

15. Dual-Purpose Canola for South Australia's High Rainfall Zone

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KEY MESSAGES

- Initial year of a new 3-year project funded by SAGIT and managed by SARDI.
- Project aims to evaluate dual-purpose canola varieties, comparing two times of sowing and exploring grazing management options.
- Trial site waterlogging resulted in high variability and confounding results, which should be interpreted with caution.
- Difference in feed test results were measured within a variety at different TOS and grazing dates, indicating the importance of getting feed quality tested.
- Dry matter production was low, maximum production recorded was Conventional 434 kg/ha, Triazine Tolerant 357 kg/ha and Clearfield 589 kg/ha.
- Conventional and Clearfield canola grain yields did not vary between TOS or varieties.
- Triazine tolerant varieties had higher yields at TOS 1 and Hyola 750TT was the highest yielding TT variety.

Aim of Trial

A new trial funded by the Southern Australian Grain Industry Trust, SAGIT, and managed by SARDI, was established at Bool Lagoon in 2016. This project aims to evaluate dryland dual-purpose canola varieties in the high rainfall zone (HRZ) (>550 mm) of the south-east of South Australia (SA).

Trial Background

The use of canola as a dual-purpose (grazing canola during the vegetative stage while producing an economic grain yield – graze and grain) option for mixed-farming systems in the HRZ of southern Australia has increased significantly (Kirkegaard *et al.* 2014) and its popularity in the HRZ of south-east SA is increasing (Christy *et al.* 2013). Innovative growers are now adopting the graze and grain practice with limited regional research to assist their management decisions.

This project will address this knowledge gap by evaluating dual-purpose canola varieties (both commercial cultivars and experimental lines) in the HRZ of south-east SA, comparing two times of sowing and exploring grazing management options.

Christy B, O'Leary G, Riffkin P, Acuna T, Potter T, Clough A (2013) Long-season canola (*Brassica napus* L.) cultivars offer potential to substantially increase grain yield production in south-eastern Australia compared with current spring cultivars *Crop & Pasture Science* 64, 901-913.

Kirkegaard J, Sprague S, Lilley J, Dove H, Bell L, Seymour M, McCormick J, Hunt J, Hamblin P (2014) Recent developments in dual-purpose canola In 'Proceedings of the 18th Australian Research Assembly on Brassicas'. Tanunda, SA. (Eds. AH Ware, T Potter) pp.165-170.

Trial Design

In 2016 three Conventional, three Triazine Tolerant and six Clearfield canolas were evaluated in a trial at Bool Lagoon (-37.205031, 140.72832). There were two times of sowing (TOS), TOS 1 - 5 April and TOS 2 - 20 May.

There was a dry start to season, which was compounded by the previous two dry years, as such there was minimal soil moisture and sub-soil moisture to get an early sow in March, so April was

considered an early sow compared to region standard practice (Table 1 and Figure 1). It was exceptionally wet from June onwards, with the site experiencing lengthy inundation, as shown in Figure 2. As a consequence, the trial was highly variable and results should be interpreted with caution.

Table 1. Monthly rainfall and temperature data for 2016 (accessed via the Dryland Probe Project an initiative between SARDI, MFMG, Integrated Irrigated and South East NRM Board) and Long Term Rainfall (LTR) (accessed via www.bom.gov.au).

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
2016 Rainfall (mm)	-	-	-	9.2	91.4	105	127.2	119.8	125.8	111.8	28.6	52.6	771.4
LTR (mm)	29.8	20.8	27.2	29.4	47.3	68.8	78.0	87.4	55.4	40.9	35.0	35.4	537.9
2016 Temp AVG (°C)	-	-	-	-	-	-	11.1	9.6	10.4	12.0	14.2	17.7	12.8
2016 Temp MIN (°C)	-	-	-	-	-	-	3.5	-0.6	-0.4	0.7	1.6	1.1	-0.6
2016 Temp MAX (°C)	-	-	-	-	-	-	15.8	23.1	20.7	26.5	32.8	38.0	38.0

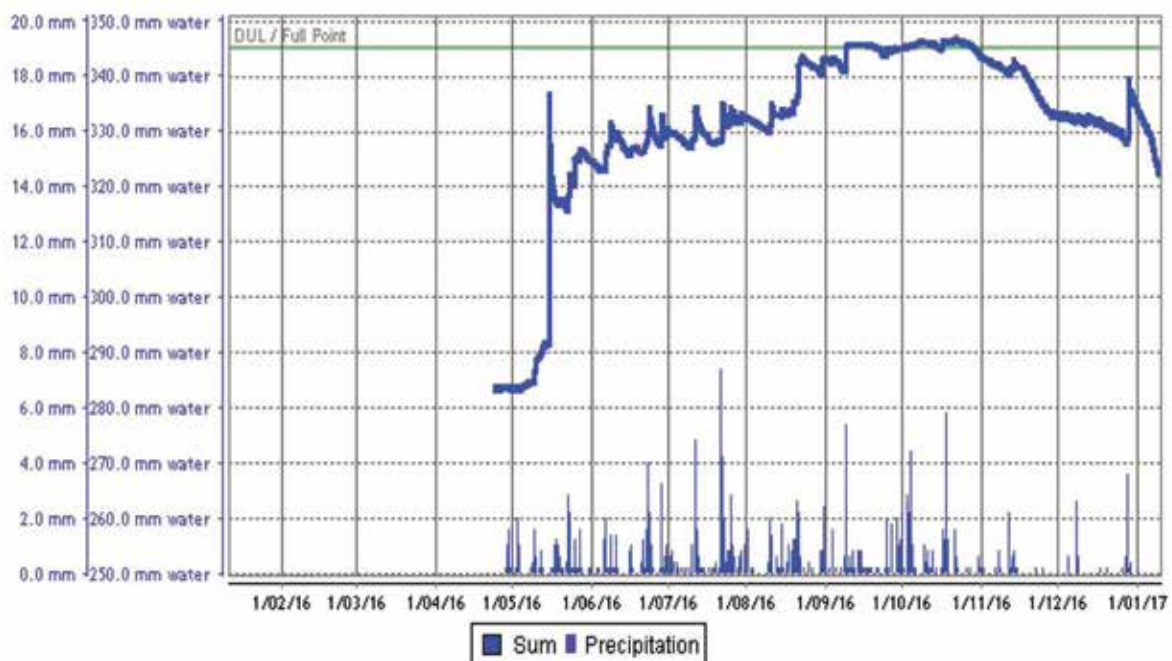


Figure 1. Rainfall and soil moisture, Bool Lagoon (accessed via the Dryland Probe Project an initiative between SARDI, MFMG, Integrated Irrigated and South East NRM Board).

'Grazing' (simulated by a ride-on-mower) of plots occurred on 15 July TOS 1 and 29 August TOS 2, 101 days from seeding. Plants were anchored and it was prior to bud elongation beyond 10 cm. Plants were grazed down to a height of approximately 5 cm (Figure 3). All plots received 75 units of N post grazing.



Figure 2. The trial site inundated on 9 September 2016.



Figure 3. Example of grazed canola, showing grazing intensity and canola height post-graze.

Plots were harvested at plant maturity which occurred on 1 and 23 December 2016 and 4 January 2017.

Trial Results

Grazed plant material was submitted for a feed test. In all instances TOS 2 DM removed on the 29 August had higher metabolisable energy, digestibility (DOMD) and in all but one instance (Hyola 750TT) higher crude protein (%) and lower Neutral Detergent Fibre (% of dry matter) than TOS 1 DM (removed on 15 July). This indicates it is important to check the quality of feed on offer to stock as it changes within a variety between sowing dates and grazing timings.

Flowering was delayed up to 12 days with grazing compared to un-grazed plots at the same time of sowing.

Within the Conventional canolas Hyola 635CC had the highest amount of DM removed at TOS 2, 434 kg/ha (Table 2). The two long-season varieties evaluated, SF Brazzil and SF Sensation, had the same amount of DM removed at TOS 1 and TOS 2. The grazing of the Conventional canola did not result in any differences in subsequent grain yield, between varieties or TOS, with an average yield of 1.09 t/ha. The Conventional plots had a higher weed pressure than the herbicide tolerant canola varieties, a problem with a dry early sow and lack of a pre-sow weed kill.

Variety	Grazed dry matter kg/ha		50 % flowering	
	TOS 1	TOS 2	TOS 1	TOS 2
SF Brazzil	250	238	28 Aug	21 Sept
SF Sensation	288	211	28 Sept	7 Oct
Hyola 635 CC	186	434	24 Sept	5 Oct
Variety X TOS				
P value	<.001			
L.s.d	96.66			

Table 2. Conventional canola grazed dry matter removed kg/ha and 50 % flowering date.

Variety	Grazed dry matter kg/ha		50 % Flowering	
	TOS 1	TOS 2	TOS 1	TOS 2
Hyola 559TT	195	284	25 Aug	14 Sep
Hyola 650TT	223	222	24 Aug	28 Sep
Hyola 750TT	187	357	28 Aug	2 Oct
Variety X TOS				
P value	0.03			
L.s.d	87.27			

Table 3. Triazine tolerant canola grazed dry matter removed kg/ha and 50% flowering date.

The Triazine Tolerant canola varieties Hyola 559TT and Hyola 650TT had the same amount of DM removed at both TOS (average 231 kg/ha) (Table 3). Hyola 750TT had significantly higher DM removed at TOS 2 than all other treatments. There was no three-way interaction between grain yield, variety and TOS. Grain yield was greatest with Hyola 750TT (0.89 t/ha) compared to Hyola 559TT and Hyola 650TT (both with 0.68 t/ha) (P value 0.05, l.s.d 0.01) and were significantly higher at TOS 1 (0.85 t/ha) compared to TOS 2 (0.64 t/ha) (P value 0.05, l.s.d 0.13).

Dry matter removed from the Clearfield canolas was significantly different between varieties and between TOS dates (Table 4 and Table 5). The higher yielding canolas tended to be the spring-types. Interesting the long-season SF Edimax CL and Hyola 970CL were lower in DM production. This may be because winter-types tend to be more responsive to temperature and photoperiod compared to the spring-types, and weather conditions experienced and TOS dates did not maximize the winter-types DM potential. Grazing at TOS 1 resulted in higher DM, 528 kg/ha, compared to TOS 2 DM 261 kg/ha. There were no significant differences in Clearfield grain yields, with an average yield of 1.26 t/ha (P value 0.05, l.s.d 0.93).

Table 4. Clearfield grazed dry matter removed kg/ha X variety and 50 % flowering date.

Variety	Grazed dry matter kg/ha X variety	50 % flowering	
		TOS 1	TOS 2
Pioneer 45Y86 (CL)	467	24 Aug	22 Sep
Archer	429	26 Aug	16 Sep
SF Edimax CL	311	28 Sep	10 Oct
Hyola 575CL	346	24 Aug	14 Sep
Hyola 577CL	447	24 Aug	16 Sep
Hyola 970CL	367	26 Sep	8 Oct
P value	0.05		
l.s.d	112.47		

Table 5. Clearfield grazed dry matter removed kg/ha X TOS.

TOS	Grazed dry matter kg/ha X TOS
TOS 1	528
TOS 2	261
P value	<0.001
l.s.d	64.93

Trial Conclusions and Plans for 2017

Overall canola yields were low, but were reflective of the season and the growers adjacent paddock. Dry matter production was much lower than anticipated and recorded in previous research.

The waterlogging experienced and high variability of the site have confounded results, with varieties not reaching their full potential in DM production and grain yield. Results should be interpreted with caution.

The trial will be repeated in 2017 at Bool Lagoon, with the aim of getting an earlier sow, with the use of irrigation to get the plants to germinate and establish if required. It is hoped a more diverse suite of canola will be evaluated incorporating experimental winter-types.

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