

Barley time of sowing and depth

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Key findings

- LaTrobe, GrangeR, and Skipper had reduced emergence from deeper sowing under both dry and wet sowing conditions.
- Varieties differed in their sensitivity to sowing time; variety choice and sowing time influenced grain yield and quality more than sowing depth.
- LaTrobe and Fathom were the highest yielding varieties across both sowing dates.
- Commander and Skipper were the only varieties to suffer a yield penalty from early dry sowing.
- GrangeR yielded similar to Commander at earlier sowing but less when delayed.
- Screenings were greater than 7% and retention less than 70% in LaTrobe across both sowing times, and in Commander and GrangeR at earlier sowing only.
- Skipper was the only variety to achieve malt specifications across both sowing times.

Why do the trial?

In SA, variable autumn/winter rainfall has often delayed the ability to sow early or during the optimum sowing window due to insufficient moisture for seed germination near the soil surface, despite there being adequate moisture at depth from summer rainfall. Growers are increasingly sowing early for timeliness of operation, and are willing to risk sowing into dry topsoil and wait for rain rather than sow deep into a moisture band and risk losses in establishment and early vigour. This trial aimed to compare the competing demands of timeliness of sowing versus sowing to maximise establishment (deep versus dry sowing, or waiting for adequate rainfall later in the season).

How was it done?

Plot size: 1.4m x 10m

Fertiliser: DAP (18:20) + 2% Zn @ 70kg/ha

Time of Sowing (2)

Sowing 1: 10th May (dry sowing) Sowing 2: 31st May (wet optimal conditions)

Sowing Depth (2): Shallow (20 mm), Deep (60 mm)

Varieties (6): Fleet, Commander, Fathom, Skipper, LaTrobe, GrangeR

This trial investigated the effect of sowing six new varieties *early* (10th May) under two seed bed conditions; *shallow* below the soil surface into dry soil (20 mm) and *deeper* into the moisture band (60 mm) versus waiting until *later* to sow when seed bed conditions were optimal for sowing (31st May). All varieties were sown at the same seed density of 150 seeds per square metre. The trial was a randomised split split plot design consisting of 3 replicates, with shallow and deep sown side by side for each variety and sowing time. Measurements of plant establishment, NDVI, grain yield and all grain quality parameters were conducted and analysed in GenStat.

Results

Plant Establishment

At the first sowing date (10th of May) the seedbed was dry to 40 mm deep with moisture present below this. However, significant rainfall fell in the week following planting. At the second sowing date conditions were ideal for germination with adequate moisture right throughout the seed bed. Establishment was similar at the early dry sowing date compared to later sowing at both sowing depths, most likely due to the rainfall following the dry sowing (Table 1).

Varieties differed in their response to sowing depth. Plant establishment in Fleet, Fathom, and Commander was similar at both sowing depths. In GrangeR, Skipper and LaTrobe establishment was reduced from deeper sowing by 19% in GrangeR and up to 35% in LaTrobe (Figure 1). These results are consistent with other trials that have demonstrated shorter coleoptile varieties such as LaTrobe exhibit poorer emergence from depth compared to medium to long coleoptile varieties Fleet, Fathom and Commander. More lab and field validation is needed but preliminary results suggest both Skipper and GrangeR may have a short – medium coleoptile.

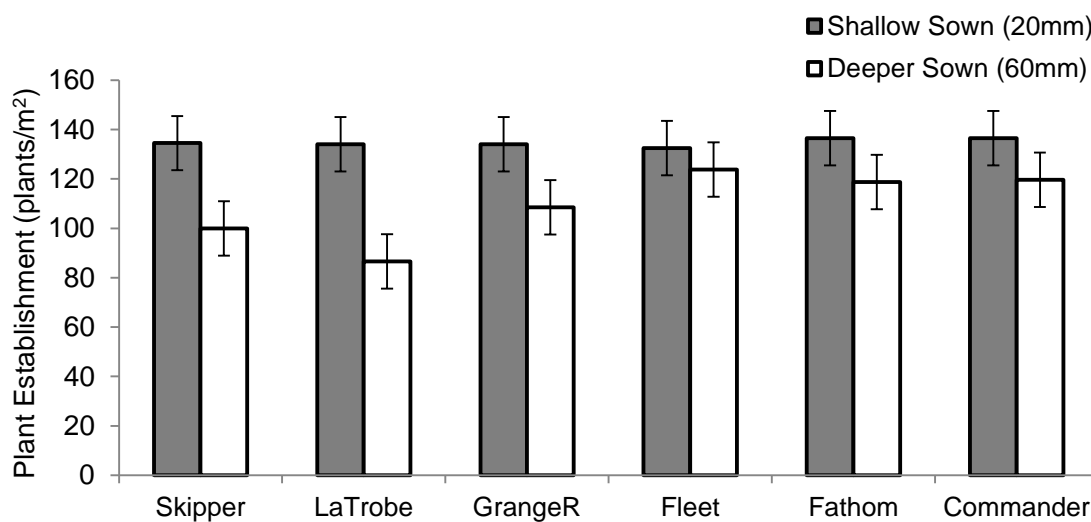


Figure 1. Plant establishment (plants per square metre) of six varieties averaged across both sowing dates when sown shallow (20 mm), and deep (60 mm) at Hart in 2013.

Early Vigour

Crop growth measurements (NDVI) taken six weeks after sowing were more pronounced at early sowing in all varieties. Sowing depth influenced the vigour of some varieties (Figure 2). The trends were consistent with what was observed in plant establishment. With up to 13% reduced vigour and canopy growth from deeper sowing occurring in LaTrobe, and GrangeR, while there were no significant difference in Fleet, Fathom, Skipper, and Commander.

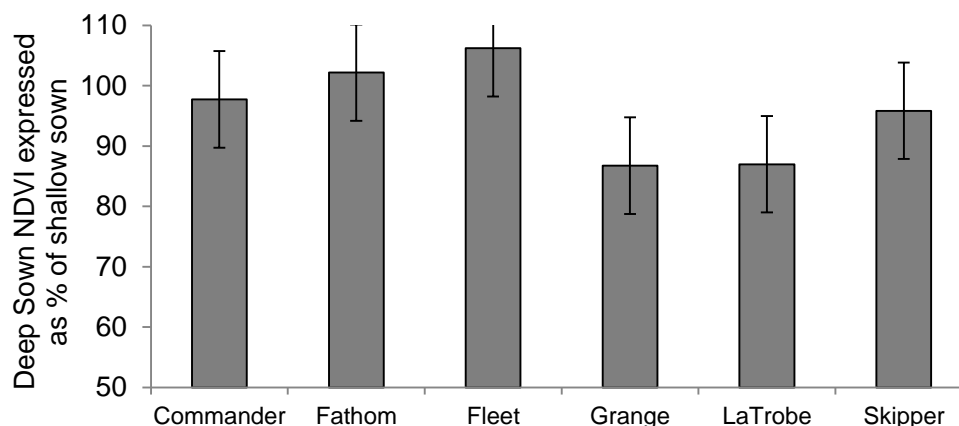


Figure 2. Growth (NDVI) at deeper sowing (60 mm) expressed as a percentage of shallow sown growth averaged cross both sowing times in barley varieties, Hart 2013.

Grain yield and quality

Varieties did not respond differently nor was there any significant effect of sowing depth on final grain yield and any grain quality parameter across all varieties (Table 1). However, varieties did respond differently to sowing date in grain yield, and all quality parameters apart from grain protein.

Fathom and LaTrobe were the equal highest yielding, followed by Fleet at both sowing dates. Commander yielded similar to Fathom and LaTrobe at delayed sowing however both Skipper and Commander suffered a 0.5 t/ha yield penalty from earlier sowing (Table 1).

Table 1. Averages for the interactions between varieties and sowing time (TOS) on grain yield and quality measurements averaged across both sowing depths, Hart 2013.

	Grain Yield t/ha		Screenings % <2.2mm		Retention % >2.5mm		Protein %		Test weight kg/hL	
	TOS 1	TOS 2	TOS 1	TOS 2	TOS 1	TOS 2	TOS 1	TOS 2	TOS 1	TOS 2
Commander	4.56	5.02	8.9	4.5	55.4	72.3	10.4	10.8	67.4	67.4
Fathom	5.42	5.20	3.3	1.4	79.4	84.3	10.0	11.1	68.2	68.3
Fleet	4.86	4.85	3.0	2.4	66.2	74.4	10.6	11.1	66.3	66.2
GrangeR	4.67	4.68	7.3	3.2	60.5	75.7	10.5	10.9	67.8	67.0
LaTrobe	5.40	5.29	7.2	7.8	58.7	52.4	10.1	10.7	69.7	69.3
Skipper	4.44	4.98	4.4	2.8	74.7	79.6	10.4	10.7	69.8	69.3
Variety x TOS LSD(P≤0.05)	0.28		2.4		4.1		NS		0.6	

Varieties differed in their quality response to sowing time. Screenings were greater than the 7% requirement for malt 1 in LaTrobe at both sowing dates, and at the earlier sowing in GrangeR and Commander. Screening levels in Fathom, Fleet, and Skipper were the lowest of all varieties and similar across both sowing dates. The trends in grain retention were very similar to screenings with LaTrobe achieving retentions less than 70% at both sow dates and GrangeR and Commander only at earlier sowing. Varieties did not differ in their protein response. Test weights were superior in Skipper and lowest in Fleet, and in general similar between sowing dates. GrangeR was the only variety to incur a reduction in test weight with delayed sowing (Table 1).

Discussion

Despite differences in varietal sensitivities in plant establishment and growth to sowing depth earlier in the season, this had little effect on grain yield and quality at this site. This demonstrated the ability of barley to compensate and recover yield from less than optimal conditions (deeper sowing, dry seedbed) at sowing and from a wide range of plant densities. Sowing depth was less important than other factors such as sowing time and variety choice on final grain yield and quality at this site in 2013.

The lack of interaction between sowing time and sowing depth across the site maybe explained by significant rainfall post sowing allowing for sufficient germination of any seeds that were sown dry. This may not be the case in other seasons where there is prolonged dry spells during the germination period. These results are encouraging for growers favouring earlier sowing under dry conditions with large cropping programs. However there is some risk, growers should be cautious with varieties such as Hindmarsh and LaTrobe and any variety that possesses a short coleoptile as they are more likely to suffer from deeper sowing.

Growers should still consider variety choice to better align with sowing date. LaTrobe and Fathom were the highest yielding varieties across both dates showing their broad adaptability and have now outclassed Fleet. GrangeR yielded similar to Commander at earlier sowing but less when delayed. GrangeR and Commander differ in phenology. When sown in early May, GrangeR has been shown to flower earlier than Commander and when sown later in May, GrangeR has shown a flowering pattern more similar to Gairdner and later than Commander. Skipper was the only variety to achieve malt specifications across both sowing times. Screenings were greater than 7% and retention less than 70% in LaTrobe across both sowing times, and in Commander and GrangeR at the earlier sowing only.