DAW00227
Tactical Break Crop Agronomy in Western Australia

Timing of nitrogen for canola grown in the high rainfall areas of Western Australia – (14ED13), Gibson

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Location of trial	EDRS, Gibson, Western Australia

Summary (Key messages)

- Canola grain yield and gross margins were more dependent on nitrogen rates than the application timings.
- Delaying application of nitrogen after 8 weeks reduced canola yield. The reduction was greater the higher the proportion of total applied N delayed.
- Hyola 404RR produced significantly higher grain yield and oil than ATR Wahoo, but similar gross margins

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 and Triazine Tolerant canola.

Trial Details

- Property: EDRS, Gibson
- Agzone 6: Growing Season rainfall (GSR) = 433 mm
- Soil type: Loamy sand (1.42% organic carbon)
- Paddock rotation: 2013 wheat, 2012 sub clover, 2011 sub clover
- Sowing date: 9 May 2014
- Seeding rate: Target density 40 plants/m^2
- Fertiliser (kg/ha): 100 kg/ha of Superphosphate at seeding, 120 kg/ha of Muriate of Potash and 400 kg/ha of gypsum (17% Ca, 14% S) top-dressed over whole site 4 weeks after seeding, 0.7 kg Zn/ha and 0.5 kg Mn/ha sprayed over the whole trial 6 weeks after seeding.

Treatment detail

28 treatments

- 2 Cultivars: ATR Wahoo (Triazine Tolerant open-pollinated variety) and Hyola 404RR (Roundup Ready hybrid variety) x 14 N treatments (kg N/ha) with timing spread between seeding, 8, 12 and 14 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 (WAS = Weeks after seeding)

				N kg/ha			
No.	Total N	N splitting	N Treatment name	Seeding	8WAS	12WAS	14WAS
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 (as urea) at seeding and $1.53/L (as urea ammomonium nitrate [UAN]) at 8, 12 and 14WAS: application costs $8/ha per application

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

RR price: Grain worth $513/t (Decile 5)

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

TT price: Grain worth $535/t (Decile 5)

Results

1. Grain yield

Grain yield of canola increased significantly with applied nitrogen and achieved the highest yield of 2.4 t/ha at 125 kg/ha (Figure 1). The grain yield of Hyola 404RR was on average 315 kg/ha higher than ATR Wahoo, and Hyola 404RR produced higher yield than ATR Wahoo at all levels of applied nitrogen.

Delaying some of the nitrogen application after 8 weeks reduced canola yield and the penalty was greater the higher the proportion of total N that was delayed. For example a significant yield reduction of

173 kg/ha was observed when 125 kg N/ha was applied as a 3-way split applied (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 14 weeks after seeding) compared to the treatment which applied all of the nitrogen within 8 weeks of seeding (Figure 2).

2. Grain oil concentration

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

Varieties differed significantly in their oil concentration with Hyola 404RR containing 48.6% compared to ATR Wahoo with 46.8%.

3. Gross margins

Canola gross margins began to plateau at 50 kg N/ha (Figure 1). Thus application of 50 kg/ha nitrogen within 8 weeks of seeding produced higher gross margins than the nil treatment but statistically similar gross margins to all other the treatments.

On occasions delaying nitrogen application reduced gross margins. For example, when 75 kg N/ha was split applied at 12 weeks after seeding gross margins were reduced by $98/ha compared to applying 75N within 8 weeks. Similarly when 125 kg N/ha was applied in a 3-way split (50 kg within 8 weeks, 50 kg/ha at 12 and 25 kg/ha at 14 weeks after seeding) a reduction of $125/ha was observed compared to applying all of the nitrogen within 8 weeks of seeding (Figure 4 and 5).

On average Hyola 404RR produced similar gross margins than ATR Wahoo.

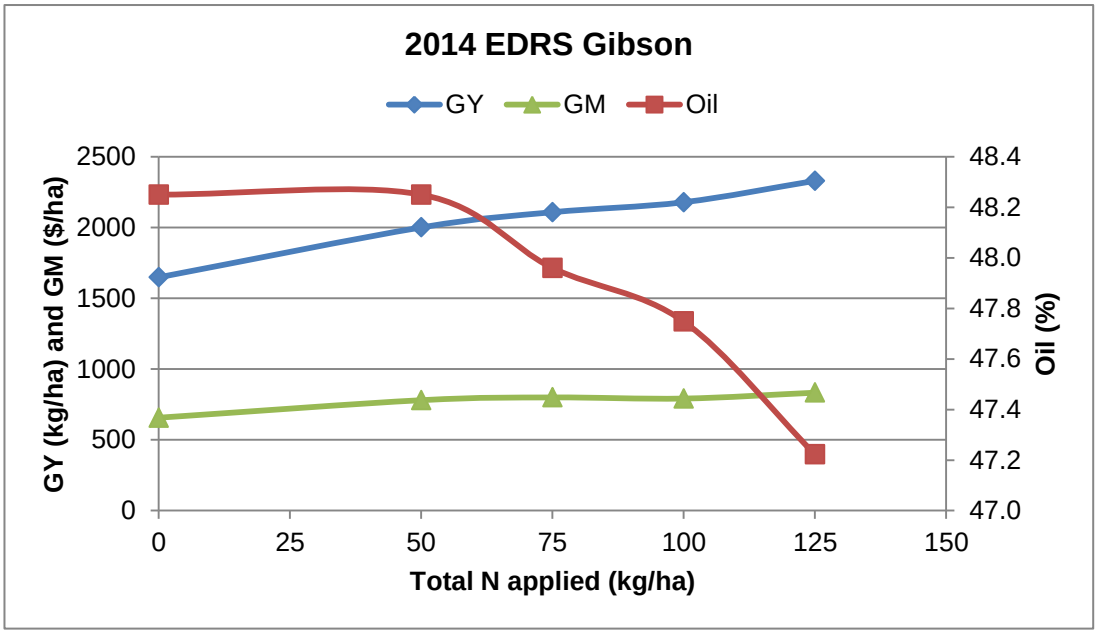

Figure 1 Effect of nitrogen fertiliser rate on grain yield, gross margin and oil concentration of canola at EDRS Gibson in 2014. LSD (P<0.05): grain yield = 119 kg/ha; gross margin = $69/ha; oil = 0.47%.

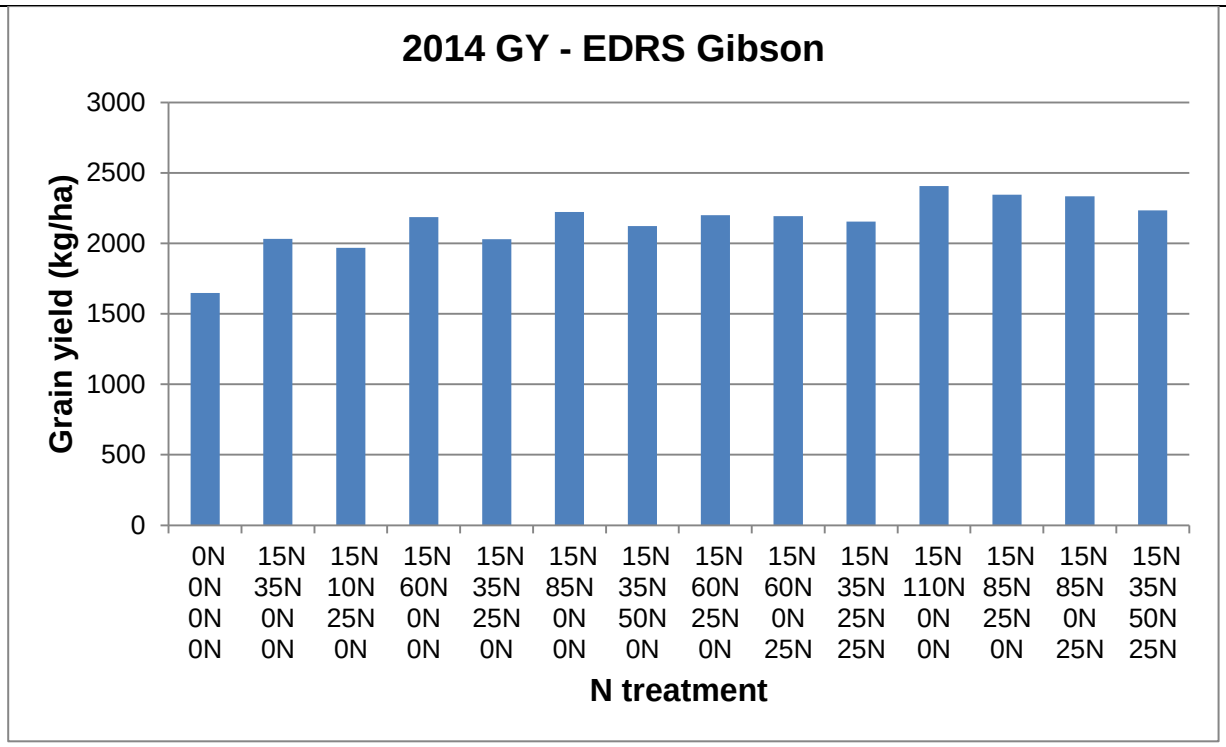

Figure 2 **Effect of nitrogen treatments on the grain yield (kg/ha) of canola at EDRS Gibson in 2014. LSD (P<0.05) = 160 kg/ha. N treatment – N (kg/ha) applied at 0 (seeding), 8, 12 and 14 weeks after seeding, respectively.**

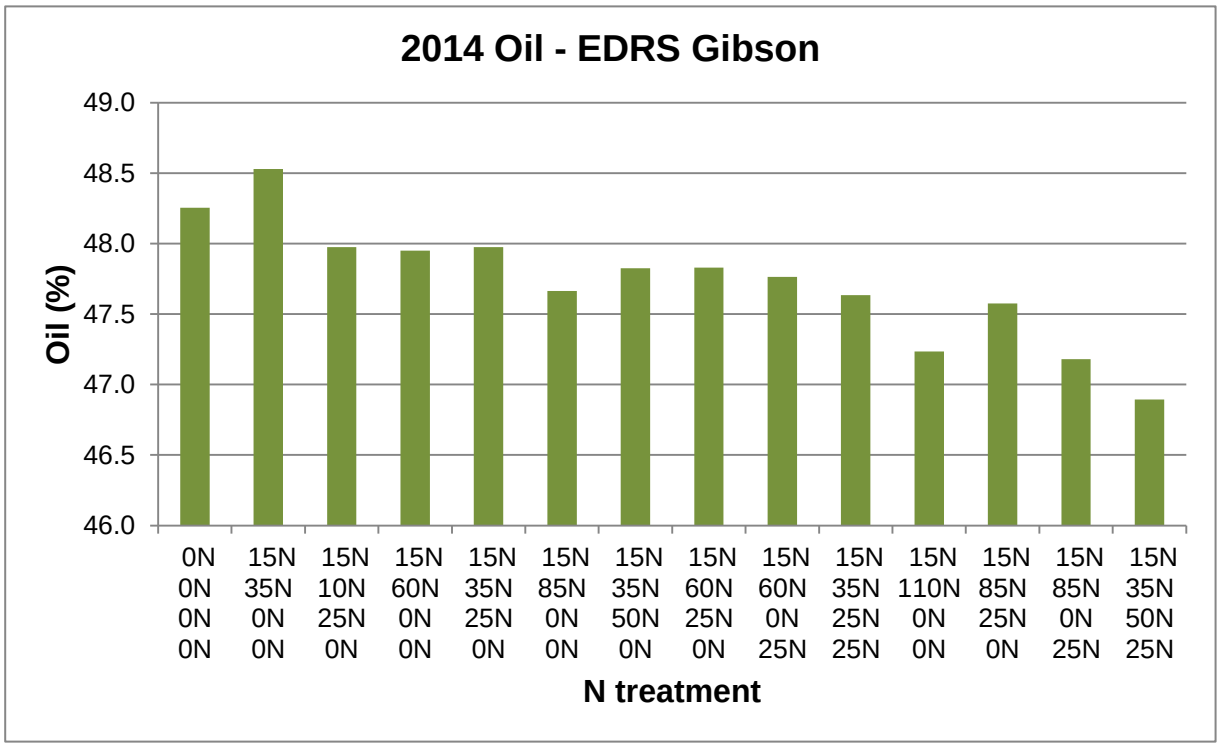

Figure 3 **Effect of nitrogen treatments on the oil concentration (%) of canola at EDRS Gibson in 2014. LSD (P<0.05) = 0.64%. N treatment – N (kg/ha) applied at 0 (seeding), 8, 12 and 14 weeks after seeding, respectively.**

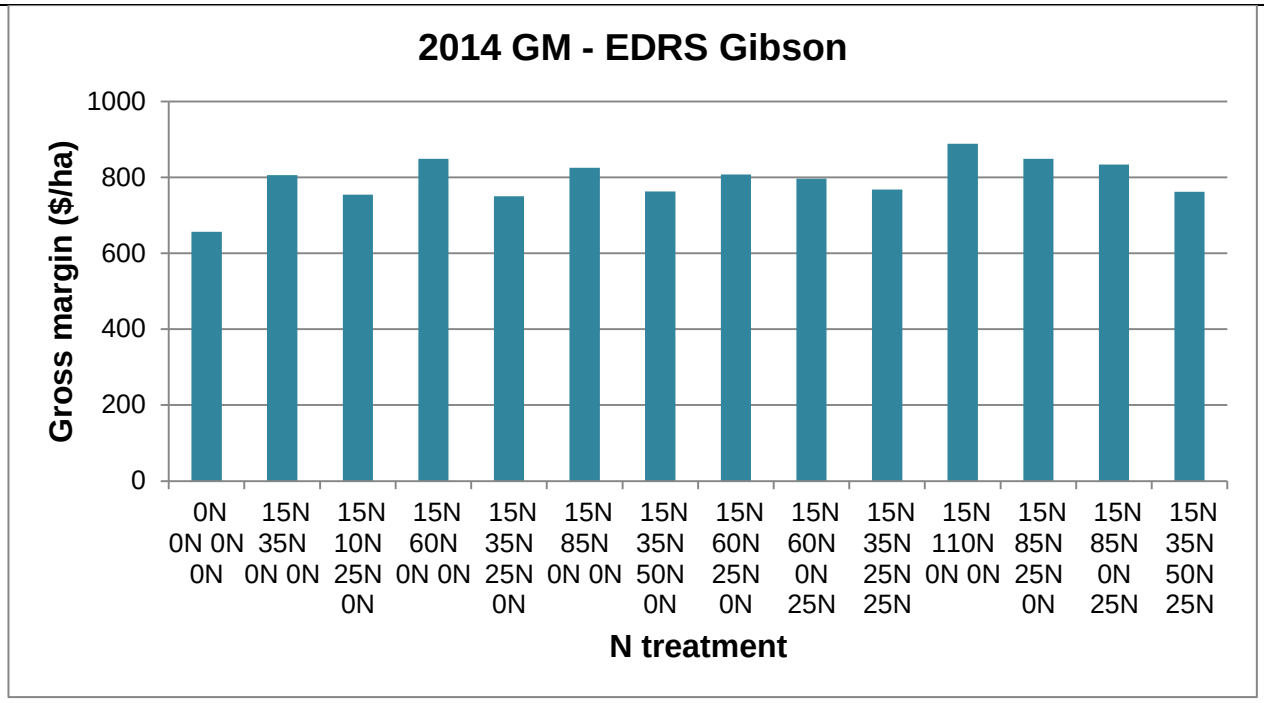

Figure 4 **Effect of nitrogen treatments on the gross margins ($/ha) of canola at EDRS Gibson in 2014. LSD (P<0.05) = $88/ha. N treatment – N (kg/ha) applied at 0 (seeding), 8, 12 and 14 weeks after seeding, respectively.**

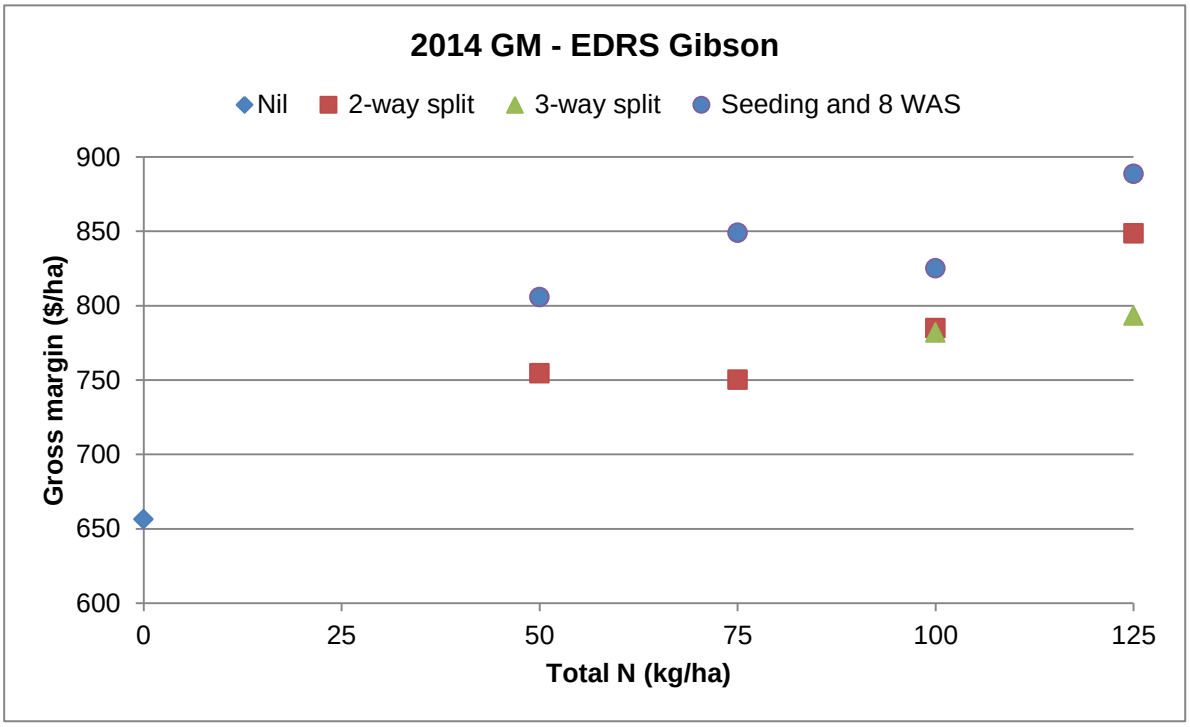

Figure 5 **Effect of nitrogen fertiliser rate and split applications on the gross margins ($/ha) of canola at EDRS Gibson in 2014. LSD (P<0.05) = $75/ha.**

Conclusion

Delaying some of the nitrogen application beyond 8 weeks after seeding to 12 or 14 weeks did not lead to yield or gross margin benefits. Instead there was a tendency of declining yield and gross margins; and generally the penalties were greater higher the proportion of total N that was delayed.

Acknowledgements

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