Department of Primary Industries and Regional Development
GOVERNMENT OF WESTERN AUSTRALIA

Oat agronomy trial report (Variety agronomy) – Brookton 2018

Georgie Troup Georgie.troup@dpird.wa.gov.au

Department of Primary Industries and Regional Development, Western Australia, Northam.

KEY MESSAGES

・New variety Bilby (breeding line 06204-16) out-yielded Carrolup (by 0.7 t/ha), but did not out-yield Williams, and had lower grain quality than Carrolup in grain quality.

・Similar to 2017, a mild finish to the growing season meant all varieties met Oat1 quality specifications, and agronomy had a reduced impact on grain quality.

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.

Methods

Similarly to 2017, in 2018, three sites were established at Yerecoin, Brookton and Lake Grace, Brookton 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^2 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 82 to 388 plants/m^2. 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 15th May, with the effective sowing date on the 25th 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 ≥51kg/hL and screenings ≤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 $CaCl_2$ (0-10cm)	Soil type	May-Oct rainfall (mm)	Seeding date	Site mean yield (t/ha)
18NO25	Brookton	0.87	0.08	5.8	Yellow/Brown shallow sandy duplex	299	15th May	3.90

Results

Grain yield

Varieties differed in their grain yield. The new variety Bilby (4.2 t/ha), Williams (4.0 t/ha), and Kowari (3.9 t/ha) produced similar yields, and all out-yielded Carrolup (3.5 t/ha) (Figure 1a). Varieties did not differ in their response to nitrogen, but did differ in their response to changes in plant density. New variety Bilby responded similarly to Williams and Carrolup when plant density increased from 160-240 plants/m², yet while Williams and Carrolup grain yield stabilised at 240 plants/m², the grain yield of Bilby continued to increase as plant density increased to 320 plants/m². Grain yield of Kowari increased as plant density increased from 80-160 plants/m², and stabilised as plant density increased further.

Plant density had a greater influence on grain yield than applied nitrogen (N). Increasing applied N by 60 kg N/ha (e.g. 0-60 or 30-90 kg N/ha) increased grain, whereas incremental increases in N (0-30kg, 30-60, 60-90 N/ha) did not (Figure 1b). Grain yield increased by 0.4 t/ha when applied N increased from 30 to 90 kg N/ha.

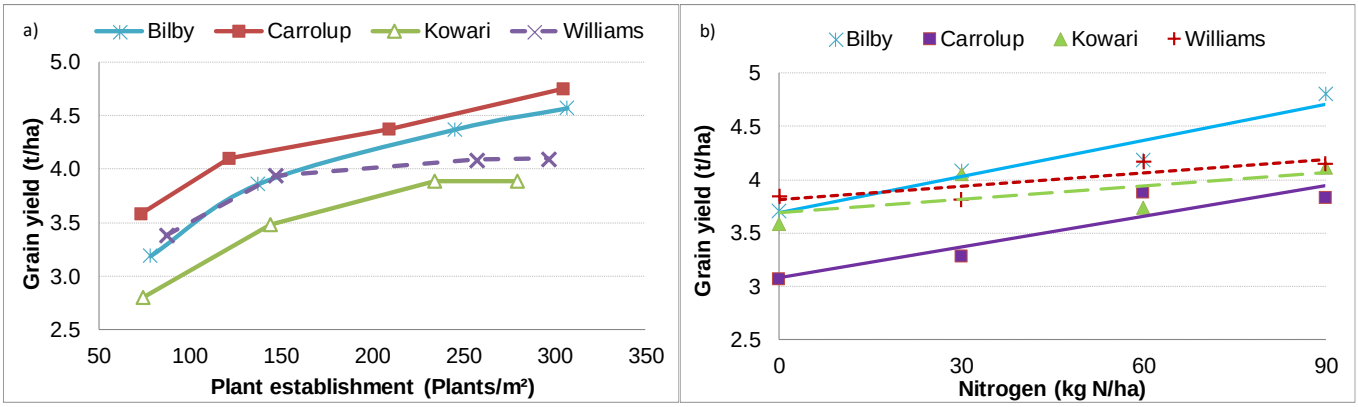
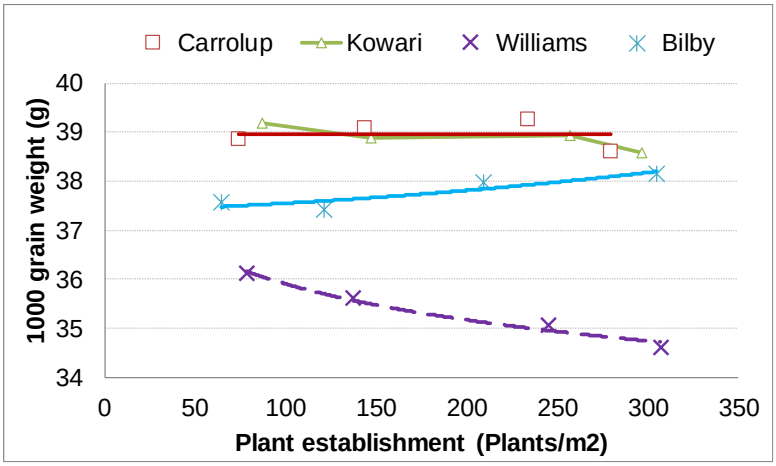


Figure 1. Grain yield of four oat varieties in response to changes in a) plant density (plants/m²) Lsd (P = 0.05) = 0.25 t/ha, and b) applied N (kg N/ha) Lsd (P = 0.05) = 0.25 t/ha at Brookton.



Grain quality

All varieties met the Oat1 minimum hectolitre weight of 51kg/hL and maximum screenings percent of 10%. Carrolup had significantly higher hectolitre weight than the other three varieties, which is similar to its performance in 2016 and 2017 trials (Troup et. al 2017, 2018), which also had cool conditions at the end of the growing season. Changes in plant density and applied nitrogen had no significant effect on hectolitre weight or screenings percent in 2018. At Brookton, the screenings percent was most influenced by variety selection.

Figure 2. 1000 grain weight (g); response to changes in plant density (plants/m²) of four milling oat varieties at Brookton Lsd (P = 0.05) = 0.7g.

Kowari and Carrolup had the lowest screenings of 2%, followed by Williams with 4%, and the new variety Bilby had the highest screenings at 6%. While it is not a receival specification, the 1000 grain weight was measured in this trial. The 1000 grain weight is an important measure of seed quality, which is effective on germination, seed potential, seedling growth, and plant performance. In this trial, varieties differed in their 1000 grain weight, with Carrolup (39.0g) and Kowari (38.9g) having higher 1000 grain weight than Bilby (37.8 g), which was higher than Williams (35.g). Varieties responded differently to changes in plant density, with Williams being the most sensitive to increases in plant density (Figure 2).

References

Troup GM (2018). Oat Agronomy Trial Report – Yerecoin 2017.

Troup GM (2018). Oat Agronomy Trial Report – Yerecoin 2018.

Troup GM, 2017, 2018 GRDC Research Updates presentation, Perth, WA (can be found at 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