

Table 1: Harvest Traits for the Treatments

Treatment	Grain Yield (t/ha)	Test Weight (kg/hL)	Harvest DM (t/ha)	Oil (%)
0	2.91 ± 0.19 - a	67.92 ± 0.28 -	11.7 ± 0.85 - a	46.88 ± 1.24 -
80	3.9 ± 0.19 - b	67.92 ± 0.28 -	14.68 ± 0.84 - ab	49.9 ± 1.19 -
120	4.09 ± 0.19 - b	68.61 ± 0.28 -	16.85 ± 0.84 - b	45.1 ± 1.2 -
160	4.17 ± 0.19 - b	68.15 ± 0.28 -	16.66 ± 0.84 - b	49.87 ± 1.18 -
200	4.05 ± 0.19 - b	68.08 ± 0.28 -	16.84 ± 0.84 - b	47.23 ± 1.21 -
240	4.37 ± 0.19 - b	68.52 ± 0.28 -	15.71 ± 0.83 - b	48.97 ± 1.14 -
280	4.14 ± 0.19 - b	68.31 ± 0.28 -	16.82 ± 0.84 - b	47.66 ± 1.17 -
320	4.18 ± 0.2 - b	68.1 ± 0.28 -	17.15 ± 0.85 - b	45.61 ± 1.23 -

Note: values expressed as mean ± standard error of prediction

- no subscripts relevant for this response

A summary of the experiment statistics is below:

Table 2: Key statistics for each response analysed

Statistic	Grain Yield (t/ha)	Test Weight (kg/hL)	Harvest DM (t/ha)	Oil (%)
LSD	0.432	0.626	2.363	3.609
Mean	4.000	68.200	15.800	47.700
Treatment_p-value	0.000	0.270	0.002	0.089
CV	15.608	0.886	15.149	5.920

### Trial 3. Nitrogen Efficiency Trial – Nitrogen Timing Trial

**Project Objective:** To assess whether the optimum timing for applied N interacts with N rate in canola

**Location:** Kerang, Victoria

**FAR Code:** ICC C21-04-2

**Sown:** 23<sup>rd</sup> April 2021

**Cultivar:** 45Y28 RR

**Harvested:** 24<sup>th</sup> November 2021

**Rotation position:** Wheaten Hay (2020), Dryland vetch/brown manure (2019), Durum wheat (2018)

**Soil Type:** Neutral medium grey clay

**Irrigation:** Surface irrigation. Pre-irrigation in autumn plus 2 spring irrigations totalling 340mm (3.4 ML/ha)

**GSR:** April-October 160mm. Total water available 500mm

### Key Messages:

- *There was no interaction between N rate and N timing in this trial on the RR hybrid 45Y28 indicating that yield responses to N rate were the same irrespective of timing.*
- *Accumulated N in the canopy at harvest indicated that optimum yields were achieved with crop canopies containing no more 268 kg N/ha. The unfertilised contained 180N.*

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- Higher applied N rates (240N) produced N crop canopy contents of 300kg N/ha at harvest but significantly more N in the canopy was not associated with more seed.
- Yield of 4.3 t/ha was achieved by applying 80 kg N/ha. Increasing N rates above this level did not result in higher seed yields.
- Timing of N application had no influence on yield or grain quality (oil and test weight).
- Water use efficiency was 10.6 kg/mm and nitrogen use efficiency (NUE) was 59.9 kg N/t.

**Table 1:** Treatment Summary – N application rates (kg N/ha) and timing (Growth Stage)

Treatments					
Intended N timing	Sowing	6 leaf	Green Bud	Early Flower	Total N applied
Date	24 April	25 June	22 July	11 August	
Treatment 1	0	0			0
Treatment 2	40	40			80
Treatment 3	80	80			160
Treatment 4	120	120			240
Treatment 5		0	0		0
Treatment 6		40	40		80
Treatment 7		80	80		160
Treatment 8		120	120		240
Treatment 9			0	0	0
Treatment 10			40	40	80
Treatment 11			80	80	160
Treatment 12			120	120	240

**Table 2a.** Canopy measurements at Early Flower (11 August): dry matter (t/ha)

DM (t/ha) Early Flower					
Treatment	Sowing/6 Leaf	6 Leaf/GBud	Green Bud/Early Fl	Mean	
0 kg N/ha	4.96 -	4.65 -	4.16 -	4.59	-
80 kg N/ha	4.96 -	5.26 -	4.85 -	5.02	-
160 kg N/ha	5.13 -	4.83 -	5.18 -	5.05	-
240 kg N/ha	4.71 -	4.96 -	4.58 -	4.75	-
Mean	4.94 -	4.93 -	4.69 -		-
LSD N Rate p = 0.05		ns	P val	0.496	
LSD Timing p=0.05		ns	P val	0.650	
LSD N Rate x Timing p=0.05		ns	P val	0.891	

Dry matter at early flowering averaged 4.85 t/ha. None of the treatments resulted in significant differences in dry matter.

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**Table 2b.** Canopy measurements at Early Flower (11 August): accumulated N (kg N/ha)

Accumulated N (kg N/ha) Early Flower					
Treatment	Sowing/6 Leaf		6 Leaf/GBud		Mean
				Green Bud/Early FI	
0 kg N/ha	86.7	-	104.9	-	92.0 c
80 kg N/ha	118.1	-	133.9	-	125.3 b
160 kg N/ha	142.2	-	162.5	-	154.2 a
240 kg N/ha	136.8	-	153.2	-	150.3 a
Mean	120.9	-	142.2	-	-
LSD N Rate p = 0.05	21.5		P val		<0.001
LSD Timing p=0.05	ns		P val		0.076
LSD N Rate x Timing p=0.05	ns		P val		0.891

Although there were no differences in dry matter at early flowering, there were differences in N content. Highest accumulated N was in the '6 Leaf/Green Bud' timings and there was an increase in N content as the rate was increased to 160 kg N/ha applied.

Accumulated N at early flowering saw the average for the '0 kg N/ha' treatments being 90 kg N/ha. After subtracting the starter N, this leaves approximately 70 kg N/ha being supplied by the soil.

**Table 3a.** Influence of N timing on yield, N content and grain quality (mean of 4 N rates).

Timing	Grain Yield (t/ha)	Accumulated N (kg N/ha)	Oil (%)	Test Weight (kg/hl)	Harvest Index
Sowing/6 leaf	3.98	241.8	48.8	68.1	0.24
6 leaf/Green Bud	4.01	262.8	48.5	69.0	0.25
Green Bud/Early Flower	3.84	261.9	48.2	68.4	0.22
P val	0.394	0.088	0.418	0.188	0.649
LSD Timing p=0.05	ns	ns	ns	ns	ns
cv%	9.2	17.4	2.6	1.0	16.8

Analysis of the yield data focussing on the timing of N application shows no response to timing of the application, and no response in oil content, test weight or harvest index.

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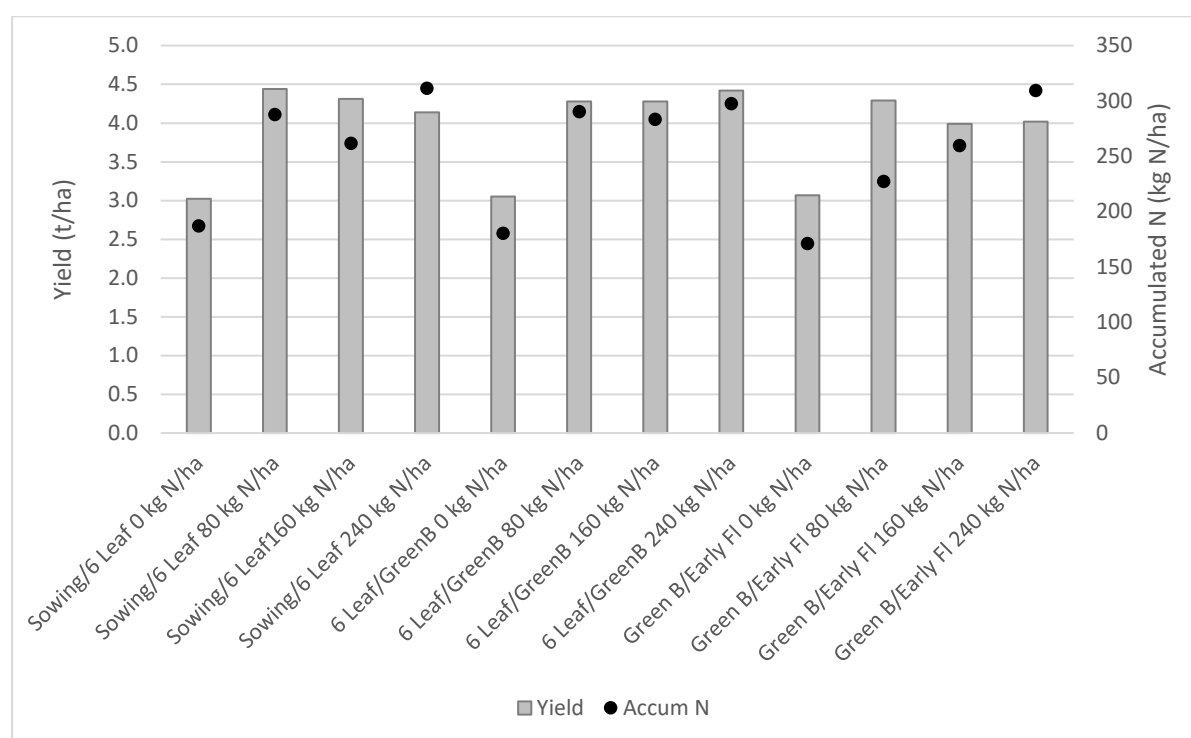
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**Table 3b.** Influence of N rate on yield and grain quality (mean of three N timings)

N rate (kg N/ha)	Grain Yield (t/ha)	Accumulated N (kg N/ha)	Oil (%)	Test Weight (kg/hl)	Harvest Index
0 kg N/ha	3.05 b	179.6 c	48.4	68.1	0.24
80 kg N/ha	4.34 a	268.3 b	48.6	68.1	0.26
160 kg N/ha	4.19 a	268.2 b	48.5	68.0	0.25
240 kg N/ha	4.19 a	306.0 a	48.2	68.3	0.22
P val	<0.001	<0.001	0.809	0.693	0.273
LSD Rate. P=0.05	0.30	24.3	ns	ns	ns
cv%	9.2	11.5	2.6	1.0	16.8

Analysis of the yield data focussing on the rate of N application shows a positive response to the 80 kg N/ha rate, with no further increase at either 160 or 240 kg N/ha. Higher rate of N application had little influence on oil content, test weight or harvest index.

**Figure 1.** Influence of nitrogen rate and timing on grain yield and nitrogen accumulation at harvest.

Highest individual yields was 4.44 t/ha where 80 kg N/ha was split between sowing and 6 leaf, but this treatment was not significantly different any of the other treatments that received an N application.

Using the average yield from the '80 kg N/ha' treatments, WUE was 10.6 kg/mm and NUE was 59.9 kg N/t.

N content in the '0' treatments averaged 180 kg N/ha. After removing the starter N, this represents approximately 160 kg N/ha being supplied from the soil, or 20 kg N/ha from in-crop mineralisation (assuming a rooting depth to 90cm).

While there was a range of 0.22 to 0.27 in the Harvest Index, there were no statistical differences, and the trial mean HI was 0.24.

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### SAGI statistical analysis (Predicted values for Yield, Harvest dry matter, test weight and oil content)

The following statistical analysis of key harvest assessments has been carried out by SAGI. This analysis uses spatial statistical analysis to refine predicted values for key assessment values.

Table 1: Harvest Traits for the Treatments

NTiming	NRate	Grain Yield (t/ha)	Test Weight (kg/hL)	Harvest DM (t/ha)	Oil (%)
6LeafGbud	0	3.03 ± 0.15 -	67.61 ± 0.34 -	12.12 ± 1.02 -	48.6 ± 0.7 -
GbudYbud	0	3.06 ± 0.15 -	68.67 ± 0.35 -	11.87 ± 1 -	47.1 ± 0.7 -
PSPE	0	3.01 ± 0.15 -	68.15 ± 0.35 -	11.99 ± 1.01 -	49.05 ± 0.7 -
6LeafGbud	80	4.28 ± 0.22 -	68.23 ± 0.35 -	15.46 ± 1.31 -	47.68 ± 0.7 -
GbudYbud	80	4.25 ± 0.21 -	67.96 ± 0.35 -	16.55 ± 1.4 -	48.92 ± 0.7 -
PSPE	80	4.42 ± 0.22 -	68.16 ± 0.35 -	15.38 ± 1.3 -	49.64 ± 0.7 -
6LeafGbud	160	4.29 ± 0.22 -	67.71 ± 0.35 -	16.06 ± 1.36 -	49.29 ± 0.7 -
GbudYbud	160	3.98 ± 0.2 -	68.27 ± 0.35 -	16.03 ± 1.36 -	48.37 ± 0.7 -
PSPE	160	4.29 ± 0.22 -	68.12 ± 0.35 -	15.36 ± 1.3 -	48.89 ± 0.7 -
6LeafGbud	240	4.41 ± 0.22 -	68.36 ± 0.35 -	17.33 ± 1.46 -	48.33 ± 0.7 -
GbudYbud	240	3.98 ± 0.2 -	68.78 ± 0.35 -	17.54 ± 1.48 -	48.66 ± 0.7 -
PSPE	240	4.12 ± 0.21 -	67.88 ± 0.35 -	18.16 ± 1.53 -	47.67 ± 0.7 -

Note: values expressed as mean ± standard error of prediction

- no subscripts relevant for this response

A summary of the experiment statistics is below:

Table 2: Key statistics for each response analysed

Statistic	Grain Yield (t/ha)	Test Weight (kg/hL)	Harvest DM (t/ha)	Oil (%)
LSD	0.100	0.900	0.200	1.800
Mean	3.900	68.200	15.200	48.500
NTiming_p-value	0.493	0.248	0.974	0.470
NRate_p-value	0.000	0.692	0.000	0.437
Interaction_p-value	0.803	0.330	0.984	0.105
CV	16.214	1.015	21.017	2.945

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