
4 Fungicide Units		6.47	a	6.17	ab	4.70	ef	5.22	cde	**5.64**	**a**
Fungicide Management Regime	***LSD***	**0.22**						***p-Value***		**<0.001**	
Cultivar x Fung Mgmt Regime	***LSD***	**0.70**						***p-Value***		**0.003**	
Disease Pressure x Fung Mgmt. Regime											
Flutriafol											
Untreated		5.88	-	5.87	-	3.40	-	2.50	-	**4.41**	-
1 Fungicide Unit		6.42	-	5.62	-	4.90	-	4.99	-	**5.48**	-
2 Fungicide Units		6.86	-	5.77	-	5.02	-	5.16	-	**5.70**	-
4 Fungicide Units		6.71	-	6.36	-	4.08	-	5.63	-	**5.69**	-
Standard											
Untreated		4.66	-	4.58	-	2.80	-	2.01	-	**3.51**	-
1 Fungicide Unit		5.77	-	5.01	-	3.64	-	3.49	-	**4.48**	-
2 Fungicide Units		6.48	-	4.82	-	5.11	-	4.16	-	**5.14**	-
4 Fungicide Units		6.40	-	5.35	-	4.67	-	4.72	-	**5.28**	-
Stubble											
Untreated		6.20	-	5.19	-	3.30	-	3.24	-	**4.48**	-
1 Fungicide Unit		6.46	-	5.68	-	4.57	-	4.25	-	**5.24**	-
2 Fungicide Units		6.32	-	6.16	-	5.42	-	5.20	-	**5.77**	-
4 Fungicide Units		6.29	-	6.80	-	5.36	-	5.31	-	**5.94**	-
Disease Pressure x Fung Mgmt	***LSD***	*ns*						***p-Value***		**0.251**	
Disease Pressure x Fung Mgmt x Cultivar	***LSD***	*ns*						***p-Value***		**0.655**	

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:	**20 April**				
Seed Rate:		180 Seeds/m^2			
Basal fertiliser:		100kg MAP			
Nitrogen:	**06 July**	50kg N/ha			
	23 August	100kg N/ha			
		Untreated	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**
Fungicide:	**GS00**	---	---	---	Systiva
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha
	GS59-61	---	---	---	Opus 500ml/ha

Trial 4: HYC Wheat Disease Management (FAR SAC W22-04-1)

cv Big Red

Key Points:

- In a low yielding trial all fungicide treatments were significantly higher yielding than the untreated, however as was found in previous seasons, lower fungicide input based on one – two units of fungicide have been the most cost effective.
- Septoria tritici blotch (STB) was the principal disease in the trial with much less effect due to the new pathotype of stripe rust.
- There were no significant differences in grain quality as a result of fungicide treatment.

Objectives: To develop profitable and sustainable approaches to disease management in High Rainfall Zone (HRZ) wheat.

Treatments:

The cultivar Big Red was evaluated with five levels of fungicide input:

1. Untreated
2. 1 unit of fungicide – GS39
3. 2 units of fungicide – GS32 & GS39
4. 2 units of fungicide – GS32, GS55 (straddle approach)
5. 4 units of fungicide – Flutriafol at sowing, GS31, GS39 and GS59

Table 1. Yield (t/ha), % Site Mean and grain quality, protein (%), test weight (kg/hL) & screenings (%).

	Yield		Quality		
	Yield (t/ha)	% of Mean	Protein (%)	Test Weight (kg/hL)	Screenings (%)
Untreated	4.16 c	88.6 c	13.6 -	75.4 -	5.1 -
1F Flag Leaf Approach	4.84 ab	103.1 ab	13.5 -	77.4 -	4.0 -
2F Straddle Approach	4.79 ab	102.0 ab	13.6 -	77.1 -	5.1 -
4F Full Protection*	4.61 b	98.1 b	13.6 -	77.3 -	4.9 -
2F Standard Approach	5.08 a	108.2 a	13.4 -	76.5 -	4.4 -
Mean	4.69	100.0	13.6	77.1	4.7
LSD 0.05	0.40	8.60	0.30	1.00	1.00
P Val	0.004	0.004	0.537	0.259	0.122
CV	5.59	5.60	1.59	0.84	13.91

** Weed control may have reduced the yield in this treatment as this appears to be an aberrant result*

Table 2. Details of the management levels.

Sowing date:	**21 April**					
Seed Rate:		180 Seeds/m^2				
Basal fertiliser:		100kg MAP				
Nitrogen:	**06 July**	50kg N/ha				
	23 August	100kg N/ha				
Fungicide:		**Untreated**	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**	**Straddle approach**
	GS00	---	---	---	Flutriafol 100g ai/ha	---
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha	---
	GS33	---	---	---	---	FAR F1-19 750ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	---
	GS55	---	---	---	---	Opus 500ml/ha
	GS59-61	---	---	---	Opus 500ml/ha	---

Trial 5: Nutrition for Hyper Yielding Wheat (FAR SAC W22-05-1)

cv RGT Accroc

Key Points:

- With 107kg N/ha in the soil (0 – 30cm shortly after sowing) there was no yield response to applied fertiliser N applied as prilled urea (46% N).
- As applied N was increased from 90kg N/ha to 290kg N/ha (in 2 split applications) grain yield initially slightly increased up to 130kg N/ha and then decreased, although none of the differences were statistically significant.
- The application of manure at 5 t/ha on top of 170kg N/ha applied as urea significantly increased yield relative to all other treatments except where the equivalent nutrients to what were contained in the manure were applied.
- Since additional nitrogen had a negative effect on grain yield when it was applied as prilled urea, it is concluded that the positive effect of the manure is either due to its slow release nature through the course of the season or more specifically the influence of other nutrients applied with the manure such as P, K and S.
- Unusually there was no increase in grain protein as the rate of N was increased with no differences in the level of grain protein in the trial (second highest yield).
- There was an increase in crop lodging as the rate of applied nitrogen increased above the zero N.

Table 1. Detailed treatment list, grain yield (t/ha) & % site Mean.

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield		Mean	
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(t/ha)		(%)	
1	0 (MAP)	22	---	---	4.19	bcd	99.8	bcd
2	80N (40N + 40N)	22	---	---	4.29	bcd	102.1	bcd
3	120N (60N + 60N)	22	---	---	4.41	bc	104.9	bc
4	160N (80N + 80N)	22	---	---	3.85	de	91.6	de
5	200N (100N + 100N)	22	---	---	4.12	b-e	98.2	b-e
6	240N (120N + 120N)	22	---	---	3.66	e	87.1	e
7	280N (140N + 140N)	22	---	---	3.85	de	91.6	de
8	200N (80N + 80N + 40N)	22	---	---	4.05	cde	96.5	cde
9	160N + Manure*	22	---	---	5.00	a	118.9	a
10	[2]180.5N + P + K + S	72	95	29	4.59	ab	109.3	ab
				Mean	4.20		100.0	
				LSD (p=0.05)	0.50		12.0	
				P Val	<0.001		<0.001	

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.

[1]Manure applied at a rate of 5 t/ha, see nutrient breakdown in table 5.*

[2]Nutrients in treatment 10 were applied at rate in the treatment details to match the nutrient content of applied manure.

Table 2. Influence of nitrogen rate on grain quality, protein (%), test weight (kg/hL) and screenings. (%).

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein	Test weight	Screenings
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	%	kg/hL	%
1	0	22	---	---	12.3 -	71.7 -	2.8 -
2	80	22	---	---	12.1 -	72.6 -	2.9 -
3	120	22	---	---	12.2 -	72.9 -	2.8 -
4	160	22	---	---	12.4 -	69.3 -	3.7 -
5	200	22	---	---	12.4 -	71.9 -	3.7 -
6	240	22	---	---	12.5 -	70.4 -	3.9 -
7	280	22	---	---	12.6 -	70.6 -	3.1 -
8	200	22	---	---	12.5 -	69.2 -	3.4 -
9	160 + M	22	---	---	12.2 -	72.6 -	2.9 -
10	180.5	72	95	29	12.3 -	72.2 -	2.9 -
				Mean	12.3	71.3	3.2
				LSD (p=0.05)	0.3	3.4	1.1
				P Val	0.050	0.236	0.272

Table 3. Influence of nitrogen rate, manure and synthetic PKS on harvest dry matter (t/ha), harvest index (%) and thousand seed weight (g).

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Harvest Dry Matter	Harvest Index
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	%
1	0	22	---	---	7.8 cd	48.3 -
2	80	22	---	---	9.8 ab	38.3 -
3	120	22	---	---	8.6 a-d	44.9 -
4	160	22	---	---	8.9 abc	38.0 -
5	200	22	---	---	7.3 cd	49.8 -
6	240	22	---	---	7.0 d	48.3 -
7	280	22	---	---	8.1 bcd	41.6 -
8	200	22	---	---	8.5 bcd	42.0 -
9	160 + M	22	---	---	10.4 a	44.2 -
10	180.5	72	95	29	8.1 bcd	49.9 -
				Mean	8.4	44.5
				LSD (p=0.05)	1.8	10.8
				P Val	0.018	0.210

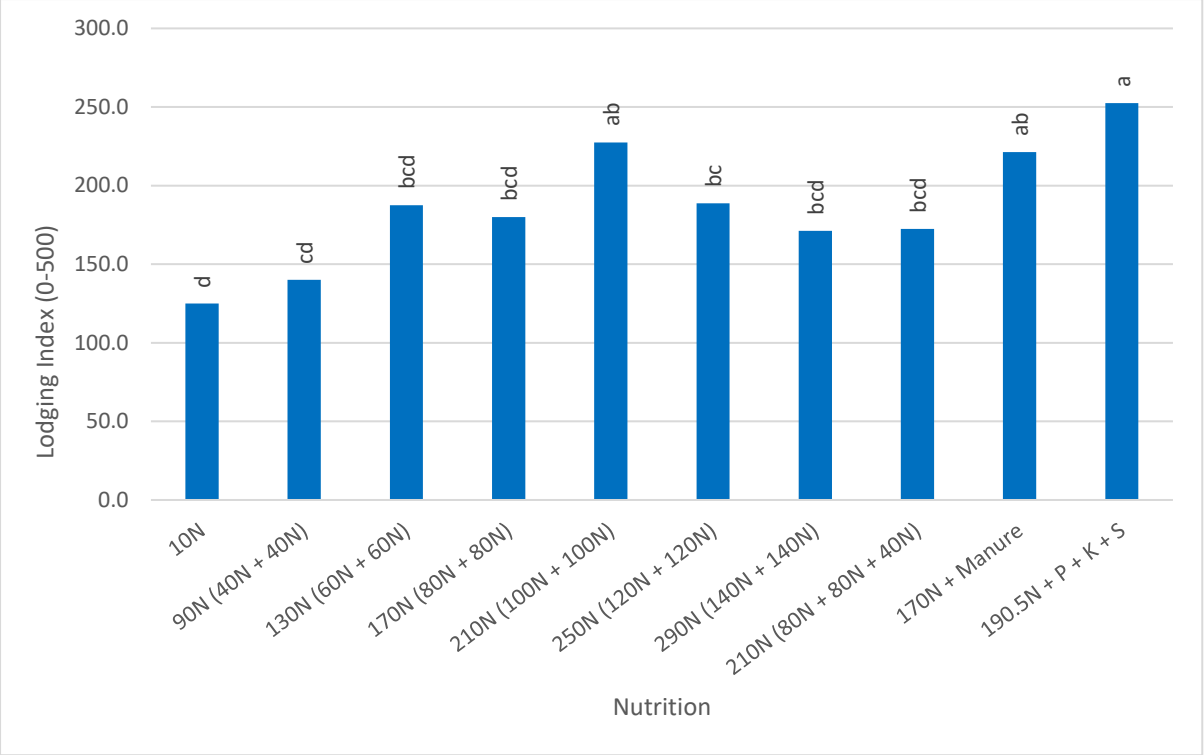

Figure 1. Influence of nitrogen rate on crop lodging, assessed at crop maturity (GS99) assessed 6 January 2023.

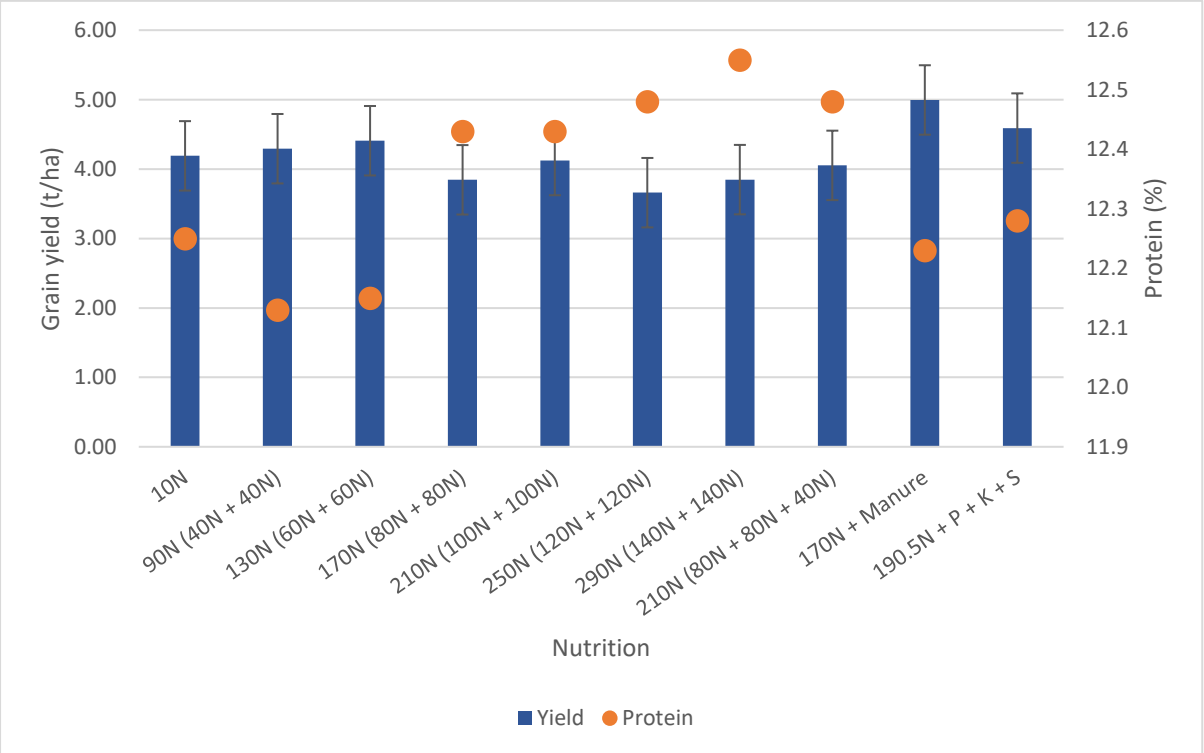

Figure 2: Influence of varying N rates (nutrition) on grain yield (t/ha) and protein (%) levels in RGT Accroc.

Table 4. Site soil test details.

	Level Found
EC (Sat. Ext.)	2.5 dS/m
Organic Carbon W&B	11.0 %
pH 1:5 water	8.2 pH
Total Mineral N*	107.9 kg soil mineral N/ha
Colwell Phosphorus	65 mg/Kg
Available Potassium	420 mg/kg
KCl Sulfur	17 mg/kg

*Mineral N 0-30cm, all other results 0-10cm depth sampled 30/5/2022

Table 5: Details of the management levels.

Sowing date:	**21 April**				
Plant population:		180 seeds/m²			
Basal fertiliser:		100 kg/ha MAP			
5 tons manure (dry matter)		**N**	**P**	**K**	**S**
		20.5	**50**	**95**	**29**
Nitrogen:	**04 July**	Treatment 2-10			
	24 August	Treatment 2-10			
	28 September	Treatment 8			
Fungicide:	**GS31**	Prosaro 300ml/ha			
	GS39	Aviator Xpro 500ml/ha			

VIC Crop Technology Centre
Gnarwarre, Victoria

Time of Sowing 1: 28 April 2022
Tome of sowing 2: 20 May 2022
Harvested: 20 December – 7 January 2022
Rotation position: 2021 Faba Beans
Soil type: Grey clay loam
Colwell P (ppm) 0-10cm: 110.0
pH (CaCl2) 0-10cm: 5.0
Organic Carbon (%) 0-10cm: 2.4

Trial 2. HYC Wheat Elite Screen – Time of Sowing 1 (FAR VIC W22-02-1)

Key Points:

- Grain yields ranged from 3.54 t/ha (untreated Beaufort) to 8.78 t/ha (AGFWH004818 treated).
- AGFWH004818 has been tested in HYC trials for three seasons and is stiffer strawed and more disease resistant than its "sister line" Big Red, but until the very high disease pressure of 2022, has been slightly lower yielding than Big Red.
- All varieties gave an economic response to fungicide application with yield increases ranging from 0.5 t/ha to 3.05 t/ha ($150/ha return to $458/ha at $300/t).
- Although AGTW0005 was the only wheat that did not give a significant yield response to fungicide (0.5 t/ha response) it did pay for the inputs at around $2 return for each $ spent (data not shown).
- The principal diseases in the trial were Septoria tritici blotch (STB) with lower levels of stripe rust in some varieties notable RGT Accroc and GS-18-105-W.
- Beaufort was extremely badly infected with STB such that even the treated plots that were defoliated with the disease gave almost 4 t/ha yield response from the control of STB, a disease that also significantly affected RGT Accroc and Stockade.
- The new white wheat RGT Waugh performed strongly but was responsive to fungicide with over 2 t/ha yield increase from the three-unit approach.
- Where fungicide had a greater impact on yield there was much greater effect on grain quality, particularly test weight.

Treatments: (9 elite lines tested under both untreated and HYC High input fungicide management (full foliar fungicide program (2 foliar fungicides – GS31, GS39, Systiva seed treatment) and PGR management – split application Moddus 0.1 + Errex 0.65 – GS30 & GS32).

Table 1. Yield (t/ha) and grain quality assessment- protein (%), test weight (kg/HL) & screenings (%).

		Yield	Grain quality assessments		
	Cultivar	**Yield (t/ha)**	**Protein (%)**	**Test Weight (kg/hL)**	**Screenings (%)**
1.	RGT Accroc	5.97 de	11.9 c	69.2 e	5.5 ab
2.	Reflection	7.42 bc	9.1 f	74.4 c	5.3 b
3.	Beaufort	3.98 f	14.8 a	61.3 f	6.0 ab
4.	SFR86-085 (RGT Waugh)	7.31 bc	12.1 c	76.3 b	2.4 d
5.	GS-18-105-W	6.32 d	12.8 b	72.8 d	6.3 a
6.	AGTW0005	7.59 b	10.8 d	78.4 a	2.5 d
7.	Big Red	7.14 c	10.7 de	79.1 a	2.7 d
8.	AGFWH004818	8.18 a	10.4 e	78.3 a	4.0 c
9.	LRPB16-0598 (Stockade)	5.86 e	12.0 c	75.0 bc	5.7 ab
	LSD = 0.05	0.38	0.42	1.29	0.88
	Cultivar p-Value	<0.001	<0.001	<0.001	<0.001
	Disease Management				
1.	Full Fungicide Program	7.55 a	11.1 b	76.4 a	3.4 b
2.	No Fungicide	5.73 b	12.2 a	71.3 b	5.6 a
	LSD = 0.05	0.18	0.51	2.26	1.42
	Disease Management p-Value	<0.001	0.006	0.005	0.018
Disease Pressure x Cultivar					
	Full Fungicide Program				
1.	RGT Accroc	7.50 de	10.9 efg	74.9 de	2.6 ij
2.	Reflection	8.30 abc	8.8 i	76.2 cd	4.6 fg
3.	Beaufort	4.43 g	14.7 a	63.1 h	5.2 ef
4.	SFR86-085 (RGT Waugh)	8.35 ab	11.3 de	79.0 ab	2.5 j
5.	GS-18-105-W	7.75 d	11.8 d	78.2 b	3.3 g-j
6.	AGTW0005	7.81 cd	10.6 fgh	79.1 ab	2.6 ij
7.	Big Red	7.87 bcd	10.1 h	80.5 a	2.7 hij
8.	AGFWH004818	8.78 a	10.4 gh	78.7 ab	3.9 gh
9.	LRPB16-0598 (Stockade)	7.19 e	11.3 de	78.2 b	3.8 ghi
	No Fungicide				
1.	RGT Accroc	4.44 g	13.0 c	63.5 h	8.4 ab
2.	Reflection	6.54 f	9.3 i	72.6 f	6.0 de
3.	Beaufort	3.54 h	15.0 a	59.4 i	6.9 cd
4.	SFR86-085 (RGT Waugh)	6.27 f	13.0 c	73.5 ef	2.4 j
5.	GS-18-105-W	4.89 g	13.7 b	67.4 g	9.3 a
6.	AGTW0005	7.37 de	11.1 ef	77.7 bc	2.5 ij
7.	Big Red	6.41 f	11.4 de	77.8 bc	2.7 hij
8.	AGFWH004818	7.59 de	10.4 gh	77.8 bc	4.1 fg
9.	LRPB16-0598 (Stockade)	4.53 g	12.8 c	71.8 f	7.7 bc
	LSD = 0.05	0.53	0.59	1.82	1.25
	Cultivar x Disease Mang. p-Value	<0.001	<0.001	<0.001	<0.001

Table 2. Details of the management levels.

Sowing date:		**28 April**
Plant population:		180 seeds/m²
Basal Fertiliser:		100 kg/ha MAP
Nitrogen:	**13 July**	50kg N/ha
	5 Sept	100kg N/ha
PGR:	**GS30**	Moddus Evo 100ml/ha + Errex 650ml/ha
	GS32	Moddus Evo 100ml/ha + Errex 650ml/ha
Fungicide:	**GS00**	Systiva
	GS31	Opus 500ml/ha
	GS39	Radial 840ml/ha

All inputs of insecticides and herbicides were standard across the trial

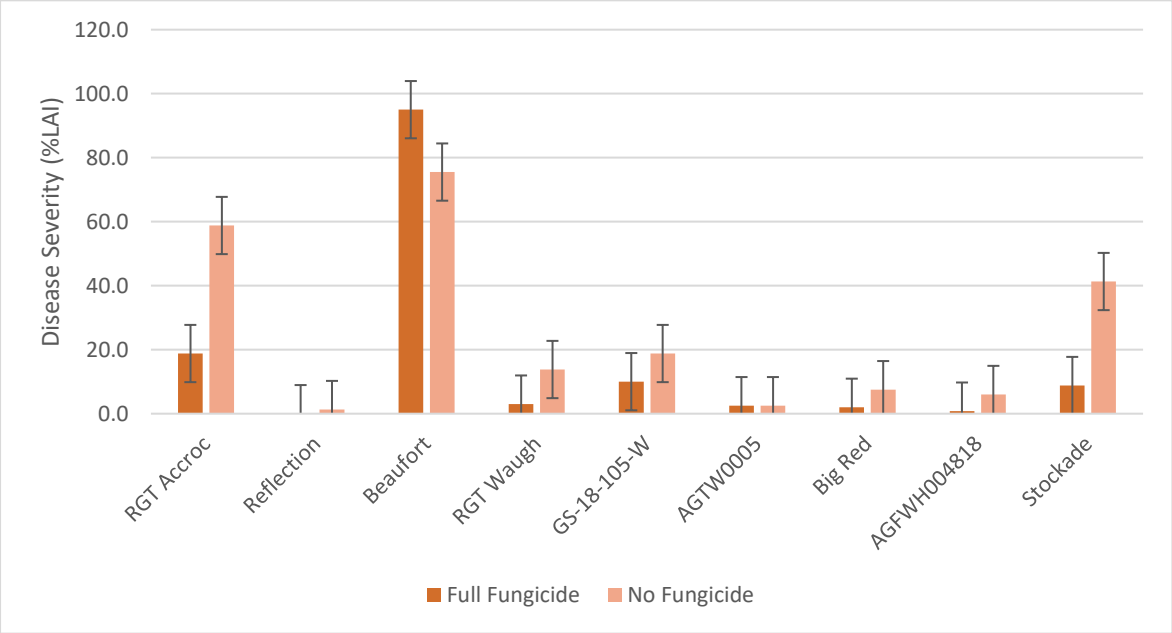

Figure 1. Septoria tritici blotch (STB) disease severity (%) in plot scores of each variety and fungicide management.

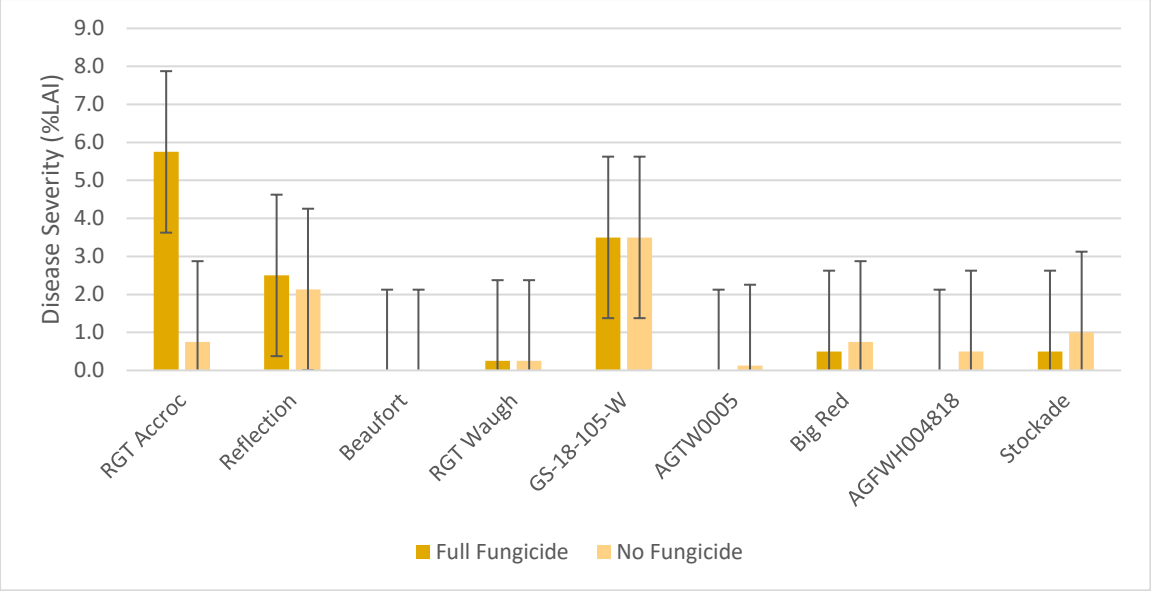

Figure 2. Stripe rust (YR) disease severity (%) in plot scores of each variety and fungicide management.

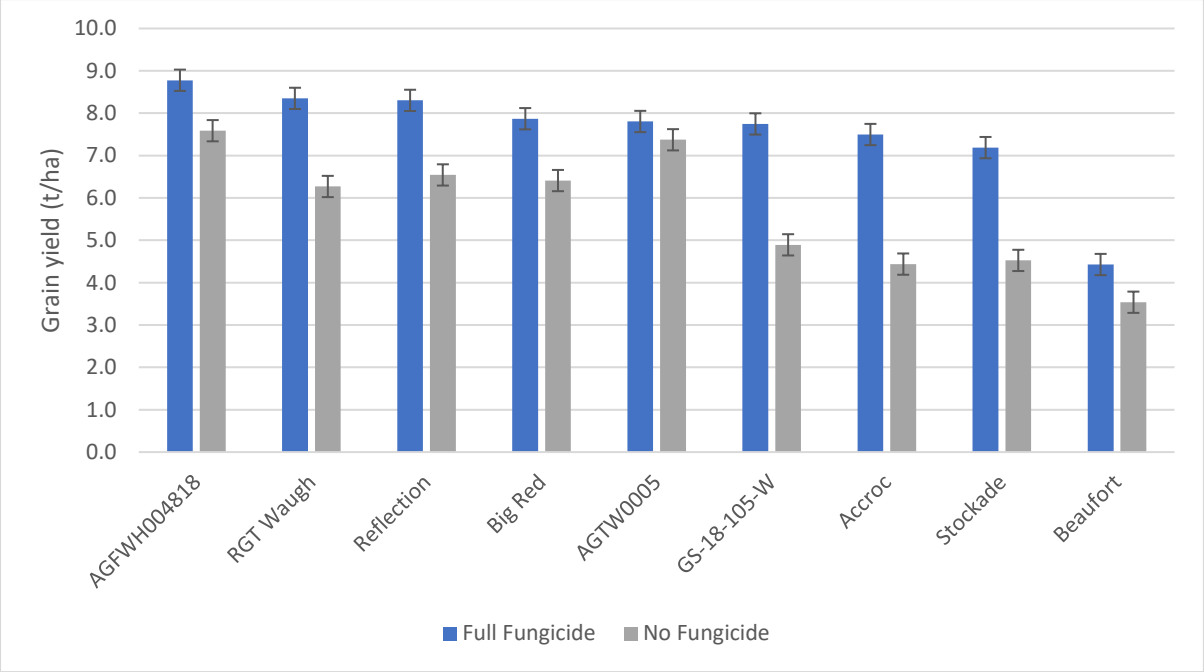

Figure 3. Influence of fungicide management on grain yield (t/ha) (± LSD = 0.05).

Trial 2. HYC Wheat Elite Screen – Time of Sowing 2 (FAR VIC W22-02-2)

Key Points:

- The feed winter wheat cultivars RGT Cesario and Big Red sown on 20 May over three weeks later than the earlier sowing trial (FAR VIC W22-02-1 reported above) were significantly higher yielding than the shorter season spring milling wheats Willaura, Rockstar and Scepter.
- The new white wheat Stockade (AWW with APW potential) performed strongly outyielding older feed wheats Anapurna and RGT Accroc which were both significantly lower yielding.
- Despite a two-spray fungicide package and later sowing reducing disease pressure there was considerable disease infection present, particularly Septoria tritici blotch and stripe rust in Scepter and Rockstar.
- Incomplete disease control with these two milling wheats led to poor grain quality characteristics (test weight in particular) and a 3-4t/ha deficit compared to best European origin feed wheats.

Treatments: 10 cultivars tested for yield and quality assessments under a two-spray fungicide management (foliar application– GS31 and GS39) were sown on 20 May. Unlike the work conducted on the first sowing date, there was no fungicide untreated element to the experiment.

Table 1: Yield (t/ha), % of mean yield and grain quality, protein (%), test weight (kg/hL) & screenings (%).

		Yield		Quality			
	Variety	**Yield (t/ha)**	**% Of Mean yield**	**Protein (%)**	**Test Weight (kg/hL)**	**Screenings (%)**	
1.	Scepter	3.87 f	65.6	14.1 a	69.2 e	4.7	bc
2.	Anapurna	6.30 d	106.7	12.0 d	77.2 b	3.8	cd
3.	RGT Accroc	5.15 e	87.4	12.0 d	72.1 d	4.1	cd
4.	Rockstar	4.04 f	68.5	13.7 b	69.0 e	4.8	bc
5.	LRPB Beaufort	6.73 c	114.1	12.8 c	74.7 c	4.7	bc
6.	RGT Cesario	7.28 ab	123.4	10.3 f	78.1 b	2.8	ef
7.	BigRed	7.65 a	129.7	10.2 f	80.8 a	3.3	de
8.	Stockade	7.00 bc	118.6	11.1 e	78.3 b	5.6	b
9.	Willaura	4.92 e	83.3	12.0 d	73.3 cd	7.9	a
10.	SUN1087I	6.06 d	102.7	12.1 d	77.3 b	2.3	f
	Mean	5.899	100.0	12.0	75.0	4.4	
	LSD 0.05	0.4282	7.3	0.4	2.3	0.9	
	p-value	<0.001	<0.001	<0.001	<0.001	<0.001	
	CV	5.00	5.0	2.3	2.1	14.9	

Table 2: Details of the management levels.

Sowing date		**20 May**
Plant population		180 seeds/m²
Basal fertiliser		100 kg/ha MAP
Nitrogen	**13 July**	50kg N/ha
	5 Sept	100kg N/ha
Fungicide	GS31	Prosaro 300ml/ha
	GS39	FAR F1-19 750ml/ha

Trial 3. HYC Wheat Germplasm x Environment x Management (GEM) (FAR VIC W22-03-1)

Key Points:

- Grain yields in the Victoria GEM (April 28 sown) trial were low with excessive rainfall during October when the crop was flowering and grain filling.
- RGT Cesario was higher yielding than Big Red which in turn was higher yielding than RGT Accroc.
- Grain yields of RGT Accroc, RGT Cesario and Big Red were consistently higher yielding under a 3-spray full fungicide programme irrespective of a canopy management strategy, with RGT Cesario being the highest yielding cultivar.
- There was significant interaction between cultivar and fungicide strategy with RGT Accroc giving a greater response to the 2-spray fungicide (1.5 t/ha) than RGT Cesario (0.90 t/ha) and Big Red (0.61 t/ha) over the single spray fungicide approach at flag leaf.
- The highest yielding canopy management approach was 150kg N/ha with no specific intervention (defoliation, additional N and PGR) and the higher input fungicide strategy.
- Although additional N input (additional 75kg N/ha giving a total of 225kg N/ha clearly benefited from PGR application, the overall yield increase was not sufficiently large to pay for the additional input compared to the standard 150kg N/ha.
- When a higher fungicide programme was employed, it did not change the optimal canopy management approach in terms of economics, with all varieties giving their optimum economics when a higher input fungicide programme was incorporated with the standard 150kg N/ha and no canopy management.

Management treatments

Treatment ID	**Fungicide***	**Canopy Intervention**	**Kg Nitrogen** (N)/ha
1. Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)	Untreated	150
2. Standard (Std) Fungicide & no intervention (NI) + N	Standard (cheaper)	Untreated	225
3. Standard (Std) Fungicide & PGR	Standard (cheaper)	Defoliation	225
4. Standard (Std) Fungicide & PGR + N	Standard (cheaper)	PGR	225
5. Higher input Fungicide & no intervention (NI)	Higher input	Untreated	150
6. Higher input Fungicide & PGR + N	Higher input	Untreated	225
7. Dual - purpose system	Higher input	Defoliation	225
8. Hyper - yield system	Higher input	PGR	225

Standard Fungicide – Foliar fungicides FAR F1/19 (DMI/SDHI mix) at GS39.
HYC high input fungicide – 2 x foliar fungicides including Prosaro GS31, FAR F1/19 GS39.
Treatments 3 & 4 - Plant growth regulators (PGR) (Moddus 0.1 + Errex 0.65 L/ha at GS30 and again at GS32)
Defoliation was done mechanically (mower) prior to the GS30.

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

		RGT Cesario		Big Red		RGT Accroc		*Mean*	
Cultivar		7.15	a	6.66	b	5.34	c	**6.38**	
	LSD	***0.27***				***P-Value***		***<0.001***	
Disease Pressure									
Single Spray Program		6.70	bc	6.35	cd	4.59	e	**5.88**	b
Full Fungicide Program		7.60	a	6.96	b	6.09	d	**6.88**	a
Fungicide	***LSD***	***0.36***				***P-Value***		***0.003***	
Fungicide x Cultivar	***LSD***	***0.38***				***P-Value***		***0.006***	
Canopy Management									
No Intervention - 150N		7.30	-	6.86	-	5.40	-	**6.52**	-
No intervention – 225N		7.03	-	6.54	-	5.34	-	**6.31**	-
Mechanical Defoliation GS30		7.06	-	6.46	-	5.20	-	**6.24**	-
PGR Moddus 0.2 + Errex 1.3 GS30		7.20	-	6.76	-	5.42	-	**6.46**	-
Canopy Management	***LSD***	***ns***				***P-Value***		***0.400***	
Cultivar x Canopy Mgmt	***LSD***	***ns***				***P-Value***		***0.994***	
Fungicide Management x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		6.72	-	6.74	-	4.66	-	**6.04**	-
No intervention – 225N		6.81	-	6.59	-	4.54	-	**5.98**	-
Mechanical Defoliation GS30		6.71	-	5.79	-	4.86	-	**5.78**	-
PGR Moddus 0.2 + Errex 1.3 GS30		6.55	-	6.30	-	4.30	-	**5.72**	-
Full Fungicide Program									
No Intervention - 150N		7.89	-	6.97	-	6.15	-	**7.00**	-
No intervention – 225N		7.26	-	6.50	-	6.14	-	**6.63**	-
Mechanical Defoliation GS30		7.42	-	7.14	-	5.54	-	**6.70**	-
PGR Moddus 0.2 + Errex 1.3 GS30		7.84	-	7.22	-	6.55	-	**7.20**	-
Fungicide Management x Canopy Mgmt.	***LSD***	***ns***				***P-Value***		***0.173***	
Fungicide Management x Canopy Mgmt. x Cultivar	***LSD***	***ns***				***P-Value***		***0.065***	

Table 2. Influence of management strategy and cultivar on screenings (%).

		RGT Cesario		Big Red		RGT Accroc		*Mean*	
Cultivar		**2.4**	**b**	**2.7**	**b**	**5.5**	**a**	**3.5**	
	LSD	***0.61***				***P-Value***		***<0.001***	
Disease Pressure									
Single Spray Program		2.5	bc	2.8	bc	7.6	a	4.3	a
Full Fungicide Program		2.2	c	2.7	bc	3.3	b	2.7	b
Fungicide	***LSD***	***0.30***				***P-Value***		***<0.001***	
Fungicide x Cultivar	***LSD***	***0.86***				***P-Value***		***<0.001***	
Canopy Management									
No Intervention - 150N		2.1	-	2.5	-	5.1	-	3.3	-
No intervention – 225N		2.4	-	2.6	-	5.7	-	3.5	-
Mechanical Defoliation GS30		2.3	-	3.3	-	4.6	-	3.4	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.6	-	2.5	-	6.6	-	3.9	-
Canopy Management	***LSD***	***ns***				***P-Value***		***0.287***	
Cultivar x Canopy Mgmt	***LSD***	***ns***				***P-Value***		***0.113***	
Fungicide Management x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		2.3	-	2.3	-	6.8	-	3.8	-
No intervention – 225N		2.5	-	2.4	-	7.9	-	4.3	-
Mechanical Defoliation GS30		2.4	-	3.8	-	5.8	-	4.0	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.8	-	2.6	-	9.9	-	5.1	-
Full Fungicide Program									
No Intervention - 150N		2.0	-	2.8	-	3.3	-	2.7	-
No intervention – 225N		2.3	-	2.8	-	3.4	-	2.8	-
Mechanical Defoliation GS30		2.2	-	2.7	-	3.4	-	2.8	-
PGR Moddus 0.2 + Errex 1.3 GS30		2.4	-	2.4	-	3.3	-	2.7	-
Fungicide Management x Canopy Mgmt.	***LSD***	***ns***				***P-Value***		***0.256***	
Fungicide Management x Canopy Mgmt. x Cultivar	***LSD***	***ns***				***P-Value***		***0.105***	

Table 3. Influence of management strategy and cultivar on harvest dry matter (t/ha).

		RGT Cesaio		Big Red		RGT Accroc		*Mean*	
Cultivar		**18.4**	**a**	**16.9**	**b**	**14.9**	**c**	**16.7**	
	LSD	***0.79***				***P-Value***		***<0.001***	
Disease Pressure									
Single Spray Program		17.5	-	16.5	-	13.5	-	15.8	b
Full Fungicide Program		19.3	-	17.4	-	16.3	-	17.7	a
Fungicide	***LSD***	***0.68***				***P-Value***		***0.003***	
Fungicide x Cultivar	***LSD***	***ns***				***P-Value***		***0.059***	
Canopy Management									
No Intervention - 150N		18.1	-	16.6	-	15.2	-	16.7	-
No intervention – 225N		19.5	-	18.0	-	14.5	-	17.3	-
Mechanical Defoliation GS30		18.4	-	16.7	-	14.2	-	16.4	-
PGR Moddus 0.2 + Errex 1.3 GS30		17.5	-	16.4	-	15.8	-	16.6	-
Canopy Management	***LSD***	***ns***				***P-Value***		***0.371***	
Cultivar x Canopy Mgmt	***LSD***	***ns***				***P-Value***		***0.068***	
Fungicide Management x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		15.8	-	16.5	-	13.4	-	15.2	-
No intervention – 225N		19.2	-	17.7	-	13.5	-	16.8	-
Mechanical Defoliation GS30		17.8	-	15.7	-	13.5	-	15.6	-
PGR Moddus 0.2 + Errex 1.3 GS30		17.3	-	16.0	-	13.5	-	15.6	-
Full Fungicide Program									
No Intervention - 150N		20.5	-	16.7	-	17.0	-	18.1	-
No intervention – 225N		19.8	-	18.4	-	15.4	-	17.9	-
Mechanical Defoliation GS30		19.1	-	17.7	-	14.8	-	17.2	-
PGR Moddus 0.2 + Errex 1.3 GS30		17.7	-	16.7	-	18.1	-	17.5	-
Fungicide Management x Canopy Mgmt.	***LSD***	***ns***				***P-Value***		***0.423***	
Fungicide Management x Canopy Mgmt. x Cultivar	***LSD***	***ns***				***P-Value***		***0.074***	

Table 4. Details of the management levels.

Sowing date:		**28 April**
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:	**13 July**	50kg N/ha
	2 Sept	+ 25kg N/ha
	5 Sept	100kg N/ha
	27 Sept	+50kg N/ha
Fungicide:	**GS00**	Systiva
	GS31	Opus 500ml/ha
	GS39	Radial 840ml/ha

Trial 3: HYC Winter Wheat GEM – May sowing (FAR SAC W22-03-2)

Key Points:

- Grain yields in this season's GEM May sown trial were inferior to the results collected from the earlier time of sowing with Scepter and Rockstar yielding an average of 4 t/ha or less.
- RGT Accroc (mean 5.44 t/ha) was higher yielding than both Rockstar (3.66 t/ha) and Scepter (4.07 t/ha).
- The most significant management effects were again those observed due to fungicide management with the three cultivars giving an average increase of 0.64 t/ha to three units of fungicide compared to one flag leaf spray.
- All varieties were, despite fungicide application, affected by the new strain of stripe rust (pathotype 239).
- Milling wheat quality (protein, test weight and screenings) was not achieved with any management approaches due to poor test weight.
- The higher yielding feed wheat RGT Accroc was subject to higher than normal disease pressure, however even with three units of fungicide it was the more profitable to grow, as milling wheats never reached the quality criteria to secure a premium and were 1.5-2.0 t/ha t/ha lower yielding.
- There were no significant differences in yield and protein levels when comparing 150 and 225kg N/ha applied.
- The only quality criteria affected by management was fungicide input which affected screening % and overall N level which increased grain protein when applied N input was increased from 150 – 225kg N/ha.
- The most profitable management approach with all three varieties was result of 150kg N/ha and three fungicide applications.

Management Treatments

Treatment ID	Fungicide	**Kg Nitrogen** (N)
1. Standard (Std) Fungicide	Standard (cheaper)[1]	150
2. Standard (Std) Fungicide + N	Standard (cheaper) [1]	225
3. Higher input Fungicide	Higher input[2]	150
4. Higher input Fungicide + N	Higher input[2]	225

[1] *Single/Standard spray program – 1 X foliar fungicide: FAR F1-19 750ml/ha at GS39.*

[2] *Increased disease management – Systiva seed treatment plus 2 x foliar fungicides: Prosaro. 300ml/ha, FAR F1-19 750ml/ha at GS31 and 39 respectively.*

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

		Rockstar		Scepter		RGT Accroc		Mean	
Cultivar		3.66	c	4.07	b	5.44	a	**4.39**	
	LSD	***0.24***				***P-Value***		***<0.001***	
Disease Pressure									
Single Spray Program		3.41	-	3.83	-	4.97	-	4.07	b
3 unit Fungicide Program		3.91	-	4.31	-	5.91	-	4.71	a
Fungicide	***LSD***	***0.39***				***P-Value***		***0.014***	
Fungicide x Cultivar	***LSD***	***ns***				***P-Value***		***0.104***	
Canopy Management									
No Intervention - 150N		3.60	-	4.18	-	5.53	-	4.44	-
No intervention – 225N		3.72	-	3.96	-	5.35	-	4.34	-
Canopy Management	***LSD***	***ns***				***P-Value***		***0.261***	
Cultivar x Canopy Mgmt	***LSD***	***ns***				***P-Value***		***0.314***	
Fungicide Management x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		3.39	-	3.88	-	4.98	-	4.08	-
No intervention – 225N		3.44	-	3.78	-	4.96	-	4.06	-
Full Fungicide Program									
No Intervention - 150N		3.82	-	4.48	-	6.08	-	4.79	-
No intervention – 225N		4.00	-	4.14	-	5.75	-	4.63	-
Fungicide Management x Canopy Mgmt.	***LSD***	***ns***				***P-Value***		***0.395***	
Fungicide Management x Canopy Mgmt. x Cultivar	***LSD***	***ns***				***P-Value***		***0.637***	

Table 2. Influence of treatment on grain protein %.

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		13.9	a	14.0	a	12.4	b	**13.4**	
	LSD	0.27				***p-Value***		<0.001	
Fungicide Management									
Single Spray Program		14.0	-	14.0	-	12.6	-	**13.5**	-
Full Fungicide Program		13.8	-	14.0	-	12.3	-	**13.4**	-
Fungicide	***LSD***	*ns*				***p-Value***		0.279	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.688	
Canopy Management									
No Intervention - 150N		13.8	-	13.7	-	12.2	-	**13.2**	b
No intervention – 225N		14.0	-	14.2	-	12.7	-	**13.6**	a
Canopy Management	***LSD***	0.18				***p-Value***		0.002	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.231	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		13.9	-	13.7	-	12.5	-	**13.4**	-
No intervention – 225N		14.0	-	14.3	-	12.7	-	**13.6**	-
Full Fungicide Program									
No Intervention - 150N		13.8	-	13.7	-	11.9	-	**13.1**	-
No intervention – 225N		13.9	-	14.2	-	12.7	-	**13.6**	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.289	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.277	

Table 3. Influence of treatment on grain test weight (Kg/hL).

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		64.9	b	69.3	a	70.3	a	75.4	
	LSD	1.31				***p-Value***		<0.001	
Fungicide Management									
Single Spray Program		64.3	-	69.1	-	68.7	-	67.4	-
Full Fungicide Program		65.5	-	69.5	-	71.8	-	68.9	-
Fungicide	***LSD***	*ns*				***p-Value***		0.060	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.100	
Canopy Management									
No Intervention - 150N		64.4	c	70.4	a	70.5	a	68.4	-
No intervention – 225N		65.4	c	68.1	b	70.0	a	67.8	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.267	
Cultivar x Canopy Mgmt	***LSD***	1.86				***p-Value***		0.046	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		63.1	-	69.6	-	68.5	-	67.1	-
No intervention – 225N		65.4	-	68.7	-	68.9	-	67.6	-
Full Fungicide Program									
No Intervention - 150N		65.6	-	71.3	-	72.5	-	69.8	-
No intervention – 225N		65.4	-	67.6	-	71.2	-	68.1	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.052	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.888	

Table 4. Influence of treatment on grain screening %.

		Rockstar		Scepter		RGT Accroc		*Mean*	
Cultivar		4.3	a	2.9	b	3.9	a	1.0	
	LSD	0.58				***p-Value***		<0.001	
Disease Pressure (Fungicide application)									
Single Spray Program		4.6	-	3.0	-	4.7	-	4.1	a
Full Fungicide Program		4.0	-	2.8	-	3.2	-	3.3	b
Fungicide	***LSD***	0.67				***p-Value***		0.032	
Fungicide x Cultivar	***LSD***	*ns*				***p-Value***		0.083	
Canopy Management									
No Intervention - 150N		4.5	-	2.7	-	3.7	-	3.6	-
No intervention – 225N		4.2	-	3.1	-	4.2	-	3.8	-
Canopy Management	***LSD***	*ns*				***p-Value***		0.481	
Cultivar x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.304	
Fungicide x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		5.0	-	2.9	-	4.6	-	4.2	-
No intervention – 225N		4.3	-	3.1	-	4.8	-	4.1	-
Full Fungicide Program									
No Intervention - 150N		3.9	-	2.5	-	2.8	-	3.1	-
No intervention – 225N		4.0	-	3.1	-	3.6	-	3.6	-
Fungicide x Canopy Mgmt	***LSD***	*ns*				***p-Value***		0.279	
Fungicide x Canopy Mgmt x Cultivar	***LSD***	*ns*				***p-Value***		0.902	

Table 5. Details of the management levels.

Sowing date:		**20 May**
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:	**13 July**	50kg N/ha
	2 Sept	+ 25kg N/ha
	5 Sept	100kg N/ha
	26 Sept	+50kg N/ha
Fungicide:	**GS00**	Systiva
	GS31	Prosaro 300ml/ha
	GS39	Revy Star 750ml/ha

Trial 4a. HYC Wheat Disease Management x Germplasm Interaction (FAR VIC W22-04a-1)

Key Points:

- STB infected wheat stubble added to the plots significantly reduced yield relative to the standard stubble (canola stubble).
- Flutriafol on the starter basal fertiliser had no significant effect on yield in this trial since stripe rust (which is well controlled by this product) was secondary to Septria tritici blotch (STB) which was the primary disease.
- There was no significant interaction (p=0.051) between the number of fungicide units and variety with all varieties giving a similar significant response to 1 and 2 units of fungicide over the untreated, but all giving the best yield results when 4 units of fungicide were employed.
- However, comparing responses to fungicide over the untreated it was clear that RGT Cesario was the most disease resistant variety with a maximum response to fungicide of 1.35 t/ha (mean of three starting disease scenarios), compared to 2.15 t/ha with Anapurna, 2.78 t/ha with RGT Accroc and 2.84 t/ha with Revenue.
- The most prevalent disease in Revenue and Accroc was STB with low-moderate levels of stripe rust in the RGT Accroc.
- Lower levels of disease were experienced in Anapurna and RGT Cesario, with Anapurna suffering from moderate levels of STB and RGT Cesario suffering from stripe rust and much lower levels of STB.

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

		RGT Cesario		Anapurna		RGT Accroc		Revenue		*Mean*	
Cultivar		5.79	a	5.77	a	5.66	a	3.13	b	**5.09**	
	LSD	0.34						***P-Value***		<0.001	
Disease Pressure											
Flutriafol		5.90	-	5.47	-	5.77	-	3.16	-	**5.07**	ab
Standard		6.02	-	6.07	-	5.80	-	3.26	-	**5.29**	a
Stubble		5.45	-	5.78	-	5.40	-	2.99	-	**4.91**	b
Disease Pressure	***LSD***	***0.28***						***P-Value***		***0.039***	
Disease Pressure x Cultivar	***LSD***	***ns***						***P-Value***		***0.607***	
Fungicide Management Regime											
Untreated		5.23	-	4.54	-	4.16	-	1.69	-	**3.91**	c
1 Fungicide Unit		5.98	-	6.14	-	5.92	-	3.07	-	**5.28**	b
2 Fungicide Units		5.38	-	5.72	-	5.61	-	3.24	-	**4.99**	b
4 Fungicide Units		6.58	-	6.69	-	6.94	-	4.53	-	**6.19**	a
Fungicide Management Regime	***LSD***	***0.34***						***P-Value***		***<0.001***	
Cultivar x Fung Mgmt Regime	***LSD***	***ns***						***P-Value***		***0.051***	
Disease Pressure x Fung Mgmt. Regime											
Flutriafol											
Untreated		5.39	-	4.41	-	4.23	-	1.85	-	**3.97**	-
1 Fungicide Unit		5.68	-	5.34	-	5.64	-	2.98	-	**4.91**	-
2 Fungicide Units		5.59	-	5.86	-	6.40	-	3.66	-	**5.38**	-
4 Fungicide Units		6.94	-	6.27	-	6.82	-	4.13	-	**6.04**	-
Standard											
Untreated		5.56	-	5.04	-	4.33	-	1.64	-	**4.14**	-
1 Fungicide Unit		6.43	-	6.68	-	6.14	-	3.10	-	**5.59**	-
2 Fungicide Units		5.21	-	5.42	-	5.25	-	3.33	-	**4.80**	-
4 Fungicide Units		6.90	-	7.15	-	7.48	-	4.96	-	**6.62**	-
Stubble											
Untreated		4.74	-	4.17	-	3.92	-	1.58	-	**3.60**	-
1 Fungicide Unit		5.83	-	6.41	-	5.98	-	3.14	-	**5.34**	-
2 Fungicide Units		5.33	-	5.88	-	5.18	-	2.75	-	**4.78**	-
4 Fungicide Units		5.90	-	6.65	-	6.54	-	4.50	-	**5.90**	-
Disease Pressure x Fung Mgmt	***LSD***	***ns***						***P-Value***		***0.767***	
Disease Pressure x Fung Mgmt x Cultivar	***LSD***	***ns***						***P Value***		***0.978***	

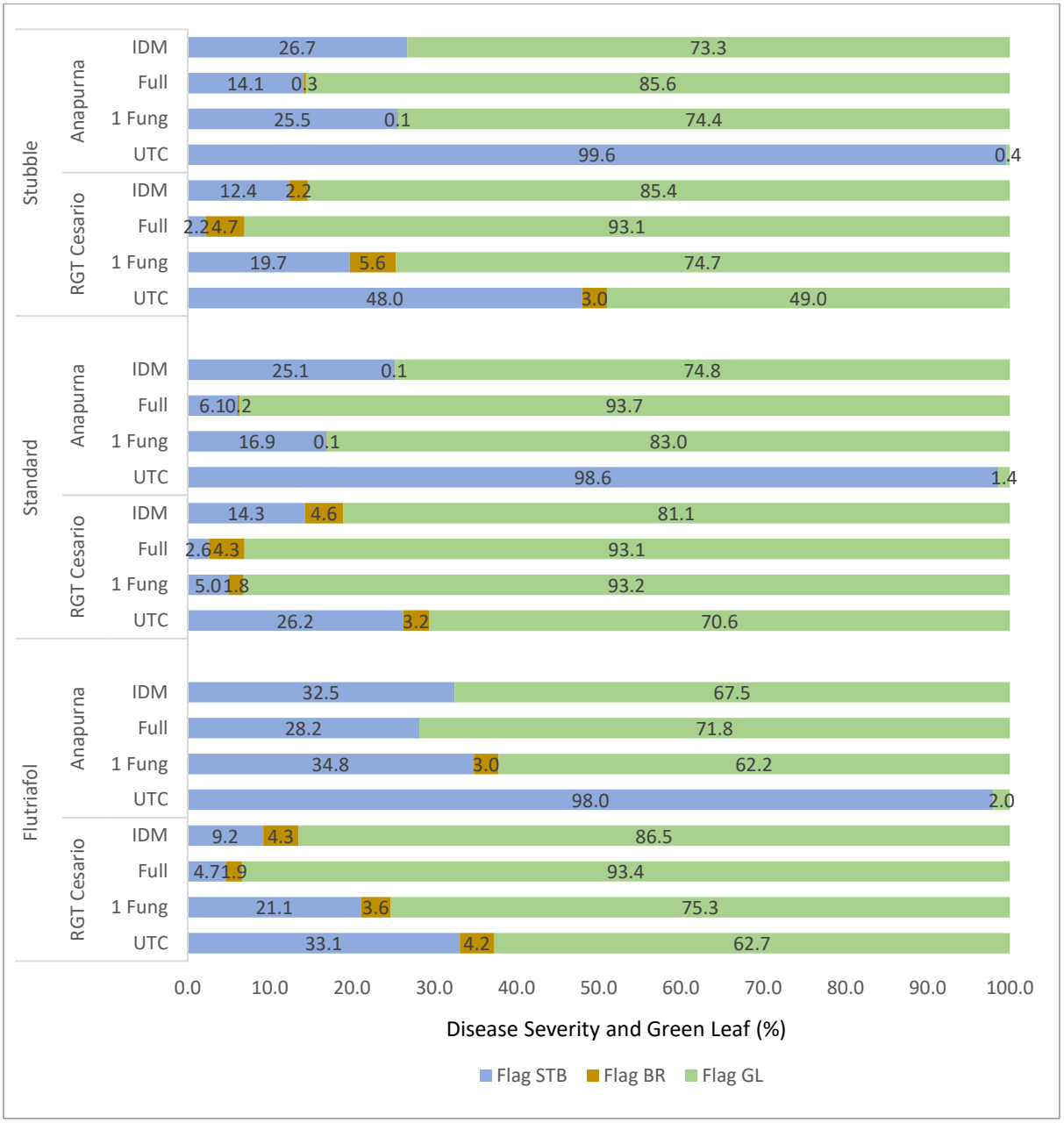

Figure 1. Septoria tritici blotch (STB), leaf rust (BR) and green area (GL) presented as a percentage of total leaf area at GS78 on the flag leaf for RGT Cesario and Anapurna across three disease pressures.

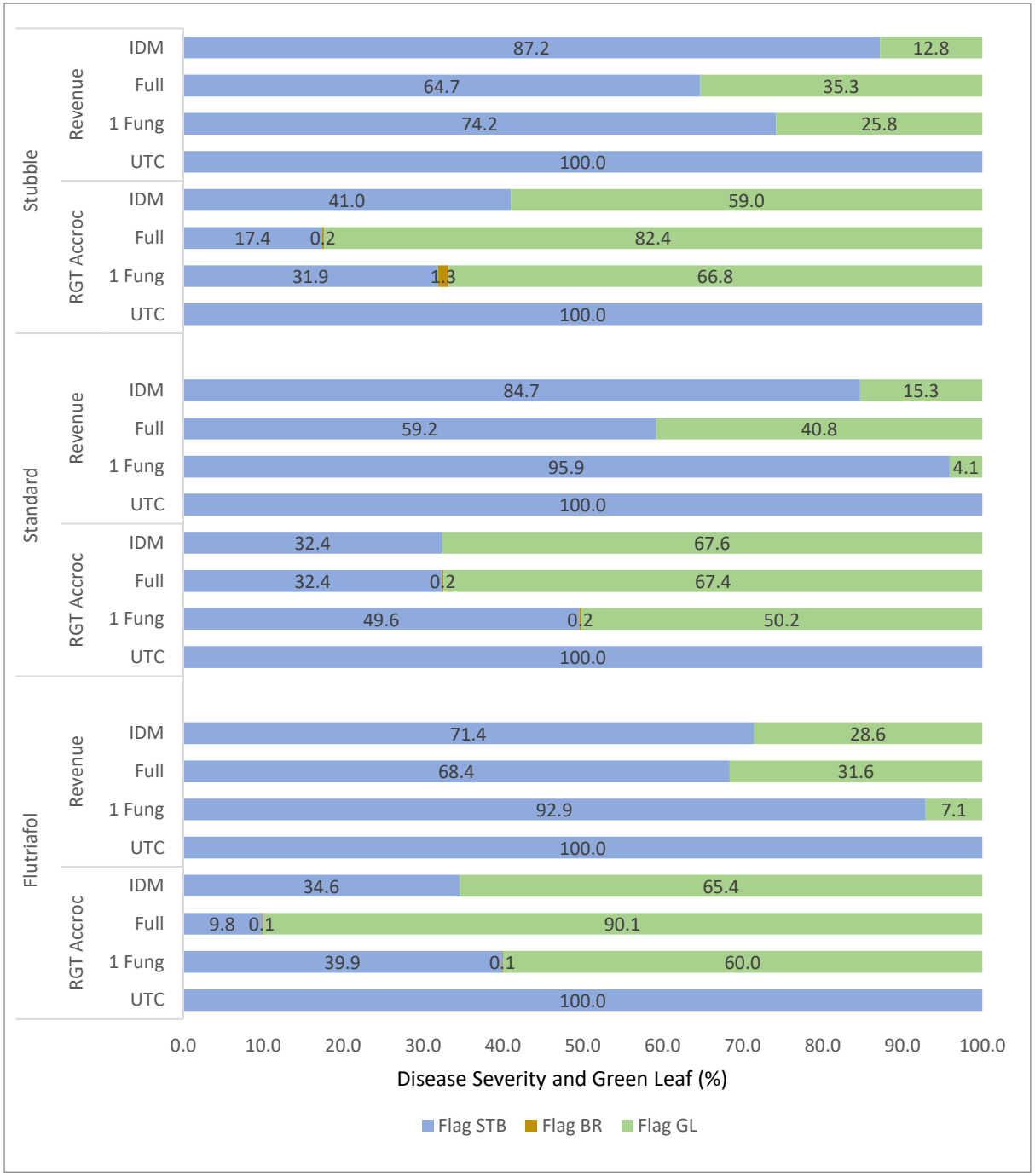

Figure 2. Septoria tritici blotch (STB), leaf rust (BR) and green area (GL) presented as a percentage of total leaf area at GS78 on the flag leaf for RGT Accroc and Revenue across three disease pressures.

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		**28 April**			
Seed Rate:		180 Seeds/m2			
Sowing Fertiliser:		100kg MAP			
Seed Treatment:		Vibrance & Goucho			
Grazing:		Nil			
Nitrogen:	**13 July**	50kg N/ha			
	5 Sept	100kg N/ha			
PGR:	**GS30**	Moddus Evo 100ml/ha + Errex 650ml/ha			
	GS32	Moddus Evo 100ml/ha + Errex 650ml/ha			
		Untreated	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**
Fungicide:	**GS00**	---	---	---	Systiva
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha
	GS59-61	---	---	---	Opus 500ml/ha

Trial 4: HYC Wheat Disease Management (FAR VIC W22-04-1)

cv Big Red

Key Points:

- In low yielding trials all fungicide treatments were significantly higher yielding than the untreated, however there were no significant differences between the different strategies based on 1 spray, 2 sprays or 4 units of fungicide.
- In line with previous seasons Big Red was relatively disease resistant to Septoria tritici blotch (STB) and did not suffer from the new strain of stripe rust to the same extent as RGT Cesario.
- Therefore, going forward at present, one – two units of fungicide should be sufficient to combat STB susceptibility in 2023 as these were the most cost-effective control programmes under very high disease pressure in 2022.
- There were no significant differences in grain quality as a result of fungicide treatment.

Treatments:

The cultivar Big Red was evaluated with five levels of fungicide input:

6. Untreated
7. 1 unit of fungicide – GS39
8. 2 units of fungicide – GS32 & GS39
9. 2 units of fungicide – GS32, GS55 (straddle approach)
10. 4 units of fungicide – Flutriafol at sowing, GS31, GS39 and GS59

Table 1. Yield (t/ha), % Site Mean and grain quality, protein (%), test weight (kg/HL) & screenings (%).

	Yield		Quality		
	Yield (t/ha)	% of Mean	Protein (%)	Test Weight (kg/hl)	Screenings (%)
Untreated	6.77 b	91.8	10.4 -	78.8 -	2.9 -
1F Flag Leaf Approach	7.48 a	101.5	10.0 -	80.0 -	2.4 -
2F Standard Approach	7.59 a	102.9	10.1 -	80.1 -	2.9 -
4F Full Protection	7.68 a	104.2	9.9 -	80.1 -	2.5 -
2F Straddle Approach	7.35 a	99.7	10.0 -	80.1 -	2.8 -
Mean	7.37	100.0	10.1	79.8	2.7
LSD 0.05	0.47	6.34	ns	ns	ns
P Val	0.009	0.009	0.593	0.202	0.627
CV	4.11	4.1	4.5	1.1	21.1

Table 2. Details of the management levels (kg, g, ml/ha).

Sowing date:		**28 April**				
Seed Rate:		180 Seeds/m2				
Sowing Fertiliser:		100kg MAP				
Seed Treatment:		Vibrance & Gaucho				
Grazing:		Nil				
Nitrogen:	**13 July**	50kg N/ha				
	5 Sept	100kg N/ha				
PGR:	**GS30**	Moddus Evo 100ml/ha + Errex 650ml/ha				
	GS32	Moddus Evo 100ml/ha + Errex 650ml/ha				
		Untreated	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**	**Straddle approach**
Fungicide:	**GS00**	---	---	---	Systiva	---
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha	---
	GS33	---	---	---	---	FAR F1-19 750ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	---
	GS55	---	---	---	---	Opus 500ml/ha
	GS59-61	---	---	---	Opus 500ml/ha	---

Trial 5. HYC Wheat Nutrition (FAR VIC W22-05-1)

cv RGT Accroc

Key Points:

- In all cropping farming systems following faba beans, with 2.4% organic carbon content in the 0-10cm, there was no response to applied nitrogen (applied as 46% N prilled N).
- With 173kg N/ha in the soil 0 – 60cm measured on 30 May, the zero N treatment (only 10kg N/ha MAP applied) yielded 7.19 t/ha with a protein of 8.8% indicating the presence of 111kg N/ha in grain.
- If 75% of the N is assumed to be in the grain and 25% in the straw residue, then the total N uptake at harvest in zero N plots would be 148kg N/ha, indicating that the crop could have been grown with the N recorded in the soil shortly after sowing.
- If straw residue was returned to the paddock, the nitrogen balance would be minus approximately 111kg N/ha removed from the paddock in the grain.
- All N applications as urea applied as 2 or 3 split applications only served to increase protein but not yield.
- The higher rates of applied N grain yields were significantly lower as a result of increased crop lodging that above 160kg N/ha was significant.
- Where N application was applied as a 3-split approach, with 20% of the N applied at the flag leaf emergence GS37-39, lodging was significantly reduced and yield increased.
- At 160kg N/ha applied grain protein was significantly increased with a yield almost identical to the 0 N control. The N offtake in the grain increased to 137kg N/ha giving a positive N balance of 23kg N/ha if the straw was returned to the paddock.
- Test weight was significantly reduced as applied N was increased over 120kg N/ha.
- There was no significant difference in dry matter at harvest with treatments varying between 14.6 and 17.3 t/ha. There was also no significant difference in Harvest index with an average of 38.2%
- Pig manure and manure equivalent treatments did not increase yield but were associated with higher grain protein levels.

Treatments:

RGT Accroc red feed wheat was subjected to 10 nutrition treatments of varying nitrogen rates and manure. The 5 t/ha manure (pig manure) treatment was applied at sowing incorporated by sowing on top of 160kg N/ha applied as a two split, 50% at tillering and 50% at GS31. The manure applied was 20.5N, 50P, 95K and 29 S kg/ha based on dry matter content. The available soil N was measured on 30 May with 173kg N/ha in the 0-60cm profile. Note this was measured following a 100kg/ha MAP application. The trial site had a relatively good organic carbon content of 2.4% in the 0 – 10cm.

Table 1. Detailed treatment list, grain yield (t/ha) & % site Mean.

Trt.	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield		Mean
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(t/ha)		(%)
1	0 (MAP)	22	---	---	7.19	a	103.8
2	80N (40N + 40N)	22	---	---	7.11	abc	102.6
3	120N (60N + 60N)	22	---	---	7.17	a	103.5
4	160N (80N + 80N)	22	---	---	7.21	a	104.0
5	200N (100N + 100N)	22	---	---	6.68	bcd	96.4
6	240N (120N + 120N)	22	---	---	6.63	cd	95.7
7	280N (140N + 140N)	22	---	---	6.62	d	95.5
8	200N (80N + 80N + 40N)	22	---	---	7.14	ab	103.1
9	160N + Manure*	22	---	---	6.74	a-d	97.3
10	160N + P + K + S	72	95	29	6.81	a-d	98.2
				Mean	6.93		100.0
				LSD (p=0.05)	0.5		7.0
				P Val	0.042		0.040

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.
**Manure applied at a rate of 5 t/ha, see nutrient breakdown in table 4.*

Table 2. Influence of nitrogen rate on grain quality, protein (%), test weight (kg/HL) and screenings (%).

	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein		Test weight		Screenings	
Trt.	**kg N/ha**	**kg P/ha**	**kg P/ha**	**kg S/ha**	**(%)**		**(kg/HL)**		**(%)**	
1	0	22	---	---	8.8	e	76.4	a	1.2	d
2	80	22	---	---	9.7	de	75.3	ab	1.6	cd
3	120	22	---	---	10.1	cd	75.4	ab	1.8	cd
4	160	22	---	---	10.8	a-d	74.9	b	1.8	c
5	200	22	---	---	11.2	abc	73.3	cd	2.4	ab
6	240	22	---	---	11.5	ab	72.8	d	2.4	ab
7	280	22	---	---	11.8	a	73.0	cd	2.4	ab
8	200 (3 split)	22	---	---	10.4	bcd	74.4	bc	2.0	bc
9	160 + M	22	---	---	11.7	a	72.5	d	2.5	ab
10	160	72	95	29	11.4	ab	72.4	d	2.8	a
				Mean	10.7		74.0		2.1	
				LSD (p=0.05)	1.2		1.5		0.5	
				P Val	<0.001		<0.001		<0.001	

Table 3. Influence of nitrogen rate, manure and synthetic PKS on harvest dry matter (t/ha), harvest index (%) and thousand seed weight (g).

	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Harvest Dry Matter	Harvest Index
Trt.	**kg N/ha**	**kg P/ha**	**kg P/ha**	**kg S/ha**	**(t/ha)**	**%**
1	0	22	---	---	15.8 -	40.4 -
2	80	22	---	---	16.6 -	37.5 -
3	120	22	---	---	18.6 -	33.8 -
4	160	22	---	---	17.3 -	37.8 -
5	200	22	---	---	14.6 -	40.4 -
6	240	22	---	---	15.1 -	39.8 -
7	280	22	---	---	15.9 -	36.6 -
8	200	22	---	---	15.5 -	41.3 -
9	160 + M	22	---	---	15.3 -	38.9 -
10	160	72	95	29	16.9 -	35.5 -
				Mean	16.2	38.2
				LSD (p=0.05)	ns	ns
				P Val	0.3616	0.5811

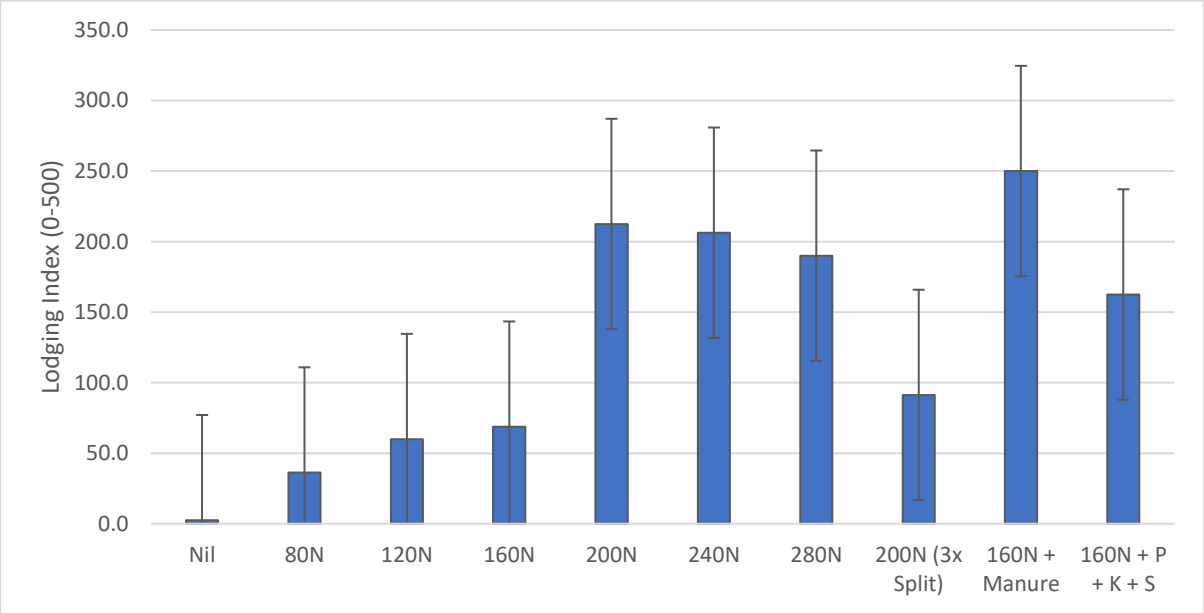

Figure 1. Influence of nitrogen rate on crop lodging, assessed at crop maturity (GS99) on January 6, 2023.

Table 4. Details of the management levels.

Sowing date:		**28 April**			
Plant population:		180 seeds/m²			
Basal fertiliser:		100 kg/ha MAP			
5 tons manure (dry matter)		**N**	**P**	**K**	**S**
		20.5	**50**	**95**	**29**
Nitrogen:	**30-June**	First Split Application			
	16-Aug	Second Split Application			
	26 Sept	+40kg N/ha (trt 8)			
Fungicide:	**GS31**	Prosaro 300ml/ha			
	GS39	Radial 840ml/ha			

Table 5. Site soil test details

	Level Found
ECEC	1.4 dS/m
Organic Carbon W&B*	2.4%
pH 1:5 water	5.7pH
Total Mineral N**	172.7kg soil mineral N/ha
Colwell Phosphorus	110 ppm
Available Potassium	180 ppm
KCl Sulfur	14 ppm

**Walkley & Black assess the organic carbon % by oxidising carbon using chromic acid in the presence of sulphuric acid.*

***Mineral N 0-60cm, all other results 0-10cm depth sampled 30/5/2022*

Tasmania Crop Technology Centre
Hagley, TAS

Sown: 27-28 April 2022
Harvested: 30 January 2023 (Trial 2), 1 February 2023 (Trial 3), 07 February 2023 (Trial 4a), 30 January 2023 (Trial 4), 31 January 2023 (Trial 5, Trial 6)
Rotation position: Following Carrots in 2021
Soil type: Chromosol
Colwell P (ppm) 0-10 cm: 302.0
pH ($CaCl_2$) 0-10 cm: 6.66
Organic Carbon (%) 0-10 cm: 2.03

Trial 2: HYC Wheat Elite Screen (FAR TAS W22-02-1)

Key Points:

- There was significant interaction between cultivar and fungicide programme with yield response to fungicide ranging from 0.1 t/ha (AGFWH004818) to 3.52 t/ha (Beaufort).
- Grain yields ranged from 4.70 t/ha (untreated Beaufort) to 12.37 t/ha (Reflection treated).
- The highest yielding white wheat was the new cultivar long season winter wheat RGT Waugh which gave a 2.39 t/ha yield response to the fungicide programme.
- The other white wheat seen as a longer season replacement for Trojan was Stockade which gave a 1.64 t/ha response with Septoria tritici blotch (STB) and stripe rust intermediate susceptibility.
- AGFWH004818 and AGTW0005 have been in HYC trials for three seasons and showed no significant yield response to fungicide application in a very high pressure disease season.
- Both are stiffer strawed and are more disease resistant than Big Red but until the very high disease pressure of 2022 has been slightly lower yielding than Big Red.
- All varieties gave an economic response to the four-unit fungicide application with the exception of the red wheat AGT00005 and AGFWH4818 with yield increases ranging from 1.21 t/ha with the UK wheat Reflection to 3.52 t/ha with Beaufort.
- When fungicide treated there was no statistical difference amongst the six highest yielding cultivars with RGT Accroc, Beaufort and GS-18-105W being significantly lower yielding.
- The principal diseases in the trial were STB and stripe rust with the latter disease more severe than in 2020 and 2021 due to a new pathotype (239).
- Beaufort STB infection was so severe that a full fungicide programme did not control the disease. To a lesser extent the fungicide programme was not fully effective with RGT Accroc and GS-18-105W.
- Test weights reflected fungicide response with large increases in test weights where there were greater yield responses to fungicide.

Treatments: Nine elite lines were tested under both untreated and HYC High input fungicide management based on a foliar fungicide program preceded with a SDHI seed treatment (3 foliar fungicides – GS31, GS39, GS59-61 and Systiva seed treatment) and PGR management – split application Moddus 0.1 + Errex 0.65 – GS30 & GS32). 184kg N/ha was applied as a three split of nitrogen fertiliser application.

Table 1. Yield (t/ha) and grain quality assessment- protein (%), test weight (kg/hL) & screenings (%) *Mean of treated and untreated.*

		Yield		Grain quality assessments					
	Cultivar	**Yield (t/ha)**		**Protein (%)**		**Test Weight (kg/hL)**		**Screenings (%)**	
1.	RGT Accroc	8.64	d	10.4	d	73.9	f	1.2	cde
2.	Reflection	11.77	a	8.9	f	75.8	ef	3.4	a
3.	Beaufort	6.46	e	12.0	a	69.2	g	3.6	a
4.	SFR86-085 (RGT Waugh)	10.73	c	11.2	b	77.0	de	1.1	de
5.	GS-18-105-W	8.93	d	11.0	bc	79.3	bc	1.6	bc
6.	AGTW0005	11.52	ab	10.8	bc	78.6	cd	0.9	e
7.	Big Red	10.83	bc	9.8	e	80.6	ab	1.3	cd
8.	AGFWH004818	11.56	ab	9.9	e	78.6	cd	1.3	cd
9.	LRPB16-0598 (Stockade)	10.57	c	10.7	cd	81.4	a	1.9	b
	LSD 0.05	0.79		0.37		1.95		0.40	
	p-Value	<0.001		<0.001		<0.001		<0.001	
Mean of nine cultivars									
	Disease Pressure								
1.	Full Fungicide Program	10.98	a	10.2	b	78.3	a	1.5	b
2.	No Fungicide	9.24	b	10.8	a	76.0	b	2.1	a
	LSD 0.05	0.26		0.35		0.40		0.39	
	p-Value	<0.001		0.014		<0.001		0.023	
	Full Fungicide Program								
1.	RGT Accroc	9.85	d	10.0	g	75.2	ghi	1.0	gh
2.	Reflection	12.37	a	8.7	j	76.5	efg	3.1	b
3.	Beaufort	8.22	e	11.1	bcd	73.7	hi	2.6	c
4.	SFR86-085 (RGT Waugh)	11.99	ab	11.0	b-e	78.4	cde	0.9	gh
5.	GS-18-105-W	10.19	cd	10.6	ef	80.1	a-d	1.3	fgh
6.	AGTW0005	11.59	ab	10.8	de	79.2	b-e	0.8	h
7.	Big Red	11.66	ab	9.5	hi	81.1	ab	1.2	fgh
8.	AGFWH004818	11.61	ab	9.9	gh	78.6	b-e	1.2	fgh
9.	LRPB16-0598 (Stockade)	11.39	ab	10.6	def	82.0	a	1.7	def
	No Fungicide								
1.	RGT Accroc	7.44	e	10.8	de	72.6	i	1.4	efg
2.	Reflection	11.16	bc	9.1	ij	75.0	ghi	3.6	b
3.	Beaufort	4.70	f	12.9	a	64.8	j	4.7	a
4.	SFR86-085 (RGT Waugh)	9.46	d	11.4	bc	75.6	fgh	1.4	fgh
5.	GS-18-105-W	7.66	e	11.5	b	78.5	b-e	1.9	de
6.	AGTW0005	11.45	ab	10.9	cde	78.0	def	0.9	gh
7.	Big Red	10.00	d	10.2	fg	80.1	a-d	1.3	fgh
8.	AGFWH004818	11.51	ab	10.0	g	78.7	b-e	1.4	efg
9.	LRPB16-0598 (Stockade)	9.75	d	10.8	de	80.8	abc	2.1	cd
	LSD 0.05	1.11		0.52		2.76		0.56	
	p-Value	<0.001		0.001		0.002		<0.001	

Table 2. Details of the management levels.

Sowing date	**28 April**	
Plant population		180 seeds/m²
Basal fertiliser		100 kg/ha MAP
Nitrogen	**10 August**	46kg N/ha
	12 September	46kg N/ha
	20 October	92Kg/ha
PGR	**GS30**	Moddus Evo 100ml/ha + Errex 650ml/ha
	GS32	Moddus Evo 100ml/ha + Errex 650ml/ha
Fungicide	**GS00**	Systiva
	GS31	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS59-61	Opus 500ml/ha

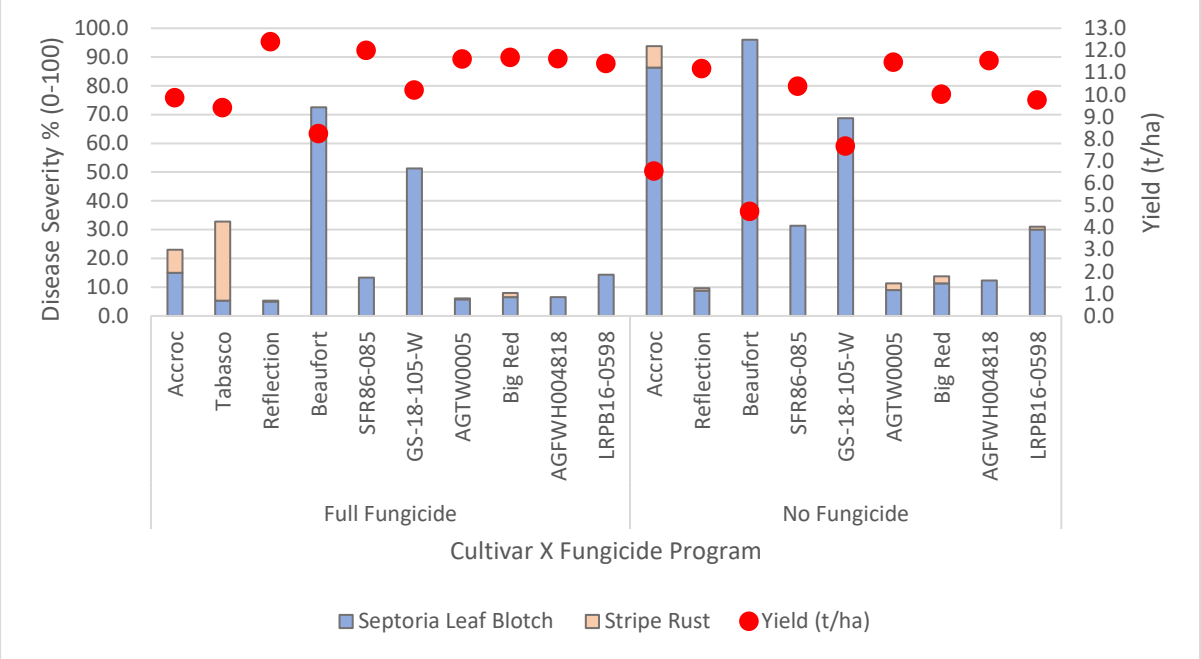

Figure 3: Effect of Fungicide and Cultivar interaction on Stripe Rust and Septoria Leaf Blotch and total grain yield (t/ha).

Trial 3: HYC Wheat Germplasm x Environment x Management GEM (FAR TAS W22-03-1)

Key Points:

- Grain yields of RGT Accroc, RGT Cesario and Big Red were consistently higher yielding under a 3-spray full fungicide programme irrespective of a canopy management strategy, with Big Red being the highest yielding cultivar.
- There was significant interaction between cultivar and fungicide strategy with RGT Accroc giving a greater response to the 3-spray fungicide (1.95 t/ha) than RGT Cesario (0.93 t/ha) and Big Red (0.73 t/ha) over the single spray fungicide approach at flag leaf.
- The highest yields were achieved with Big Red 11.62 t/ha which was 2 t/ha higher yielding than RGT Accroc 9.59 t/ha and RGT Cesario 9.64 t/ha.
- The highest yielding canopy management approach was 225N plus PGR application with the higher input fungicide strategy, but it was on average 0.23 t/ha higher than 150N with no PGR and the same higher input fungicide package.
- The largest management effects on grain yield were fungicide input (on average positive effect) and defoliation (on average negative effect).
- Additional yield response to an extra 75N (150N v 225N) was only significant when PGR was part of the canopy management.
- Economics illustrated that if a low fungicide input (1 spray) was used then 150N and no canopy management intervention produced the optimum margins.
- However higher input fungicide produced better margins with the 150N and no canopy intervention.
- There was a case with applying PGR management when 225N was used as the N strategy, however it was only with Big Red that 225N and PGR produced a sufficiently large enough yield increase to pay for the extra input, but the difference compared to 150N and no PGR was small (0.66 t/ha to pay for extra 75N at $2/kg N and PGR application).
- With RGT Accroc and RGT Cesario the yield increase associated with the extra N and PGR was 0.31 and 0.44 t/ha respectively.
- Crop lodging was not excessive but was most pronounced where RGT Accroc was grown with 225N and no PGR intervention. Big Red showed similar trends but lodging was not as pronounced as RGT Accroc. RGT Cesario showed no lodging irrespective of management.

Treatments:

Three cultivars RGT Cesario, Big Red and RGT Accroc were subject to three tiers of management intervention as outlined in Table 1.

Table 1. Three tiers of management including levels of fungicide inputs, canopy management and additional Nitrogen.

	Treatment ID	Fungicide	Canopy Management	Kg Nitrogen (N)
1.	Standard (Std) Fungicide & no intervention (NI)	Standard (cheaper)[1]	Untreated	184
2.	Standard (Std) Fungicide & no intervention (NI) + N	Standard (cheaper) [1]	Untreated	284
3.	Standard (Std) Fungicide & PGR	Standard (cheaper) [1,4]	Defoliation	284
4.	Standard (Std) Fungicide & PGR + N	Standard (cheaper) [1,3]	PGR	284
5.	Higher input Fungicide & no intervention (NI)	Higher input[2]	Untreated	184
6.	Higher input Fungicide & PGR + N	Higher input[2]	Untreated	284
7.	Dual - purpose system	Higher input[2,4]	Defoliation	284
8.	Hyper - yield system	Higher input[2,3]	PGR	284

[1] Single flag spray (Standard spray program) – 1 foliar fungicide: Aviator Xpro 500ml/ha at GS39.

[2] Higher fungicide input – 3 foliar fungicides: Prosaro 300ml/ha, Aviator Xpro 500ml/ha and Radial 600ml/ha at GS31, 39 and 59-61 respectively.

[3] Plant Growth Regulators (PGR) (Moddus® Evo 200 mL/ha + Errex 1300mL/ha at GS30).

[4] Mechanical Defoliation (mower) to simulate biomass removal with livestock at GS30.

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

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		8.84	b	10.66	a	8.12	c	9.21	
	LSD	0.36				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		8.38	d	10.30	b	7.14	e	8.60	b
Full Fungicide Program		9.31	c	11.03	a	9.09	c	9.81	a
Fungicide	***LSD***	0.84				***p-Value***		0.020	
Fungicide x Cultivar	***LSD***	0.51				***p-Value***		0.003	
Canopy Management									
No Intervention - 150N		8.85	-	10.94	-	8.28	-	9.36	ab
No intervention – 225N		8.63	-	10.56	-	7.77	-	8.99	bc
Mechanical Defoliation GS30		8.71	-	9.96	-	8.02	-	8.89	c
PGR Moddus 0.2 + Errex 1.3 GS30		9.18	-	11.21	-	8.39	-	9.59	a
Canopy Management	***LSD***	0.45				***p-Value***		0.014	
Cultivar x Canopy Mgmt	***LSD***	ns				***p-Value***		0.511	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		8.49	-	10.92	-	7.64	-	9.01	-
No intervention – 225N		8.12	-	10.07	-	6.91	-	8.37	-
Mechanical Defoliation GS30		8.19	-	9.41	-	6.45	-	8.01	-
PGR Moddus 0.2 + Errex 1.3 GS30		8.71	-	10.80	-	7.56	-	9.02	-
Full Fungicide Program									
No Intervention - 150N		9.22	-	10.96	-	8.92	-	9.70	-
No intervention – 225N		9.13	-	11.05	-	8.63	-	9.60	-
Mechanical Defoliation GS30		9.22	-	10.51	-	9.59	-	9.77	-
PGR Moddus 0.2 + Errex 1.3 GS30		9.64	-	11.62	-	9.23	-	10.16	-
Disease Pressure x Canopy Mgmt	***LSD***	ns				***p-Value***		0.137	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	ns				***p-Value***		0.684	

Table 2. Influence of cultivar, management strategy and fungicide application on protein (%).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		11.3	a	10.9	b	10.7	c	10.9	
	LSD	0.16				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		11.4	-	10.9	-	10.7	-	11.0	a
Full Fungicide Program		11.1	-	10.9	-	10.6	-	10.9	b
Fungicide	***LSD***	0.06				***p-Value***		0.006	
Fungicide x Cultivar	***LSD***	ns				***p-Value***		0.062	
Canopy Management									
No Intervention - 150N		11.2	-	10.6	-	10.7	-	10.8	-
No intervention – 225N		11.3	-	11.0	-	10.8	-	11.0	-
Mechanical Defoliation GS30		11.4	-	11.0	-	10.4	-	10.9	-
PGR Moddus 0.2 + Errex 1.3 GS30		11.1	-	10.8	-	10.7	-	10.9	-
Canopy Management	***LSD***	ns				***p-Value***		0.551	
Cultivar x Canopy Mgmt	***LSD***	ns				***p-Value***		0.090	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		11.3	-	10.6	-	10.8	-	10.9	-
No intervention – 225N		11.6	-	11.1	-	10.8	-	11.2	-
Mechanical Defoliation GS30		11.6	-	11.0	-	10.6	-	11.0	-
PGR Moddus 0.2 + Errex 1.3 GS30		11.2	-	10.8	-	10.7	-	10.9	-
Full Fungicide Program									
No Intervention - 150N		11.0	-	10.7	-	10.6	-	10.8	-
No intervention – 225N		11.0	-	10.9	-	10.8	-	10.9	-
Mechanical Defoliation GS30		11.2	-	11.0	-	10.3	-	10.8	-
PGR Moddus 0.2 + Errex 1.3 GS30		11.1	-	10.9	-	10.8	-	10.9	-
Disease Pressure x Canopy Mgmt	***LSD***	ns				***p-Value***		0.776	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	ns				***p-Value***		0.914	

Table 3. Influence of cultivar, management strategy and fungicide application on test weight (kg/hL).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		78.5	b	80.7	a	75.9	c	78.4	
	LSD	0.61				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		78.5	b	80.3	a	74.9	d	77.9	b
Full Fungicide Program		78.6	b	81.0	a	76.8	c	78.8	a
Fungicide	***LSD***	0.39				***p-Value***		0.005	
Fungicide x Cultivar	***LSD***	0.86				***p-Value***		0.013	
Canopy Management									
No Intervention - 150N		78.7	-	81.0	-	77.3	-	79.0	a
No intervention – 225N		78.9	-	80.7	-	74.9	-	78.2	b
Mechanical Defoliation GS30		78.1	-	80.1	-	75.7	-	78.0	b
PGR Moddus 0.2 + Errex 1.3 GS30		78.4	-	80.9	-	75.6	-	78.3	b
Canopy Management	***LSD***	0.52				***p-Value***		0.004	
Cultivar x Canopy Mgmt	***LSD***	ns				***p-Value***		0.104	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		79.2	-	81.0	-	76.3	-	78.8	-
No intervention – 225N		79.0	-	80.1	-	73.8	-	77.6	-
Mechanical Defoliation GS30		77.3	-	79.8	-	74.6	-	77.2	-
PGR Moddus 0.2 + Errex 1.3 GS30		78.6	-	80.4	-	74.9	-	78.0	-
Full Fungicide Program									
No Intervention - 150N		78.2	-	81.0	-	78.2	-	79.1	-
No intervention – 225N		78.8	-	81.4	-	76.0	-	78.7	-
Mechanical Defoliation GS30		79.0	-	80.4	-	76.8	-	78.7	-
PGR Moddus 0.2 + Errex 1.3 GS30		78.2	-	81.5	-	76.3	-	78.7	-
Disease Pressure x Canopy Mgmt	***LSD***	ns				***p-Value***		0.128	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	ns				***p-Value***		0.635	

Table 4. Influence of cultivar, management strategy and fungicide application on screenings (%).

		RGT Cesario		BigRed		RGT Accroc		*Mean*	
Cultivar		1.0	b	1.4	a	1.5	a	1.3	
	LSD	0.10				***p-Value***		<0.001	
Disease Pressure									
Single Spray Program		1.0	-	1.5	-	1.7	-	1.4	-
Full Fungicide Program		0.9	-	1.4	-	1.4	-	1.2	-
Fungicide	***LSD***	ns				***p-Value***		0.204	
Fungicide x Cultivar	***LSD***	ns				***p-Value***		0.079	
Canopy Management									
No Intervention - 150N		1.0	-	1.3	-	1.4	-	1.2	b
No intervention – 225N		1.0	-	1.4	-	1.5	-	1.3	b
Mechanical Defoliation GS30		1.2	-	1.6	-	1.8	-	1.5	a
PGR Moddus 0.2 + Errex 1.3 GS30		0.9	-	1.4	-	1.4	-	1.2	b
Canopy Management	***LSD***	0.14				***p-Value***		<0.001	
Cultivar x Canopy Mgmt	***LSD***	ns				***p-Value***		0.479	
Disease Pressure x Canopy Mgmt.									
Single Spray Program									
No Intervention - 150N		1.0	-	1.3	-	1.4	-	1.2	-
No intervention – 225N		0.9	-	1.4	-	1.7	-	1.3	-
Mechanical Defoliation GS30		1.3	-	1.7	-	2.1	-	1.7	-
PGR Moddus 0.2 + Errex 1.3 GS30		0.9	-	1.5	-	1.4	-	1.3	-
Full Fungicide Program									
No Intervention - 150N		0.9	-	1.3	-	1.3	-	1.2	-
No intervention – 225N		1.0	-	1.4	-	1.3	-	1.3	-
Mechanical Defoliation GS30		1.0	-	1.5	-	1.5	-	1.3	-
PGR Moddus 0.2 + Errex 1.3 GS30		0.8	-	1.4	-	1.4	-	1.2	-
Disease Pressure x Canopy Mgmt	***LSD***	ns				***p-Value***		0.087	
Disease Pressure x Canopy Mgmt x Cultivar	***LSD***	ns				***p-Value***		0.513	

Table 5. Details of the management levels.

Sowing date:	**28 April**	
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:		As per treatment list
Canopy intervention:	**GS30**	Moddus® Evo 200 mL/ha + Errex 1300mL/ha
	GS30	Defoliation
Fungicide:	**GS31**	Prosaro 300ml/ha
	GS39	Aviator Xpro 500ml/ha
	GS59-61	Radial 600ml/ha

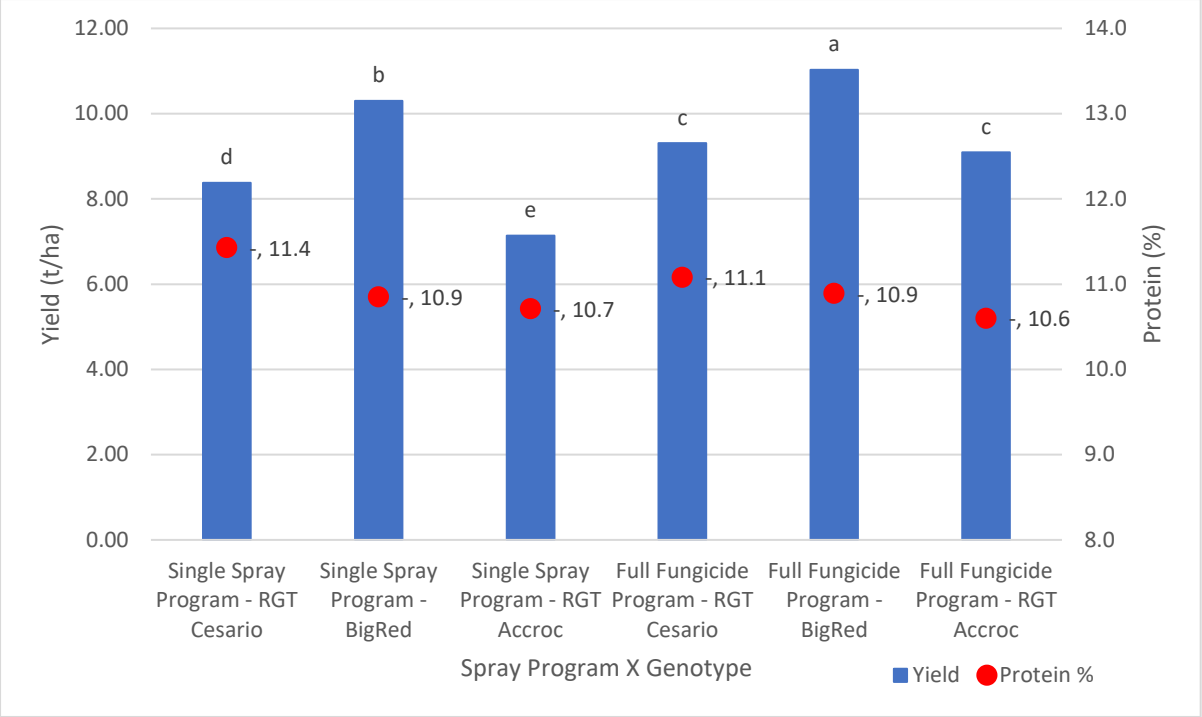

Figure 1: Yield and protein assessments in six different Spray Program-Genotype combinations. Significant differences in yield levels and non-significant differences in protein levels were recorded.

Trial 4a: HYC Wheat IDM Disease Management Germplasm Interaction (FAR TAS W22-04a-1)

- STB infected wheat stubble added to the plots significantly reduced yield relative to the standard stubble (carrot seed stubble) with only the STB resistant cultivar RGT Cesario being unaffected.
- There was a significant interaction between measures employed at sowing and cultivar with RGT Accroc giving a significant yield response to flutriafol, as a result of increased stripe rust & STB susceptibility.
- The two more resistant varieties RGT Cesario and Anapurna showed significant yield responses to two units of foliar fungicides over a single flag leaf fungicide but there was no yield response to four units of fungicide over two.
- The most prevalent disease in Revenue and Accroc was STB with low levels of stripe rust in the latter.
- Lower levels of disease were experienced in Anapurna and RGT Cesario with Anapurna suffering from low to intermediate levels of STB and RGT Cesario suffering from stripe rust and very low levels of STB.

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

		RGT Cesario		Anapurna		RGT Accroc		Revenue		*Mean*	
Cultivar		9.30	b	9.88	a	8.52	c	7.28	d	8.74	
	LSD	0.18						***p-Value***		<0.001	
Disease Pressure											
Infected Wheat Stubble		9.17	cd	9.53	b	8.07	f	7.08	h	**8.46**	b
Standard Residue		9.44	bc	9.93	a	8.58	e	7.43	g	**8.85**	a
Flutriafol treated MAP		9.28	bc	10.17	a	8.89	d	7.34	gh	**8.92**	a
Disease Pressure	***LSD***	0.16						***p-Value***		<0.001	
Disease Pressure x Cultivar	***LSD***	0.31						***p-Value***		0.031	
Fungicide Management Regime											
Untreated		8.09	ef	7.66	g	5.86	i	4.80	j	**6.60**	d
1 Fungicide Unit		8.78	d	9.86	b	7.93	fg	6.91	h	**8.37**	c
2 Fungicide Units		10.20	b	11.12	a	10.92	a	9.06	cd	**10.33**	a
4 Fungicide Units		10.11	b	10.87	a	*9.36**	*c*	*8.35**	*e*	***9.67****	b
Fungicide Management Regime	***LSD***	0.33						***p-Value***		<0.001	
Cultivar x Fung Mgmt Regime	***LSD***	0.35						***p-Value***		<0.001	
Disease Pressure x Fung Mgmt. Regime											
Flutriafol treated MAP											
Untreated		8.19	-	8.04	-	6.14	-	4.84	-	**6.80**	-
1 Fungicide Unit		8.76	-	10.10	-	8.14	-	6.81	-	**8.45**	-
2 Fungicide Units		10.08	-	11.30	-	11.19	-	8.89	-	**10.37**	-
4 Fungicide Units		10.08	-	11.26	-	10.10*	-	8.82*	-	**10.07***	-
Standard Residue											
Untreated		8.47	-	7.70	-	5.90	-	4.98	-	**6.76**	-
1 Fungicide Unit		8.87	-	9.94	-	8.21	-	7.11	-	**8.53**	-
2 Fungicide Units		10.42	-	11.05	-	10.82	-	9.40	-	**10.42**	-
4 Fungicide Units		10.01	-	11.04	-	9.41*	-	8.22*	-	**9.67***	-
Infected Wheat Stubble											
Untreated		7.63	-	7.25	-	5.53	-	4.57	-	**6.24**	-
1 Fungicide Unit		8.72	-	9.55	-	7.44	-	6.82	-	**8.13**	-
2 Fungicide Units		10.11	-	11.00	-	10.75	-	8.91	-	**10.19**	-
4 Fungicide Units		10.23	-	10.32	-	8.58*	-	8.01*	-	**9.28***	-
Disease Pressure x Fung Mgmt	***LSD***	ns						***p-Value***		0.748	
Disease Pressure x Fung Mgmt x Cultivar	***LSD***	ns						***p-Value***		0.539	

**** Due to an input error the 4 units of fungicide on RGT Accroc and Revenue cannot be regarded as a true reflection of the treatment.***

Table 2. Details of the management levels.

Sowing date:	**27 April**				
Seed Rate:		180 Seeds/m^2			
Basal fertiliser:		100kg MAP			
Nitrogen:	**10 August**	46Kg N/ha			
	12 September	46Kg N/ha			
	20 October	92Kg N/ha			
		Untreated	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**
Fungicide:	**GS00**	---	---	---	Systiva
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha
	GS59-61	---	---	---	Opus 500ml/ha

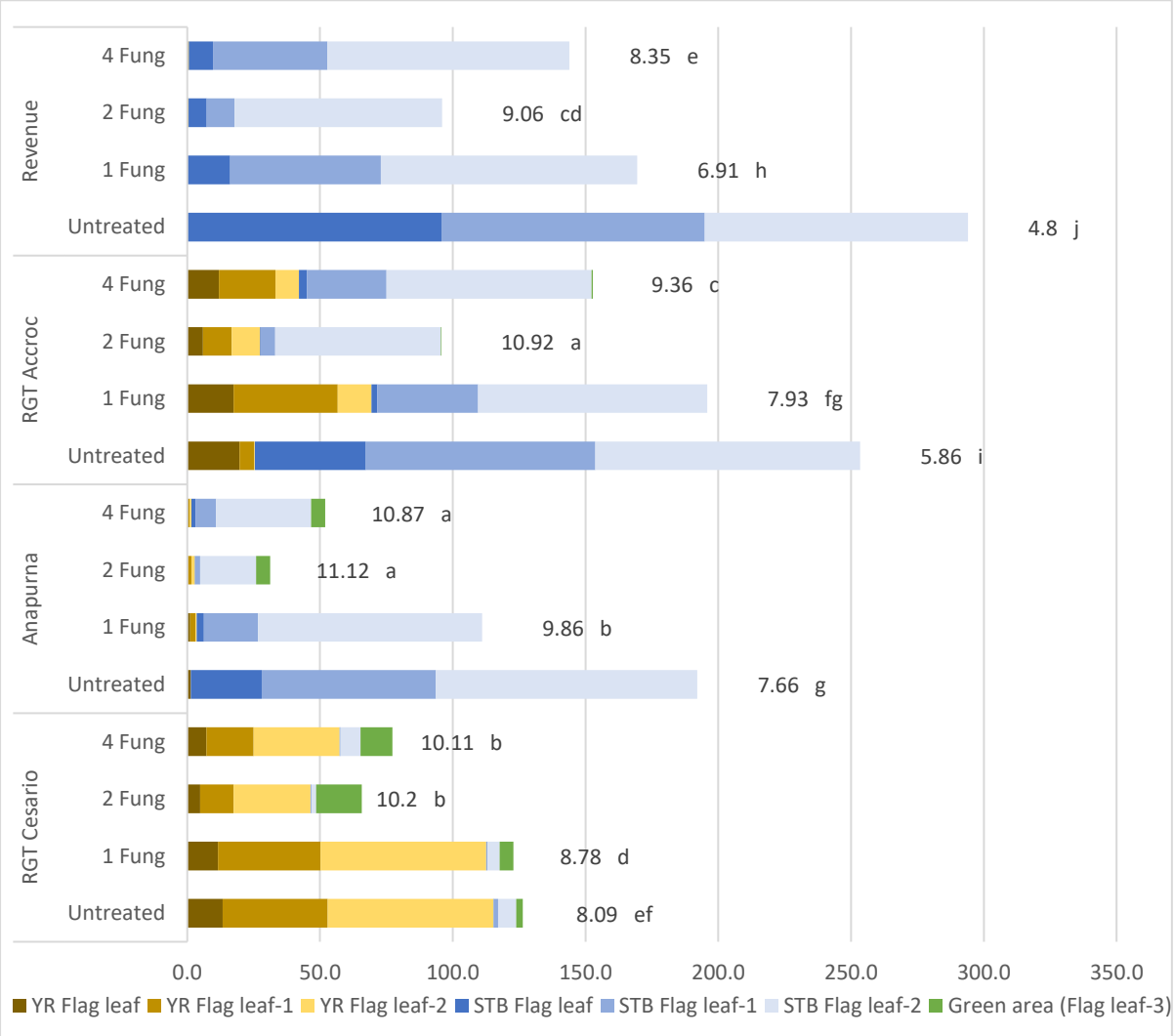

Figure 1: Effect of Fungicide and Cultivar interaction on Stripe Rust (YR), Septoria Leaf Blotch (STB) and Green leaf area at different leaf layers and total grain yield (t/ha).

**** Due to an input error the 4 units of fungicide on RGT Accroc and Revenue cannot be regarded as a true reflection of the treatment***

Trial 4: HYC Wheat Disease Management (FAR TAS W22-04-1)

Key Points:

- Grain yields of the untreated crop in a high-pressure disease season yielded 10.40 t/ha indicating the more resistant nature of this cultivar.
- There was a significant response to a single flag leaf fungicide of 0.91 t/ha and a further 0.69 t/ha response to an additional GS32 spray at the start of stem elongation.
- There was no added value in either yield or margin when applying four units of fungicide to this cultivar.
- Delaying the flag leaf spray in order to combine the head and flag leaf application (straddle approach) was less effective than the traditional two spray approach of applying two units of fungicide at GS32 and GS39.

Objectives: To develop profitable and sustainable approaches to disease management in High Rainfall Zone (HRZ) wheat.

Treatments:

The cultivar Big Red was evaluated with five levels of fungicide input:

11. Untreated
12. 1 unit of fungicide – GS39
13. 2 units of fungicide – GS32 & GS39
14. 2 units of fungicide – GS32, GS55 (straddle approach)
15. 4 units of fungicide – Flutriafol at sowing, GS31, GS39 and GS59

Table 1. Yield (t/ha), % of Mean and grain quality, protein (%), test weight (kg/hL) & screenings (%).

	Yield				Quality					
	Yield (t/ha)		% of Mean		Protein (%)		Test Weight (kg/hL)		Screenings (%)	
Untreated	10.41	c	90.7	c	10.5	b	80.8	-	1.5	-
1F Flag Leaf Approach	11.32	b	98.7	b	10.9	a	80.8	-	1.3	-
2F Straddle Approach	11.64	ab	101.5	ab	10.8	a	80.8	-	1.2	-
4F Full Protection	11.96	a	104.3	a	10.9	a	81.2	-	1.2	-
2F Standard Approach	12.03	a	104.9	a	10.7	ab	80.5	-	1.4	-
Mean	11.47		100.0		10.7		80.8		1.3	
LSD 0.05	0.41		3.6		0.3		ns		ns	
P Val	<0.001		<0.001		0.045		0.697		0.271	
CV	2.31		2.32		1.84		0.8		15.2	

Table 2. Details of the management levels.

Sowing date:	**27 April**					
Cultivar:		BigRed				
Seed Rate:		180 Seeds/m^2				
Basal fertiliser:		100kg MAP				
Nitrogen:	**10 August**	46kg N/ha				
	12 September	46kg N/ha				
	20 October	92Kg N/ha				

Fungicide:		**Untreated**	**1 Fungicide Unit**	**2 Fungicide Units**	**4 Fungicide Units**	**2 Straddle approach**
	GS00	---	---	---	Flutriafol 100g ai/ha	---
	GS31	---	---	Prosaro 300ml/ha	Prosaro 300ml/ha	---
	GS33	---	---	---	---	FAR F1-19 750ml/ha
	GS39	---	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	FAR F1-19 750ml/ha	---
	GS55	---	---	---	---	Opus 500ml/ha
	GS59-61	---	---	---	Opus 500ml/ha	---

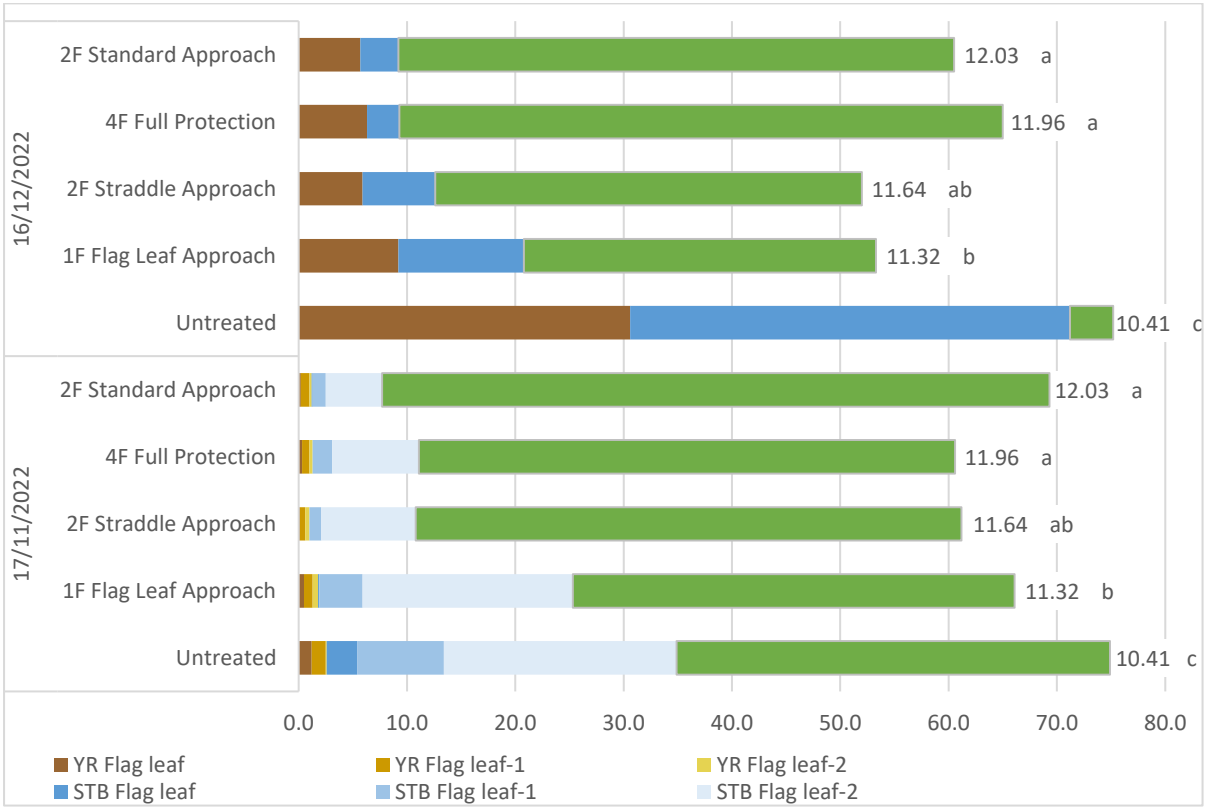

Figure 1: Effect of fungicide application approaches on Stripe Rust (YR), Septoria Leaf Blotch (STB) and Green leaf area at different leaf layers and total grain yield (t/ha).

Trial 5: Nutrition for Hyper Yielding Wheat (FAR TAS W22-05-1)

cv RGT Relay

Key Points:

- With 165kg N/ha in the soil 0 – 60cm on the zero N treatment (only 10 kg N/ha MAP applied) yielded 10.26 t/ha with a protein of 9.0% indicating the presence of 155kg N/ha in grain.
- If 75% of the N is assumed to be in the grain and 25% in the straw residue, then the total N uptake at harvest in zero N plots would be 216kg N/ha indicating approximately 51kg N/ha coming from the soil via mineralisation.
- If straw residue was returned to the paddock the nitrogen would balance as 165kg N/ha as available in the soil in the autumn (10N from MAP) and 162kg N/ha removed in the grain at harvest.
- All N applications as urea applied as 2 or 3 split applications only served to increase protein but not yield.
- There was a significant yield decrease when more than 170N was applied.
- Applying N as a three split as opposed to a two split at 210N increased yield but the difference of 0.38 t/ha was not statistically significant.
- Applying manure on top of 170N gave a significant yield decrease, and where the equivalent macro nutrients were applied there was also reduction in yield.
- There were no significant differences in flowering dry matters and no significant differences in harvest dry matters as a result of N applications between 0 – 160N
- The zero N treatment had the highest test weight and lowest protein.

Table 1. Detailed treatment list, grain yield (t/ha) & % site mean.

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Yield		Mean	
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	(t/ha)		(%)	
1	0 (MAP)	22	---	---	10.26	a	106.4	a
2	80N (40N + 40N)	22	---	---	10.22	a	105.9	a
3	120N (60N + 60N)	22	---	---	9.81	abc	101.7	abc
4	160N (80N + 80N)	22	---	---	10.04	ab	104.1	ab
5	200N (100N + 100N)	22	---	---	9.31	cd	96.5	cd
6	240N (120N + 120N)	22	---	---	9.09	d	94.2	d
7	280N (140N + 140N)	22	---	---	9.23	cd	95.7	cd
8	200N (80N + 80N + 40N)	22	---	---	9.69	a-d	100.5	a-d
9	[1]160N + Manure	22	---	---	9.40	cd	97.4	cd
10	191N + P + K + S	65	83	37	9.43	bcd	97.8	bcd
				Mean	9.65		100.0	
				LSD (p=0.05)	0.63		6.57	
				P Val	0.004		0.004	

Note: All treatments received 100kg/ha MAP (10N: 22P) which is included in the treatment details.

[1]Manure applied at a rate of 5 t/ha, see table 5 for details.*

[2]Nutrients applied at rate in the treatment details to match the nutrient content of applied manure.

Table 2. Influence of nitrogen rate on grain quality, protein (%), test weight (kg/hL) and screenings (%).

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Protein		Test weight		Screenings	
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	%		kg/hL		%	
1	0	22	---	---	9.0	g	74.9	a	3.3	bc
2	80	22	---	---	9.3	fg	74.8	a	3.4	bc
3	120	22	---	---	9.8	ef	73.6	bc	3.1	c
4	160	22	---	---	10.1	de	74.3	ab	3.4	bc
5	200	22	---	---	10.6	bc	73.3	bc	4.1	ab
6	240	22	---	---	10.8	ab	72.0	d	4.1	ab
7	280	22	---	---	11.2	a	70.7	e	4.3	a
8	200	22	---	---	10.8	ab	72.7	cd	3.9	ab
9	160 + M	22	---	---	10.4	bcd	72.7	cd	4.3	a
10	191	65	83	37	10.3	cde	73.1	c	4.0	ab
				Mean	10.2		73.2		3.8	
				LSD (p=0.05)	0.48		1.07		0.80	
				P Val	<0.001		<0.001		0.030	

Table 3. Influence of nitrogen rate, manure and synthetic PKS on harvest dry matter (t/ha), harvest index (%) and thousand seed weight (g).

Treatment	Nitrogen rate	Phosphorus rate	Potassium rate	Sulphur rate	Harvest Dry Matter	
	kg N/ha	kg P/ha	kg P/ha	kg S/ha	t/ha	
1	0	22	---	---	24.6	abc
2	80	22	---	---	23.8	abc
3	120	22	---	---	24.2	abc
4	160	22	---	---	27.4	a
5	200	22	---	---	22.4	bc
6	240	22	---	---	22.0	bc
7	280	22	---	---	26.7	a
8	200	22	---	---	25.8	ab
9	160 + M	22	---	---	22.2	bc
10	191	65	83	37	20.7	c
				Mean	24.0	
				LSD (p=0.05)	3.97	
				P Val	0.032	

Table 4. Site soil test details.

	Level Found
ECEC	0.17 dS/m
Organic Carbon W&B	3.02 %
pH 1:5 water	7.05 pH
Total Mineral N*	164.7 kg soil mineral N/ha
Colwell Phosphorus	311 ppm
Colwell Potassium	588 ppm
KCl Sulfur	5.60 ppm

*Mineral N 0-60cm, all other results 0-10cm depth sampled 21/5/2022

Table 5: Details of the management levels.

Sowing date:	**28 April**				
Cultivar:		RGT Relay			
Plant population:		180 seeds/m²			
Basal fertiliser:		100 kg/ha MAP			
5 t/ha of Manure		**N**	**P**	**K**	**S**
		5.5	50	90	26
Nitrogen:	**GS30**	Treatment 2-10			
	GS32	Treatment 2-10			
	GS39	Treatment 8			
Fungicide:	**GS31**	Prosaro 300ml/ha			
	GS39	Aviator Xpro 500ml/ha			
	GS59-61	Opus 500ml/ha			

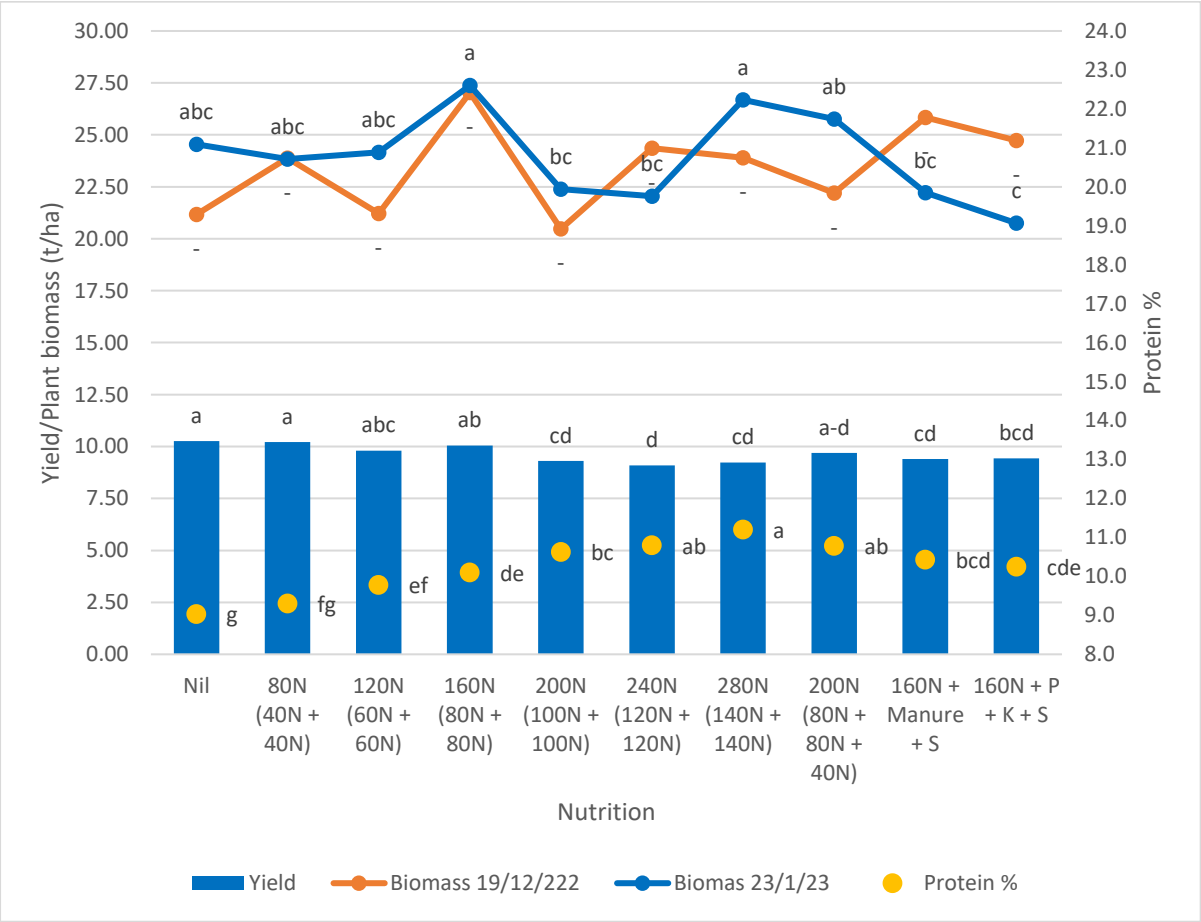

Figure 1: Effect of nutrition/Nitrogen rates on total grain yield (t/ha), plant biomass at anthesis and maturity and protein per cent.

Trial 6: Erect Head Control in Winter Wheat cv RGT Relay (FAR TAS W22-06-1)

Key Points:

- Insecticide management with the Imidacloprid seed treatment Gaucho significantly increased yield by 0.56 t/ha but additional foliar insecticides applied at tillering and at GS31 gave no further yield increases over Gaucho seed treatment alone.
- Adding additional fungicides (prochloraz and azoxystrobin) to the stem base GS31 fungicide based on epoxiconazole (Opus) significantly increased yield.

Table 1. Yield (t/ha), % of mean and grain quality assessment- protein (%), test weight (kg/hL) & screenings (%).

		Yield				Quality					
		Yield (t/ha)		% of Mean		Protein (%)		Test Weight (kg/hL)		Screenings (%)	
1.	Untreated	9.61	c	93.8	c	9.9	-	72.0	-	4.3	-
2.	Gaucho Seed Treatment	10.17	b	99.3	b	9.4	-	73.6	-	4.0	-
3.	Gaucho + GS21 SP	9.81	bc	95.7	bc	9.9	-	73.0	-	3.7	-
4.	Gaucho + GS21 SP + GS31 Insect	10.32	ab	100.7	ab	9.4	-	73.9	-	4.1	-
5.	T4 + GS31 Bolide 2L/ha	10.76	a	104.9	a	9.3	-	74.8	-	3.6	-
6.	T5 + Azoxy 62.5g/ha ai	10.82	a	105.5	a	9.8	-	74.1	-	3.7	-
	Mean	10.25		100.0		9.6		73.5		3.9	
	LSD 0.05	0.53		5.16		0.71		2.02		0.62	
	P Val	<0.001		<0.001		0.351		0.131		0.148	
	CV	3.43		3.42		4.91		1.82		10.60	

SP – Based on Karate Zeon 40ml/ha, GS31 spray based on Dominex

Table 2. Details of the management levels.

Sowing date:	**27 April**	
Cultivar:		RGT Relay
Plant population:		180 seeds/m²
Basal fertiliser:		100 kg/ha MAP
Nitrogen:	**10 August**	46Kg N/ha
	12 September	46Kg N/ha
	20 October	92Kg N/ha
Fungicide:	**GS31**	T1-T4 Epoxiconazole 62.5g/ha ai
	GS39	Radial 840ml/ha
	GS59-61	Prosaro 300ml/ha

Meteorological Data

NSW Crop Technology Centre- Wallendbeen, New South Wales

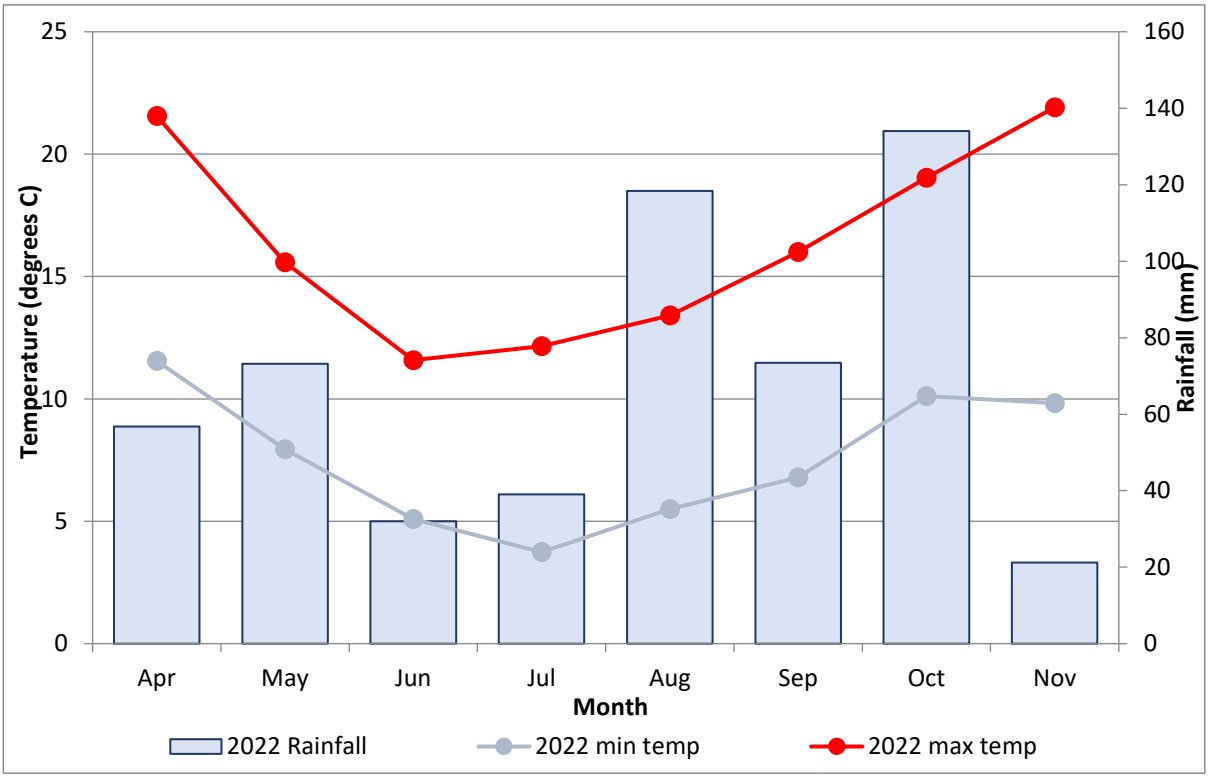

Figure 1. 2022 growing season rainfall and min and max temperatures (recorded by the onsite weather station). *Growing season rainfall (April to November) = 548mm*

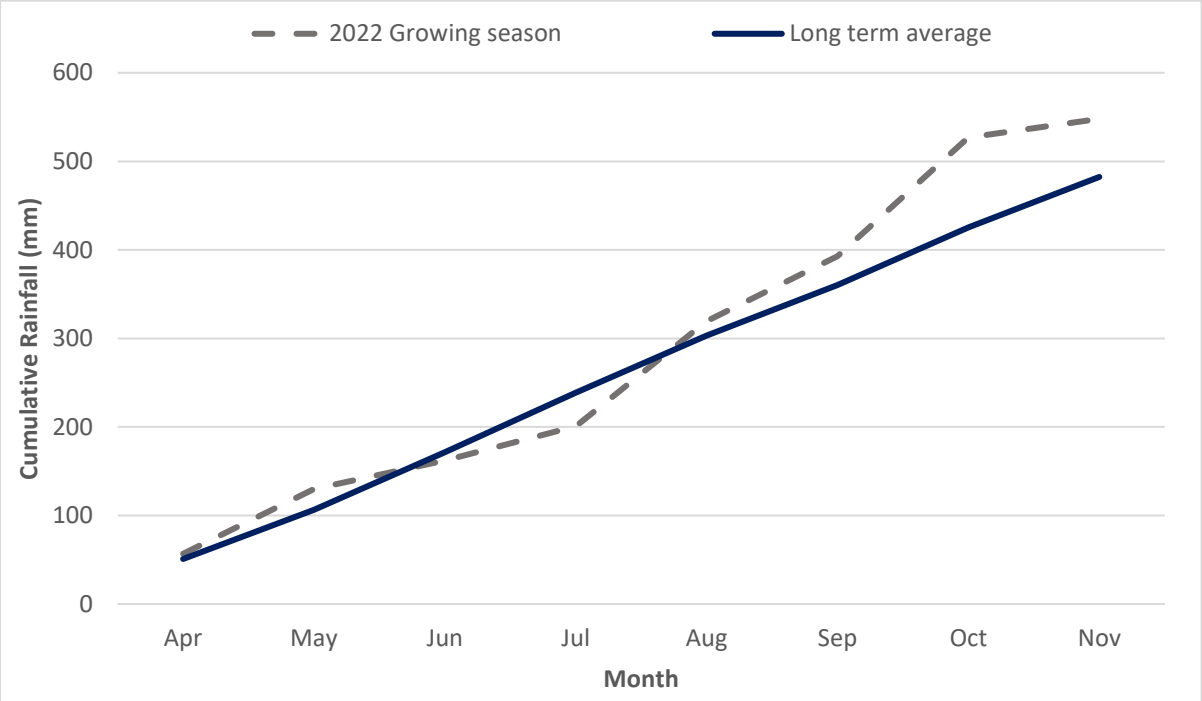

Figure 2. Cumulative rainfall for 2022 and the long-term average for the growing season (long term average recorded at Wallendbeen (Corang) BOM weather station).

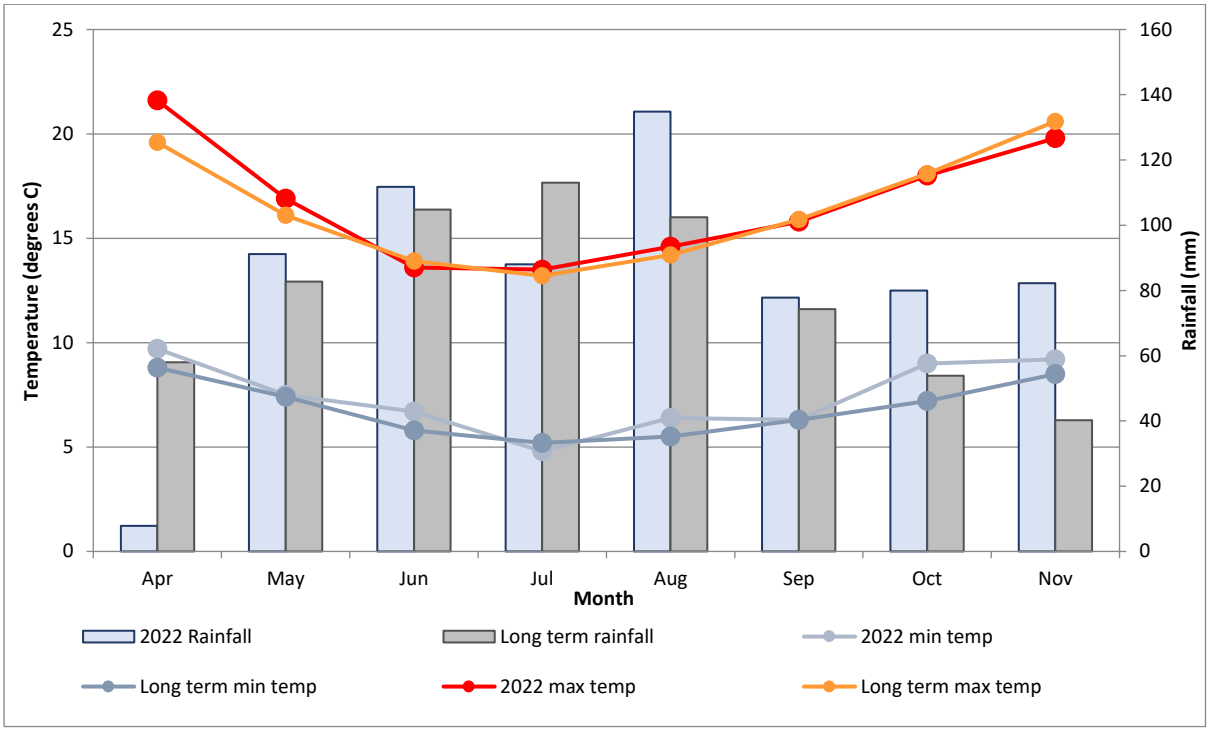

Figure 1. 2022 growing season and long-term rainfall recorded at Millicent (1877-2022) and growing season and long-term min and max temperatures recorded at Mount Gambier Aero (1941 to 2022) for the growing season (April to November). *Rainfall April to November= 674mm.*

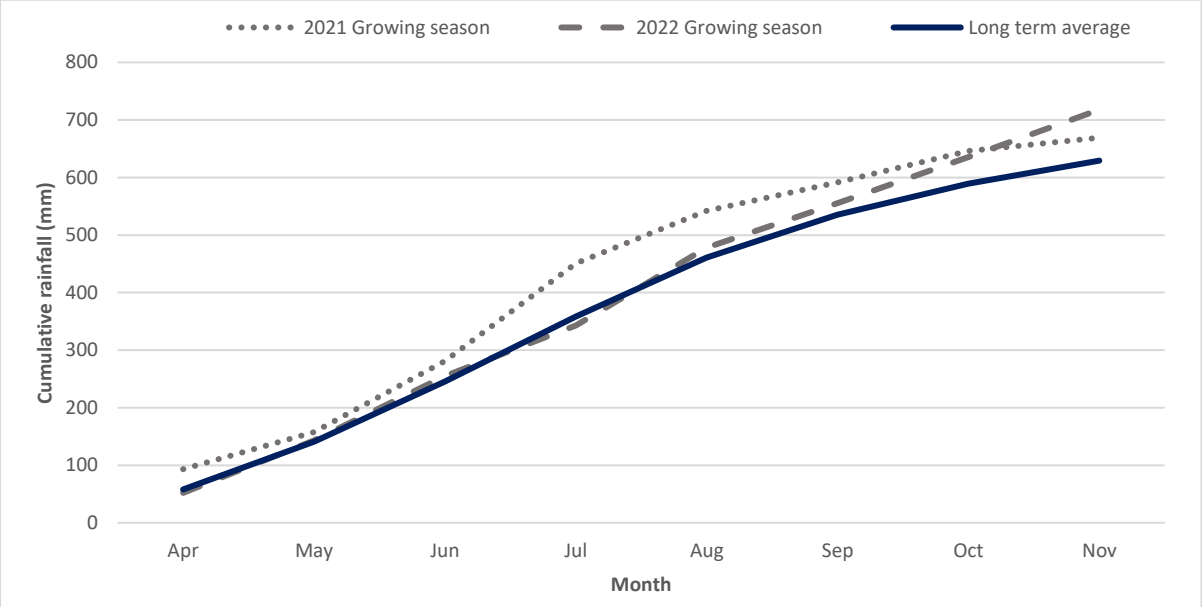

Figure 2. Cumulative growing season rainfall for 2021, 2022 and the long-term average for the growing season (April-November).

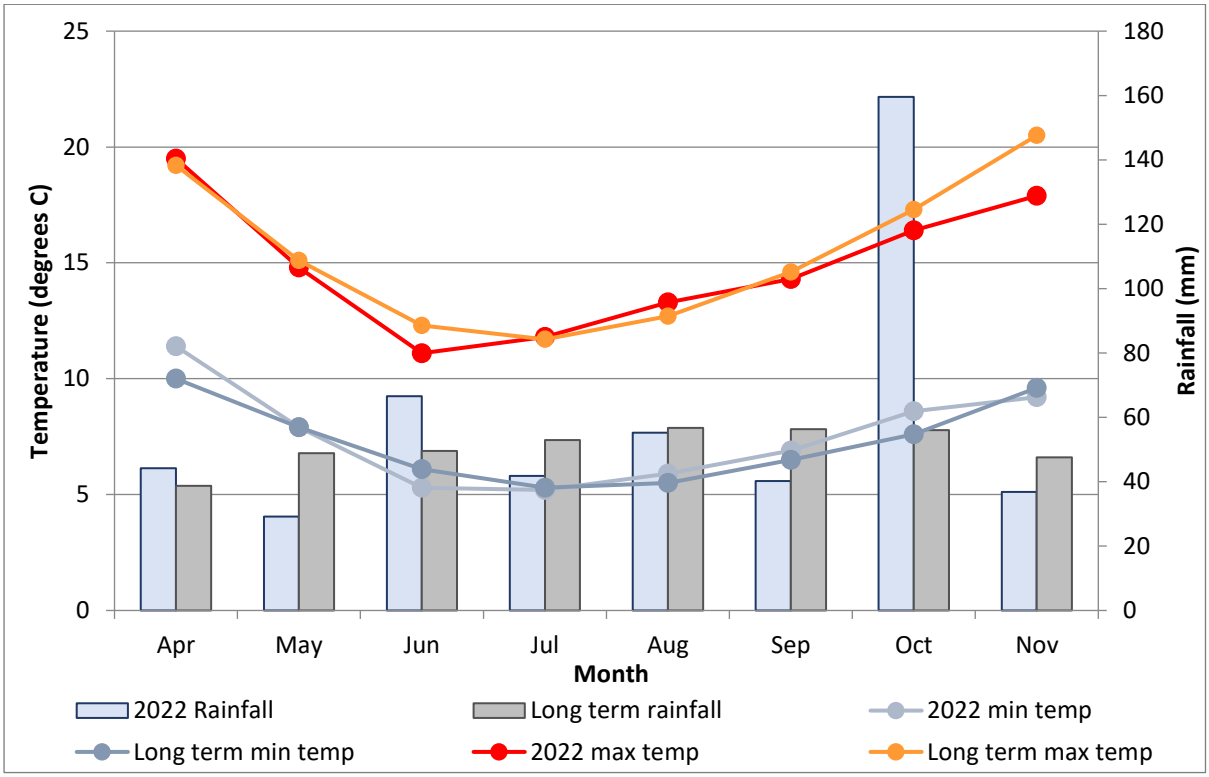

Figure 1. 2022 growing season rainfall and long-term rainfall (1898-2022) (recorded at Winchelsea (Post Office)), 2022 min and max temperatures and long-term min and max temperatures (2000-2022) (recorded at Mount Gellibrand). *Rainfall April to November= 473.6mm.*

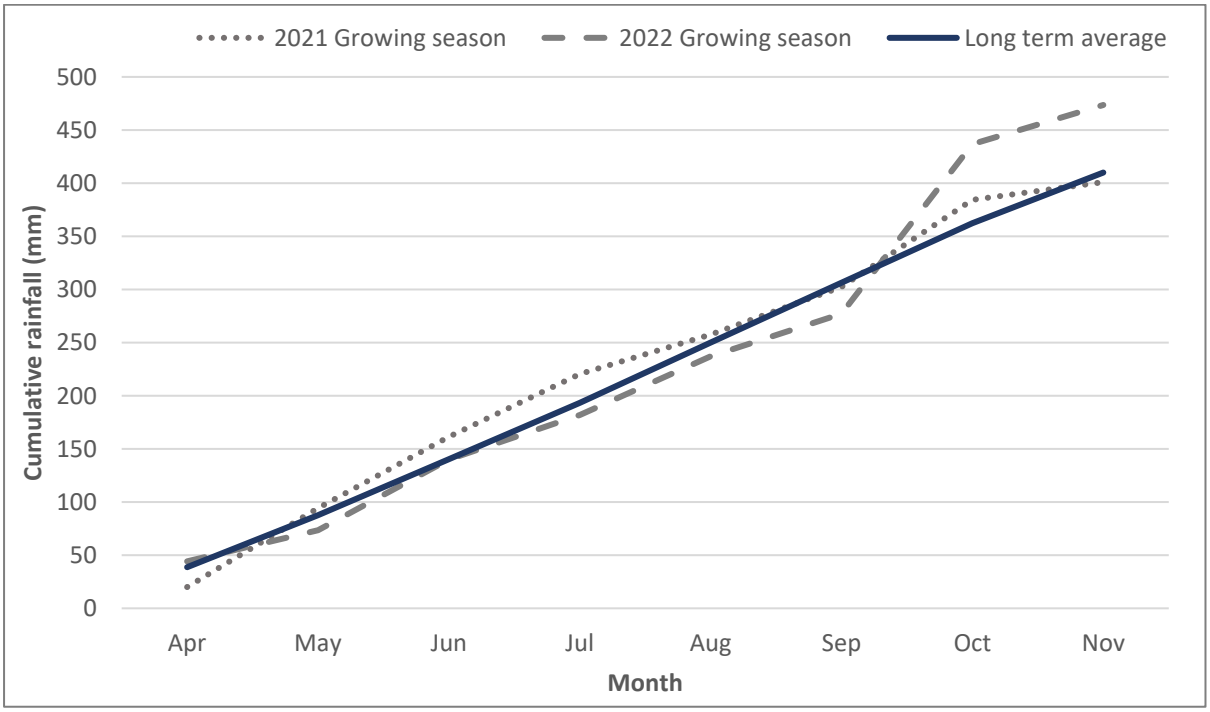

Figure 2. Cumulative growing season rainfall for 2021, 2022 and the long-term average for the growing season (April to November).

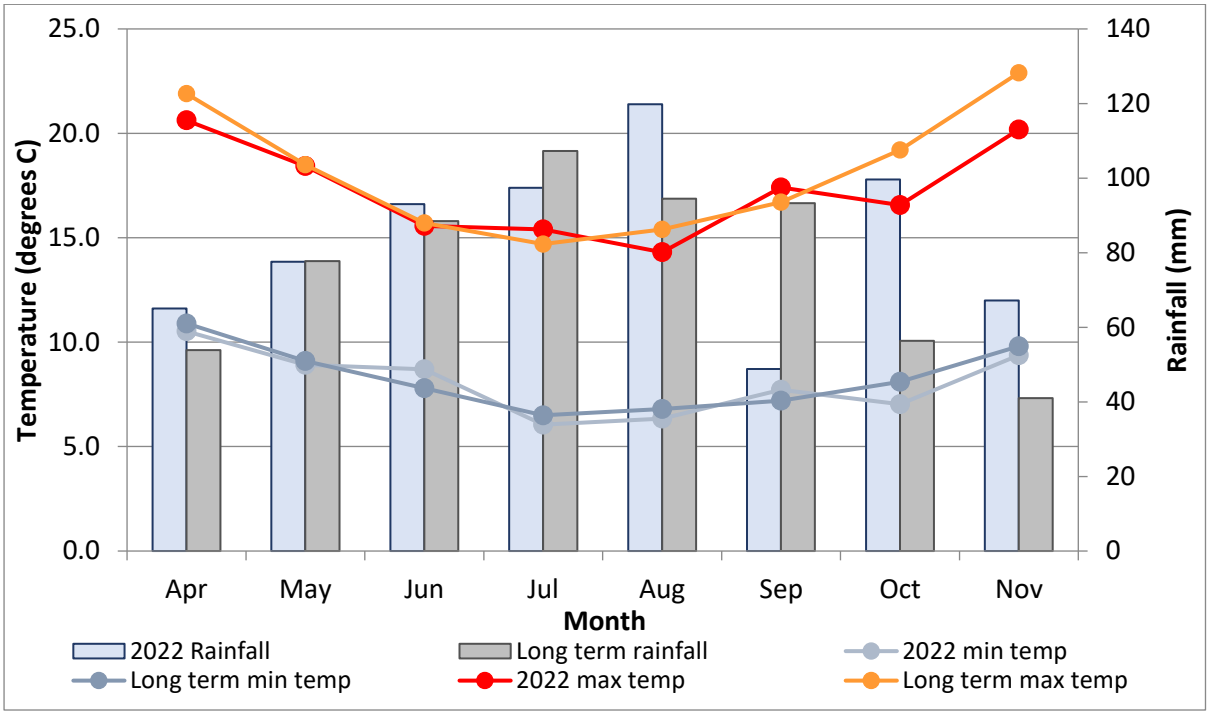

Figure 1. 2022 growing season rainfall and long-term rainfall, 2022 min and max temperatures and long-term min and max temperatures (1996-2022) (recorded at Rock Gully). *Growing season rainfall (April to October) = 601.2mm.*

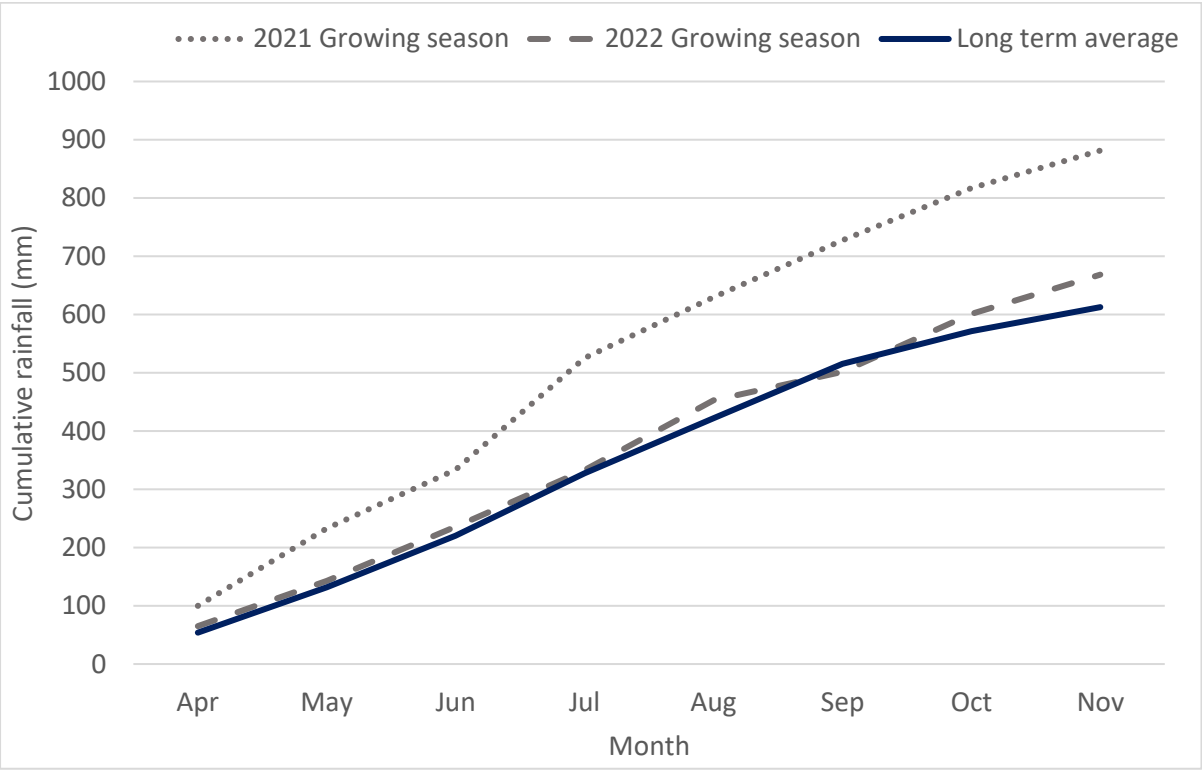

Figure 2. Cumulative growing season rainfall for 2021, 2022 and the long-term average for the growing season.

Tas (Spring sown) Crop Technology Centre - Hagley, Tasmania

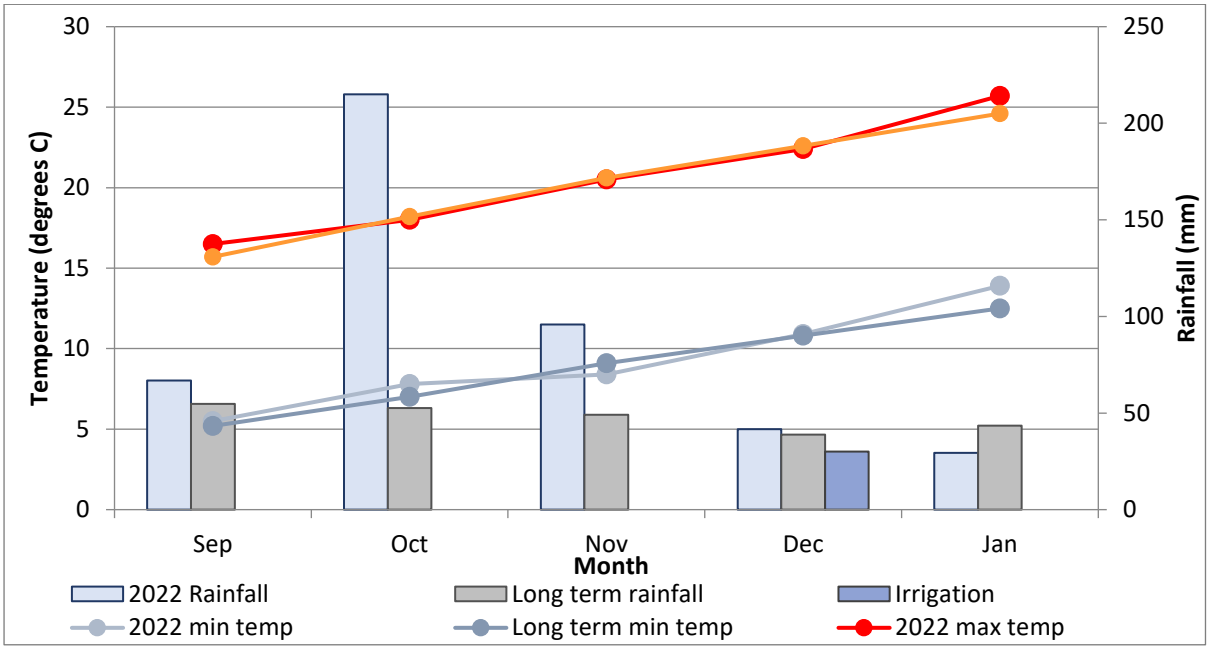

Figure 1. 2022/23 growing season and long-term rainfall recorded at Strathbridge (Meander River) (1985 - 2023) and growing season and long-term min and max temperatures recorded at Launceston (Ti Tree Bend) (1980 - 2023) for the growing season (September to January). *Rainfall September to January= 448.6mm..*

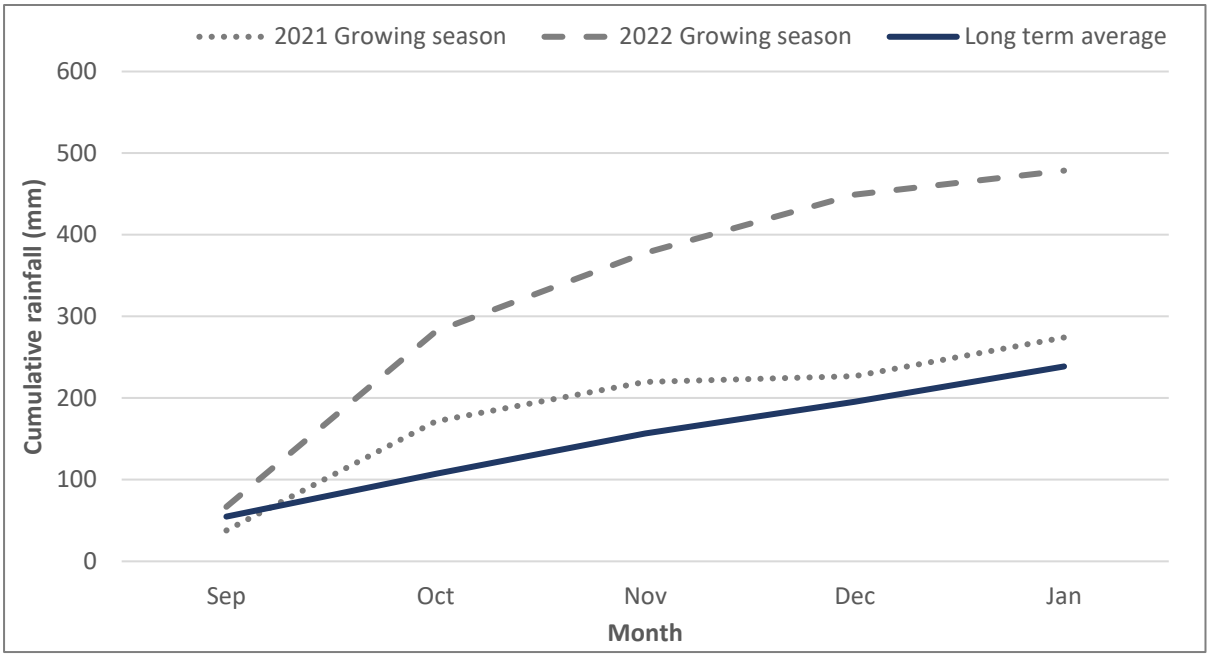

Figure 2. Cumulative growing season rainfall for 2021/22, 2022/23 and the long-term average for the growing season (September- January).

Tas (Autumn sown) Crop Technology Centre- Hagley, Tasmania

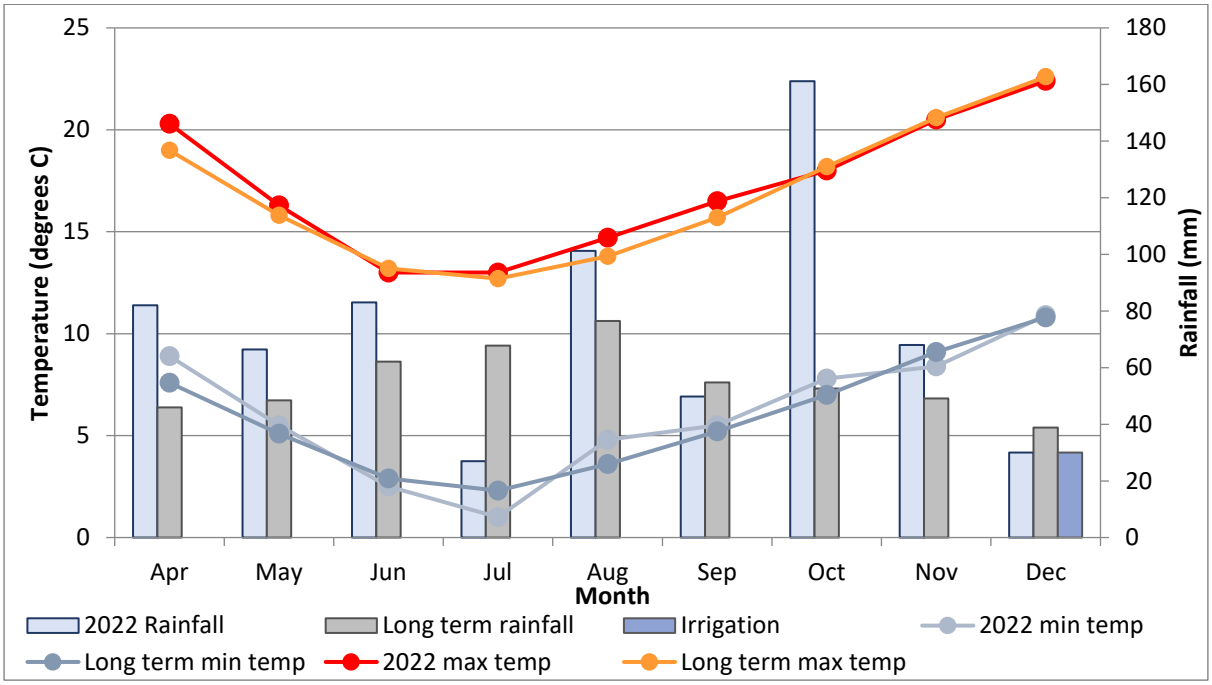

Figure 1. 2022 growing season and long-term rainfall recorded at Strathbridge (Meander River) (1985 - 2022) and growing season and long-term min and max temperatures recorded at Launceston (Ti Tree Bend) (1980 - 2022) for the growing season (April to December). *Rainfall April to December= 698.6mm with irrigation.*

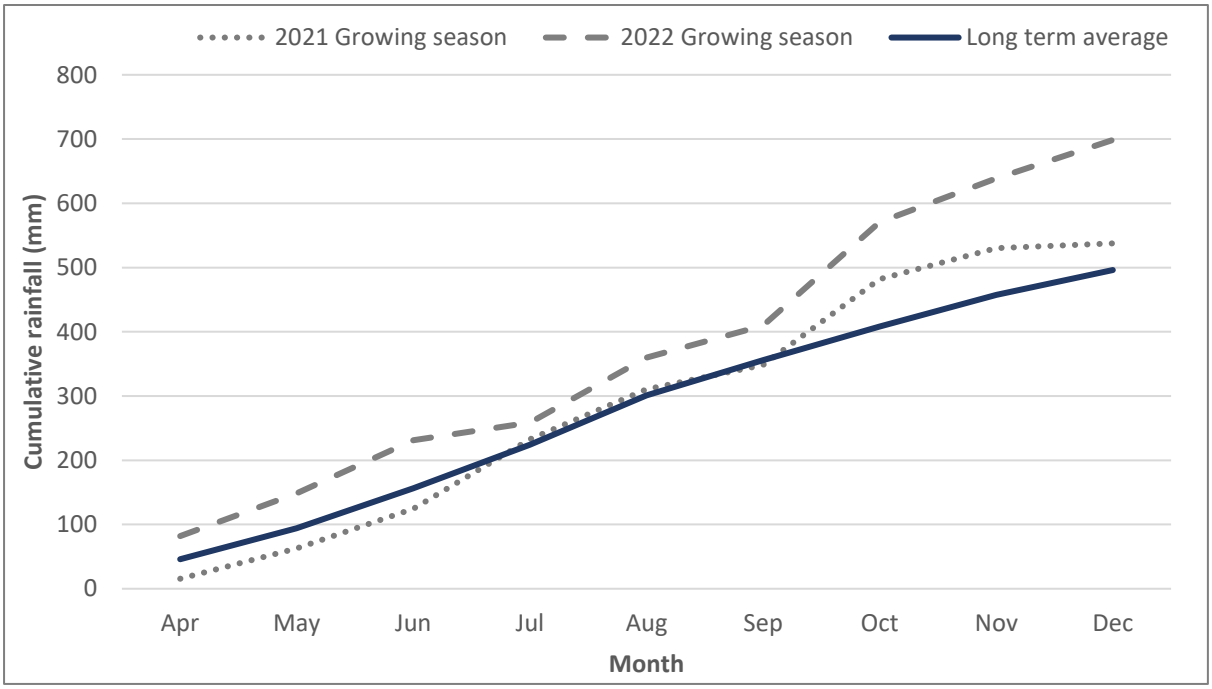

Figure 2. Cumulative growing season rainfall for 2021, 2022 and the long-term average for the growing season (April- December).