

HAS HINDMARSH BARLEY RUN ITS RACE? BARLEY TIME OF SOWING

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TAKE HOME MESSAGES

- The yield advantages of earlier sowing may not be achieved if volunteer plants cannot be controlled.
- Compass showed good adaptability at each sowing time both at Horsham and Watchupga East.
- Earlier sown barley plots at both sites were limited by nitrogen in 2013.

KEY WORDS

Barley, Mallee, quality, sowing time, varieties, Wimmera, yield.

BACKGROUND

Farmers have been growing barley for decades, yet we are constantly changing varieties to increase yield and avoid the risk of disease. Over recent years Gairdner and Hindmarsh have dominated the bulk of the barley crops grown in the Wimmera and Mallee. These varieties have been consistent performers and farmers have profited from their reliability. The question is: 'is it time for a changing of the guard?' Over recent years some new malt accredited barley varieties have shown encouraging yields in variety trials across the Wimmera and Mallee.

This paper will report on the two barley time of sowing trials conducted by BCG at Watchupga East and Horsham as part of the GRDC 'Barley agronomy for the Southern region' project.

AIM

To determine the performance of new and current barley varieties in the Wimmera and Mallee at two different sowing times (May and June).

METHOD

The barley time of sowing (TOS) trials were managed to maximise yield (e.g. weed and disease free). Nitrogen (N) applications were based on the requirements determined by Yield Prophet®. Emergence date, canopy 'greenness' (as NDVI), grain yield and quality were measured. Management details for both sites are listed in Table 1, while the agronomic characteristics of the varieties used in this trial can be seen on pp. 49.

Location: Watchupga East and Horsham
Replicates: Four
Target plant density: 130 plants/m²
Seeding equipment: BCG cone seeder (knife points, press wheels, 30cm row spacing)

Table 1. List of the trial operations and applications at Watchupga East and Horsham.

Location	Watchupga East				Horsham			
Treatment	May sown		June sown		May sown		June sown	
Soil type	Sandy loam				Clay (black)			
Previous crop	Wheat				Wheat			
Sowing date	2 May		5 June		7 May		11 June	
Emergence date	2 June		16 June		1 June		19 June	
GSR (mm)	221				341			
Varieties	Bass, Commander, Compass, Gairdner, GrangeR, Hindmarsh, Fathom, Fairview, La Trobe, Navigator, Scope, Skipper and SY Rattler.				Bass, Commander, Compass, Fairview, Fathom, Fleet, Flinders, Gairdner, GrangeR, Hindmarsh, La Trobe, Navigator, Oxford, Scope, Skipper, SY Rattler, Westminster and Wimmera			
Fertiliser (per ha)	13/5	Granulock Supreme Z @ 55kg	5/6	Granulock Supreme Z + Impact @ 55kg	7/5	Granulock Supreme Z + Impact @ 55kg	11/6	Granulock Supreme Z + Impact @ 55kg
			7/8	Urea @ 90kg	2/7	Urea @ 90kg	13/8	Urea @ 90kg
	2/7	ZincSol @ 2L			13/8	Urea @ 90kg	30/9	Urea @ 90kg
	9/7	Urea @ 90kg						
Herbicides (per ha)	2/5	Avadex Xtra @ 2L + Triflur X @ 2L + Weedmaster Duo @ 2L + Hasten @ 1%	2/5	Weedmaster Duo @ 2L	5/6	Avadex Xtra @ 2L + Triflur X @ 2L + Weedmaster Duo @ 1L + Goal @ 100mL	11/6	Avadex Xtra @ 2L + Triflur X @ 2L + Weedmaster Duo @ 2L
	9/7	Velocity @ 670mL + Lontrel Advanced @ 50mL + Hasten @ 1%	5/6	Avadex Xtra @ 2L + Triflur X @ 2L + Weedmaster Duo @ 2L + Goal @ 80mL	15/8	Velocity @ 670ml + MCPA LVE @ 330ml + Lontrel @ 170ml + Hasten @ 1%	15/8	Velocity @ 670ml + MCPA LVE @ 330ml + Lontrel @ 170ml + Hasten @ 1%
			9/7	Velocity @ 670mL + Lontrel Advanced @ 50mL + Hasten @ 1%				
Fungicides (per ha)	13/5	Impact @ 400ml	13/5	Impact @ 400ml	7/5	Impact @ 400ml	11/6	Impact @ 400ml
	29/8	Prosaro @ 150ml + Spreadwet @ 0.25%	4/10	Prosaro @ 150ml + Spreadwet @ 0.25%	4/10	Prosaro @ 150ml + Spreadwet @ 0.25%	4/10	Prosaro @ 150ml + Spreadwet @ 0.25%

RESULTS AND INTERPRETATION

Watchupga East

The barley yields achieved were exceptional considering the dry season, with an average yield of 3.0t/ha. With only 242mm of water available (soil plant available water at sowing plus rainfall) to the crop in the 2013 growing season the crop achieved a water use efficiency (WUE) of 19.7kg/mm. This WUE is evidence that the trial was not affected by weeds, pests or disease. WUE may have been improved if the trial had received more N. The average protein in the trial was only 8.7% indicating that the crop was nitrogen limited.

The May and June TOS were sown 34 days apart. However, with the late break experienced at the Watchupga East site, emergence was only separated by 14 days. Despite this small difference the May TOS still produced higher grain yield, retention and test weight than the later June TOS (Table 3). Despite the differences in retention and test weight no grain quality specifications were affected. The only parameter that was higher with June TOS compared to the May TOS was protein (Table 3). The increase in protein by sowing later changed the average quality specification from feed to malt. With a 0.33t/ha difference between May and June sowing the June TOS would require a \$21 premium from the malt price over feed to make up for the difference in yield. The barley grain prices at Birchip (consistent with this publication) shows that Gairdner (GA1) and Commander (CO1) but not Hindmarsh (HIND) malt would have provided this premium in 2013.

Table 2. Grain yield (mean of 14 varieties) sown at different times at Watchupga East.

Sowing time	Grain yield (t/ha)	Grain protein (%)	Retention (%)	Test weight (kg/hl)
May	3.2	8.3	92	70
June	2.9	9	80	66
Sig. diff.	P<0.001	P<0.001	P<0.001	P<0.001
LSD (P=0.05)	0.1t/ha	0.40%	2.20%	1.50%
CV%	9.5	10.9	6.7	2.1

In this trial the average yields for Fathom, Compass, Commander, Hindmarsh, Skipper and La Trobe were higher than GrangeR and Gairdner (Figure 1). These results are consistent with BCG barley trials conducted in previous years in low rainfall areas with new varieties performing equally well as Hindmarsh. However, when the quality specifications achieved by the highest yielding varieties were considered, each achieved Feed specification with the exception of Hindmarsh which was classified as Malt. When gross income was calculated the highest yielding varieties in this trial Fathom (\$615.20/ha) and Compass (\$608.50/ha) achieved an equivalent gross income to Hindmarsh (\$644.30/ha) (P<0.001, LSD=53.8, and CV9.6%). It should be noted that it was low protein that was prevented Compass, Commander, Skipper and La Trobe from achieving malt specification. As noted previously the trial was adversely affected by insufficient nitrogen. If more nitrogen was applied there is a possibility that these varieties could have achieved the higher specification and could have returned more than Hindmarsh malt. Compass, Skipper and La Trobe malt accreditation is still pending.

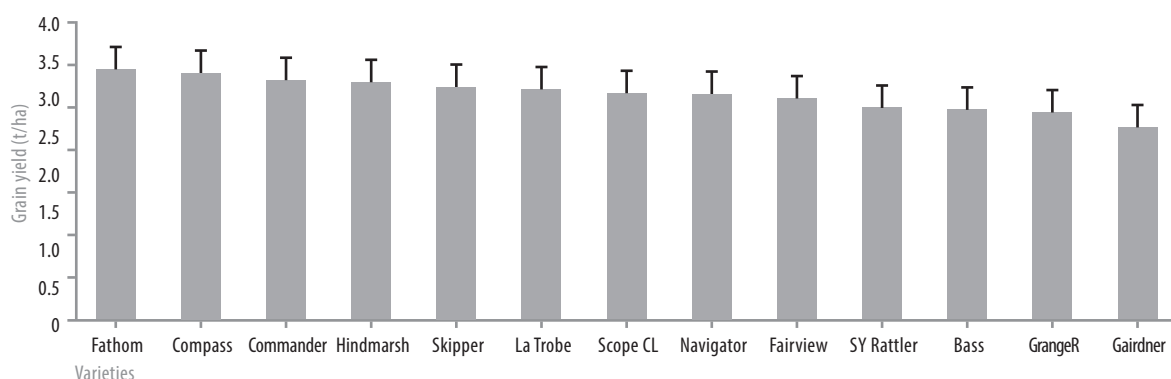


Figure 1. Average barley grain yields (Variety: $P < 0.001$, $LSD = 0.3$, $CV 9.5\%$).

No TOS by variety interaction was expressed in grain yield, protein or test weight at Watchupga East in 2013. Interactions were evident for screenings and retention; however, no grain quality specifications were affected. As such there is no evidence to suggest that variety selection should be altered in response to sowing time. Though not shown in this trial, previous trials have shown significant yield advantage to earlier sowing and varietal interactions at different sowing times. Comparison of varietal performance over a number of seasons and sowing times is important to determine how 'adaptable' the variety is to the seasonal variability (in terms of season opening rainfall) in the Mallee.

Horsham

The results from the barley TOS trial at Horsham was the reverse of the yield results from the Watchupga East trial occurred in the Barley TOS trial at Horsham with the June TOS producing a higher grain yield than the earlier May TOS (Table 3). TOS also resulted in differences in the quality parameters with retention and test weight being higher with earlier TOS and protein being higher compared with the June TOS (Table 3). The retention and test weight parameters did not alter the grain quality specifications for either TOS but June sowing resulted in the protein achieving malt category as opposed to feed for the May TOS. It is apparent from these results that in the 2013 season later sowing resulted in higher yields and better quality barley. These results are not consistent with previous studies that show a clear benefit to earlier sowing. A likely influence in 2013 was the particularly dry summer and late break, which put greater weed pressure on dry sown trials and commercial paddocks. Volunteer wheat plants were present in high number at the site during winter when accessibility to the site was poor (particularly in the early sown plots). Though these plots were extensively hand-weeded, it is plausible that the competition that occurred up to this point affected yield. A reflection of the season (also experience commercially), differences between the varieties from the early sowing to the late, should be treated with caution.

Table 3. Grain yield (mean of 18 varieties) sown at different times at Horsham.

Sowing time	Grain yield (t/ha)	Grain protein (%)	Retention (%)	Test weight (kg/hl)
May	5.02	8.8	92	67
June	5.16	9.4	87	66
Sig. diff.	$P = 0.006$	$P < 0.001$	$P < 0.001$	$P < 0.001$
LSD ($P = 0.05$)	0.09t/ha	0.10%	1.40%	0.3
CV%	5.8	4.9	4.9	2.4

The Horsham barley TOS trial produced a significant variety by TOS interaction (Figure 2). It is evident from Figure 1 that Compass and Skipper were more suited to the June TOS and Navigator to the May

TOS. This is not a surprising result given the maturity of each variety with Navigator, Compass and Skipper having mid-late, mid and mid-early classifications respectively with the longer season varieties suited to early sowing and the reverse for the shorter season varieties. None of the other varieties exhibited yield differences between TOS.

The results from the trial showed that Compass sown in the June TOS was higher yielding than all other varieties sown at either sowing time with the exception of Fathom and Commander sown in June and Navigator sown in May. Growing these varieties at these sowing times was optimal for yield in 2013 at Horsham. With the exception of retention there were no other variety by TOS interactions in the quality parameters. However, the differences in retention did not result in any change in grain quality specification.

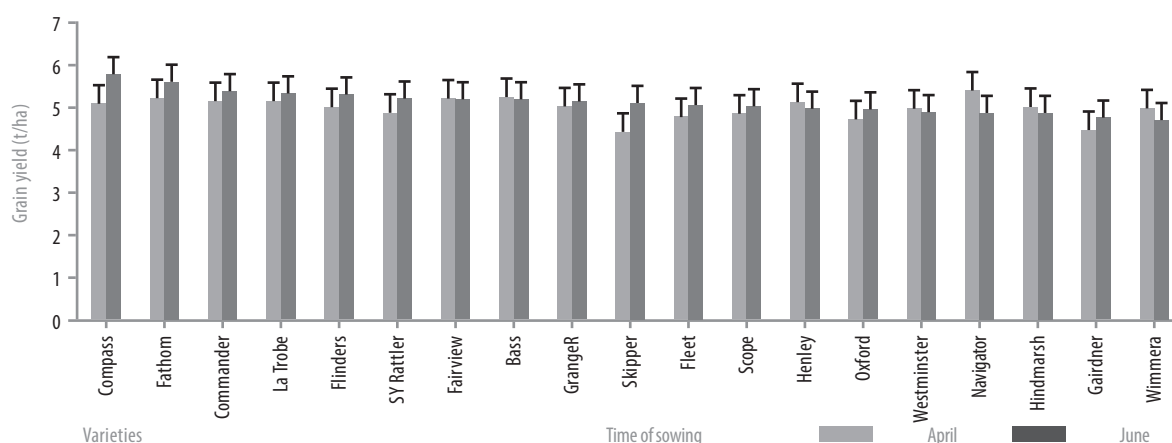


Figure 2. The effect of sowing time on the grain yield (t/ha) of barley varieties at Horsham in 2013 (TOS x var: $P=0.006$, $LSD=0.41\text{t/ha}$, $CV5.8\%$).

BCG barley trials conducted over recent years in the Wimmera have resulted in Hindmarsh topping the yields. The 2013 result have shown that under, what could be considered favourable growing conditions, some of the newer varieties have surpassed Hindmarsh as the variety of choice including Compass, Fathom and Commander. Based on this fact alone growers should consider growing these varieties instead of Hindmarsh. However, when you consider the varietal grade specifications for Commander as a malt variety, Fathom as a feed variety, and Compass has not yet been approved as a malt variety, and at the time of writing was classed as feed the situation may change.

Table 4 shows gross income associated with the three highest yielding varieties and Hindmarsh. In this trial, Hindmarsh has maintained an equitable level of income to the new varieties. This result should be viewed with caution as quality parameters, particularly protein, can be greatly affected by small changes in conditions. As such, classifying Commander as feed due to its low protein may be misleading. However, while Hindmarsh has not achieved the same yields as the newer varieties, it has still performed well and should still be considered a viable variety in this environment. In situations where yield and quality parameters are similar between varieties, growers should consider the disease tolerances and resistance of each variety and assess the suitability of each in the context of the existing farming system.

Table 4: Grain yield, quality and gross income for four varieties at Horsham.

Variety	Grain yield (t/ha)	Grain protein (%)	Retention (%)	Test weight (kg/hl)	Grade	Quality specification	Gross income (\$/ha)
Compass	5.5	8.6	93.6	66.3	pending	Feed	1036
Fathom	5.4	9.2	92.3	66.1	Feed	Feed	1029
Commander	5.3	8.6	91.4	66.5	Malt	Feed	1068
Hindmarsh	5	9.4	84.7	67.7	Food	HIND	1057
Sig. diff.	P<0.001	P=0.04	P<0.001	P<0.001	-	-	NS
LSD (P=0.05)	0.3	0.9	5.7	0.6	-	-	-
CV%	9.5	10.9	6.7	2.1	-	-	-

COMMERCIAL PRACTICE

Compass, is now a legitimate alternative to Hindmarsh. It has achieved the highest yield in BCG trials this year and NVT in 2012 and 2013. Its adaptability to a wide range of environments (high and low yielding) and regions makes it a suitable contender. Unfortunately, seed will not be available until 2015.

ACKNOWLEDGMENTS

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