

Canola – Nitrogen timing and plant population

Trial Code:	GONU00815-2
Year:	Winter 2015
Location:	'Spicers Creek' 20 km north of Wellington
Collaborators:	Joe and Sam Mason

Keywords

GONU008, Canola nutrition, plant population, nitrogen timing, Wellington

Take home message

Crops with lower populations are capable of achieving high yields.

Canola can compensate for lower than desired plant establishment provided the nutrition is optimal.

Background

GOA research in recent years has found that canola has a significant response to N application. There has been some discussion that these responses have occurred under 'ideal' conditions and that canola may behave differently in farmer fields, particularly where low plant populations commonly occur. Research has primarily investigated two N application timings (sowing and budding), where no response was found, leaving open the question as to whether it can be applied even later without adverse impacts on yield.

Therefore two questions have arisen regarding further options for canola nitrogen management, how late can nitrogen be applied, and will this change in the plant population is sub-optimal.

Aim

- Compare the influence of plant population and N application timing on canola yield and oil content.

Methods

Following treatments were assessed;

- Population – 15 and 45 plants/m
- Nitrogen application timing (200 kg/ha nitrogen as urea, hand broadcast)

Table 1. Application details

N Timing	Date	Comments
Sowing	29/4/2015	Broadcast urea prior to planting then IBS, good soil moisture at planting, 40mm ~ 3 weeks post planting)
Two leaf	15/6/2015	over 40 mm 16/17 th June
Bud visible	10/7/2015	rained every day for a week post application, total of ~48 mm
Flowering	21/8/2015	~ 35 mm rain on 23/24 th Aug

Table 2. Trial site details

Trial Establishment Date	Autumn, 2015		
Crop and Variety	Canola – 44Y89	Seeding rate	0.8 & 2.5 kg/ha
Sowing date	29/4/2015	Harvest Date	11/11/2015
Seedling equipment	Double Boot Tyne	Row Spacing	27.5 cm
Crop Nutrition (kg/ha)	100 Triphos	Soil type	Clay Loam
Previous Crop (and yield)	Wheat	Pre Sowing Stubble Management	Cultivated
Soil test value (at sowing)	Colwell P ~ 12 ppm, Sulphur ~ 7 ppm	Nitrogen	0-10cm ~ 30 kg/ha, 10-90cm ~ 86 kg/ha

A randomized complete block with 3 replications across 6 ranges was designed. Results were analysed by ANOVA and results compared by using a LSD method with a 95% confidence interval. Any references to differences between treatments should be assumed to be statistically different unless otherwise stated.

Results

Plant Population: Against targeted population of 45 and 15 plants/m², 38 and 11 were established for high and low treatments respectively.

Vegetation Index: During the growing season plant development was tracked using NDVI (Normalized Difference Vegetation Index). At the first measurement 29 days after sowing (DAS) there were no differences in NDVI readings. Subsequent measurements found the higher population treatments recording greater NDVI scores. For the last assessment timing (97 DAS) NDVI readings for N applied at sowing higher than where N was not yet applied (i.e. flowering treatment).

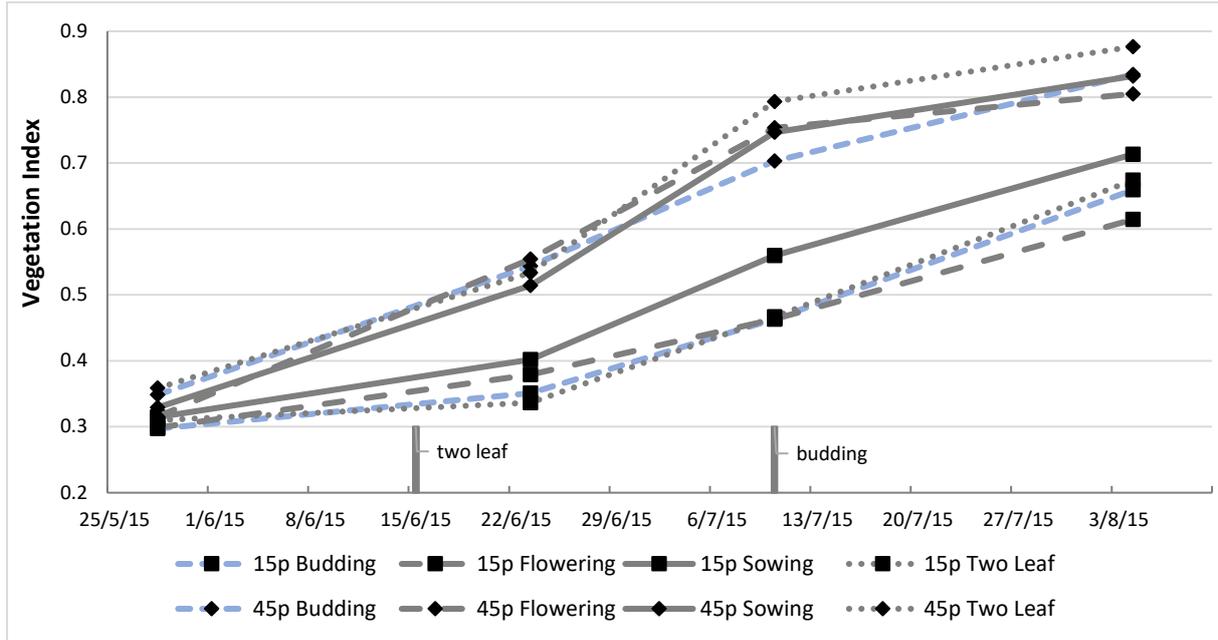


Figure 1. Vegetation Index

Yield: There were no significant differences in yields (Figure 2).

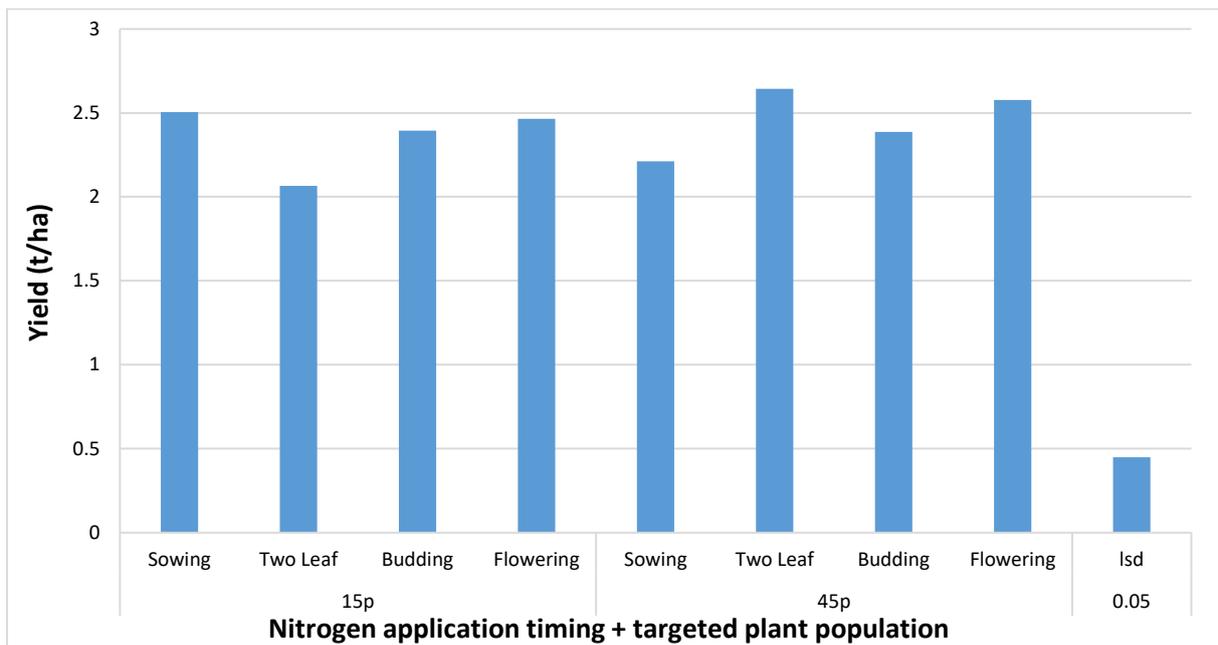


Figure 2. Yield (t/ha) for the various treatments

Oil Content: Plant population had no influence on oil content, however, flowering (late) N application had a higher oil content than all other timings (Figure 3).

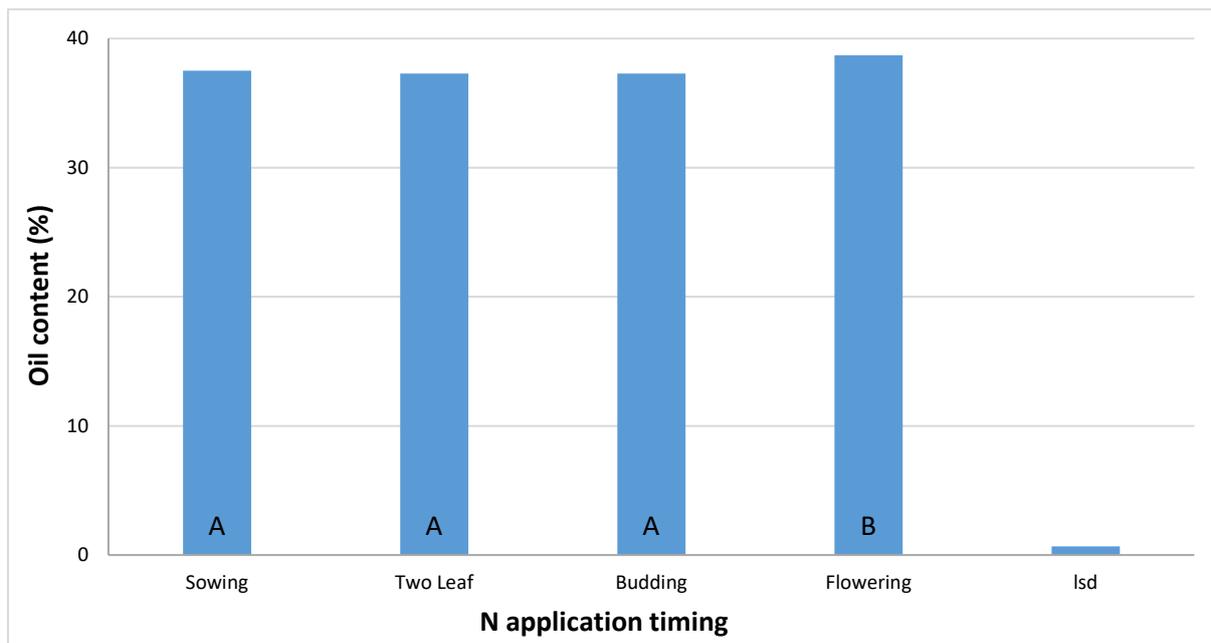


Figure 3. Oil content by nitrogen application timing (regardless of population)

Discussion

The plant population achieved in the lower population treatment was slightly less (11) than the target (15). Some anecdotal information suggests that canola populations as low as 4-6 plants per meter can compensate and achieve yields similar to that of an optimal 20-30 plants/m²¹. It may be useful to repeat this trial in a scenario with a lower target population.

Yields in this trial were high, with a trial average of over 2t/ha. The starting soil N was calculated to be in the order of 116 kg/ha, which would be considered moderate, and possibly enough to achieve a 2t/ha yield (assuming 60 kg N/ha requirement per tonne of canola²). This trial did not contain a “no nitrogen” treatment, as such yield responses may be masked by the background soil N rates.

However, no differences were detected in yields in either population or fertilizer application timing. This tends to support the theory that canola has good capacity to compensate for poorer plant establishment under optimal nutritional conditions. It is not however clear the influence of timing, and further work is required.

Later (flowering) N application resulted in higher oil higher oil content. At other trials oil contents have tended to be higher with early (sowing) N applications. While differences are relatively minor these anomalies may warrant further investigation.

Conclusion

The results of this trial suggest that further testing is required.

- Canola can compensate for lower than desired plant establishment provided the nutrition is optimal.

¹ https://www.dpi.nsw.gov.au/_data/assets/pdf_file/0017/1302173/nsw-dpi-wcvsg-2021-web.pdf

² [GrowNote-Canola-North-5-Nutrition.pdf \(grdc.com.au\)](https://www.grdc.com.au/GrowNote-Canola-North-5-Nutrition.pdf)

- For populations lower than 11 plants/m² it is recommended that additional N be applied at budding or earlier.
- Indication that higher oil content with late N applications – needs further investigation.

Acknowledgements

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Appendix

Trial results table.

Plant Pop	Timing	Yield	Oil
15p	Sowing	2.5	37.4
	Two Leaf	2.1	37.9
	Budding	2.4	38.1
	Flowering	2.5	38.2
45p	Sowing	2.2	37.6
	Two Leaf	2.6	36.7
	Budding	2.4	37.2
	Flowering	2.6	38.5
5%	Isd	0.45	1.2316