Exploring the Merits of Sulphur Fertilization in Flax Production

For most crops, including flax, fertilizer is one the largest input costs and typically provides a large return on investment when appropriate rates are applied. Despite flax being widely perceived as a relatively low input crop, sulphur deficiencies can limit the yields of flax. On a per bushel basis, flax sulphur requirements are actually higher than those of canola. While soil tests do not always show potential for sulphur deficiencies, estimated availability is often marginal and S fertility is known to be highly variable across the landscape which can limit the reliability of soil testing for this nutrient. Furthermore, as sulphur is a mobile nutrient and is subject to leaching below the rooting zone, potential yield loss and/or improved response to sulphur fertilization may be dependent on the timing. This trial was aimed to promote sound agronomic management of flax and simultaneously demonstrate the relative performance of a few top varieties.

The demonstration was arranged as a 2- way factorial, randomized complete block design with four replicates at Scott, 2016. The demonstration consisted of four sulphur fertilizer rates (0, 15, 30 and 45 kg S/ha) and three varieties (CDC Bethune, CDC Neela, and CDC Glas).

Plant densities were collected for treatments of similar sulphur rates of 15 kg S /ha for the three different varieties: CDC Bethune, CDC Glas, CDC Neela. Variety had a significant effect on plant density (P= 0.0132) with CDC Neela resulting in a significantly higher plant density of 70 plants m^{-2} compared to CDC Bethune. CDC Glas and CDC Neela resulted in similar plant densities of 226 and 263 plants m^{-2}, respectively. Overall, the plant densities recorded in this study were lower than the recommended density of 500 plants m^{-2}. In most field conditions, plant densities below 300 plants m^{-2} resulted in a significant seed yield decline due to excessive crop-weed competition (Saskatchewan Flax Development Commission, N/A). However, seed yield losses due to crop-weed competition were not observed as the average yield was 50 bu ac^{-1}, a 26 % yield increase compared to the 5 -year yield average at Scott (Agriculture and Agri-Food Canada, 2015). This is likely attributed to the fact that the plots were kept weed-free via in-crop herbicide applications and rigorous hand-weeding.

Flax seed yield was largely influenced (P = 0.004) by varietal selection with CDC Glas and CDC Neela resulting in a 4 bu ac^{-1} seed yield increase compared to CDC Bethune (Fig.1).

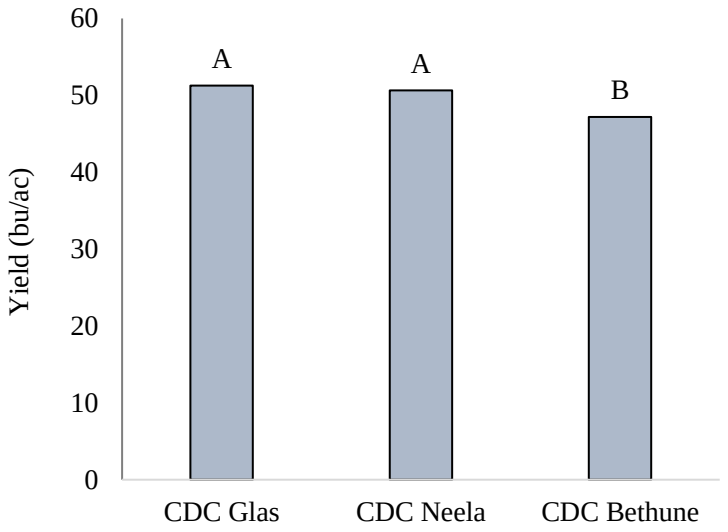

Figure 1. The effect of variety on flax yield (bu/ac) at Scott, SK in 2016 growing season. Different lettering indicates significant difference between treatments, respectively.

Sulphur applications had a negligible effect on plant density, maturity, and seed yield, regardless of the low residual soil sulphur levels. Sulphur deficiencies have been found to limit yields, yet flax responses to sulphur fertilizer applications in western Canada are rare. However, as continuous canola cropping rotations are largely used on the Prairie, sulphur deficiencies may become more common due to the high sulphur requirements associated with canola production.

Consistently high yielding flax crops may have the potential to be a large user of sulphur and therefore may require sulphur fertilization in the future. Although flax did not respond to sulphur, it is important for producers to continue to apply sulphur to ensure soil residual levels do not become depleted and cause future seed production problems. A conservative fertility management approach should be utilized to ensure that S deficiencies do not impact future yields.

For the full report, see https://www.westernappliedresearch.com/research/fact-sheets/. Project was supported by the ADOPT initiative under the Canada-Saskatchewan Growing Forward 2 bi-lateral agreement.