Department of **Agriculture** and **Food**

GOVERNMENT OF WESTERN AUSTRALIA

GRDC Grains Research & Development Corporation

DAW00227
Tactical Break Crop Agronomy in Western Australia

14CH26- Timing of nitrogen in low rainfall canola

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Location of trial	Chapman Valley

Summary (Key messages)

- Grain yield responded to applied nitrogen up to 70 kg/ha.
- Oil did not decrease as nitrogen rate increased, unlike what we have observed at other trials – probably a reflection of the continued grain yield response to N.
- Positive gross margin returns were seen at 40-70 kg/ha of applied nitrogen.
- Overall when nitrogen was applied did not alter the response to nitrogen – but avoid putting the majority of N at 12 weeks.

Background

In general, as long as nitrogen is applied within 8 weeks of sowing, there is no yield penalty.

How canola responds to nitrogen applied later than 8 weeks has not been widely researched. Similarly how new generation canola such as RoundupReady (RR) hybrids respond to nitrogen has not been widely tested, particularly in low and medium rainfall areas.

Aim

To investigate the response to changing the nitrogen rate and changing the time of application. Canola yield and oil will be measured and RR hybrids will be compared with open-pollinated TT types (OP TT).

Trial Details

- Property: Chapman Valley Shire, Narra Tarra Moonyoonooka Rd, Narra Tarra, WA 6532.
- Growing Season rainfall (GSR, April to Oct) = 255 mm, GSR + stored water (estimate) = 325 mm. Long term average (LTA, 1974on) 371 and 418 mm. Lower than LTA June, July and August, but above average September
- Soil type: Brown deep sand (0.72% organic carbon), estimated to be 49 kg N/ha available in paddock from soil and plant residues
- Paddock rotation: Wheat 2013, Wheat 2012, Wheat 2011
- 22 treatments: 2 Cultivars (Sturt TT [TT open-pollinated variety] and Pioneer 43Y23 RR [RR hybrid variety]) x 11 N treatments (kg N/ha) with timing spread between seeding, and up to 12 weeks after sowing –see Table 1;
- 3 replicates
- Sowing date April 29
- Seeding rate – Target density 30 plants/m² - Sturt TT 2.4 kg/ha, Pioneer 43Y23 RR 1.5 kg/ha

Trial Details

Treatment detail

		kg N/ha at:			
Treatment ment	Name	Seeding	8WAS	12WAS	Total N
1	Nil	0	0	0	0
2	10N Seeding	10	0	0	10
3	30N in 8weeks	10	20	0	30
4	50N in 8weeks	10	40	0	50
5	70N in 8weeks	10	60	0	70
6	10N seeding and 20N 12WAS	10	0	20	30
7	10N seeding and 40N 12WAS	10	0	40	50
8	10N seeding and 60N 12WAS	10	0	60	70
9	30N in 8weeks and 10N 12WAS	10	20	10	40
10	30N in 8weeks and 20N 12WAS	10	20	20	50
11	30N in 8weeks and 40N 12WAS	10	20	40	70

Assumptions used in Gross Margins

Oil bonus +/- 1.5% per unit of oil (%) either side of 42%, with no oil ceiling.

Additional costs such as seeding, harvest, insecticides assumed to be $205/ha.

Nitrogen costs $1.33/kg or $1.5/L, application costs $8/ha

RR costs – seed $76/ha, Herbicides $56/ha, Grain worth $513t (5 Year decile price)

TT costs – seed $5/ha, Herbicides $64/ha, Grain worth $535/t

Results

Pioneer 43Y23 (RR) and Sturt TT performed similarly in terms of grain yield, oil yield and gross margin and responded in a similar fashion to applied N. Sturt (TT) produced higher oil % than Pioneer 43Y23 (RR).

Table 1: Grain yield, oil %, oil yield and gross margin (mean of varieties) response of canola to nitrogen application at Chapman in 2014

	Pioneer 43Y23 RR	Sturt TT	P	LSD
Grain yield (kg/ha)	1035	750	0.137	172
Oil %	42.1	44.2	0.01	0.6
Oil yield (kg/ha)	435	331	0.18	75
Gross margin ($/ha)	54	88	0.419	165

Response to N

Grain yield responded to applied nitrogen (P = <.001) up to ~ 70 kg N/ha (~36 kg soil plus applied N/ha), attaining yields of 0. 9 t/ha, oil yield 0.4 t/ha and gross margins $ 71/ha.

Gross margins responded to nitrogen application at 40- 70 kg N/ha.

Timing of Nitrogen

Overall when nitrogen was applied did not alter the response to nitrogen of both varieties. There was a trend (P = 0.006) at the highest rate of applied nitrogen of 70 kg/ha (10 at seeding and 60 at a later date) for applications of the top-up of 60 kg/ha that occurred at 12 weeks to be slightly lower yielding than the same top-up of nitrogen applied at 8 weeks. If the same total nitrogen was split so as to apply 30 within 8 weeks and the remaining 40 at 12 weeks there were no significant differences.

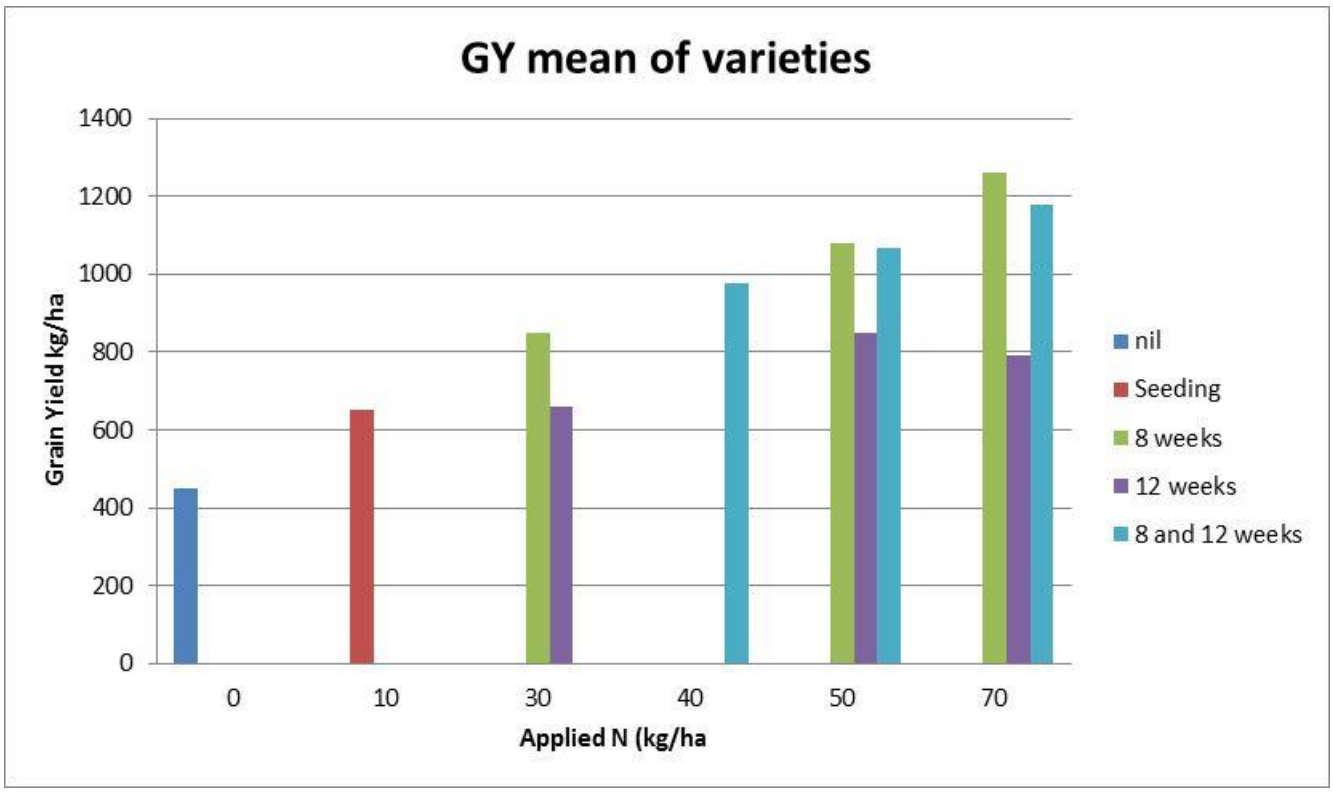

Figure 1 **Grain yield response (mean of varieties) of canola to nitrogen application and timing at Chapman in 2014**

Conclusion

In this trial both varieties performed similarly. Grain yield responded to applied nitrogen up to 70 kg/ha. Oil did not decrease as nitrogen rate increased, unlike what we have observed at other trials – probably a reflection of the continued grain yield response to N. Positive gross margin returns were seen at 40-70 kg/ha of applied nitrogen.

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Acknowledgements

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Links

For other reports related to this trial see https://www.agric.wa.gov.au/canola/canola-nitrogen-trials

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