Barley Agronomy: Time of Sowing and Plant Growth Regulators

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KEY MESSAGES

- Earlier times of sowing for barley in the HRZ can have many advantages, but should be carefully weighed up in terms of added costs involved with an earlier time of sowing
- Westminster was once again a standout variety across all sowing dates, performing well in both April sown and May sown conditions
- The use of PGRs can significantly reduce the height of early sown crops, and significantly improve yields across all varieties.

BACKGROUND

Time of sowing has become an annual topic of discussion for grain growers in the southern high rainfall zone. Research into the benefits of earlier sowing has mainly focussed on wheat, but are there benefits to be gained with our current range of barley varieties? The traditional sowing date for longer season barley varieties in the Western District is the middle of May, so this trial has incorporated two sowing dates to determine whether sowing earlier in April affects yield and grain quality. However, one change in agronomic practice can open the door to other issues to encounter over the growing season. An earlier sowing date often increases the biomass and yield potential of a crop, which in turn can increase the risk of lodging. This trial aims to understand the potential impact of these factors and whether this tendency can be controlled with the use of plant growth regulators (PGRs).

This trial was grown as a part of the GRDC Barley Agronomy project (DAN00173) which aims to improve grower productivity and industry sustainability through new management techniques and cultivars.

METHOD

The trial was sown at the Westmere site and was a three-way factorial investigating the relationship between variety, time of sowing and PGR application. Three mid to late season varieties were chosen: Westminster, Commander and Navigator. Two times of sowing were used in alternating strips; half were sown on April 27 and half on May 20. Moddus Evo was applied as a PGR at GS32 and GS39 to specific treatments to examine its effect in large biomass crops.

All starter fertiliser was treated prior to sowing to minimise disease risk, and the seed was sown at rates of 74 kg/ha for Commander, 93kg/ha for Navigator and 80kg/ha for Westminster aiming for 160 plants/m^2. Urea was applied on different dates to each time of sowing to coincide with GS31 for the variety and sowing time.

RESULTS AND DISCUSSION

Variety

Out of the three varieties Westminster yielded the highest at 6.94 t/ha, but this was significantly higher than Commander which yielded at 6.63t/ha, and Navigator which yielded 6.11t/ha. This result is interesting as Commander did establish at a significantly higher rate than Westminster, however it did experience a significantly higher incidence of lodging throughout the season, which was to be expected as Commander is well known for its lodging properties.

Table 1. Effect of variety on establishment, yield and lodging in barley sown at Westmere, 2016.

Variety	Establishment	Yield	Lodging
Westminster	134.21 a	6.94 a	2.31 b
Navigator	123.1 b	6.11 b	0.59 c
Commander	135.07 a	6.36 b	5.09 a

Means followed by the same letter do not significantly differ (LSD p=0.05)

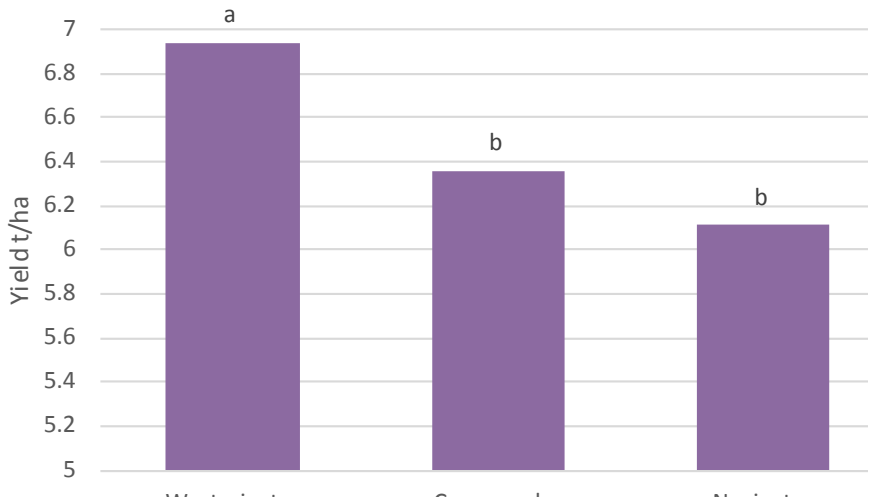

Figure 1. Yield difference between varieties

PGR Effect

Moddus Evo had a significant effect on the plant height and yield of all varieties across all varieties and both sowing dates. There was also a trend between the PGR applications and reduced incidence and severity of lodging within the trial.

Table 2. Treatment effect of PGRs on yield and height of barley varieties at Westmere, 2016.

Treatment	+PGR	-PGR
Yield	6.6 t/ha b	6.3 t/ha a
Height	877.5 cm b	912.26 cm a
May	157 b	1.33 b

Means followed by same letter do not significantly differ

Time of Sowing

Time of sowing had a significant effect on establishment, disease, lodging and height in the trial

Table 2. Treatment effect of PGRs on yield and height of barley varieties at Westmere, 2016.

Time of Sowing	Establishment	Disease in lower canopy	Lodging Incidence	Lodging severity	Height
	(plants/m2)	0 = no disease 10=100% infection	0 = no lodging 9=maximum lodging	0 = flat on ground 9=fully upright	(cm)
April	104 a	3.03 a	4.15 a	7.42 b	924.03 a
May	157 b	1.33 b	1.19 b	8.35 a	865.73 b

Means followed by same letter do not significantly differ

The plants sown in April had a lot of biomass, especially earlier on in the season when temperatures were still reasonably warm. This biomass combined with warmer temperatures throughout the growing season meant that disease was more prevalent across all varieties, especially in the lower canopy. In a farm scale situation, this increased disease pressure from an earlier time of sowing could incur more costs throughout the season from increased fungicide applications. This trial did not experience large amounts of disease pressure through the season, but if earlier sowing dates are to be transferred to the paddock this is something that growers should be mindful of.

All treatments sown in May established at a significantly higher rate than those sown in April. The second time of sowing was not water limited at all throughout its growing season, whereas the first timing was dry sown and had very little soil moisture available for the first weeks of its growing season. The May sown varieties may have also had an advantage in that their nitrogen was applied later in the growing season when they were in a more active growing period due to increased sunlight and temperature, in comparison to those sown in April.

Whether this improved uptake was successful or not is hard to say, as there was no significant difference in yield for the time of sowing treatments, only a trend toward April sown barley yielding higher.

May sown treatments were significantly shorter than those sown in April, and with this difference in height came a significant difference in the incidence of lodging. April sown treatments had a significantly higher lodging incidence than the May sown, and the severity of this lodging was also significantly higher.

The plants sown in April had plenty of warmth and sunlight early in their growing season, which caused this significant difference in height.

Even though there was a significant difference in the amount of lodging experienced in the two time of sowings, neither of the treatments had an incidence score that was close to 9, which would have indicated that the barley was lying on the ground. Because of this the lodging effect would not have had a strong impact on the yield result that we saw between the two times of sowing.

Combination of Factors

When the effect of all treatment factors are considered as a whole, the results show that there was a trend toward April sown Westminster with PGR application being the highest yielding treatment.

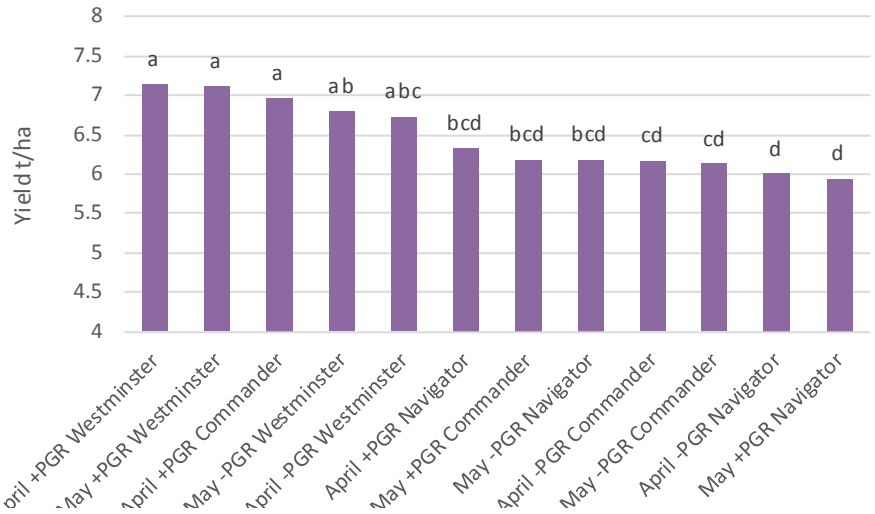

Figure 2. Effect of variety, time of sowing and PGR applications on yield.

CONCLUSION

An early time of sowing in barley can be useful to growers in terms of increasing yield, however growers should be wary of added costs involved with this, such as more frequent fungicide applications, as well as increased opportunity for losses through lodging damages in a wet season like 2016.

ACKNOWLEDGEMENTS

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