

# Flax Response to a Wide Range of Nitrogen & Phosphorus Fertilizer Rates in Western Canada: Factsheet



## Objective:

1. to evaluate the yield response of flax to various rates and combinations of nitrogen (N) and phosphorus (P) fertilizer
2. to evaluate the potential yield response to higher N and P rates than are typically recommended or utilized for flax

## Methodology:

Field trials were conducted over a 3-year period (2016-2018) at six locations in Saskatchewan (Indian Head, Melfort, Redvers, Scott, Swift Current and Yorkton), one in Alberta (Vegreville), and one in Manitoba (Brandon). All fertilizer was side-banded, and the treatments were a factorial combination of four N fertilizer rates (13, 50, 100, and 150 kg N/ha) and four P fertilizer rates (0, 20, 40, and 60 kg P<sub>2</sub>O<sub>5</sub>/ha).

## Key Findings:

- Flax emergence was somewhat sensitive to side-banded urea whereby stand reductions associated with increasing N rate were observed at 74% of the sites. Among the affected sites, there was a 28% reduction in plant densities when the N rate was increased from 13 kg N/ha to 150 kg N/ha. Side-banded monoammonium phosphate did not affect plant density, regardless of rate.
- Increasing N rate delayed maturity by 2.4 days 71% of the time. Phosphorus rate did not have a noticeable effect on flax maturity.
- Flax yields were increased with both N and P fertilizer. Response to N was relatively strong at 83% of the sites, increasing yields by 39% on average with maximum yields achieved at 100 kg N/ha. At the remaining sites, the response was weak with an 11% yield increase on average and optimal rates closer to 50 kg N/ha.
- Yield response to P was relatively shallow (7%); therefore, more modest rates of 20-40 kg P<sub>2</sub>O<sub>5</sub>/ha are likely to be most economical and enough to maintain soil fertility under most circumstances. At 50% of the sites, the maximum yield increase with P was 5-10%.
- Test weight increased slightly with increased rates of N, but was generally not affected by P fertilizer rate.
- In conclusion, these results show that adequate N and P fertility are both important for achieving higher flax yields; however, the responses were modest with respect to both magnitude of the yield increase and the rates at which maximum yield was achieved.

The full report is available at: [www.warc.ca](http://www.warc.ca). This project was jointly funded through the Canada-Saskatchewan ADF program (administered by the Saskatchewan Ministry of Agriculture), Saskatchewan Flax Development Commission, and Western Grains Research Foundation.

**Table 1. Individual treatment means for the N rate by P rate (not statistically significant) interaction averaged across all sites (n=18) for flax seed yield. Means followed by the same letter do not significantly differ (L.S.D. = 89.0).**

Nitrogen Rate	Phosphorus Rate				Orthogonal Contrasts	
	0 kg P <sub>2</sub> O <sub>5</sub> /ha	20 kg P <sub>2</sub> O <sub>5</sub> /ha	40 kg P <sub>2</sub> O <sub>5</sub> /ha	60 kg P <sub>2</sub> O <sub>5</sub> /ha	PR – linear	PR – quadratic
	----- kg/ha -----				----- p-values -----	
13 kg N/ha	1627 g	1697 g	1686 g	1707 g	0.103	0.438
50 kg N/ha	1993 f	2113 de	2063 ef	2122 de	0.017	0.329
100 kg N/ha	2129 de	2235 bc	2325 a	2317 ab	<0.001	0.068
150 kg N/ha	2188 cd	2219 c	2326 a	2352 a	<0.001	0.946
<b>Orthogonal Contrasts</b>	----- p-values -----				–	–
NR – linear	<0.001	<0.001	<0.001	<0.001	–	–
NR - quadratic	<0.001	<0.001	<0.001	<0.001	–	–

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