

Timing of nitrogen for canola in lower rainfall areas in WA

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Key messages

In 2013 applying nitrogen either at seeding, 4, 8 or 12 weeks after sowing provided similar responses to nitrogen.

In low rainfall areas, as nitrogen supply increases the oil% of canola often decreases at a faster rate than grain yield increases.

In the majority of instances RR canola produced higher grain yields, oil and gross margins.

Aims

To investigate the nitrogen rate and time of application response of canola in lower rainfall parts of WA.

Method

We conducted 9 nitrogen experiments in lower rainfall areas in 2013 and 8 in 2014 which compared elite hybrid and open pollinated (OP) cultivars of triazine tolerant (TT) and RoundupReady (RR) herbicide technologies (Table 2). Due to time constraints, in this document we will report on the 2013 trials and include 2014 information in the presentation. Nitrogen treatments in 2013 included 5 rates of nitrogen – 0, 25, 50, 75 and 100 kg N/ha applied as per schedule in Table 1. Gross margins were calculated taking into account grain and seed prices and herbicide costs for RR and TT varieties, oil bonuses, nitrogen fertiliser and application costs, and all other associated input costs.

Table 1: Nitrogen treatments in canola trials in 2013

Total N applied (kg/ha)	Timing of N application(s) (Weeks after seeding)	Treatment name
0	0	0N
25	0	25N
25	4	0N 25N
25	8	0N 0N 25N
25	12	0N 0N 0N 25N
50	0	50N
50	4	0N 50N
50	8	0N 0N 50N
50	12	0N 0N 0N 50N
50	0 + 4	25N 25N
50	0 + 8	25N 0N 25N
50	0 + 12	25N 0N 0N 25N
75	0 + 4 + 8	0N 50N 25N
100	0 + 4 + 8	25N 50N 25N

Results

Grain yield of canola with no applied nitrogen ranged from 0.7 to 1.7 t/ha in 2013 (mean of both varieties, Table 2). Canola yield and oil% responded to applied nitrogen at all 9 sites (Table 3). A typical response is shown in Figure 1, where oil% decreased and grain yield increased at Salmon Gums with applied nitrogen. At Salmon Gums oil reduced quicker than grain yield increased, resulting in a flat financial response at rates of applied nitrogen above 40 kg/ha. Similar responses at other sites resulted in four out of 9 sites showing no financial gain in applying nitrogen (Table 3).

Time of application of 25 or 50 kg/ha of nitrogen had no effect on grain yield in 8 out of 9 trials. Similarly oil was not affected by time of application of 25 kg N/ha in 8 out of 9 trials, whilst timing of 50 kg N/ha had a significant effect on oil at the three driest sites – Merredin, Miling North and Salmon Gums. At these sites applications near flowering at 12 weeks after sowing (WAS) reduced oil in the seed by 0.6 to 1%, with split applications (25 at seeding and 25 at 12WAS) having less effect than a single application of 50 kg N/ha near flowering. Despite the reductions in oil with delayed nitrogen application at a few sites, there was little overall effect on timing of nitrogen on gross margins, with timing of nitrogen having no significant effect in 17 out of 18 instances.

In the majority of instances RR out yielded TT canola and produced higher oil %, resulting in higher gross margins for RR in 4 out of 9 trials. However, at Salmon Gums and Merredin TT canola produced similar yields to RR and therefore higher gross margins due to lower seed costs.

Table 2. Site details, grain yield with no applied nitrogen, 90% of maximum grain yield and nitrogen applied to achieve 90% maximum yield for canola nitrogen experiments in 2013

Location	April to October rainfall (mm)	Organic carbon (%) in top 10cm at sowing	Nitrogen (kg N/ha) in top 30 cm at sowing*	Navail. # (kg N/ha)	Previous crops (2012/2011/2010)	OP TT and RR hybrid varieties	Grain yield (t/ha) with no applied nitrogen	90% of max GY (t/ha)	N at 90% of max GY (kg N/ha)
Cunderdin	243	0.86	36	42	barley/wheat/pasture	ATR Stingray and Hyola 404RR	0.7	0.9	107
Eradu	280	0.86	80	66	wheat/wheat/lupin	ATR Stingray and Hyola 404RR	1.1	1.5	76
Holt Rock	282	1.42	132	71	barley/barley/wheat	CB Telfer and Hyola 404RR	1.7	2.0	52
Katanning	356	2.91	86	139	oats/lupin/hay	ATR Stingray and Hyola 404RR	1.5	1.8	60
Merredin	204	0.55	92	60	fallow	CB Telfer and Hyola 404RR	0.8	1.0	61
Miling North	223	0.47	49	74	wheat/wheat/lupin	CB Telfer and Hyola 404RR	0.9	1.1	36
Salmon Gums	217	0.80	31	39	wheat/barley/canola	CB Telfer and Hyola 404RR	0.9	1.2	57
Wittenoom Hills	305	1.80	41	104	barley/wheat/field pea	ATR Stingray and Hyola 404RR	1.0	1.5	86
Wongan Hills	227	1.01	150	63	wheat/pasture/pasture	ATR Stingray and Hyola 404RR	1.48	1.53	23

* CSBP soil tests.

Estimated using DAFWA's Select your nitrogen (SYN) excel tool

Table 3. Results of ANOVA for the traits grain yield (GY), oil in seed (%) and gross margin (\$/ha, GM) from 2013 nitrogen trials

Treatments	N applied (kg/ha)	Cunderdin	Eradu	Holt Rock	Katanning	Merredin	Miling North	Salmon Gums	Wittenoom Hills	Wongan Hills	# of sites with a significant response
<i>Grain yield</i>											
N	0 to 100	***	***	**	***	***	***	***	***	***	9 out of 9
Timing	25	ns	ns	ns	ns	*	ns	ns	ns	ns	1 out of 9
	50	ns	ns	*	ns	ns	ns	ns	ns	ns	1 out of 9
Timing.Variety	25	ns	ns	ns	ns	ns	ns	ns	ns	ns	0 out of 9
	50	ns	ns	*	ns	ns	ns	ns	ns	ns	1 out of 9
Variety	0 to 100	*	**	ns	*	ns	*	ns	ns	*	5 out of 9
N.Variety	0 to 100	ns	ns	ns	ns	ns	ns	**	ns	ns	1 out of 9
<i>Oil in seed (%)</i>											
N	0 to 100	***	**	***	***	***	***	***	***	***	9 out of 9
Timing	25	ns	ns	ns	ns	*	ns	ns	ns	ns	1 out of 9
	50	ns	ns	ns	ns	**	***	*	ns	*	4 out of 9
Timing.Variety	25	ns	ns	ns	ns	ns	*	ns	ns	ns	1 out of 9
	50	ns	ns	ns	ns	**	ns	ns	ns	ns	1 out of 9
Variety	0 to 100	***	***	ns	ns	*	*	ns	**	**	6 out of 9
N.Variety	0 to 100	ns	ns	ns	ns	*	ns	ns	ns	ns	1 out of 9
<i>Gross margin (\$/ha)</i>											
N	0 to 100	ns	***	ns	***	ns	ns	***	***	***	5 out of 9
Timing	25	ns	ns	ns	ns	*	ns	ns	ns	ns	1 out of 9
	50	ns	ns	ns	ns	ns	ns	ns	ns	ns	0 out of 9
Timing.Variety	25	ns	ns	ns	ns	ns	ns	ns	ns	ns	0 out of 9
	50	ns	ns	ns	ns	ns	ns	ns	ns	ns	0 out of 9
Variety	0 to 100	*	*	ns	ns	**	*	*	ns	ns	5 out of 9
N.Variety	0 to 100	ns	ns	ns	ns	ns	ns	*	ns	ns	1 out of 9

P <0.001 ***, <0.01 **, <0.05 *, ns = not significant

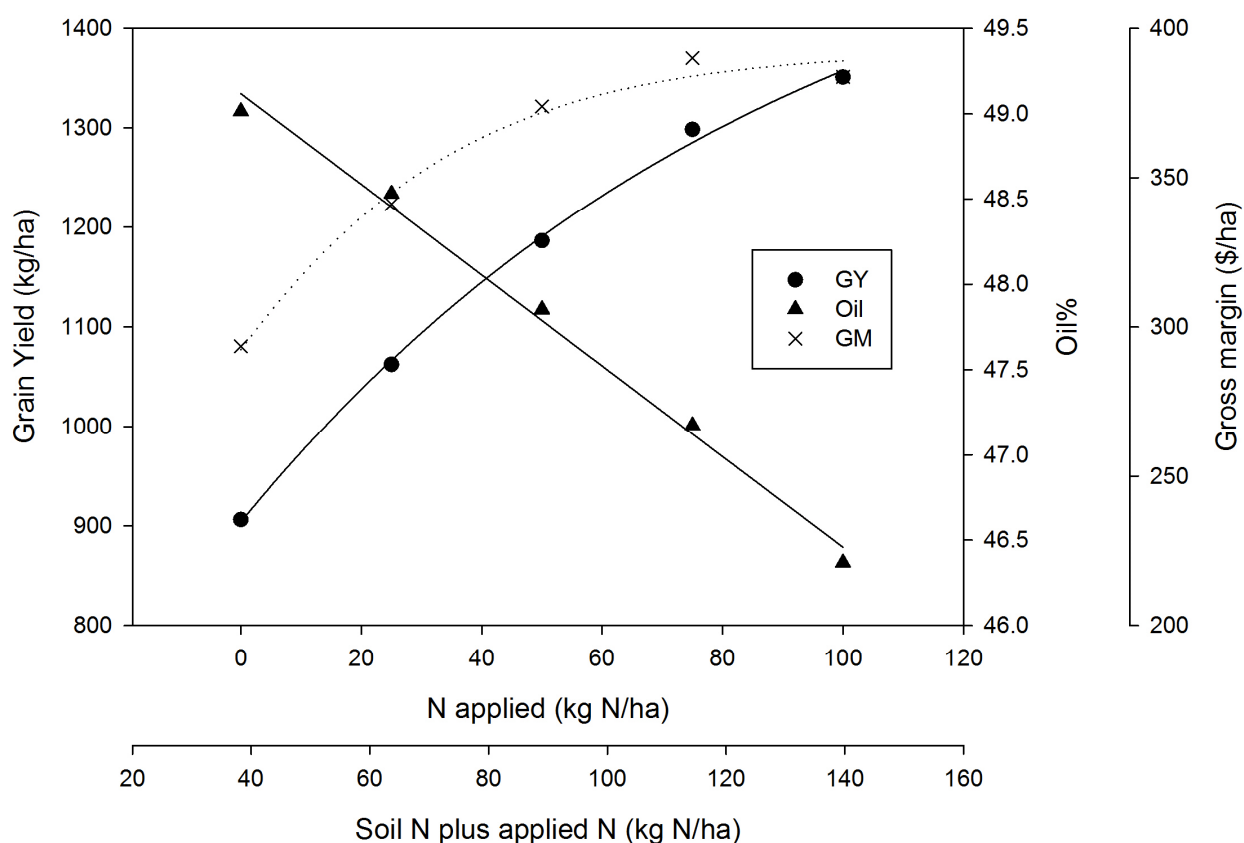


Figure 1 Response of canola grain yield (kg/ha), seed oil (%) and gross margin (\$/ha) to increasing nitrogen at Salmon Gums in 2013

Conclusion

In the majority of experiments conducted in 2013, the timing of nitrogen application had no significant effect on grain yield, oil or gross margins. In a few instances applying nitrogen near flowering (12WAS) reduced the oil in canola. However the reductions were often not large enough to reduce gross margins.

Currently it is not common for farmers to apply nitrogen much later than 8 weeks after sowing. This work suggests that in seasons similar to 2013, where we had a long soft spring over much of the grain growing areas, farmers can delay their nitrogen decisions until early flowering (12 weeks). Thus farmers can play the season for a few more weeks or 'catch-up' if they missed their regular fertiliser time.

Key words

Timing of nitrogen, canola

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