

# Agronomy of New Wheat and Barley Varieties

## Response to N Applied on Wheat Stubble

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### Key Messages

- Barley yields averaged 1.78 t/ha compared to 1.64 t/ha for wheat.
- The barley and wheat varieties differed in their response to added nitrogen (N). Cobra, Mace and Wyalkatchem yields increased at 40 kg/ha of N as did yields of Compass, La Trobe and IGB1337. The other varieties were not responsive to added N.
- Barley had a higher tillering capacity than wheat.
- Grain quality and price will influence the profitability of added N. The current high prices for barley grain make it a profitable option. However, barley is less tolerant to acid soils and so site selection is important, as is a good understanding of grain quality and end price.

### Aim

To evaluate yields and quality of new and existing wheat and barley varieties and their response to N.

### Background

Wheat or barley? Which crop do you think is more productive in your paddock? Current research from the Department of Agriculture and Food, Western Australia (DAFWA) indicates barley can be more productive than wheat in a range of environments. However, the profitability of those cereals will be influenced by rotations, management and price.

This experiment is one in a series of 10 trials. It compares the response of wheat and barley varieties to changes in N application across a range of environments. Trials are located from Binnu, to Merredin and Newdegate on wheat or canola stubble.

### Trial Details

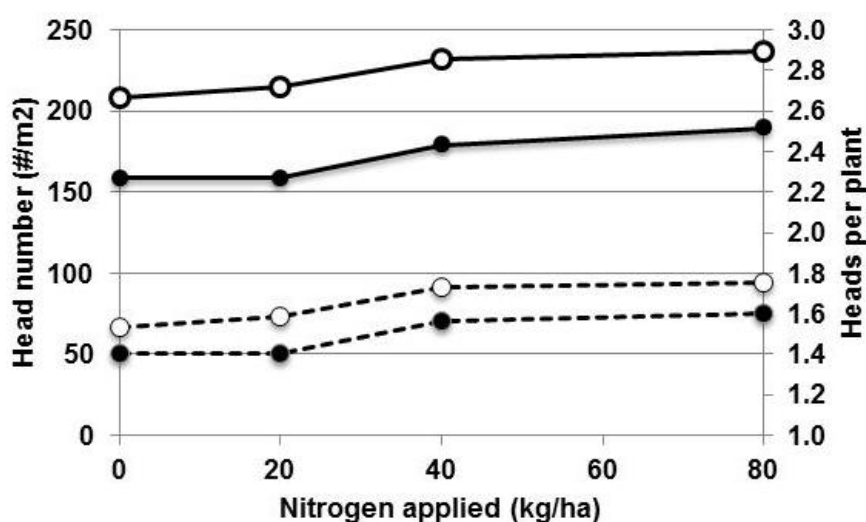
<b>Property</b>	Fitzsimons Property, east Buntine					
<b>Plot size &amp; replication</b>	1.54m x 10m x 3 replications					
<b>Soil type</b>	Sandy loam over loam					
<b>Soil pH (CaCl<sub>2</sub>)</b>	0-10cm: 5.3      20-30cm: 4.7					
<b>EC (dS/m)</b>	0-10cm: 0.052					
<b>Soil Nitrate N (mg/kg)</b>	0-10cm: 9	10-20cm: 7	20-30cm: 5	30-40cm: 6	40-50cm: 4	50-60cm: 3
<b>Soil Ammonium N (mg/kg)</b>	0-10cm: 2	10-20cm: 2	20-30cm: 2	30-40cm: 1	40-50cm: 1	50-60cm: 1
<b>Paddock rotation</b>	2011: wheat, 2012: canola, 2013: wheat					
<b>Variety</b>	Barley: Compass, Flinders, Granger, IGB1337, La Trobe, Scope CL Wheat: Cobra, Corack, Emu Rock, Mace, Magenta, Wyalkatchem					
<b>Seeding date</b>	12/05/2014: 22cm using 7 row cone seeder with press wheels					
<b>Seeding rate</b>	Approximately 70 kg/ha targeting 120 plants/m <sup>2</sup> . Note: 126 plants/m <sup>2</sup> established					
<b>Nitrogen treatments</b>	N0 = nil nitrogen; N20 = 20 kg/ha of nitrogen applied at seeding; N40 = N20 + 20 kg/ha N top dressed; N80 = N20 + 60 kg/ha N top dressed					
<b>Fertiliser</b>	12/05/2014: 120 kg/ha Summit Super CZM banded at seeding 11/06/2014: post N treatments applied					
<b>Herbicides</b>	12/05/2014: 118 g/ha Sakura, 2 L/ha Spray.Seed 11/06/2014: 670 mL/ha Velocity, 1% Hasten					
<b>Growing Season Rainfall</b>	180mm					

### Results

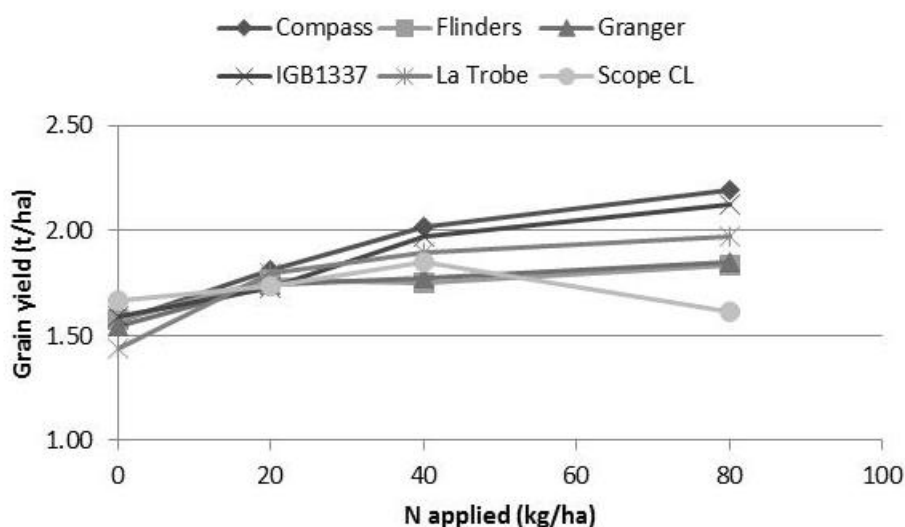
Barley yields (averaged across all varieties) were significantly higher than wheat at all N treatments except the control. Barley and wheat yields differed in their response to added N in 2014. When averaged across all varieties, barley yields at 40 kg/ha were significantly higher yielding than the

control however, yields did not increase with added N to 80 kg/ha. In contrast, wheat yields (averaged across all varieties) did not increase significantly with added N to 80 kg/ha. Barley had a higher tillering capacity than wheat (Figure 1). At a variety level, there were different responses to added N. La Trobe and Compass were responsive at 20 kg/ha of added N compared to the control (Figure 2: LSD 0.23 t/ha). La Trobe was not responsive to further additions of N. In contrast, the yield of Compass at 80 kg/ha of N was significantly greater than 20 kg/ha of N but not 40 kg/ha of N (Figure 2: LSD 0.23 t/ha). Flinders and Granger yield responses were similar. The yields at 80 kg/ha of N were significantly greater than the control. Scope CL yields did not increase significantly with added N up to 60 kg/ha and declined significantly at 80 kg/ha of N (Figure 2: LSD 0.23 t/ha). Wheat grain yields of Cobra, Mace and Wyalkatchem at 40 kg/ha of N was significantly greater than the control (Figure 3: LSD 0.23 t/ha). Further application of N to 80 kg/ha did not significantly increase yields. In contrast Corack, Emu Rock and Magenta yields were not responsive to added N (Figure 3: LSD 0.23 t/ha).

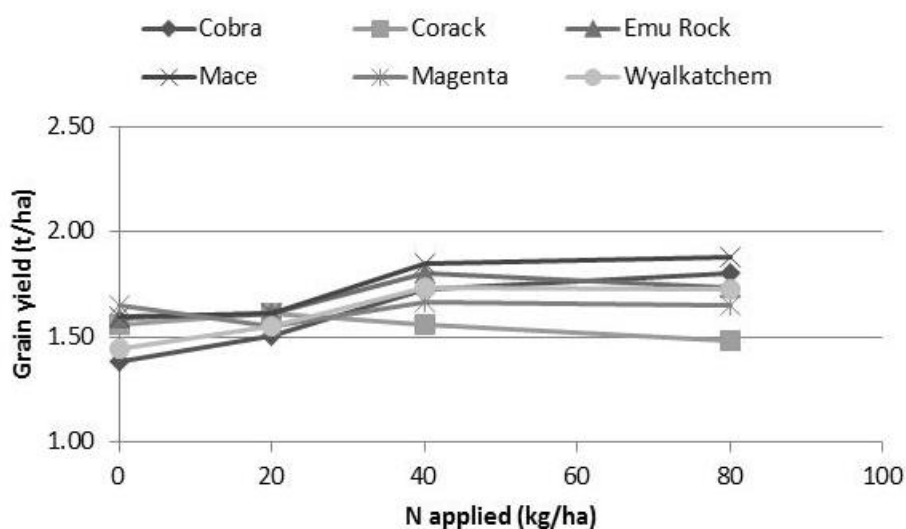
Wheat varieties were susceptible to 'lodging' which was a result of the high wind speeds late in the season. The 'lodging' ratings increased as N rates increased. This was not as evident in the barley varieties but lodging did occur to a lesser extent in La Trobe and IGB 1337.



**Figure 1:** Head numbers per m<sup>2</sup> (solid line) and heads per plant (dotted line) for barley (white circles) and wheat (black circles) with added nitrogen (kg/ha) at Buntine in 2014.



**Figure 2:** Response of added N to grain yield of barley varieties at Buntine in 2014. (LSD (0.05) = 0.336 t/ha between varieties and 0.231 t/ha within variety).



**Figure 3:** Response of added N to grain yield of wheat varieties at Buntine in 2014. (LSD (0.05) = 0.336 t/ha between varieties and 0.231 t/ha within variety).

**Table 1:** Wheat grain price (\$/t) needed to offset the yield increase of barley at four barley price levels (\$/t).

Barley price (\$/t)	Barley minus wheat yield = 0.2t/ha	Barley minus wheat yield = 0.3t/ha	Barley minus wheat yield = 0.4t/ha	Barley minus wheat yield = 0.6t/ha
150	180	195	210	225
200	240	260	280	300
250	300	325	350	375
300	360	390	420	450

### Comments

Grain quality testing is not available at the time of print. However, this will have an influence on the profitability of added N on barley and wheat production. At current high prices for barley grain, it is a profitable option. However, barley is less tolerant to acid soils and so site selection is important, as is a good understanding of grain quality and end price. The yield potential of the site will influence the wheat grain price needed to offset improved barley yields. For example where barley yields 1.5 t/ha and wheat is likely to yield 1.3 t/ha (yield difference 0.2 t/ha), at a current price for barley of \$300/t and \$150/t, the break even wheat prices are \$346/t and \$173/t respectively. The yield difference between wheat and barley will also influence break even prices. At a barley yield of 3.5 t/ha at \$250/t, when the yield differences between barley and wheat is 0.2t/ha and 0.4t/h, the break even wheat price is \$265/t and \$282/t respectively, (Table 1).

**Table 2:** Wheat grain price (\$/t) needed to offset the yield increase of barley at four barley price levels (\$/t) at 1.5 t/ha and 3 t/ha of barley.

Barley price (\$/t)	At Barley 1.5t/ha and Yield difference Barley-wheat = 0.2t/ha	At Barley 3.5t/ha and Yield difference Barley-wheat = 0.2t/ha	At Barley 1.5t/ha and Yield difference Barley-wheat = 0.4t/ha	At Barley 3.5t/ha and Yield difference Barley-wheat = 0.4t/ha
150	173	159	205	169
200	231	212	273	226
250	288	265	341	282
300	346	318	409	339

### Acknowledgements

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