

# Dual purpose oat varieties show promise in the Mallee

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## Background

Oats are very versatile and have long been used in Mallee paddock rotations for grazing, hay production and grain for feeding animals, but of late they have not usually been grown for grain value. Oats became more popular in 2015 when attractive contracts for milling oats were offered prior to sowing, largely driven by demand from China.

The National Oat Breeding Program, supported by industry and commercial bodies, has resulted in SARDAI oat varieties accounting for up to 85 per cent of the 160,000 tonnes of milling oats grown in south-eastern Australia. One of the program's most successful varieties, Mitika, now comprises more than 80 per cent of the oats used by Uncle Toby's Australia in its popular porridge and muesli bar snacks. Australia exports up to 700,000 tonnes of oaten hay a year, much of it SARDAI-bred varieties.

## Why was the project done?

There were no current evaluation trials for oats in the southern Mallee, nor had there been any local evaluation of oat variety response to grazing since 2012 at Corack. In 2015 the GRDC Grain & Graze 3 program set out to evaluate the yield performance of a selection of current milling and grazing-hay oat varieties and to assess the grazing value, hay and grain yield in the southern Mallee.

## Key Messages

- Milling oat varieties Mitika, Bannister, Dunnart and Yallara yielded highest, closely followed by breeding line WA02Q302-9.
- Yallara and new variety WA02Q302-9 had the greatest dual purpose value, incurring little yield penalty after grazing. provide key messages in bullet point form

## Method

Replicated field trials were sown at BCG's 2015 Main Research site at Berrillillock using a randomised trial design. Sowing occurred on April 24 following 13.4mm of rain. Varieties included milling oat varieties – Bannister, Williams, Yallara, Dunnart, Mitika and WA02Q302-9 and grazing/hay varieties – Wintaroo, Mulgara, Busher, Tungoo, Yallara and WA02Q302-9.

Trial inputs included Granulock Supreme Z + Impact @ 50kg/ha at sowing and urea @ 45kg/ha applied at GS20 (9 July).

Grazing of grazing/hay oat varieties was simulated when the crop was at GS24 (16 July), using a line trimmer to cut the crop to 6cm high. Milling oats were not grazed.

Assessments included crop biomass at grazing time and anthesis (Grazing-Hay trial only), as well as grain yield and quality parameters.

## Results and Interpretation

Dry seasonal conditions (141mm GSR) meant that emergence was patchy and early growth was slower than normal for both trials.

Varieties used in the grazing/hay trial are normally recommended for May sowing (rather than early sowing in March-April) and grain production, but were chosen for their suitability for a low-medium rainfall environment with quick early dry matter production and early-mid growing season length.

Overall, grain yields for milling oat varieties averaged 0.76t/ha, compared with the (ungrazed) grazing-hay varieties at 0.52t/ha.

### Milling oats

Similar yields were achieved by early-mid maturing milling varieties Mitika, Bannister, Dunnart and Yallara, closely followed by breeding line WA02Q302-9 (Table 1). Williams, a mid-maturing variety, did not perform well due to the season.

Grain quality was sound for protein but poor for screenings and test weight. Protein levels ranged from 11.5 (Yallara) to 12.2 (Dunnart) per cent. Screenings were high in general. Mitika had the lowest screenings at 24.2 per cent, while Williams was most compromised at 59 per cent. All test weights were lower than the receival limit of 49 kg/hL.

**Table 1.** Grain yield and quality of milling oat varieties, Berrwilllock 2015.

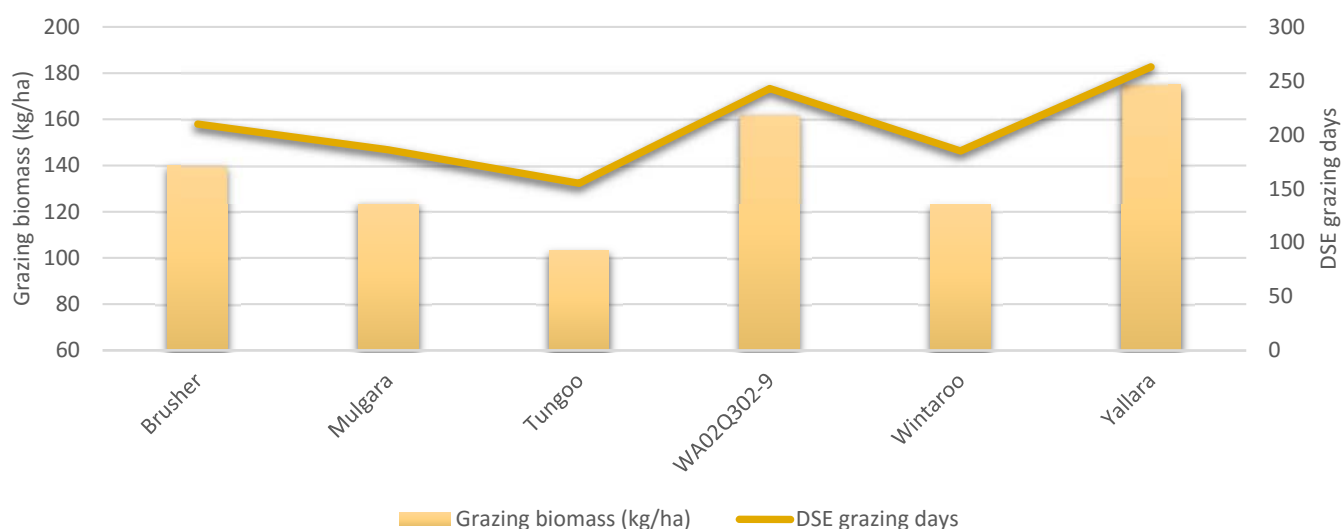
Variety	Grain Yield (t/ha)	Protein (%)	Screenings (%)	Test weight (kg/hL)
Bannister	0.84 <sup>a</sup>	11.8 <sup>bc</sup>	38.6 <sup>b</sup>	42.4 <sup>cd</sup>
Dunnart	0.81 <sup>ab</sup>	12.2 <sup>a</sup>	38.6 <sup>b</sup>	43.2 <sup>bc</sup>
Mitika	0.84 <sup>a</sup>	11.7 <sup>c</sup>	24.2 <sup>d</sup>	45.5 <sup>a</sup>
WA02Q302-9	0.75 <sup>b</sup>	12.0 <sup>ab</sup>	29.6 <sup>c</sup>	45.1 <sup>ab</sup>
Williams	0.55 <sup>c</sup>	12.0 <sup>ab</sup>	59.0 <sup>a</sup>	37.9 <sup>e</sup>
Yallara	0.80 <sup>ab</sup>	11.5 <sup>c</sup>	30.1 <sup>c</sup>	40.5 <sup>d</sup>
Sig. diff.	<b>P&lt;0.001</b>	<b>P=0.003</b>	<b>P&lt;0.001</b>	<b>P&lt;0.001</b>
LSD (P=0.05)	<b>0.088</b>	<b>0.328</b>	<b>5.33</b>	<b>2.01</b>
CV%	<b>7.7</b>	<b>1.8</b>	<b>10.2</b>	<b>3.1</b>

In previous SARDI trials, Bannister and Williams generally had the highest grain yield followed by Mitika. Yallara and WA02Q302-9 are usually slightly lower yielding compared to those varieties. Results for 2015 SARDI trials are yet to be analysed.

### Grazing-Hay oats

Crop growth was slow so grazing didn't occur until 12 weeks after sowing, just prior to the canopy closing. They were grazed high enough to ensure some green stem and leaf remained to assist with plant recovery, important when there is lower rainfall and shorter season length. This meant the amount of feed available was light and variable. There were no differences between varieties (P=NS, CV%=28.2), although feed ranged from 103-175 kg/ha (or 155-263 grazing days) (Figure 1). Despite the lower growth, the grazing value of the oats would still be very useful for ewes with young lambs at that time of year.

**Figure 1** Grazing biomass and DSE grazing days of oat varieties, Berrwilllock 2015.



There was no difference between varieties in biomass production at anthesis, averaging 2073kg/ha across ungrazed varieties. Hay biomass was reduced by 15 per cent if oats were grazed, averaging 1759kg/ha of hay - a reduction of 314kg/ha (Table 2).

Grain yield was highest for Yallara and the new variety WA02Q302-9, followed closely by Mulgara - all early-mid maturing varieties. Tungoo, a mid-late maturing type, suffered with the season and produced the lowest yield.

Grain yield was reduced by grazing, but only by 100kg/ha. It is common to have smaller grain yield penalties in poorer seasons.

New variety WA02Q302-9 was able to maintain grain yield after grazing, while Brusher, Mulgara and Wintaroo, incurred grain yield penalties. Yallara, while losing 90kg/ha in grain production, was still one of the best grazed varieties.

**Table 2.** Hay and grain value of oat varieties, Berriwillock 2015.

Variety	Grazing treatment	Hay biomass at anthesis (kg/ha)	Grain yield (t/ha)
<b>Brusher</b>	Grazed	1786	0.38
	Ungrazed	2180	0.51
<b>Mulgara</b>	Grazed	1985	0.50
	Ungrazed	2032	0.68
<b>Tungoo</b>	Grazed	1527	0.08
	Ungrazed	2000	0.10
<b>WA02Q302-9</b>	Grazed	1525	0.63
	Ungrazed	2067	0.63
<b>Wintaroo</b>	Grazed	1895	0.31
	Ungrazed	2036	0.49
<b>Yallara</b>	Grazed	1836	0.60
	Ungrazed	2120	0.69
<b>Sig. diff.</b>		<b>NS</b>	<b>P&lt;0.001</b>
<b>Variety</b>		<b>P&lt;0.001</b>	<b>P&lt;0.001</b>
<b>Grazing</b>		<b>NS</b>	<b>P=0.003</b>
<b>Variety x grazing</b>			
<b>LSD (P=0.05)</b>		<b>235.7</b>	<b>0.053</b>
<b>Variety</b>		<b>136.1</b>	<b>0.031</b>
<b>Grazing</b>		<b>333.3</b>	<b>0.075</b>
<b>Variety x grazing</b>			
<b>CV%</b>		<b>12.1</b>	<b>11.1</b>

Having two oat varieties (Yallara and new variety WA02Q302-9) express potential for dual purpose use - early winter grazing, and hay and grain production - provides a degree of flexibility to respond to the season at hand and manage for livestock and hay or grain markets.

These varieties are CCN resistant, but CCN intolerant: they will ensure that CCN does not multiply in the paddock, but will be affected if CCN is present. Yallara has leaf rust resistance, but depending on the pathotype could be MR to S for stem rust. However, rust is species specific, so oat rust will not affect wheat or barley.

The National Oat Breeding Program is focusing on releasing oats with added health benefits, including higher fibre beta-glucan levels for lower cholesterol re-absorption such as Mitika. In the future they aim to release varieties with low avenin (gluten protein in oats) which will elevate oat products as an alternative for gluten-free (wheat) diets. This will increase the markets for oats around the world.

### Acknowledgements

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