

DAW00227

Tactical Break Crop Agronomy in Western Australia

14NO17- Timing of nitrogen in low rainfall canola

Authors

Mark Seymour and Sally Sprigg

Location of trial

WANTFA Cunderdin

Summary (Key messages)

- 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.
- Maximum oil% was produced with no applied nitrogen.
- 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.

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: WANTFA Cunderdin
- 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: Yellow-brown deep sandy duplex (1.49% organic carbon), estimated to be 46 kg N/ha available in paddock from soil and plant residues
- Paddock rotation: Wheat 2013, Canola 2012, Wheat 2011, Wheat 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 April 29
- Seeding rate – Target density 30 plants/m² - Sturt TT 2.4 kg/ha, Pioneer 43Y23 RR 1.5 kg/ha

Trial Details

- 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.

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 higher grain yield, oil yield and gross margins than Sturt TT, with both varieties producing similar oil %.

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

	Pioneer 43Y23RR	Sturt TT	LSD
Grain yield (kg/ha)	1328	1049	79
Oil %	43.3	43.3	2.0
Oil yield (kg/ha)	575	454	52
Gross margin (\$/ha)	672	537	53

Response to N

Grain yield responded to applied nitrogen up to ~ 30 kg N/ha (~ 85 kg soil plus applied N/ha), attaining yields of 1.2 t/ha, oil yield 0.5 t/ha and gross margins \$627/ha. Both varieties responded similarly to applied nitrogen with no variety x N rate interaction for grain yield.

Maximum oil% was produced with no applied nitrogen (mean oil% at 0N = 44.1%). 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. Both varieties responded at a similar rate (no Variety x N interaction). The relatively slow decrease in % oil as nitrogen increased resulted in oil yield mirroring grain yield.

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. As for oil and yield, the gross margins of both varieties responded similarly to nitrogen rate (no Variety x N interaction).

Timing of Nitrogen

Overall when nitrogen was applied did not alter the response to nitrogen of both varieties ($P = 0.05$, for GY, oil, oil yield and GM). There was a trend ($P < 0.1$) at the highest rate of applied nitrogen of 70 kg/ha (10 and 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 differences.

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 %.

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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

This trial is one of a series conducted throughout WA as part of the GRDC/DAFWA co-funded project “Tactical Break Crop Agronomy in Western Australia”. Thanks to the Northam RSU for trial management.

Links

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

For more information contact

Mark Seymour, Senior Research Officer, Esperance on 90831 143.

Email: mark.seymour@agric.wa.gov.au