

N Fertiliser strategies to maximise the grain yield of hybrid canola in the West Midlands region: Part 2 – Gross Margin Analysis

Nathan Craig (WMG), Brianna Hindle (WMG), Erinn McCartney (Gentech Seeds)

Key Messages

- The highest Gross Income was \$2527/ha where 300 kg N/ha was applied
- The highest Gross Margin was \$1797 where 240 kg N/ha was applied
- Rates of N >80 kg N/ha captured >92% of maximum Gross Margin

Background

Canola is an important crop grown in rotation through the West Midlands Region due to its rotational benefits when grown in rotation with cereals, and the generally profitable nature of the crop. While canola is known to have a high nutritional requirement to achieve grain yield relative to cereal crops, it is suggested that the genetic potential of hybrid canola varieties is being limited by the availability of N to the crop. The yield potential of canola has been shown to be related to biomass production, and the objective of this trial is to evaluate the amount and timing of N application on hybrid canola to maximise biomass production and grain yield in our region.

A randomised complete block design experiment was conducted at 'Kayanaba', Dandaragan in 2019 to assess various rates and timing of application of nitrogen on Hybrid canola. The soil type was a strong sandy loam soil with 23 mg/kg of N in the top 90 cm prior to seeding, and a pH of 6.7 in the 0-10 cm and 4.6 in the 30-50 cm soil depth. The site was previously sown to barley in 2018.

The site was sown dry on the 5th of May 2019 using knifepoints and press wheels to achieve a sowing depth of 2 cm. The nitrogen treatments evaluated are presented in Table 1. Growing season rainfall was 267 mm and was 66% of the long-term average, while annual rainfall was 272 mm for 2019 (BOM, Chelsea site 9006).

Table 1. Amount and timing of nitrogen application in the Pioneer hybrid canola trial. N fertiliser was applied as a mix of Maxam and Urea to give 15 units of S with each application of N.

Treatment	Strategy	Total N applied (kg N/ha)	Applied N (kg N/ha)			
			Seeding	2 leaf	6 leaf	First flower
1	Control	10	10			
2	N early	80	10	35	35	
3	N early	150	10	70	70	
4	N early	200	10	95	95	
5	N early	240	10	100	100	30
6	N late	150	10		70	70
7	N late	200	10	30	80	80
8	N unlimited	300	10	92	138	60
9	NKS21	150	10	40	60	40
10	NKS21	300	10	80	120	90

Results

Table 1. Gross Margin comparison of treatments for the Pioneer Yieldmax canola trial in 2019 at Dandaragan. Income is based on yield x base canola price of \$550/t and including oil bonus above 42%. Machinery inputs calculated using contract rates for all operations, fertiliser cost based on prices of \$870/t for Gusto Gold, \$390/t for MaxAm, \$550/t for Urea, \$530/t for NKS21. Overhead costs not included in calculations.

Tmt	N-applied	Timing	Income \$/ha	Seed \$/ha	Chemical \$/ha	Fertiliser \$/ha	Machinery \$/ha	Total cost \$/ha	Gross Margin \$/ha
1	10	Early	\$1,678	\$68	\$75	\$87	\$160	\$390	\$1,288
2	80	Early	\$1,990	\$68	\$75	\$201	\$172	\$516	\$1,474
3	150	Early	\$2,239	\$68	\$75	\$285	\$172	\$600	\$1,639
6	150	Late	\$2,241	\$68	\$75	\$285	\$172	\$600	\$1,641
4	200	Early	\$2,339	\$68	\$75	\$345	\$172	\$660	\$1,680
7	200	Late	\$2,326	\$68	\$75	\$360	\$178	\$681	\$1,645
5	240	Early	\$2,526	\$68	\$75	\$408	\$178	\$729	\$1,797
8	300	Unlimited	\$2,527	\$68	\$75	\$480	\$178	\$801	\$1,727
9	150	NKS21	\$2,264	\$68	\$75	\$346	\$178	\$667	\$1,597
10	300	NKS21	\$2,456	\$68	\$75	\$623	\$178	\$944	\$1,513

The Gross Margin increased from \$1288/ha where 10 units of N were applied and up to a maximum of \$1797/ha where 240 units of N were applied. The application of 300 units of N did not increase the Gross Margin further due to the extra cost of fertiliser and application costs. There was a curvilinear relationship between the amount of N applied and the Gross Margin of each treatment ($R^2=0.79$, Figure 1). The fitted model determined that the maximum Gross Margin occurred at approximately 200 kg N/ha. The rate of N to be applied to achieve 95% of the maximum Gross Margin was 110 kg N/ha, while the application of 80 kg N/ha achieved a Gross Margin that was 92% of the maximum.

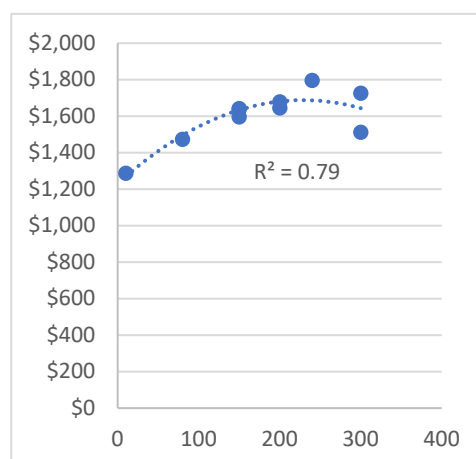


Figure 1. Relationship between N applied and Gross Margin resulting in a curvilinear relationship.

Discussion

There was a relatively flat relationship between the rate of nitrogen applied and Gross Margin, with 80 kg N/ha capturing 92% of the maximum Gross Margin for this below average season. Further evaluation is required in higher rainfall and crop nitrogen requirement seasons as nitrogen demand/response curves will change with seasonal conditions. This study has not evaluated the associated increase in financial risk of growing canola with high N application rates.

The full report can be found on the WMG website www.wmggroup.org.au

Acknowledgements

Thank you to the Roberts family for hosting the trial and Pioneer Australia for the opportunity to work with them on this project. WMG project code: RAD1927