Nitrogen applications to maximise canola yield

RESEARCH

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Location:
Minnipa Ag Centre
Paddock S5
Rainfall
Av. Annual: 325 mm
Av. GSR: 241 mm
2015 Total: 258 mm
2015 GSR: 333 mm
Yield
Potential: 2.22 t/ha (C)
Actual: 1.85 t/ha (Best bet treatment)
Paddock History
2014: Wheat
2013: Barley CL
2012: TT Canola
Soil Type
Red loam
Plot Size
1.5 m x 10 m x 3 reps
Yield Limiting Factors
Dry conditions after sowing

Key messages

- **Canola yields of 2 t/ha are possible in an average growing season (decile 5) at Minnipa Agricultural Centre.**
- **The total application of 85 kg/ha N and 108 kg/ha N exceeded the 2 t/ha target, producing 2.13 t/ha and 2.22 t/ha respectively, and 62 kg/ha N very nearly achieved 2 t/ha (1.96 t/ha).**
- **Soil tests determined that 70-80 kg/ha N was available in the soil, including mineralisation, which predicted a potential yield of 1 t/ha.**

Why do the trial?

Canola varieties have advanced in the last 5-10 years in terms of maturity and adaptability, allowing canola to be successfully grown in lower rainfall areas. The aim of this trial was to push the nitrogen inputs at Minnipa Agricultural Centre to achieve a target yield of 2 t/ha.

How was it done?

A nitrogen application trial was established in 2015 with six treatments (Table 1). The replicated trial was sown on the 29 April using Stingray TT canola. 2 L/ha Sprayseed, 1.5 L/ha Triflur X was used as a knockdown and 1 L/ha Lorsban was applied post sowing, pre emergence for insect control. Grassy weeds were controlled 25 June with 0.18 L/ha of Elantra Xtreme, 1 L/100L Kwicken and further insect control with 0.5 L/ha Astound Duo. No triazine herbicides were used or needed for broadleaved weeds. Plant emergence, vigour, start and end of flowering, yield and seed oil content were measured. The trial was harvested on 26 October.

All trials were sown with 59 kg/ha of DAP (18:20:0:0) and weeds and pests were controlled as required in line with standard field pea management.

What happened?

There was a distinct relationship between yield and nitrogen rate, regardless of what method was used and application timing of nitrogen. An initial soil test showed there was 80 kg/ha of nitrogen in the soil with potential to produce around 1 t/ha of canola. Therefore another 70-80 kg/ha of nitrogen was required to reach the target of 2 t/ha of canola grain yield (Table 2). All treatments received 8 units of phosphorus.

The gross margins were calculated for each treatment using the PIRSA Farm Gross Margin Guide 2015. The grain price used was $550/t to undertake the economic analysis (Table 2).

Table 1 2015 nitrogen application treatments.

	Total units nitrogen	Treatment
Opportunistic	108	65 kg/ha 19:13:0 S9% + 57 kg/ha urea @ sowing + 50 kg/ha urea @ 4 leaf, 9 leaf & budding
N++	85	65 kg/ha 19:13:0 S9% + 57 kg/ha urea @ sowing + 50 kg/ha urea @ 4 leaf & budding
N+	62	65 kg/ha 19:13:0 S9% + 57 kg/ha urea @ sowing + 50 kg/ha urea @ 4 leaf
Best Bet	53	Best bet 40 kg/ha DAP + 50 kg/ha urea @ 4 leaf & budding
Standard N	39	65 kg/ha 19:13:0 S9% + 57 kg/ha urea @ sowing
Control	7	40 kg/ha DAP

Table 2 Nitrogen rate, timing and gross margins of treatments.

Treatment	Sowing N	Extra N as urea				Total N	Cost of Fert	Yield	Gross Margin
		Sowing	4 leaf	9 leaf	Budding				
	19:13 or DAP	kg/ha N	kg/ha N	kg/ha N	kg/ha N	kg/ha N	$/ha	t/ha	$/ha
Opportunistic	12	26	23	23	23	108	137	2.22	834
N++	12	26	23	0	23	85	113	2.13	821
N+	12	26	23	0	0	62	90	1.96	766
Best Bet	7	0	23	0	23	53	75	1.85	715
Standard N	12	26	0	0	0	39	66	1.65	621
Control	7	0	0	0	0	7	27	1.14	396
LSD (P=0.05)								*0.26*	
CV (%)								7.9	

What does this mean?

The opportunistic treatment yielded 2.22 t/ha with the highest application of N (108) and achieved the best gross margin, significantly out yielding all other treatments apart from the N++ and N+ treatments.

This trial demonstrates the potential of canola to yield 2 t/ha in an average (or decile 5) growing season at Minnipa. It has also shown that canola needs to have access to 150 kg/ha of nitrogen to achieve a 2 t/ha yield.

In this trial, where approximately half of the crop's requirements needed to be applied through artificial fertiliser, the cost of fertiliser required to reach a yield potential of 2 t/ha was approximately $100/ha. This increased the risk of growing canola in this environment.

A lower risk option may be planting the canola into a soil with higher levels of plant available nitrogen after a productive legume based pasture. Regardless, a good knowledge of plant available soil nitrogen will assist in targeting nitrogen application to a canola crop.

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Registered products: see chemical trademark list.