

DAW00227

Tactical Break Crop Agronomy in Western Australia

13ED11 - Timing of nitrogen in low rainfall canola

Authors

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Location of trial

Geoff Sanderson's, Bishops Road Grass Patch

Summary (Key messages)

In this 2013 trial

- Canola grain yield responded positively to nitrogen application
- Canola oil content responded negatively to nitrogen application
- Therefore a wide number of treatments produced equal highest gross margins
- The lowest rate of nitrogen treatment to produce maximum returns was 25 kg N/ha applied 4 weeks after sowing.
- We found treatments applied 12 weeks after sowing when the canola was flowering produced similar results to applications applied at 8 weeks after sowing – which is the industry norm.
- Hyola 404RR produced higher oil but equal yield and gross margins to CB Telfer

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. This trial is one of a series of 13 timing of nitrogen experiments DAFWA conducted in 2013.

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: Geoff Sanderson's, Bishops Road Grass Patch
- Agzone 5, Growing Season rainfall (GSR) = 224 mm, GSR + stored water (estimate) = 320 mm
- Soil type: Loam (0.97% organic carbon)
- Paddock rotation Barley 2012 1.7 t/ha, 2011 Wheat 2.26 t/ha, 2010 Canola 0.87 t/ha, 2009 Wheat 1.86 t/ha
- 34 treatments: 2 Cultivars (CB Telfer [TT open-pollinated variety] and Hyola 404 RR [RR hybrid variety]) x 14 N treatments (kg N/ha) with timing spread between seeding, and up to 12 weeks after sowing –see Table 1;

Trial Details

- 3 replicates
- Sowing date April 18
- Seeding rate – Target density 30 plants/m² - CB Telfer 2.7 kg/ha, Hyola 404RR 3.4 kg/ha
- Fertiliser (kg/ha) 100 kg/ha of Superphos at seeding, 120 kg/ha of Muriate of Potash and 400 kg/ha of gypsum (17% Ca, 14% S) topdressed over whole site 4 weeks after seeding

Treatment detail

Table 1 Treatment details for 13ED11 at Grass Patch in 2013 (WAS = Weeks after seeding)

No.	Total N	Treatname	N kg/ha			
			Seeding	4WAS	8WAS	12WAS
1	0	0N	0	0	0	0
2	25	0N 25N	0	25	0	0
3	25	0N 0N 25N	0	0	25	0
4	25	0N 0N 0N 25N	0	0	0	25
5	25	25N	25	0	0	0
6	50	50N	50	0	0	0
7	50	0N 50N	0	50	0	0
8	50	0N 0N 50N	0	0	50	0
9	50	0N 0N 0N 50N	0	0	0	50
10	50	25N 25N	25	25	0	0
11	50	25N 0N 25N	25	0	25	0
12	50	25N 0N 0N 25N	25	0	0	25
13	75	25N 25N 25N	25	25	25	0
14	100	25N 50N 25N	25	50	25	0

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 \$100/ha.

Nitrogen costs \$1/kg, application costs \$8/ha

RR costs – seed \$31/kg, Herbicides \$28/ha, Grain worth \$482/t (CBH Pool Esperance 5/11/13).

TT costs – seed \$2/kg, Herbicides \$47/ha, Grain worth \$502/t (CBH Pool Esperance 5/11/13).

Results

1. *Grain yield.*

Grain yield increased with the rate of nitrogen applied, with maximum yield produced with 50 kg N/ha applied 4 weeks after sowing (WAS), or with 75 or 100 kg N/ha applied in a 3 way split at seeding, 4WAS and 8WAS. Compared to most other methods of applying nitrogen, grain yield was reduced if 50 kg N/ha was applied at seeding. The late application of nitrogen at 12WAS produced similar grain yields to applications at seeding and 8WAS, with only 50 kg N/ha 4WAS outyielding applications at 12WAS. The 4WAS application was applied just before a run of wet conditions which led to boggy paddocks and perhaps some brief transient waterlogging. Although the plants did not look overly stressed during June and July, these conditions may have favoured the 4WAS timing and/or not favoured other times of nitrogen application.

2. *Oil*

Whilst nitrogen increased grain yield it had the inverse effect on oil content, with treatments with lowest yields having the highest oil%. The latest application of nitrogen at 12WAS reduced oil content compared to the same rate of nitrogen applied earlier in the year.

3. *Gross margins*

The contrary effects of nitrogen on grain yield and oil resulted in a wide range nitrogen rates producing maximum gross margins. Eight treatments produced equal maximum gross margins including 25N applied 4WAS, 50N applied at 4, 8 or 12WAS or in splits at seeding and 4 or 8WAS, and 75 and 100 kg N/ha treatments.

4. *Variety*

Hyola 404RR produced higher oil (48.3%) than CB Telfer at 47%, but on average both the grain yield and gross margins of both varieties and the response to nitrogen and timing of nitrogen was the same.

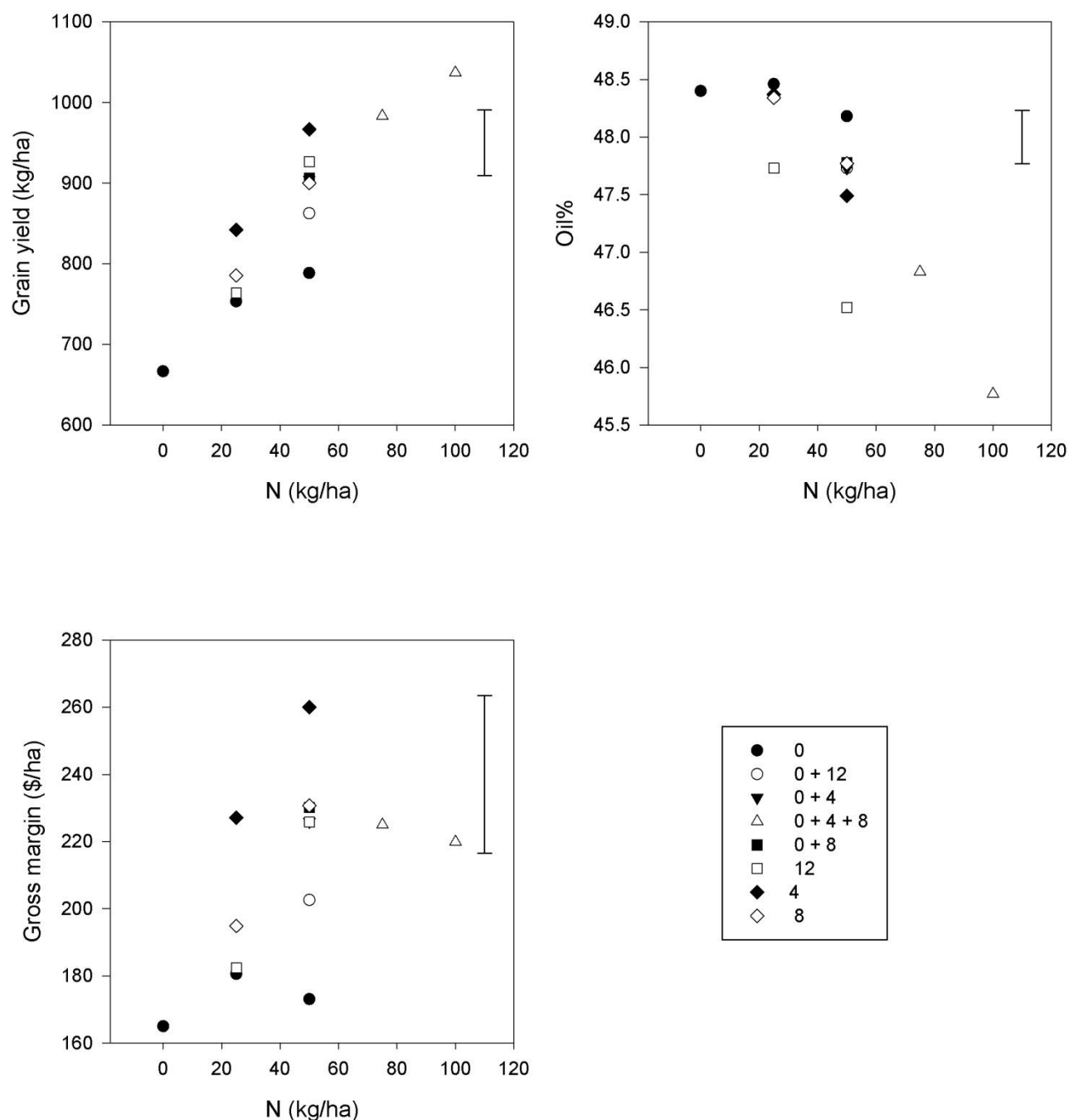


Figure 1 Grain yield (kg/ha), oil (%) and gross margin (\$/ha) response of canola to nitrogen at Grass Patch in 2013 (13ED11, mean of two varieties). Legend indicates weeks after sowing treatments were applied.

Conclusion

Whilst canola responded to nitrogen and produced higher yields, the negative effect of nitrogen on oil content resulted in high rates of nitrogen not being required to produce maximum returns. Indeed whilst 25 kg N/ha applied 4WAS did not produce the highest yields it produced maximum oil content and equalled the gross margins of treatments with higher rates of applied nitrogen.

In general treatments which applied nitrogen only at seeding were the least reliable treatments, whilst applying at nitrogen 4 weeks after sowing produced the most reliable results, and applying nitrogen at 8 or 12 weeks after sowing produced mixed results. Whilst the 12WAS treatments results were mixed they

were the equal of 8WAS sowing treatments which are the industry norm.

Despite higher oil content Hyola 404RR did not out-yield CB Telfer and consequently this is one of the first comparisons in the WA mallee where RR hybrids have not produced higher gross margins than TT canola.

Acknowledgements

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Links

For other reports related to this trial see NVTplus

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