

**DAW00227**

## Tactical Break Crop Agronomy in Western Australia

### 14MR18- Timing of nitrogen in low rainfall canola

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**Location of trial** Merredin

#### Summary (Key messages)

- With grain yield of less than 400kg/ha, there was no grain yield response to applied N and no economic response to applied N.
- At 'low rainfall' N rates of 30 kg/ha top-up N at 12 weeks gave a similar response to top-up N within 8 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: Merredin Research Station
- Growing Season rainfall (GSR, April to Oct) = 193 mm, GSR + stored water (estimate) = 255 mm. Long term average (LTA, 1974on) 203 and 240 mm. Lower than LTA June and July, but above average September
- Soil type: Brown sandy loam (1.08% organic carbon), estimated to be 124 kg N/ha available in paddock from soil and plant residues
- Paddock rotation: Wheat 2013, Wheat 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 May 13
- Seeding rate – Target density 30 plants/m<sup>2</sup> - Sturt TT 2.4 kg/ha, Pioneer 43Y23 RR 1.5 kg/ha
- Basal Fertiliser: 100 kg/ha of Doublephos at seeding, 400 kg/ha of gypsum (17% Ca, 14% S) top-dressed over whole site before sowing (kg/ha) and 120 kg/ha of Muriate of Potash top-dressed

## Trial Details

over whole site 27<sup>th</sup> 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 \$126/ha.

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

RR costs – seed \$76/ha, Herbicides \$47/ha, Grain worth \$513t (5 Year decile price)

TT costs – seed \$5/ha, Herbicides \$56/ha, Grain worth \$535/t

## Results

Grain yield and gross margin results for this trial were extremely poor. Treatments had no significant effect on grain yield. Applying N reduced the concentration of oil of both varieties by an average of 0.08 units of oil per kg of applied N. The loss of oil with applied N combined with the cost of N resulted in a negative gross margin response to applied N.

At rates of N most commonly used in low rainfall areas of less than 30 kg N/ha, it did not appear to matter when N was applied. Applying 30N within 8 weeks or applying 10 at seeding and a topup at 12 weeks produced the same level of oil. At higher rates of total applied N it appeared timing of N had did alter the oil in the seed of canola. At a total rate of applied N of 50 or 70 applying 10 at seeding and then the top-up at 12 weeks gave similar results to applying the top-up N within 8 weeks, however if the N was applied in more of a 'split application' with 30N within 8 weeks and the top-up at 12 weeks oil levels dropped. However applying 30N within 8 weeks and then applying more at 12 weeks is highly unlikely to be undertaken by growers in low rainfall areas.

Sturt produced higher oil then Pioneer 43Y23 RR, but there were no differences between varieties for grain yield or gross margins. In addition there were no interactions between variety and N treatments.

Table 1: Grain yield (GY, kg/ha), oil concentration in seed (%) and gross margin (GM, \$/ha) of two canola varieties in response to rates x timing of N at Merredin in 2014.

N Treatment	GY		Oil			GM		
	Pioneer 43Y23 RR	Sturt	Pioneer 43Y23 RR	Sturt	Mean	Pioneer 43Y23 RR	Sturt	Mean
Nil	193	208	42.9	43.9	43.4	-189	-154	-172
10N Seeding	249	231	42.1	43.3	42.7	-180	-155	-168
30N in 8weeks	212	301	40.6	40.2	40.4	-225	-155	-190
50N in 8weeks	221	249	38.1	39.2	38.7	-254	-212	-233
70N in 8weeks	212	259	38.3	39.5	38.9	-287	-235	-261
30N in 8weeks and 10N 12WAS	197	245	38.7	39.7	39.2	-250	-198	-224
30N in 8weeks and 20N 12WAS	240	207	37.1	37.9	37.5	-247	-234	-240
30N in 8weeks and 40N 12WAS	245	197	36.0	37.7	36.8	-277	-268	-273
10N seeding and 20N 12WAS	250	188	40.7	40.1	40.4	-206	-212	-209
10N seeding and 40N 12WAS	206	250	38.1	39.8	38.9	-261	-210	-235
10N seeding and 60N 12WAS	202	216	37.8	38.9	38.3	-293	-257	-275
Mean	223	234	38.7	39.6	39.2	-248	-214	-231
	P		P		I.s.d.	P		I.s.d.
Variety	0.765		0.034		1.2	0.19		
N Treat	0.815		<.001		0.7	<.001		75
Var.Ntreat	0.243		0.688			0.286		

## Conclusion

With reasonably high background N levels in the paddock and low yield potential, the best option was to not apply N.

## Acknowledgements

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## Links

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

## For more information contact

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