

Comparison of barley varieties

Mikaela Tiller and Kaidy Morgan

Hart Field-Site Group

Key findings

- The average barley yield observed at Hart in 2025 was 2.37 t/ha, with yields ranging from 1.44-2.92 t/ha.
- As a result of high protein, screenings and low-test weight, no varieties met Malt 1 receival standards at Hart in 2025. Coded line SCA25-Y006 (19Y027S-003) was the only variety to meet BAR1 receival standards across all quality metrics.
- All varieties exceeded the maximum receival standard threshold of 12% protein for Malt 1, with the site average being 15.8%. High protein likely resulted from high soil N and water stress during grain fill.
- Below average spring rainfall likely contributed to high screenings ranging from 11.5-40.1% and low retention ranging from 11.0-52.7% across all varieties.

Aim

To compare the performance of pre-commercial and newly released barley (*Hordeum vulgare*) varieties alongside current commercial variety options in the medium rainfall zone of South Australia.

Methodology

A trial was conducted at Hart, SA in 2025 to investigate barley varietal performance (Table 1). The trial was established as a randomised complete block design with three replicates of 29 barley varieties including new varietal lines AGT Bunyip IA (AGTB0530), RGT Atlantis (RP22054) and Rocket CL (IGB22023T), and coded lines: RGT-RP19034 and RGT-RP21011.

The trial was managed through the application of pesticides to ensure an insect, weed and disease-free canopy. Grain yield (t/ha), protein (%), test weight (kg/hL), screenings (%) and retention (%) were assessed post-harvest. The 2025 growing season was characterised by below average rainfall. The trial was not subject to stress from any other external or environmental factors. Trial data was analysed utilising REML spatial model (Regular Grid) in GenStat 24th Edition. Bonferroni critical difference values (Bonferroni CD) were calculated using average standard error of difference (SED) from the GenStat output and the relevant t critical value calculated in Excel. This number can be used to determine the difference required for a significant effect between treatments.

Table 1. Trial details for 2025 barley variety comparison at Hart, SA.

Plot size	1.75 x 10 m	Soil N	120.4 kg N/ha
Location	Hart, SA	Fertiliser	Seeding: MAP (10:22)
Seeding date	May 23, 2025		Zn 1% @ 80 kg/ha
Harvest date	November 7, 2025		July 14: 30 kg N/ha (applied as
Previous crop	Bale awnless wheat		Easy N)
Growing season rainfall	Decile 3 (223 mm)		

Results and discussion

Grain yield

Following Decile 2 rainfall in 2024 and a late start to the 2025 growing season, 73.4 mm of rain received in July favoured early crop development. Despite good early crop growth, below average rainfall was seen for the remainder of the 2025 growing season, limiting yield potential during reproductive stages. The average barley yield observed at Hart in 2025 was 2.37 t/ha, with yields ranging from 1.44-2.92 t/ha (Table 2). Many varieties yielded similarly, with a difference of 0.55 t/ha required for a significant yield result between varieties.

Feed varieties Beast, Combat and Granite CL produced 2.92, 2.82 and 2.75 t/ha respectively. Long-term yield data shows Beast and Combat continue to perform well, often yielding above the trial average across multiple seasons at Hart. Granite CL has performed well but requires further evaluation across a range of seasons (Table 3). Beast and Combat were also ranked in the top five yielding varieties within the National Variety Trial at Salter Springs and Crystal Brook (GRDC, 2025).

Malt varieties Compass, Laperouse and Maximus CL yielded 2.78, 2.80 and 2.72 t/ha respectively. Although long-term yield data for Malt varieties trialed at Hart remains variable, Compass, Laperouse and Maximus CL have performed well over the past two seasons, consistently yielding above the trial average (Table 3). Pending malt varieties AGT Bunyip IA (AGTB0530) and Rocket CL (IGB22023T) also performed well, achieving yields of 2.80 and 2.81 t/ha, respectively.

Grain quality

All barley varieties recorded protein that exceeded the maximum receival standard threshold of 12% for Malt 1. Nitrogen availability and water stress leading into grain fill were likely contributing factors to high protein in 2025, potentially causing a “haying off” effect through the utilisation of moisture and nutrient resources early, prematurely ending grain fill (Kirkegaard et al, 2001).

RGT Asteroid (RP14033) and RGT-RP19034 were the only varieties to exceed the 65 kg/hL test weight minimum for Malt 1, however achieved feed only for all other quality parameters. Many varieties did not meet the receival standards for BAR1, exhibiting a test weight of less than 62.5 kg/hL. Combat achieved the lowest test weight at 57.8 kg/hL.

All varieties exhibited high screenings ranging from 11.5-40.1% and low retention ranging from 11.0-52.7%. Beast, SCA25-Y006 (19Y027S-003) and Rocket CL (IGB22023T) were the only varieties where screenings did not exceed the maximum threshold of 15% for BAR1 receival standards. As expected, when considering screenings results, Beast, SCA25-Y006 (19Y027S-003) and Rocket CL (IGB22023T) also exhibited the highest retention at 52.7, 50.5 and 49.8%, respectively.

Summary

A Decile 3 (223 mm) GSR at Hart in 2025 affected yield and quality across the trial site. The average barley yield observed was 2.37 t/ha with yield ranging from 1.44-2.92 t/ha. As a result of high protein and screenings and low-test weight, no varieties met Malt 1 receival standards. Coded line SCA25-Y006 was the only variety to meet BAR1 receival standards across all quality metrics.

Table 2. Barley grain yield (t/ha) and quality results at Hart in 2025. Shaded values in each column indicate best performing treatments. Any difference between two means greater than the Bonferroni critical difference value is significant at $\alpha = 0.05$ after Bonferroni correction.

Quality	Variety	Grain yield t/ha	% of site average	Protein %	% of site average	Test weight kg/hL	% of site average	Screening s %	% of site average	Retention %	% of site average
Malt	Commodus ^(b) CL	2.51 ^{e-h}	106	15.0 ^{a-d}	95	63.5 ^{bcd}	103	19.7 ^{a-d}	79	34.5 ^{a-f}	120
	Compass ^(b)	2.79 ^{gh}	117	15.0 ^{abc}	95	63.1 ^{bcd}	102	15.5 ^{ab}	62	35.9 ^{b-f}	125
	Cyclops ^(b)	2.59 ^{gh}	109	15.3 ^{a-e}	97	59.2 ^{ab}	96	25.3 ^{a-f}	102	24.0 ^{ab}	83
	Laperouse ^(b)	2.80 ^{gh}	118	15.2 ^{a-d}	96	64.3 ^{cd}	104	19.0 ^{abc}	77	30.2 ^{a-f}	105
	Maximus ^(b) CL	2.72 ^{gh}	115	15.7 ^{a-e}	100	63.0 ^{bcd}	102	24.0 ^{a-f}	97	29.3 ^{a-e}	101
	Neo ^(b) CL	1.92 ^{a-e}	81	15.1 ^{a-d}	96	58.2 ^{ab}	94	40.1 ^{df}	162	20.2 ^{ab}	70
	RGT Planet ^(b)	1.86 ^{a-d}	78	17.4 ^{efg}	110	61.7 ^{a-d}	100	26.4 ^{a-f}	106	18.5 ^{ab}	64
	Spartacus CL ^(b)	2.51 ^{gh}	106	16.3 ^{b-f}	103	61.8 ^{a-d}	100	35.3 ^{c-f}	142	18.4 ^{ab}	64
	Malt 1 Reception Standards										
				9-12		>65		<7		>70	
Feed	Beast ^(b)	2.92 ^h	123	15.3 ^{a-d}	97	61.7 ^{a-d}	100	11.6 ^a	47	52.7 ^{cd}	183
	Bigfoot CL ^(b)	2.68 ^{gh}	113	15.7 ^{a-e}	100	60.6 ^{abc}	98	21.0 ^{a-d}	85	32.5 ^{a-f}	113
	Combat ^(b)	2.82 ^h	119	13.9 ^a	88	57.8 ^a	93	21.2 ^{a-d}	85	29.0 ^{a-d}	100
	Granite ^(b) CL	2.75 ^{gh}	116	15.0 ^{ab}	93	59.1 ^{ab}	96	33.0 ^{b-f}	133	18.5 ^{ab}	64
	Minotaur ^(b)	2.41 ^{d-h}	102	15.3 ^{a-d}	97	63.3 ^{bcd}	102	30.1 ^{a-f}	121	18.9 ^{ab}	66
	PegasusAX ^(b)	2.27 ^{c-g}	96	17.1 ^{d-g}	109	62.5 ^{bcd}	101	34.1 ^{b-f}	137	11.1 ^a	38
	Spinnaker ^(b)	2.08 ^{b-f}	88	15.7 ^{a-e}	100	59.5 ^{ab}	96	36.9 ^{def}	149	18.0 ^{ab}	62
	BAR1 Reception Standards										
				NA		>62.5		<15		NA	
Pending malt accreditation	AGT Buryip IA ^(b) (AGTB0530)	2.80 ^{gh}	118	14.9 ^{abc}	94	64.2 ^{cd}	104	19.8 ^{a-d}	80	28.9 ^{abc}	100
	RGT Atlantis ^(b) (RP22054)	1.49 ^a	63	17.8 ^{fg}	113	62.3 ^{a-d}	101	29.0 ^{a-f}	117	29.6 ^{a-e}	103
	Rocket ^(b) CL (IGB22023T)	2.81 ^{gh}	119	14.3 ^{ab}	90	59.6 ^{ab}	96	14.5 ^a	58	49.8 ^{c-f}	173
	Titan AX ^(b)	2.52 ^{gh}	106	15.1 ^{a-d}	96	62.7 ^{bcd}	101	22.4 ^{a-f}	90	34.4 ^{b-f}	119
	RGT Asteroid (RP14033)	1.44 ^a	61	18.9 ^g	120	65.2 ^{cd}	105	21.8 ^{a-e}	88	36.7 ^{b-f}	127
Under evaluation	RGT-RP19034	1.70 ^{abc}	71	18.0 ^{fg}	113	66.1 ^d	107	29.0 ^{a-f}	117	24.7 ^{ab}	86
	RGT-RP21011	1.68 ^{ab}	71	17.0 ^{c-g}	108	61.7 ^{a-d}	100	29.3 ^{a-f}	118	17.3 ^{ab}	60
	SCA25-Y006 19Y027S-003	2.53 ^{gh}	107	14.2 ^{ab}	90	63.1 ^{bcd}	102	11.8 ^a	48	50.5 ^{cef}	175
	Site average	2.37		15.8		61.9		24.8		28.9	
P-value		<0.001		<0.001		<0.001		<0.001		<0.001	
Bonferroni CD		0.55		2.02		4.88		19.18		22.81	

Table 3. Long-term barley variety performance at Hart for 2021–2025 seasons (expressed as a % of trial average).

% Trial average							Grain yield (t/ha)
Quality	Variety	2021	2022	2023	2024	2025	2025
Malt	Commodus ^(b) CL	100	95	97	78	106	2.51
	Compass ^(b)	112	90	101	113	117	2.78
	Cyclops ^(b)	103	101	96	89	109	2.59
	Laperouse ^(b)	112	87	94	102	118	2.80
	Leabrook ^(b)	107	96	98			
	Maximus ^(b) CL	96	91	93	188	115	2.72
	Neo ^(b) CL				70	81	1.92
	RGT Planet ^(b)	86	119	100	80	78	1.86
	Spartacus CL ^(b)	83	91	94	136	106	2.51
	Zena ^(b) CL		117	98			
Feed	Beast ^(b)	111	96	105	129	123	2.92
	Bigfoot CL ^(b)				105	113	2.68
	Combat ^(b)		112	110	139	119	2.82
	Fathom ^(b)	107	101				
	Granite ^(b) CL				129	116	2.75
	Minotaur ^(b)	101	107	106	129	102	2.41
	PegasusAX ^(b)				115	96	2.27
	Rosalind ^(b)	105	101	102			
	Spinnaker ^(b)			98	58	88	2.08
Pending malt accreditation	AGT Bunyip IA ^(b) (AGTB0530)					118	2.80
	RGT Atlantis ^(b) (RP22054)					63	1.49
	Rocket ^(b) CL (IGB22023T)					119	2.81
	Titan AX ^(b)		96	102	82	106	2.52
Under evaluation	AGTB0532				99		
	RGT Asteroid (RP14033)				47	61	1.44
	RGT Orbiter				47		
	RGT-RP19034					71	1.70
	RGT-RP21011					71	1.68
	SCA25-Y006 19Y027S-003				63	107	2.53
	Trial average yield (t/ha)	2.61	5.99	4.66	0.69	2.37	
	Sowing date	May 3	May 5	May 12	May 13	May 23	
	April-Oct (mm)	232	355	236	176	223	
	Annual rainfall (mm)	401	519	355	240	263	

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Photo. Barley varieties session at the 2025 Hart Field Day.