

DAW00227

Tactical Break Crop Agronomy in Western Australia

14GS11- Timing of nitrogen in low rainfall canola

Authors

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Location of trial

Holt Rock

Summary (Key messages)

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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: Hyde's Holt Rock
- Growing Season rainfall (GSR, April to Oct) = 266 mm, GSR + stored water (estimate) = 323 mm. Long term average (LTA, 1974on) 206 and 246 mm
- Soil type: loamy sand (0.79% organic carbon), estimated to be 110 kg N/ha available in paddock from soil and plant residues
- Paddock rotation: barley 2013, lupin 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 May 7
- 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 4-6 weeks after sowing.

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) out performed Sturt (TT) in terms of grain yield and gross margins. Whereas Sturt (TT) produced higher oil %.

Table 2: Grain yield, oil %, oil yield and gross margin (mean of varieties) response of canola to nitrogen application at Holt Rock in 2014

	Pioneer 43Y23RR	Sturt TT	P	LSD
Grain yield (kg/ha)	1815	1347	<.001	193
Oil %	44.1	45.8	0.023	1.1
Oil yield (kg/ha)	739	676	0.353	191
Gross margin (\$/ha)	674	487	0.003	101

Response to N

Grain yield, oil % and gross margins responded to applied nitrogen. Both grain yield and gross margins were optimised at ~ 40 kg N/ha. Oil was max

Both varieties responded similarly to applied nitrogen with no variety x N rate interaction for grain yield, oil %, oil yield or gross margin.

Table 3: Grain yield, oil and gross margin response of canola to nitrogen and timing of nitrogen application at Holt Rock in 2014

N	GY	Oil	GM
0	1047	44.7	370
10	1009	45.8	340
30	1463	44.3	541
40	1656	44.3	624
50	1786	44.3	678
70	1799	43.1	644
Mean	1581	44.1	580
	P	P	P
Variety	<0.001	0.023	0.003
N	<0.001	<0.001	<0.001
Variety.N	0.54	0.438	0.628
	l.s.d.	l.s.d.	l.s.d.
Variety	193	0.8	101
N	232	1.2	124
Variety.N	ns	ns	ns

Timing of Nitrogen

When nitrogen was applied did not alter the response to nitrogen of both varieties for yield, oil % and gross margin.

Conclusion

The Cunderdin trial saw Pioneer 43Y23 (RR) perform better in terms of higher grain yield, oil yield and gross margins than Sturt TT, with both varieties producing similar oil %.

Grain yield responded to applied nitrogen up to 30 kg N/ha.

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 also responded to nitrogen application up to ~ 30 kg N/ha after which further increases in nitrogen led to no further financial gain.

Overall when nitrogen was applied it did not alter the response to nitrogen of both varieties for GY, oil, oil yield and GM.

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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