

Canola – Nitrogen timing and plant population

Trial Code: GONU00815-1
Year: Winter 2015
Location: 'Inglewood' 10 km North of Gilgandra
Collaborators: Kilby Family

Keywords

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

Take home message:

Canola can compensate for lower than desired plant establishment.
 Timing of N application was not critical for yield, however, early applications tended to favour higher oil contents.

Background

Research by GOA in recent years has found that canola has a significant response to nitrogen (N) application. However, it has been pointed out that these conclusions have been made under research (or 'ideal') conditions and that canola may behave differently in farmers' paddocks, particularly where low plant populations are likely to occur. Research also has mainly only investigated two application timings (sowing and budding), where no response was found. Therefore, the queries raised about canola's ability to compensate if N was applied later and on low plant populations.

Aim

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

Methods

Treatments:

1. Population – 15 and 45 plants/m²
2. Nitrogen application timing (200 kg/ha N as urea, hand broadcast)

N timing	Date	Comments	Rain
Sowing	28/4/2015	Top dressed and IBS*	
Two leaf	15/6/2015	Crop actually at 5-7 leaf	20 mm on 16/6 40 mm on 17/6
Budding	9/7/2015	Bud visible, occasional plant flowering	10 mm on 11/7 23 mm 12-15/7
Flowering	21/8/2015	Full flowering	25 mm on 23-24/8

*IBS = incorporated by sowing

Table 1: Trial site details

Trial Establishment Date	Winter 2015		
Crop and Variety	Canola – 44Y89	Seeding rate	0.8 & 2.5 kg/ha
Sowing date	28/4/2015	Harvest Date	30/10/2015
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	Burnt pre-sowing
Soil test value (at sowing)	Colwell P ~ 21 ppm, Sulphur ~ 4 ppm	Nitrogen	0-10cm ~ 22 kg/ha, 10-90cm ~ 39 kg/ha

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

Results

Results are tabulated in Appendix 1

Plant Population: against targeted populations of 45 and 15 plants/m², 63 and 21 plants/m² were established for high and low treatments respectively.

Vegetation Index: During the season NDVI readings were collected to capture the crops progression of biomass accumulation. There were no significant differences in the NDVI readings at any of the three assessment timings.

Yields: Lodging was a significant issue in this trial. Visual assessments at harvest assessed 20% of the plots to be 100% lodged. Lodging tended to be highest where 45 plants/m² were sown and where nitrogen was applied before flowering. The trial was hand harvested as well as direct headed. There was no significant yield differences between 15 and 45 plants/m². For N application timing, flowering out-yielded budding by 0.65 t/ha. Some differences were detected between various treatments when the interaction between timing and population were considered (**Figure 1**).

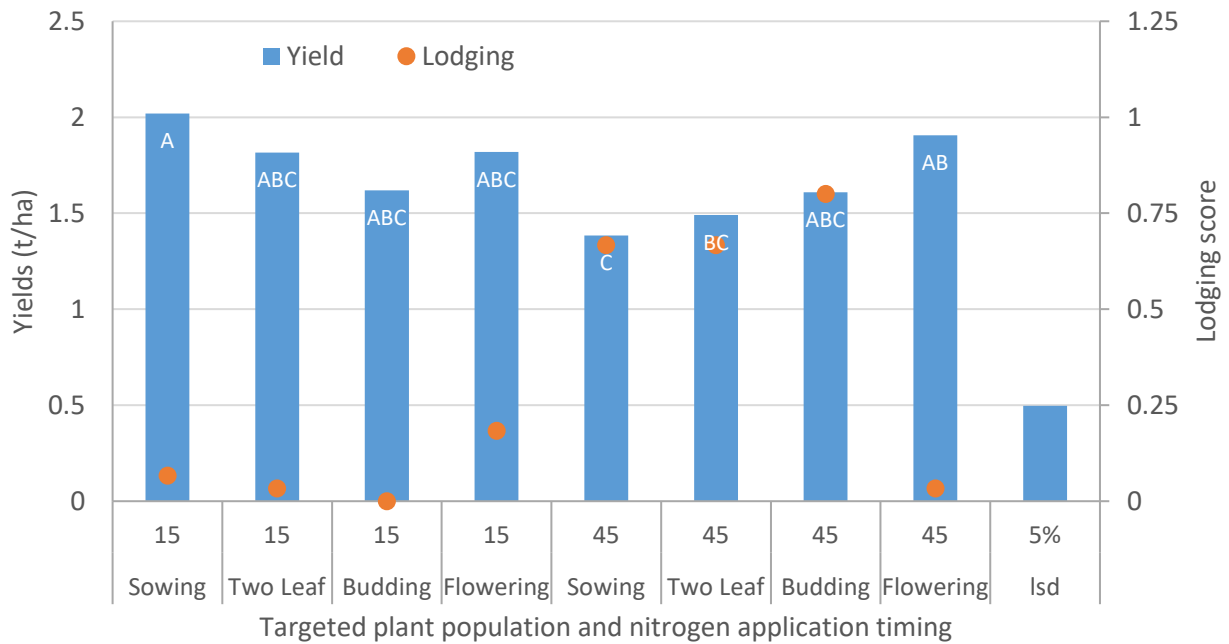


Figure 1. Yield (t/ha) and lodging scores by N application timing and targeted plant population. Treatments with the same letter are not significantly different.

Oil: There was very little influence on oil of either plant population or nitrogen application timing.

Discussion

No nil N treatments were used in the trial. However the site was N responsive (adjacent to this trial was a canola fertiliser trial where significant N responses occurred).

The plant populations achieved for each of the high and low population were more than sufficient to allow for a contrast, however it must be noted that, at times, populations as low as 4 – 6 plants/m² can be sufficient.

The outside rows (guard rows) were removed about 10 days prior to harvest, as the yield carried by these may have been influenced by the inter-plot area. Subsequently this allowed for more wind penetration and exposed of the remaining crop to lodging. At harvest most of the high population treatments were assessed as 'lodged'. Lower population treatments were less susceptible to lodging possibly because of more robust stems.

The harvest results are therefore very highly likely to be influenced by the degree of lodging. Where 200 kg/ha was applied to the high population treatment at flowering the lodging was assessed as low. This may indicate that application during the flowering phase resulted in a shorter and more robust crop. On the other hand, application of N prior to flowering in the high population treatments resulted in high levels of lodging and possibly suppressed yields.

Looking at the low population is interesting as there was no (statistical) difference in the yield response regardless of timing. This would tend to indicate that where populations are lower (~20/m²) the crop was able to compensate when N is applied at a later timings.

Hand cuts were also collected at this trial (data not presented) and the site average yield was 3.3 t/ha compared with 1.7 t/ha from the machine. This would tend to suggest that there were considerable

losses between the timing of the hand cut and when the grain arrived in the header tank. The hand cut showed no yield differences.

Assessing results for both harvest techniques, there was no clear pattern in response to either timing or population. This tends to indicate that canola with low plant population combined with late N application has the capacity to (rapidly) compensate and may question the value of building early biomass. These results would tend to imply that canola has remarkable ability to add yield in a short period of time and potential to compensate for adverse plant populations.

Implications of these findings might be that farmers can hold off on N application if seasonal conditions were marginal, even those with less than desirable plant stands.

Conclusion

- Canola can compensate for lower than desired plant establishment.
- Timing of application of N not so critical for yield, however, if populations are lower than 20 plants/m² application at budding or prior would be recommended.

Results of this trial suggest that further testing is required.

Acknowledgements

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Appendix

Results table

Timing	Plant	Yield		Lodging	Oil
Sowing	15	2.02	A	7%	41.9
Two Leaf	15	1.8167	ABC	3%	41.9
Budding	15	1.62	ABC	%	41.2
Flowering	15	1.82	ABC	18%	40.8
Sowing	45	1.3833	C	67%	41.9
Two Leaf	45	1.49	BC	67%	41.6
Budding	45	1.61	ABC	80%	40.4
Flowering	45	1.9067	AB	3%	41.5
Isd	5%	0.4962			