

Commander – a new high yielding, malting barley

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Key messages

- Commander is an established malting variety in the eastern states with international market demand.
- Commander is best suited to 3+ t/ha environments where it out yields current established malting varieties.
- Commander is prone to lodging and is an inherently low protein accumulator. It may require specific N management to achieve desired yield and protein outcomes.

Background and aims

Commander is being targeted to replace the current international demand for Gairdner and Vlamingh barley and malt. This transition may take several years as the Western Australian production of Commander is only just beginning.

Commander is a medium fermentability variety with a malting profile that is considered to be superior to Gairdner. Short term there is strong demand for the accumulation of Commander in the Kwinana Port Zone and northern part of the Albany Port Zones for supply to Joe White Maltings in Perth. Unlike other new malting varieties being established in Western Australia there is international demand for its grain as it is an established malting variety on the east coast. Commander is also currently being assessed for its suitability for the production of Japanese shochu.

Commander was accredited as a malting variety in 2009 and the first commercial production of Commander in Western Australia occurred in 2012. Is Commander a suitable alternative to Baudin, Buloke, Gairdner and Vlamingh? What is the likelihood of its adoption as compared with other malting and food varieties? What are the agronomic constraints of growing malt quality Commander? This paper addresses some of those issues.

Results

Characteristics of Commander Barley

Commander is an erect, tall variety with medium coleoptile length (60-80 mm) and a tapering ear with very long awns that are devoid of redness. Its head retention is considered fair and similar to Gairdner, but it is more susceptible to lodging, particularly when yielding above 3 t/ha. Commander is a late maturing variety with awn emergence 11-13 days later than Stirling and 3-4 days later than Buloke when sown in late May.

Commander is high yielding variety. The long term NVT MET analysis (2008–2012) (Table 1) indicates Commander does well in all port zones. It is either the highest or the second highest yielding malting variety, but is consistently out yielded by the food variety Hindmarsh in each port zone.

Figure 1 is a linear analysis comparing the grain yield of Bass, Baudin, Buloke, Hindmarsh and Vlamingh with the yield of Commander as the grain yield of Commander increases. It suggests that Commander is best suited to >3 t/ha environments where it out yields current established malting varieties (Figure 1). In the sub 3 t/ha environments, the grain yield of Commander is equivalent to Buloke and up to 0.2 t/ha higher than Bass, Baudin and Vlamingh. Relative to the food variety Hindmarsh, Commander is likely to be a better option once the site potential is >4 t/ha. At sites with a yield potential below 4 t/ha, Hindmarsh is likely to out yield Commander by up to 0.3 t/ha.

Table 1 Grain yield of malting and food barley varieties expressed as a per cent of Commander (adapted from NVT MET analysis 2008–2012, Paynter *et al.* (2012)).
(Figures in parenthesis are the number of observations). Data is only presented where there are 5 or more observations in an Agzone.

Variety	Agzone 1	Agzone 2	Agzone 3	Agzone 4	Agzone 5	Agzone 6
Commander yield (t/ha)	3.30 (7)	2.70 (20)	3.34 (22)	2.08 (6)	2.70 (17)	3.21 (9)
Malting varieties						
Bass	99 (7)	94 (20)	97 (22)	95 (6)	95 (19)	96 (9)
Baudin	93 (7)	89 (20)	90 (22)	94 (6)	88 (19)	85 (9)
Buloke	98 (7)	97 (20)	98 (22)	105 (6)	98 (17)	96 (9)
Commander	100 (7)	100 (20)	100 (22)	100 (6)	100 (17)	100 (9)
Gairdner	- (2)	91 (17)	92 (22)	90 (6)	90 (12)	91 (9)
Granger	- (2)	99 (12)	102 (14)	- (2)	97 (12)	102 (9)
Scope	96 (5)	98 (15)	98 (19)	- (4)	97 (15)	96 (9)
Vlamingh	101 (7)	96 (20)	98 (22)	- (4)	96 (19)	97 (9)
Food varieties						
Hindmarsh	105 (7)	105 (20)	106 (22)	113 (6)	109 (17)	104 (9)

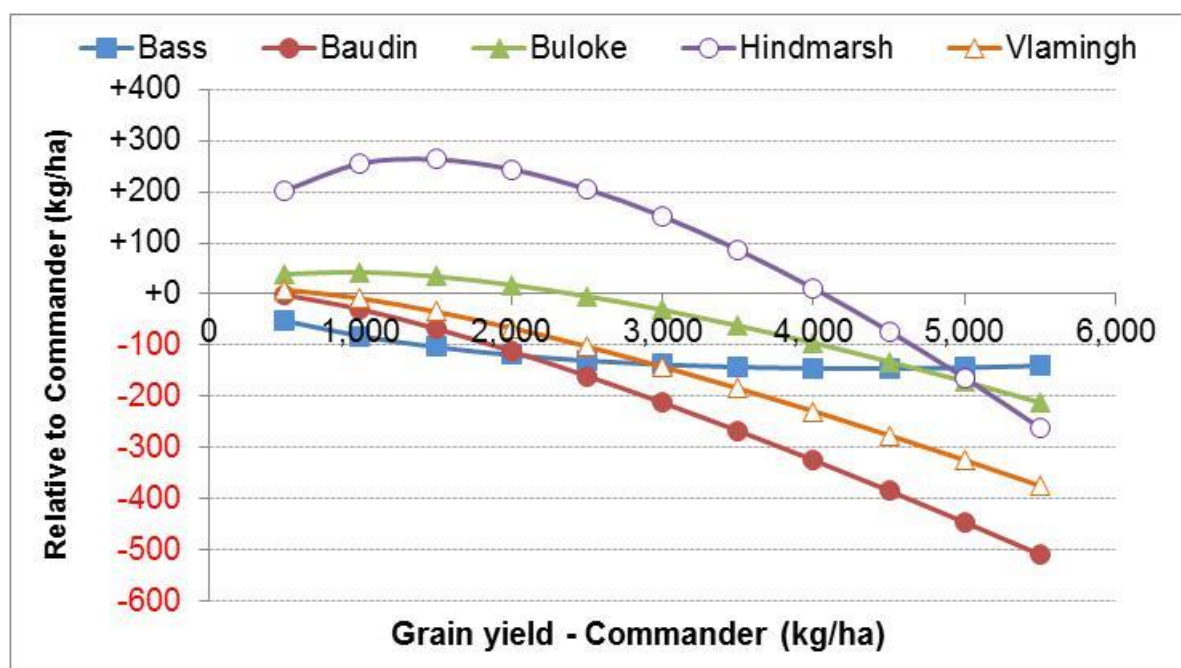


Figure 1 Grain yield of the malting varieties Bass ($r^2 = 0.93$), Baudin ($r^2 = 0.91$), Buloke ($r^2 = 0.90$) and Vlamingh ($r^2 = 0.93$) and the food variety Hindmarsh ($r^2 = 0.88$) at different grain yields achieved by Commander. (Data from 2007-2012 DAFWA barley agronomy, 2005 CVT and 2008-2012 NVT trials. Each variety is sown in all 268 trial-years of data).

Sowing date influences the grain yield of barley and late sowing can result in significant yield penalties. Across 24 time of sowing trials the average yield penalty for delaying seeding was 0.35 t/ha for a 3 week delay and 0.76 t/ha for a 6 week delay after late May. In these trials, Commander was a better option than Baudin, Gairdner and Vlamingh with later sowing as the yield penalties in Baudin, Gairdner and Vlamingh were greater than for Commander (Figure 2). As seeding was delayed the advantage of Commander decreased relative to Buloke, but the advantage of Hindmarsh over Commander increased.

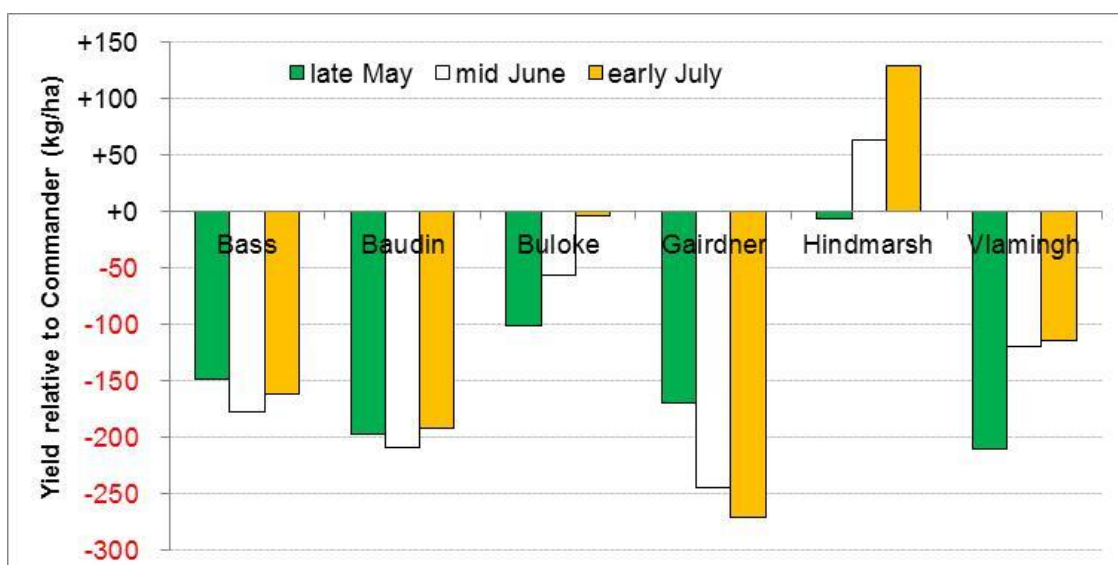


Figure 2. Difference in the grain yield of six barley varieties relative to Commander when sown in late May, mid June and early July in Western Australia. Data averaged over 24 trial-years of DAFWA barley agronomy time of sowing trials (2007-2011). Commander is slightly plumper than Baudin and Buloke. Figure 3 compares the screening levels of Commander with other varieties from the same trials as used for the grain yield analysis in Figure 1. Figure 3 suggests that Commander should meet the Malt 1 receival standards for grain plumpness (max 20% screenings) more often than Baudin and Buloke, but less frequently than Bass and Vlamingh. Hindmarsh is also likely to meet the BFOD1 plumpness standard (max 20% screenings) more often than Commander due to its plumper grain shape.

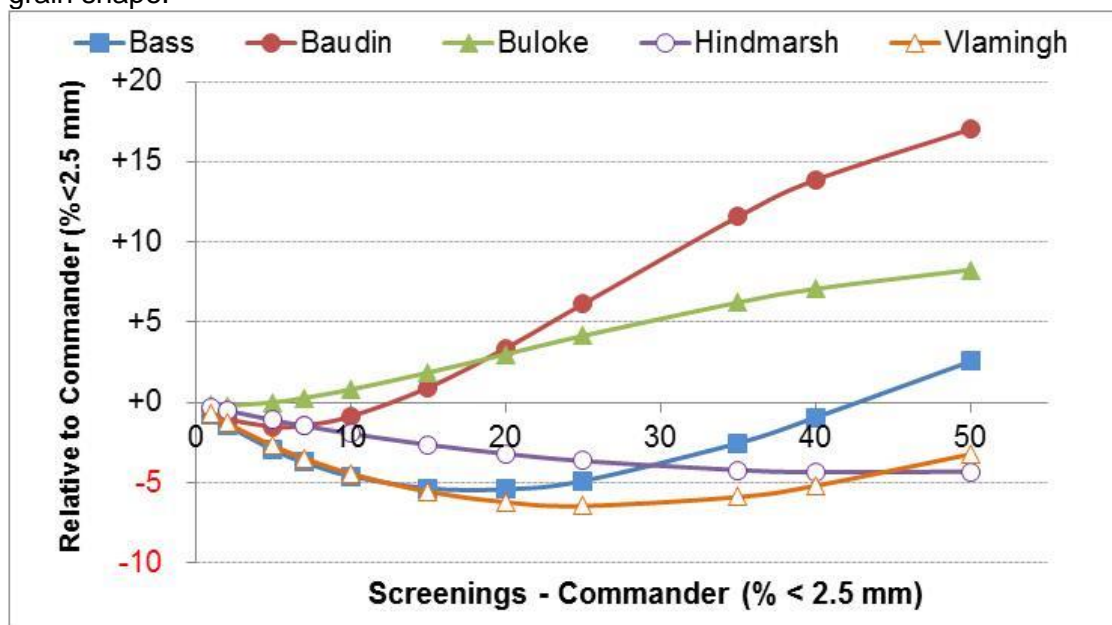


Figure 3. Plumpness of the malting varieties Bass ($r^2 = 0.83$), Baudin ($r^2 = 0.85$), Buloke ($r^2 = 0.85$), and Vlamingh ($r^2 = 0.86$) and the food variety Hindmarsh ($r^2 = 0.73$) at different screenings levels achieved by Commander. (Data from 2007-2012 DAFWA barley agronomy, 2005 CVT and 2008-2012 NVT trials. Each variety is sown in all 268 trial-years of data).

Commander is a low protein accumulator. Porker and Wheeler (2013) found Commander to be less responsive to nitrogen than Hindmarsh, whilst Graham *et al.* (2013) found no varietal interaction. Our experience in Western Australia is that in about two-thirds of trials, varieties respond similarly in their grain yield response to applied nitrogen, albeit at different potential yields. However Graham *et al.* (2013), Porker and Wheeler (2013) and Paynter and van Burgel (2014) did observe that Commander consistently had a lower grain protein

concentration than varieties like Baudin and Hindmarsh at any given grain yield. In the study of Graham *et al.* (2013), Commander showed a lower increase in grain protein concentration with increasing nitrogen application than the other varieties tested. This suggests that Commander may require a different nitrogen management plan to established varieties like Baudin, Gairdner and Vlamingh in order to maximise its yield potential and meet the protein receival standards for malting barley. Whilst more research is needed, Porker and Wheeler (2013) proposed that earlier sowing and delayed nitrogen may provide the best long term strategy for achieving optimum yield and protein in Commander in higher yielding environments. Increased up-front nitrogen or sowing into high nitrogen fertility paddocks may increase the risk of lodging, an issue to which Commander is prone.

Commander may be less competitive against ryegrass. Whilst we have limited data, results from a weed competition trial (with and without sown ryegrass) showed that Commander had a similar yield loss to that of Bass, Baudin and Vlamingh in the presence of 100 – 200 ryegrass plants/m². However, higher numbers of ryegrass tillers were observed in the Commander plots. Further research is being undertaken to confirm if this observation holds true over a greater number of trials.

Commander has a useful level of disease resistance. As an adult plant, Commander is rated as MR to powdery mildew, MS-S to spot type net blotch, MS-S to scald, S to net type net blotch and S to barley leaf rust. Commander will require foliar fungicides to manage barley leaf rust and net type net blotch in disease prone areas.

Conclusions

Commander is a competitor to the other new malting variety Bass. Whilst it is generally higher yielding than Bass, it's probability of malting is likely to be slightly lower due to a narrower grain shape (increased screenings). Ultimately, the decision to grow Commander ahead of Hindmarsh and/or Bass will be dependent on the site's yield potential, varietal premiums offered at harvest, the probability of delivering malt or food grade barley and access to segregations.

Key words

Barley, Commander barley, grain yield, grain quality

References

- Paynter BH, Hills AL and Dhammu H (2012). Barley variety guide for 2012. Department of Agriculture and Food, Western Australia, Bulletin 4826.
- Paynter BH and van Burgel A (2014). Barley cultivars differ in their protein concentration. Agribusiness Crop Update Proceedings 2014.
- Porker K, Wheeler R (2013). Managing grain protein; Cultivar specific responses to nitrogen. 16th Australian Barley Technical Symposium, Melbourne.
- Graham RW, Paynter BH, Fettell NA, Gardner M, Porker K, Hills AL, Malik R, Craig S, Moody N and Graham NA (2013). Yield and quality responses of potential malting barley varieties of national significance. 16th Australian Barley Technology Symposium, Melbourne.

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