



Can2-2011 2010-2011 Spring Canola Nitrogen – Sulphur Project

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2010-2011 Spring Canola Nitrogen – Sulphur Project

Sponsored by Ontario Canola Growers Association

Purpose:

2011 was year 2 of a 3 year project to evaluate the benefit of nitrogen fertilizer applications at rates above those recommended by OMAFRA and evaluate the need for sulphur; the fourth macronutrient of canola.

Methods:

A total of 8 farmer co-operators participated in 2011. Each site included 2-3 replications of 3 nitrogen rates (80,120,160 lb/ac; 90, 135, 180 kg/ha), and 3 sulphur rates (0,20,40 lb/ac; 0, 22, 45 kg/ha). The zero sulphur treatment was only included in the 120 lb/ac nitrogen treatment, to manage the number of treatments. Plots were a minimum of 500 feet (150m) long .. In 2010 only one rate of sulphur was applied at 20 lb/ac sulphur. Ammonium sulphate and ammonium nitrate fertilizer were used to supply the target rates of nitrogen and sulphur. Sulphur and nitrogen soil tests to a depth of 12 in.(30 cm) were taken prior to planting.

Cool and wet conditions in April delayed planting of trials until May. Heavy rains following planting resulted in reduced plant populations relative to 2010. Plant populations varied between 5.5 – 8.6 plants/ft² compared to the ideal 8-12 plants/ft². Hot and dry conditions during flowering and pod fill negatively impacted yields. The average yield across all treatments receiving sulphur was 2423 lb/ac, 22% lower than achieved in 2010 (3108 lb/ac). No visual differences were evident between sulphur treatments, but treatments receiving the 120 and 160 lb/ac nitrogen treatment displayed taller growth and denser canopies than the 80 lb/ac treatment. In 2010 visual differences in treatments receiving sulphur were evident at 2 locations. Nitrogen rates above the recommended 80 lb/ac (89 kg/ha) improved both yields and returns (Table 1).

Table 1 2011 Canola Nitrogen & Sulphur Rate Trial

| Location | Planting Date | Soil Type | 20 lbs/ac Sulphur | | | 40 lbs/ac Sulphur | | | No Sulphur |
|---|---------------|-----------|-------------------|-------------|-------------|-------------------|-------------|-------------|-------------|
| | | | 80 | 120 | 160 | 80 | 120 | 160 | 120 |
| | | | Lbs/ac N | | | | | | |
| Arthur | May-09 | Clay Loam | 1525 | 2344 | 2505 | 1566 | 2242 | 2401 | 2234 |
| Grand Valley | May-05 | Clay Loam | 2448 | 2950 | 3129 | 2544 | 2818 | 3201 | 2842 |
| Arthur | May-09 | Clay Loam | 2352 | 2561 | 2792 | 2356 | 2459 | 2593 | 2454 |
| Durham | May-21 | Loam | 1534 | 1447 | 1374 | 1296 | 1366 | 1637 | 1256 |
| Listowel | | Clay Loam | 2554 | 2834 | 2907 | 2558 | 2852 | 2816 | 2738 |
| Chesley | May-03 | Clay Loam | 2552 | 2750 | 3023 | 2604 | 2917 | 3144 | 2750 |
| Meaford | May-10 | Loam | 2245 | 2422 | 2597 | 2264 | 2566 | 2734 | 2445 |
| Average Yield lb/ac | | | 2173 | 2473 | 2618 | 2170 | 2460 | 2646 | 2388 |
| Increased yield vs. 80 N | | | | 300 | 445 | | 291 | 477 | |
| Increase Return vs. 80 N | | | | 57.52 | 74.53 | | 55.17 | \$ 82.84 | |
| Notes: Economic return was calculated at canola price of \$580/t, nitrogen price of \$0.53/lb, sulphur price of \$0.29/lb. The zero sulphur rate was only included at the 120 lb/ac N rate. | | | | | | | | | |

Lower Spring Soil Nitrogen Levels in 2011

In 2011 there was a greater yield response to higher nitrogen rates than in 2010. In 2010, the increased N rates improved yield but not overall returns (Table 2). The greater yield response to nitrogen in 2011 may have been due to the fact that spring soil nitrate levels were lower than in 2010. The lower soil nitrate levels in 2011 were evident in pre-sidedress nitrate test collected in corn fields in June.

Table 2. Increase in Canola Yield vs 80 lb/ac Nitrogen Rate

| Yield lb/ac | Nitrogen Rate (lb/ac) | |
|-----------------------------------|-----------------------|-----------------|
| | 120 | 160 |
| 2010 | 90 | 199 |
| 2011 | 295 | 461 |
| Average Increase \$ Return | \$ 26.58 | \$ 38.08 |

Nitrogen – Sulphur Relationship

Sulphur is the 4th major nutrient required by canola and Agronomists often recommend a N:S ratio of 5-7:1 be maintained when applying nitrogen and sulphur in canola. If high levels of nitrogen are supplied to canola, when soil sulphur levels are very low, plants can suffer from nitrogen induced sulphur deficiency. No visual differences in sulphur rate were evident in 2011. Application of sulphur improved average yield marginally by 79 lb/ac and returns by \$15.00/acre. There was no yield advantage for the 40 lb/ac sulphur rate over the 20lb/ac rate.

2010 Sulphur Deficiency

In 2010 visual sulphur deficiency were clearly evident at the Grand Valley and Fergus sites during the growing season. At the Grand Valley site, increasing the rate of nitrogen without the addition of sulphur accentuated sulphur deficiency symptoms and depressed yields Western Canada research has proven that once the sulphur requirements of canola have been met; there is no need to increase the rate of sulphur with increasing nitrogen rates.

In 2010 sulphur fertilization improved yields at 5 of the 6 sites by 8% (229 lb/ac) on average across all sites. This was surprising given that the sites selected did not have a history of sulphur deficiency. One explanation for this may be that in 2009-10, high precipitation levels resulted in leaching of sulphur in soil below the rooting zone of canola. Like nitrogen, sulphur is quite mobile in the soil. In addition reductions in sulphur emissions have significantly reduced the amount of sulphur supplied by the atmosphere.

Next Steps

The project will be continued in 2012.

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