

## XVI NITROGEN RATE FERTILITY TRIAL

**Objective:** Investigate the effect of nitrogen (N) rate on yield, oil content and quality of specialty trait oil canola.

**Background:** Canola is a relatively high user of N and N rates usually have a large effect on yield. However, there is often an inverse relationship between N rate and seed oil content. With the increasing acreage of specialty trait oil varieties, it is important to determine the effect of N rates on the quantity and quality of oil produced by these varieties.

**Methodology:** This trial consisted of the following treatments:

1. N rate 50% below soil test recommendations.
2. Soil test recommendation levels (based on 25% probability of receiving this amount of moisture as per Enviro-Test Lab soil test results).
3. N rate 50% above soil test recommendations.

The majority of the nitrogen (N) fertilizer was banded prior to seeding. The phosphorous (P), potassium (K) and sulphur (S) fertilizer were applied at the soil test recommended rates for all treatments, provided the ratio of N to S did not exceed a ratio of 7 to 1. When it did, additional sulphate S was added to maintain that ratio. The variety used was Nex 705.

**Western Canadian Summary:**

CPC Location	Selkirk, MB			Nipawin, SK			Lethbridge (Irr), AB		
	NYD	CMD	Oil	NYD	CMD	Oil	NYD	CMD	Oil
<b>NITROGEN RATE FERTILITY TRIAL</b>									
50% above soil test	31.6	153	48.3	20.2	33	44.1	43.7	231	47.3
Soil test recommendation	27.8	123	48.4	18.0	33	45.2	41.5	227	46.8
50% below soil test	22.0	73	48.2	13.9	15	46.1	38.1	212	46.8
LSD	1.63		0.56	2.77		0.96	2.15		0.42
CV%	4.4		0.8	11.6		1.5	3.8		0.7

Note: NYD – Net Yield Data (bu/ac), CMD – Contribution Margin Data (\$/ac)

**Discussion:**

Higher rates of N fertilizer resulted in yield increases at all locations. With increasing N rates, oil content declined at only one of the three locations. At Selkirk and Lethbridge Irrigation, the yield trend indicates that the additional N was still contributing to yield rather than increased protein content of the seed. Protein content and oil content are inversely related. Yields at Nipawin were limited by environmental factors.

## **SELKIRK**

### **Methodology:**

All of the fertilizer in each of the treatments was banded at a depth of 2" using the hoe press drill prior to seeding. The actual nitrogen rates applied to the 50% below, soil test recommendation and 50% above treatments were 36, 62 and 87 lb/ac of N, respectively. Phosphate and sulphate were applied at rates of 35 and 12 lb/ac, respectively, to all three treatments. The trial was seeded at a depth of ¾" into excellent moisture on May 22. All other agronomic practices were performed as outlined for conventional varieties in the *Site Information*.

### **Observations:**

Emergence was very good for all treatments. The treatments with lower rates of nitrogen showed various symptoms of stress throughout the season, including paler green colour, slower canopy closure, shorter stature and reduced branching.

### **Results:**

<b>NITROGEN RATE FERTILITY TRIAL Selkirk, MB</b>							
<b>Treatment</b>	<b>Yield (%)</b>	<b>Yield (bu/ac)</b>	<b>Contribution Margin (\$/ac)</b>	<b>Oil (%)</b>	<b>Growing Degree Days</b>	<b>Days To Maturity</b>	<b>Grade</b>
50% above soil test	114	31.6	153.10	48.3	1185	93	1
Soil test recommendation	100	27.8	122.82	48.4	1185	93	1
50% below soil test	79	22.0	72.85	48.2	1199	94	1
LSD		1.63		0.56			
CV%		4.4		0.8			

### **Discussion:**

Yield increased dramatically with increased nitrogen fertilizer application rates, with only a one-day delay in maturity. Oil content was unaffected by the rate of nitrogen applied. The yield increases were sufficient to provide increased economic returns in spite of the additional fertilizer costs.

## NIPAWIN

**Methodology:** Nex 705 was seeded at 6.2 lb/ac on May 16. A liquid fertilizer blend of 85-25-10-20 (actual) was side-banded for soil test recommendation treatments. Liquid fertilizer blends of 44-25-10-10 (actual) and 128-25-10-25 actual were side banded for 50% below and 50% above treatments respectively. An in-crop application of Muster Gold II (Assure II @ 0.2 L/ac + Muster @ 8 g/ac or 40 ac/case) was applied at the 2 to 3-leaf stage of the crop. Lontrel (0.17 L/ac or 26 ac/jug) was applied to all treatments six days later.

**Observations:** Cool conditions combined with heavy trash resulted in slow and uneven emergence. Weed pressure was variable across all treatments. Rain on June 2 resulted in a second flush of volunteer barley which warranted an application of Select to all treatments. Weed control was good for all treatments. Maturity varied greatly among plants within the treatments due to late July frosts and rain. Secondary re-growth of canola made determining the proper stage to swath more difficult. Plant height, days to ground cover and lodging ratios did not vary greatly among treatments.

### Results:

NITROGEN RATE FERTILITY TRIAL Nipawin, SK							
Treatment	Yield (%)	Yield (bu/ac)	Contribution Margin (\$/ac)	Oil (%)	Growing Degree Days	Days To Maturity	Grade
50% above soil test	112	20.2	32.95	44.1	1281	110	1
Soil test recommendation	100	18.0	32.62	45.2	1253	107	1
50% below soil test	77	13.9	15.19	46.1	1201	104	1
LSD		2.77		0.96			
CV%		11.6		1.5			

**Discussion:** Yield differences of 2.77 bu/ac or more are significant. A fifty percent reduction in fertilizer applied resulted in a significantly lower yield. Contribution margins reflected differences in yield and fertilizer costs. A yield increase of 2.2 bu/ac for 50% above soil test treatment did not have an economic advantage compared to the soil test recommendation treatment. Days to maturity increased with increasing levels of fertility.

Results also indicate that increased rates of applied fertilizer had a negative impact on oil content. This is a commonly observed response to increased fertility.

## LETHBRIDGE (IRRIGATION)

**Methodology:** Granular 46-0-0 was broadcast onto the soil surface of the treatments then harrowed in. The 50% below soil test treatment received 40 lb/ac (actual). The soil test recommendation treatment received 85 lb/ac (actual) and the 50% above soil test treatment received 124 lb/ac (actual). A fertilizer blend of 15-40-10-10 (actual) was seed placed in all treatments. Nex 705 was seeded at a rate of 4 lb/ac. Weed control consisted of an in-crop application of Poast Ultra (0.19 L/ac) and Muster (12 g/ac) at the 2 to 3-leaf stage of the crop. This was followed with an application of Lontrel (0.2 L/ac) three days later.

**Observations:** Emergence was slow but even across all treatments. The 50% below soil test treatment was first to flower. These plants were spindly, short and had a small root system. This later translated into swaths that were vulnerable to wind damage. This treatment had swaths that were flipped by wind.

### Results:

NITROGEN RATE FERTILITY TRIAL Lethbridge (Irrigation), AB							
Treatment	Yield (%)	Yield (bu/ac)	Contribution Margin (\$/ac)	Oil (%)	Growing Degree Days	Days To Maturity	Grade
50% above soil test	105	43.7	230.56	47.3	1216	114	3
Soil test recommendation	100	41.5	227.56	46.8	1202	111	3
50% below soil test	92	38.1	212.36	46.8	1187	109	3
LSD		2.15		0.42			
CV%		3.8		0.7			

**Discussion:** Yield differences of 2.15 bu/ac were significant. The 50% above soil test treatment yielded significantly higher than the soil test recommendation treatment. However, there was only an extra \$3.00/ac in contribution margin. The 50% above soil test treatment had significantly higher oil content.