

## Barley variety response to grazing and ryegrass

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### Key findings

- Grazing had no grain yield impact for all barley varieties in the trial with Hindmarsh yielding the highest (1.54t/ha).
- There was no significant difference for dry matter produced between varieties.
- The presence of annual ryegrass decreased the grain yield of Hindmarsh and Urambie by 20% and 42% respectively, but had no impact on Flagship and Maritime grain yields.

### Why do the trial?

The trial was designed to compare barley variety grain yield response to grazing in the presence of annual ryegrass.

### How was it done?

A replicated trial was established at the Hart Field site. The trial assessed 4 barley varieties, Flagship, Hindmarsh, Maritime and Urambie. These varieties differ in growth rate, habit and height. Annual ryegrass was planted at the time of sowing at 25kg/ha.

Seeding rates were adjusted according to grain weight and germination to produce target plant populations of 145 plants per square metres. The trial was sown on the 5<sup>th</sup> June using chisel points and press wheels.

The grazing treatments were applied when the crop was at Zadoks growth stage 30, simulated using a mower.

**Plot size**                      1.5m x 10m                      **Fertiliser rate**      DAP @ 70kg/ha

Barley plant and annual ryegrass counts were carried out four weeks after sowing to determine establishment. The trials were harvest on the 12<sup>th</sup> of November and scores for straw strength, plant height and grain yield measurements were recorded. Grain quality was assessed for retention (%) with a 2.5mm screen, protein (% dry basis), screenings with a 2.2mm screen and test weight (kg/hectolitre).

### Results

Table 1 displays establishment counts for annual ryegrass (ARG) and barley plants. Treatments that did not have ARG planted (Minus ARG) recorded 10.8 ryegrass plants per square meter, which is significantly lower than the planted ARG treatment (Plus ARG) of 231.8 ryegrass plants per square meter. There was no interaction with ARG populations and barley plant populations; this indicates that ARG did not have an impact on barley establishment. No barley plant count

difference was recorded between barley varieties, meaning all varieties achieved a good establishment.

Table 1. Annual ryegrass (ARG) and barley crop establishment at Hart in 2008.

	Annual Rye Grass/m <sup>2</sup>		Barley Plants/m <sup>2</sup>	
Minus ARG	11	a	158	a
Plus ARG	232	b	156	a
LSD (P=<0.05)	58		ns	

Comparison of dry matter production at Hart showed no significant difference between all varieties when the grazed dry matter was measured (Table 2). However, there was a significant difference for grain yield between varieties. Hindmarsh was the highest yielding variety followed by Flagship. The lowest grain yielding variety was Urambie producing 0.83t/ha.

Table 2. Barley variety dry matter and grain yield production at Hart in 2008.

Variety	Dry matter (t/ha)		Grain yield (t/ha)	
Flagship	1.46	a	1.23	b
Hindmarsh	1.29	a	1.54	a
Maritime	1.37	a	1.05	c
Urambie	1.08	a	0.83	d
LSD (P=<0.05)	ns		0.14	

Annual ryegrass had no impact on grain yield for barley varieties Flagship and Maritime. Hindmarsh and Urambie showed the presence of annual ryegrass significantly reduced grain yield (Table 3).

Table 3. Barley variety grain yield with and with out annual ryegrass (ARG) at Hart in 2008.

	Flagship		Hindmarsh		Maritime		Urambie	
Minus ARG	1.25	a	1.73	a	1.12	a	1.06	a
Plus ARG	1.21	a	1.35	b	0.98	a	0.61	b
LSD (P=<0.05)	ns		0.27		ns		0.27	

Table 4 shows the grain yield impact of simulated grazing on barley varieties. All varieties responded alike with no significant effect of grazing on grain yield. Although not significant, Flagship and Hindmarsh had grain yield increases as a result to grazing with Flagship increasing by 0.38t/ha.

Table 4. Barley variety grain yield when grazed and un-grazed at Hart in 2008.

	<b>Flagship</b>	<b>Hindmarsh</b>	<b>Maritime</b>	<b>Urambie</b>
Grazed	1.42 a	1.58 a	0.88 a	0.84 a
Un-Grazed	1.04 a	1.49 a	1.21 a	0.83 a
LSD (P<.05)	ns	ns	ns	ns

Table 5 displays the variety grain quality characteristics. All barley varieties showed very high grain protein levels. Hindmarsh and Urambie had the lowest grain protein with, malting variety, Flagship having the highest. All varieties produced very high screenings levels; Flagship, Hindmarsh and Urambie levels were significantly higher compared to Maritime. Maritime also showed significantly higher retention levels compared to all other varieties, although the retention levels were very poor. The test weight of Flagship was significantly higher compared to all other varieties, Hindmarsh produced the lowest. Maritime was the only variety to produce screenings levels low enough to achieve Feed 3 classification. All other varieties produced Feed 4 delivery grade grain quality.

Table 5. Barley variety grain quality characteristics at Hart in 2008.

<b>Variety</b>	<b>Protein (%)</b>	<b>Screenings (%)</b>	<b>Retention (%)</b>	<b>Test weight (kg/hL)</b>	<b>Receival grade</b>
Flagship	17.7 a	82.9 b	1.4 b	62.9 a	F4
Hindmarsh	15.9 c	81.2 b	2.7 b	59.2 c	F4
Maritime	16.9 ab	42.8 a	13.6 a	61.1 b	F3
Urambie	16.4 bc	76.8 b	2.6 b	60.1 bc	F4
LSD (P<.05)	0.9	9.1	5.1	1.8	

The presence of annual ryegrass had no impact on grain quality characteristics grain protein, screenings, retention, test weight or grain quality receival grade (Table 6).

Table 6. Annual ryegrass (ARG) impact on grain quality characteristics at Hart in 2008.

	<b>Protein (%)</b>	<b>Screenings (%)</b>	<b>Retention (%)</b>	<b>Test weight (kg/hL)</b>	<b>Receival grade</b>
Minus ARG	16.6 a	69.6 a	5.0 a	61.4 a	F4
Plus ARG	16.9 a	72.2 a	5.2 a	60.2 a	F4
LSD (P<.05)	ns	ns	ns	ns	

The simulated grazing treatment had no impact on grain protein, screenings, retention, test weight and grain receival grade (Table 7).

Table 7. Grazing impact on grain quality characteristics at Hart in 2008.

	Protein (%)		Screenings (%)		Retention (%)		Test weight (kg/hL)		Receival grade
Grazed	16.7	a	69.2	a	4.5	a	61.1	a	F4
Un-Grazed	16.8	a	72.7	a	5.6	a	60.6	a	F4
LSD (P=<0.05)	ns		ns		ns		ns		

## Discussion

Good early rainfall enabled excellent crop establishment at Hart. Rains throughout winter allowed high biomass production with crops setting high grain yield potential. These beneficial conditions were followed with a very dry spring, imposing severe drought effects on the crop, and as a consequence grain quality was very poor.

The grain yield of Hindmarsh and Urambie was significantly reduced by the increased presence of annual ryegrass (ARG), however ARG did not impact on dry matter production. This indicates that these varieties are less suitable to grow in paddocks with high ryegrass populations due to the inability to compete with this weed. Despite the difference in weed populations all ARG in this trial died due to the extreme conditions endured at the end of the growing season. The early maturing feed variety Hindmarsh was the highest grain yielding in the trial. This result replicates data seen in other trials at Hart in 2008. Urambie produced the lowest grain yields in the trial. Urambie is promoted as a high yielding dual-purpose feed variety with the unique adaptability to early sowing. This variety is historically grown in the eastern states of Australia and has recently been planted in small areas of South Australia. Although this trial was not sown early, as is recommended for to achieve maximum performance, the grain yield of Urambie compared to all other varieties in the trial was significantly less.

Flagship produced the highest amount of dry matter at Zadoks growth stage 30 when the crop was 'grazed'. This barley variety exhibits good early growth and is quickly established, despite no significant difference in variety dry matter production, Flagship produced the highest amount. The grain yield of Flagship was increased by 0.38t/ha when it when it was grazed. Although this result was not significant, data from the Mid North High Rainfall Zone trial site at Tarlee in 2008 showed the same trend with a significant grain yield increase of Flagship after grazing. Once grazed, Flagships growth habit tends to become more prostrate and the grazing treatment did not reduce the grain yield.

Trials will continue in 2009 to validate 2007 and 2008 results with different seasonal conditions.

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