

DAW00227

Tactical Break Crop Agronomy in Western Australia

14WH11- Timing of nitrogen in low rainfall canola

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Location of trial Wongan Hills

Summary (Key messages)

- Grain yield responded to applied nitrogen up to 30 kg N/ha.
- Highest oil %, oil yield and gross margins were obtained with no applied nitrogen.
- When nitrogen was applied, did not alter the yield, oil or \$/ha response to nitrogen of both varieties.
- Thus 30, 50 or 70 kg N/ha applied either in splits at seeding and 8 weeks or seeding and 12 weeks provided similar responses.

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: Wongan Hills R.S.
- Growing Season rainfall (GSR, April to Oct) = 242 mm, GSR + stored water (estimate) = 323 mm. Long term average (LTA, 1974on) 270 and 309 mm
- Soil type: Yellow deep sand (1.2% organic carbon), estimated to be 123 kg N/ha available in paddock from soil and plant residues
- Paddock rotation: Wheat 2013, Pasture 2012, Pasture 2011, Barley 2010
- 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 May 13
- Seeding rate – Target density 30 plants/m² - Sturt TT 2.4 kg/ha, Pioneer 43Y23 RR 1.5 kg/ha
- Basal fertiliser – 100 kg/ha SuperPhos at seeding, 400 kg/ha of gypsum and 120 kg/ha of Muriate of Potash applied by hand over whole site on 10th of June.

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) had similar grain yield, oil, oil yield and gross margins to Sturt (TT).

Table 2: Grain yield, oil %, oil yield and gross margin of two canola varieties at Wongan Hills in 2014

	Pioneer 43Y23RR	Sturt TT	P	LSD
Grain yield (kg/ha)	756	697	0.202	68
Oil %	42.5	42.9	0.572	0.7
Oil yield (kg/ha)	321	299	0.312	32
Gross margin (\$/ha)	40	61	0.385	37

Response to N

Grain yield responded to applied nitrogen up to ~ 30 kg N/ha, attaining yields of 0.73 t/ha. Whilst highest oil%, oil yield and gross margins were obtained with no applied nitrogen. Both varieties responded similarly to applied nitrogen with no variety x N rate interaction for grain yield.

As the rate of applied nitrogen increased the % oil in the seed of both canola varieties decreased at a rate of 0.02% oil per kg applied N/ha.

The highest gross margins (GM) were seen at the nil, with a mean GM of \$97/ha, and by 30N in 8 weeks. Gross margins decreased as nitrogen rates increased above 30 kg N/ha. As for oil and yield, the gross margins of both varieties responded similarly to nitrogen rate (no Variety x N interaction).

Table 3: Grain yield, oil %, and gross margin (mean of varieties) response of canola to nitrogen application at Wongan Hills in 2014

N	GY	Oil	GM
0	674	43.8	97
10	647	43.3	60
30	732	43.0	72
40	749	42.6	60
50	742	42.5	46
70	744	42.1	18
N P	0.006	<0.001	<0.001
l.s.d.	57	0.6	32
N x Variety P	0.574	0.219	0.663

Timing of Nitrogen

When nitrogen was applied, it did not alter the yield, oil or \$/ha response to nitrogen of both varieties. Thus 30, 50 or 70 kg N/ha applied either in splits at seeding and 8 weeks or seeding and 12 weeks provided similar responses.

Conclusion

In this trial both varieties performed similarly. Grain yield responded to applied nitrogen up to 30 kg N/ha. Whilst highest oil %, oil yield and gross margins were obtained with no applied nitrogen. As the rate of applied nitrogen increased the % oil in the seed of both canola varieties decreased at a rate of 0.02% oil per kg applied N/ha. Gross margins decreased as nitrogen rates increased above 30 kg N/ha.

Overall when nitrogen was applied, did not alter the yield, oil or \$/ha response to nitrogen of both varieties. Thus 30, 50 or 70 kg N/ha applied either in splits at seeding and 8 weeks or seeding and 12 weeks provided similar responses.

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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