

DAW00227

## Tactical Break Crop Agronomy in Western Australia

### Timing of nitrogen for canola grown in the high rainfall areas of Western Australia – (14GS10) Kojonup

#### Authors

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#### Location of trial

Kojonup-West, Western Australia

#### Summary (Key messages)

In this 2014 trial at Kojonup-W

- Canola grain yield and gross margins were more dependent on nitrogen rates than the application timings.
- There was no effect of delayed nitrogen application on grain yield or gross margins up to 100 kg N/ha.
- At 125 kg N/ha, a significant yield and gross margins reduction was observed when nitrogen was applied as a 3-way split (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 16 weeks after seeding) compared to when all of the nitrogen was applied within 8 weeks of seeding.

#### Background

Previous experience with canola has found there is no yield penalty if nitrogen is applied within 8 weeks of sowing, and most farmers aim to apply nitrogen within this timeframe. However in high rainfall zones there have been requests from growers to investigate if canola continues to respond to nitrogen applied later than 8 weeks.

#### Aim

To investigate the effect of nitrogen rates and time of application on grain yield, oil and gross margins of Roundup Ready, Triazine Tolerant and Clearfield canola.

#### Trial Details

- Property: Marbarrup, Kojonup - Ben Webb
- Agzone 3: Growing Season rainfall (GSR) = 400 mm
- Soil type: Loamy sand (4.14% organic carbon)
- Paddock rotation: 2013 barley, 2012 canola, 2011 wheat, SYN estimate = 160 kg N/ha
- Sowing date: 14 May 2014
- Seeding rate: Target density 40 plants/m<sup>2</sup>
- 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

42 treatments

- 3 Cultivars: ATR Wahoo (Triazine Tolerant open-pollinated variety), Hyola 404RR (Roundup Ready hybrid variety) and Pioneer 45Y88CL (Clearfield hybrid variety) x 14 N treatments (kg N/ha) with timing spread between seeding, 8, 12 and 16 weeks after sowing (Table 1).
- Trial design: Split plot design with herbicide tolerant varieties as main plots and nitrogen rates and timings randomised within these, sown in three banks.
- Replications: 3

**Table 1 Treatment details for 14GS10 at Kojonup in 2014 (WAS = Weeks after seeding)**

No.	Total N	N splitting	N Treatment name	N kg/ha			
				Seeding	8WAS	12WAS	16WAS
1	0	Nil	0N	0	0	0	0
2	50	Seeding and 8 WAS	15N 35N	15	35	0	0
3	75	Seeding and 8 WAS	15N 60N	15	60	0	0
4	100	Seeding and 8 WAS	15N 85N	15	85	0	0
5	125	Seeding and 8 WAS	15N 110N	15	110	0	0
6	50	2-way split	15N 10N 25N	15	10	25	0
7	75	2-way split	15N 35N 25N	15	35	25	0
8	100	2-way split	15N 35N 50N	15	35	50	0
9	100	2-way split	15N 60N 25N	15	60	25	0
10	100	3-way split	15N 60N 0N 25N	15	60	0	25
11	100	3-way split	15N 35N 25N 25N	15	35	25	25
12	125	2-way split	15N 85N 25N	15	85	25	0
13	125	3-way split	15N 85N 0N 25N	15	85	0	25
14	125	3-way split	15N 35N 50N 25N	15	35	50	25

## Assumptions used in Gross Margins

Oil bonus: +/- 1.5% per unit of oil (%) either side of 42%, with no oil ceiling

Additional costs: Seeding, harvest, insecticides assumed to be \$180/ha

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

RR costs: Seed \$98/ha, herbicides \$45/ha

RR grain: \$508/t (Decile 5)

TT costs: Seed \$40/ha, herbicides \$60/ha

TT and CL grain \$523/t (Decile 5)

Clearfield costs: Seed \$60/ha, herbicides \$97/ha

## Results

### 1. Grain yield

The grain yield of canola increased significantly with increasing rates of applied nitrogen up to 100 kg/ha and then flattened off (Figure 1). The grain yield of Hyola 404RR and ATR Wahoo were more than 150 kg/ha higher than Pioneer 45Y88CL.

Delaying some of the nitrogen application after 8 weeks or delaying from 12 to 16 weeks after seeding

did not result in any yield reduction when the total rate of applied N was 100 kg N/ha or less. However, a significant yield reduction of 230 kg/ha was observed when 125 kg N/ha was applied as a 3-way split (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 16 weeks after seeding) compared to when all of the nitrogen was applied within 8 weeks of seeding (Figure 2).

## 2. Grain oil concentration

Generally increasing rates of nitrogen resulted in a decrease in the oil concentration of canola, with the lowest concentration found at 125 kg/ha (Figure 1). Delaying nitrogen application tended to reduce oil (Figure 3), except at 125 kg/ha where the oil concentration improved with delayed application of nitrogen.

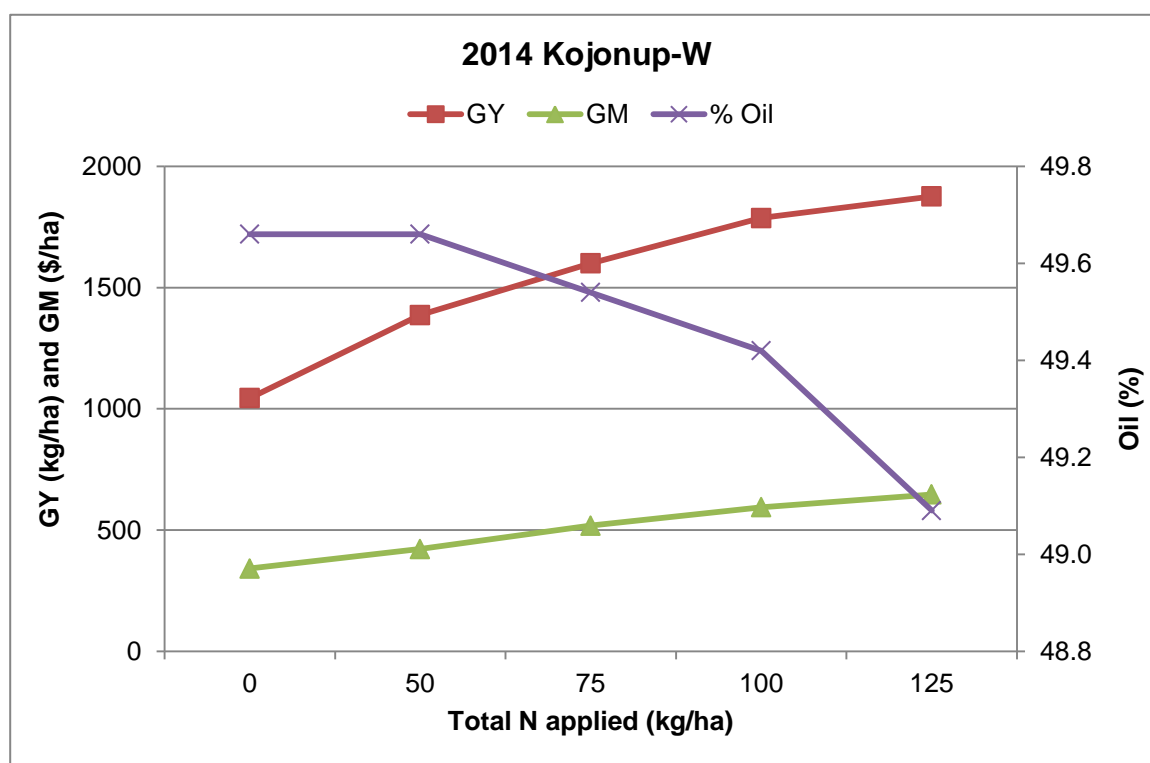
Varieties differed significantly in their oil concentration with Hyola 404RR containing 50.9%, ATR Wahoo 49.6% and Pioneer 45Y88CL 47.6% oil.

## 3. Gross margins

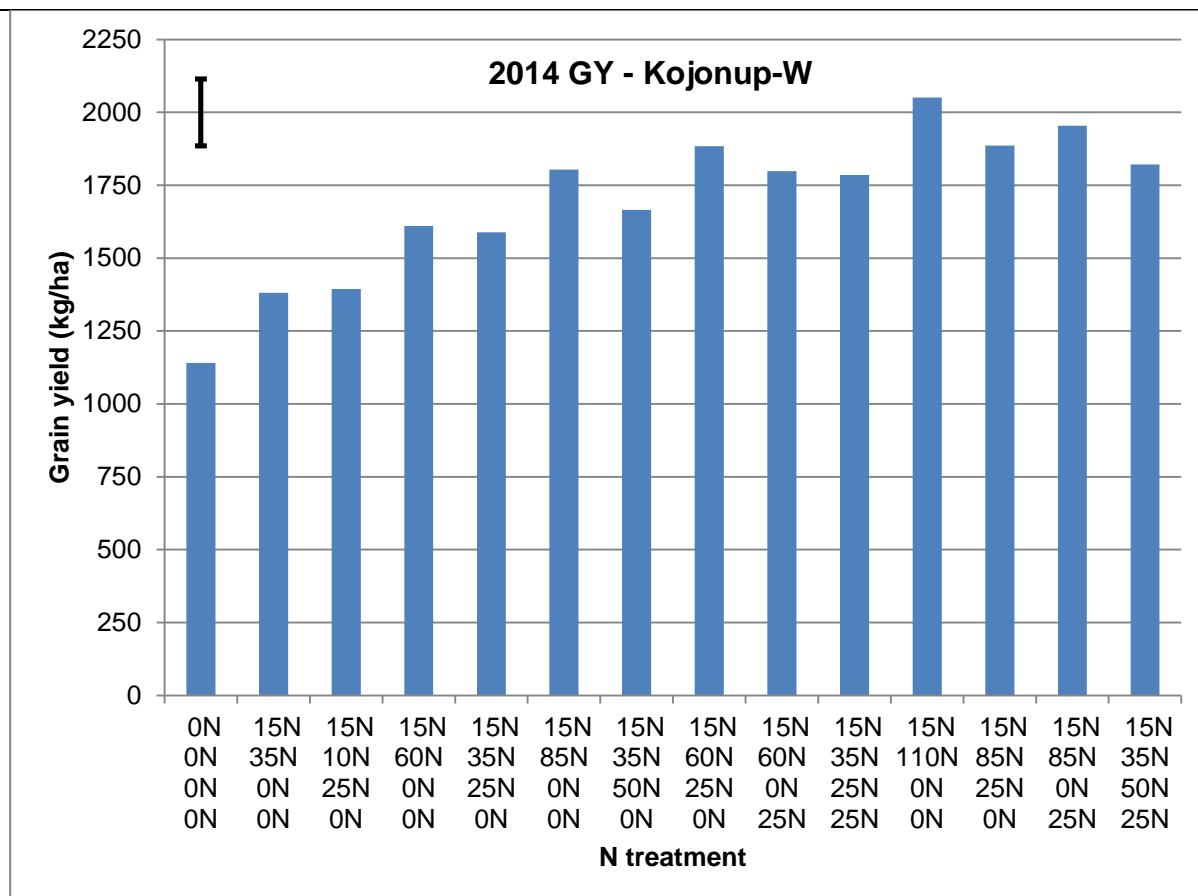
Canola gross margins began to plateau at 100 kg N/ha (Figure 1). Thus application of 100 kg/ha nitrogen produced higher gross margins than the nil, 50 and 75 kg/ha treatments but statistically similar gross margins to 125 kg/ha.

On occasions delaying nitrogen application reduced gross margins. For example, when 125 kg N/ha was 3-way split applied (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 16 weeks after seeding) a reduction of \$138/ha was observed compared to when all of the nitrogen was applied within 8 weeks of seeding (Figure 4).

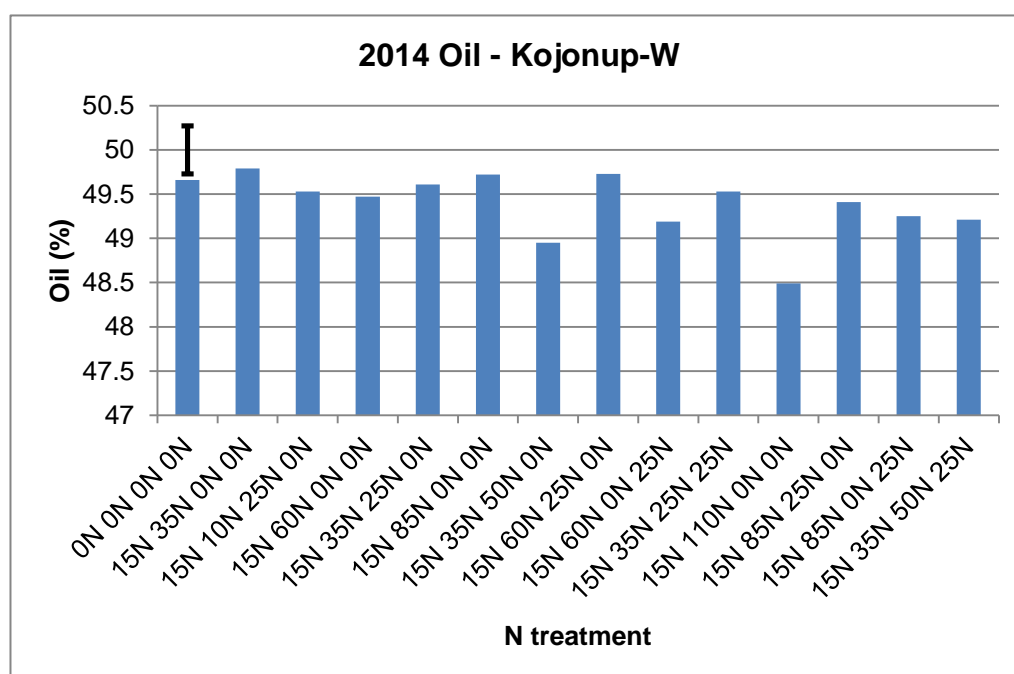
On average, ATR Wahoo produced \$135/ha and \$38/ha higher gross margins than Pioneer 45Y88CL and Hyola 404RR, respectively.



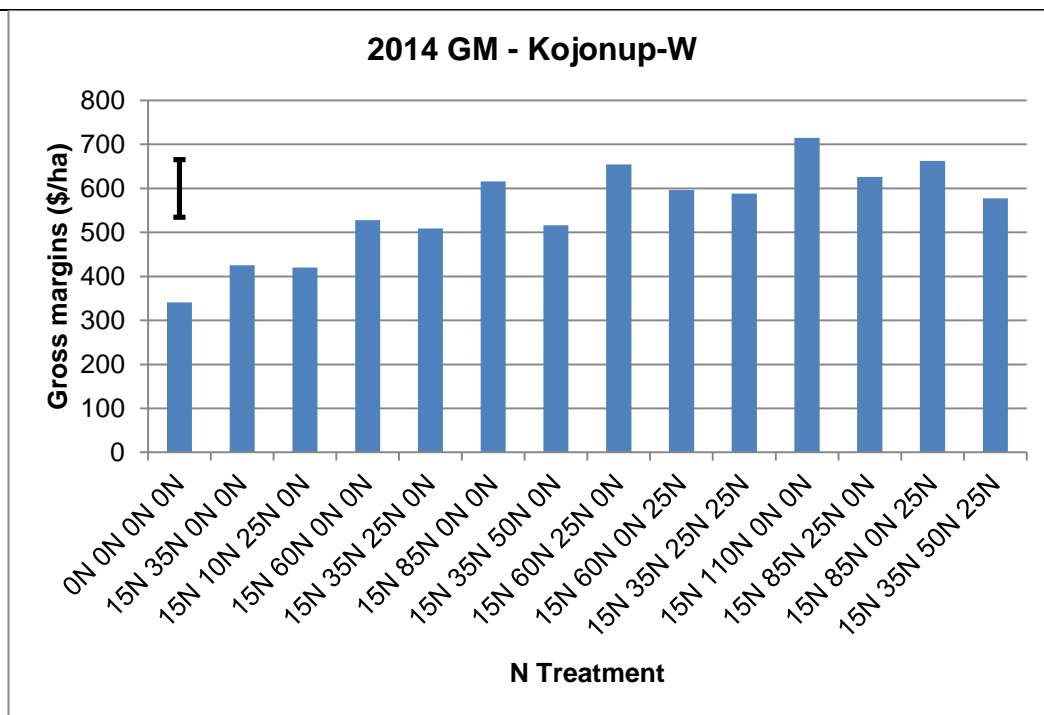
**Figure 1** Effect of nitrogen fertiliser rate on grain yield, gross margin and oil concentration of canola at Kojonup-W in 2014. LSD ( $P < 0.05$ ): grain yield = 216 kg/ha; gross margin = \$97/ha; oil = 0.48%.



**Figure 2** Effect of nitrogen treatments on the grain yield (kg/ha) of canola at Kojonup in 2014. Vertical bar in the chart is LSD ( $P<0.05$ ): 230 kg/ha. N treatment notations – N (kg/ha) applied at 0 (seeding), 8, 12 and 16 weeks after seeding, respectively.



**Figure 3** Effect of nitrogen treatments on the oil concentration (%) of canola at Kojonup-W in 2014. Vertical bar in the chart is LSD ( $P<0.05$ ) = 0.57%. N treatment notations – N (kg/ha) applied at 0 (seeding), 8, 12 and 16 weeks after seeding, respectively.



**Figure 4** Effect of nitrogen treatments on the gross margins (\$/ha) of canola at Kojonup in 2014. Vertical bar in the chart is LSD ( $P < 0.05$ ): \$131/ha. N treatment notations – N (kg/ha) applied at 0 (seeding), 8, 12 and 16 weeks after seeding, respectively.

## Conclusion

At this site 100 kg N/ha was the optimum rate for gross margins. There was significant yield and gross margin reductions when 125 kg N/ha was 3-way split applied (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 16 weeks after seeding) compared to when all of the nitrogen was applied within 8 weeks of seeding. Up to 100 kg/ha delayed application of some of the nitrogen from 8 to 12 or 16 weeks after seeding did not result in any significant grain yield or gross margin reductions.

## Acknowledgements

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## For more information contact

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