



# Oat agronomy trial report (Variety agronomy) – Lake Grace 2018

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## KEY MESSAGES

- Kowari and Williams yielded similarly, and out-yielded newly accredited variety Bilby (breeding line 06204-16) (by 0.15 t/ha) and Carrolup (by 0.25 t/ha).
- Bilby was the most sensitivity to increasing nitrogen, with N increasing from 0 to 60kg N/ha significantly reducing Bilby's hectolitre weight.

## Introduction

This trial is the second year of the trial series comparing the performance and response of two breeding lines (03198-18, named Kowari and 06204-16, named Bilby) and two benchmark varieties (Carrolup and Williams) to changes in nitrogen and plant density in medium rainfall environments. This research builds on the trials conducted at Holt Rock in 2014-2016.

## Methods

Similarly to 2017, in 2018, three sites were established at Yerecoin, Brookton and Lake Grace, Lake Grace data is presented in this report. The seed rate (kg/ha) to establish the four target plant densities of 80, 160, 240 and 320 plants/m<sup>2</sup> varied for each variety and was adjusted based on their grain weight and germination percentage. Plant establishment was determined at 4 weeks after seeding and ranged from 100 to 381 plants/m<sup>2</sup>. The four nitrogen (N) rates were 0, 30, 60, 90kg N/ha. Basal fertiliser comprised of CSBP Super CZM which was treated with Uniform (40ml/L) and banded below the seed at 120 kg/ha.

### Site and environment

The trial was sown dry on the 15<sup>th</sup> May, with the effective sowing date on the 25<sup>th</sup> May when the season break occurred (30+mm). Growing season rainfall (May-October) was 239mm at Brookton (Table 1). The site mean grain yield was 3.90 t/ha. Grain quality of all treatments was within the Oat1 limits (hectolitre weight  $\geq$ 51kg/hL and screenings  $\leq$ 10%).

**Table 1. Location, soil attributes, growing season rainfall, seeding dates and site mean yields for the six trials.**

Site No.	Location	Organic C (%)	Total N (kg N/ha)	pH CaCl <sub>2</sub> (0-10cm)	Soil type	May-Oct rainfall (mm)	Seeding date	Site mean yield (t/ha)
18KA15	Lake Grace (Kuender)	0.78	0.06	5.01	Yellow sandy earth	163	30 <sup>th</sup> May	1.26

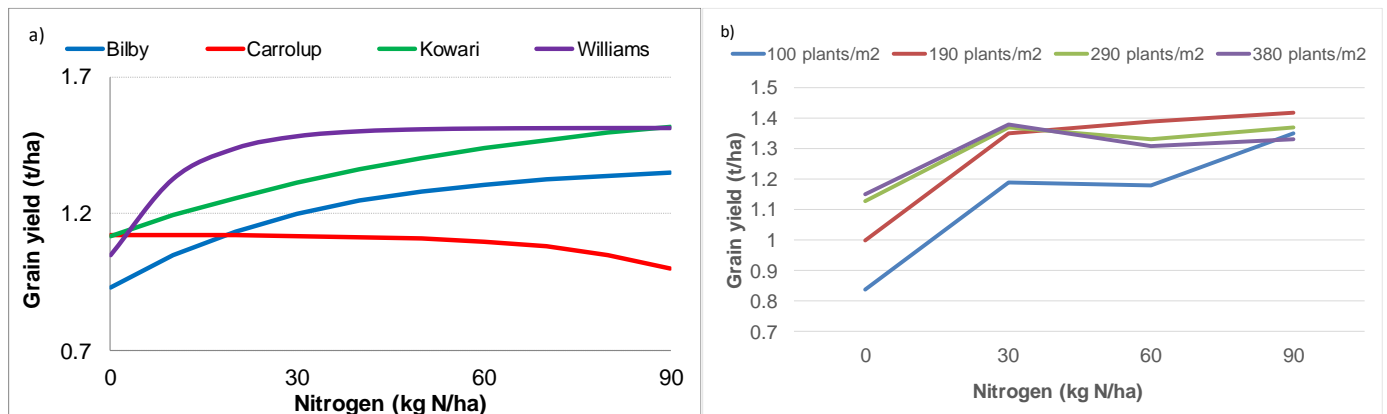
## Results

### Grain yield

Varieties differed in their grain yield. Williams (1.39 t/ha) and Kowari (1.35 t/ha) yielded similarly and were the highest yielding varieties at this site, which had a site mean grain yield of 1.26 t/ha. The new variety Bilby had a lower grain yield (1.2 t/ha) than Williams or Kowari, which was higher than Carrolup grain yield of 1.09 t/ha.

Both nitrogen and plant density influenced grain yield at this site, and varieties differed in their response to nitrogen and plant density. Grain yield of the new variety Bilby, Kowari and Williams improved when applied nitrogen increased from 30 to 90 kg N/ha, whereas the grain yield of Carrolup remained stable, and did not improve with the addition of more than 30kg N/ha (Figure 1a). Changes to plant density had a similar effect on Carrolup whose yield remained stable, whereas the grain yield of Bilby, Kowari and Williams improved as plant density increased from ~100-200 plants/m<sup>2</sup>.

There was an interaction between nitrogen and plant density, which supported the current recommended planting density of ~160 plants/m<sup>2</sup> in this environment, and yield was optimised when 30kg N/ha was applied (Figure 1b). There was no advantage in applying more than 30kg N/ha, or sowing to achieve more than 190 plants/m<sup>2</sup>. Nitrogen was a split application, with 1/3 applied at seeding, and the remainder 2/3 applied at Z31 (first node).

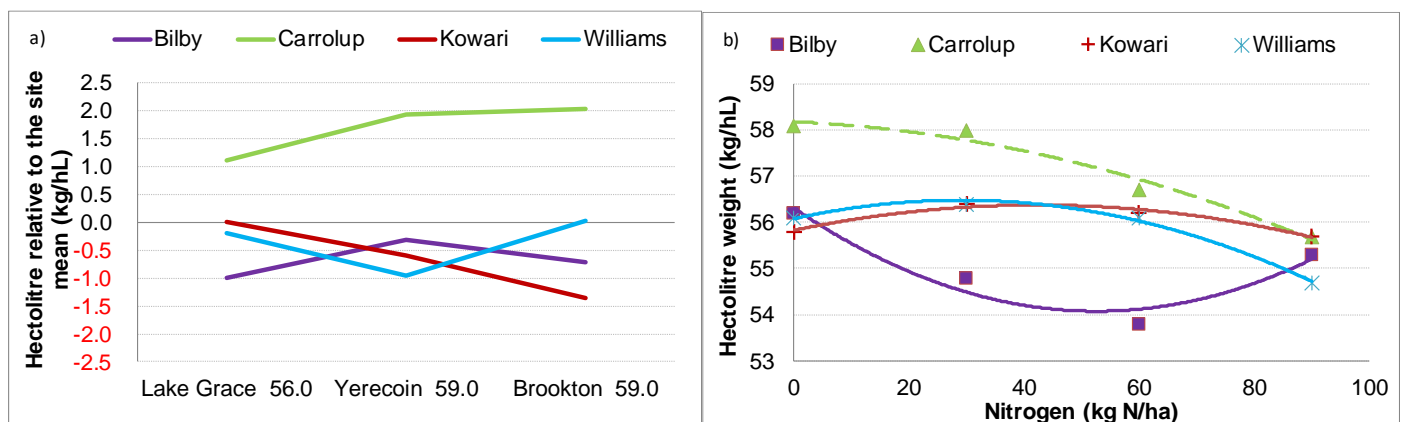


**Figure 1. Grain yield response to changes in a) applied nitrogen (kg N/ha) for four oat varieties Lsd ( $P = 0.05$ ) = 0.19 t/ha, and b) plant density (plants/m<sup>2</sup>) and applied nitrogen (kg N/ha) Lsd ( $P = 0.05$ ) = 0.12 t/ha at Lake Grace.**

### Grain quality

All varieties met the Oat1 minimum hectolitre weight of 51kg/hL, but not all varieties/treatments met the Oat1 maximum screenings limit of 10%.

Varieties differed in their hectolitre weight, and their response to nitrogen influencing hectolitre weight. Carrolup had the highest hectolitre weight (57.1 kg/hL), higher than Williams and Kowari (-1 kg/hL), and Bilby (-2 kg/hL) (Figure 2a). Bilby was the most sensitivity to increasing nitrogen (Figure 2b), with N increasing from 0 to 60kg N/ha significantly reducing Bilby's hectolitre weight. The response of Carrolup was similar, albeit to a lesser extent. Kowari's hectolitre weight remained stable as N applied increased. The sensitivity of Bilby to nitrogen at Lake Grace is supported by its response at Yerecoin and Brookton in 2018.



**Figure 2. Hectolitre weight of a) four oat varieties relative to the site mean at Lake Grace, Yerecoin and Brookton in 2018, and b) their responses to changes in applied nitrogen (kg N/ha) Lsd ( $P = 0.05$ ) = 1.0 kg/hL, at Lake Grace in 2018.**

Carrolup and Williams had similar screenings (11%), which was higher than Bilby (7%), and Kowari (4%) at Lake Grace. The ranking of varieties is supported by their ranking at Yerecoin and Brookton in 2018.

### References

Troup GM, 2017, 2018 GRDC Research Updates presentation, Perth, WA (can be found at [www.giwa.org.au](http://www.giwa.org.au))

### Acknowledgments

The author acknowledges the research support of Blakely Paynter, and technical support of Kim Arnold, and the DPIRD Research Support Units at Northam, Wongan Hills and Katanning. The research undertaken as part of this project is made possible by the significant contributions of growers through both trial cooperation and the support of the GRDC, the author would like to thank them for their continued support.

**GRDC Project Number: DAW00227**