

Validating Nitrogen and Sulphur Rates in Canola

Purpose:

With increases in canola yields over time, many producers are considering the economics of higher nitrogen rates given the high price for canola and increased cost of nitrogen. To validate whether the current OMAFRA recommended nitrogen rate of 100-110 lb. N/ac at today's canola and nitrogen prices is high enough, trials were conducted in 2012 to evaluate the response of canola to higher nitrogen rates. At the same time, while past trials have clearly indicated the need for sulphur fertilization of canola, the correct rate of sulphur required has not been tested in Ontario. In 2012, the Ontario Canola Growers Association (OCGA) sponsored field trials which evaluated three nitrogen rates (80, 120, & 160 lb. N/ac) and 4 rates of sulphur (0, 10, 20 & 40 lb. S/ac).

Methods:

A total of 8 farmer co-operators participated in the project during 2012. Each site included 2-3 replications of 3 nitrogen rates (80,120,160 lb. /ac), and 4 sulphur rates (0, 10, 20, 40 lb. /ac). Table 1 shows the treatments in 2010-2012.

Table 1: Rates of Nitrogen and Sulphur in Replicated Canola Trials.

Nitrogen rate lb./ac	SULPHUR RATE lb./ac			
	0	10	20	40
80			2010-2012	2010-2012
120	2010-2012	2012	2010-2012	2010-2012
160			2010-2012	2010-2012

The zero sulphur treatment was only included with the 120 lb. /ac nitrogen treatment, to manage the number of treatments. Plots were a minimum of 500 feet long and included a minimum of 2 replications of each treatment. Ammonium sulphate and ammonium nitrate fertilizer were used as top dress applications to supply the necessary rates of actual nitrogen and sulphur. Sulphur and nitrogen soil tests to a depth of 12 in. (30 cm) were taken prior to planting.

2012 Results

The 2012 average yield across the trials was 1856 lb. /ac (0.84 t/ac), 19% lower than that achieved in previous trials conducted in 2010 & 2011. In 2012, there was a small economic advantage to the 120 lb. N/ac over the 80 lb. /ac rate (Table 2), but not with the 160 lb. N/acre rate. The yield increase from higher nitrogen rates in 2012 was less than in 2011. The smaller or lack of economic response to nitrogen in 2012 may have been related to the lower yields, drier summer and higher spring soil N levels than available in 2011. Results with sulphur fertilizer application were more positive (Table 3). Application of sulphur as ammonium sulphate or ammonium thiosulphate (liquid) improved canola yields at 6 of the 8 field trials by 320 lb. /ac (19 % increase) versus no sulphur. There was no yield advantage to applying 20 or 40 lb. S/ac over the 10 lb. S/ac rate. Across the 8 sites returns were improved by \$91/acre by using 20 or 40 lb. S/ac versus no sulphur.

Table 2: 2012 Canola Nitrogen Rate Response

Summary of 8 Trials Nitrogen Rate lb./ac	Average Yield lb./ac	Yield Increase vs. 80 lb. N/ac		Dollar Return/acre vs. 80 lb./ac N rate ¹
		lb./ac	Percent Increase	
80	1729			
120	1852	123	7%	\$6.00
160	1925	196	11%	-\$3.00

1. Dollar return per acre vs. 80 lb. N/ac rate is increase or decrease in returns at 120 or 160 lb. N/ac using nitrogen cost of \$0.73 /lb. N and canola price of \$625/tonne

Table 3: 2012 SULPHUR RATE SUMMARY Yield lb. /ac

Nitrogen Rate lb./ac	Yield lb./ac			
	No Sulphur	10 lb./ac Sulphur	20 lb./ac Sulphur	40 lb./ac Sulphur
80			1816	1828
120	1582	1982	1906	2004
160			1983	2090
Average lb./ac	1582	1982	1902	1974
Average Yield of 20 & 40 S Rate Yield				1938
Yield increase at 20 or 40 lb. S/ac vs. no sulphur				382
\$ Return to Sulphur				\$ 91.27

3 Year Summary (2010-2012)

Nitrogen Response

Table 4 summarizes the results from the 21 N rate trials conducted over the 3 years. It should be noted that the 120 lb. N/ac yields increased returns in 57% of the trials compared to the 80 lb. N/ac. This highlights the challenges in predicting the most economical rate of nitrogen to apply in any given year.

Table 4: 2010-2012 Canola Nitrogen Rate Response¹

Nitrogen Rate lb./ac	Average Yield ¹ lb./ac	Yield Increase vs. 80 lb. N/ac		Dollar Return/acre vs. 80 lb./ac N rate ²	% Dollar wins vs. 80 lb. N/ac ³
		lb./ac	Percent Increase		
80	2195				
120	2366	171	7%	\$19	57%
160	2492	296	13%	\$26	59%
1.) Results are average of 21 trials; 6, 7, & 8 conducted in 2010-2012 respectively.					
2.) Dollar return per acre vs. 80 lb. N/ac rate is increase or decrease in returns at 120 or 160 lb. N/ac using nitrogen cost of \$0.73 /lb. N and canola price of \$625/tonne					
3.) % Dollar wins is percentage of trials from 2010-2012 in which returns were improved with either 120 or 160 lb. N/ac vs. 80 lb. N/ac					

Sulphur summary

Results with sulphur fertilization clearly indicate the need for sulphur but more trials are required to better determine rate recommendations. Over 3 years, yields improved by 9.7% (210 lb. /ac) with the use of sulphur. Economic returns were improved on average by \$48/ac and in 80% of the 21 trials from 2010-2012 there was a positive return to sulphur application. To date there has been no advantage to applying more than 20 lb. S/ac. The current recommendation is to apply 15 – 25 lb. S/ac as ‘insurance’ against potential sulphur deficiency. Soil tests (30cm/1 foot depth) for sulphur at planting time was not an accurate indicator of the need to apply fertilizer sulphur.

Next Steps

Further testing of sulphur rates is required to determine most economical rate. Analysis of soil and tissue samples collected to date is to be completed.

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Location of Project Final Report: