

## Improving chickpea, mustard and durum yield, crop health, and soil fertility with potassium chloride fertilizer

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
\$28,750.00	Active	January 2022 – October 2024	Saskatchewan Ministry of Agriculture – Agriculture Development Fund; Saskatchewan Wheat Development Commission; Alberta Wheat Commission; Mustard 21 Canada Inc.	\$128,084.00

### Project Description

To assess impact of starter potash fertilizer on yield, soil fertility and crop health in chickpea, mustard and durum.

### Outcome

Potassium (K) and chloride (Cl) are essential plant nutrients that are associated with water regulation, reduced incidence of shoot and root diseases, photosynthetic performance, and nitrogen use efficiency. Potash (KCl; 0-0-60) may be considered a “dual duty” fertilizer and is the most economical and widely used source of K and Cl. However, the link between potash fertilization and plant disease resistance and crop yield has not been investigated with chickpea, mustard, and durum wheat on the prairies. Consequently, there is a need to evaluate how these crops respond to KCl application. The objective of this research work is to address this knowledge gap by examining the influence of banded potash applied at seeding on crop yield and disease incidence during a two-year field trial, complemented by controlled environment growth chamber pot experiments. A two-year (2022 and 2023) field study (year one has been completed) is therefore conducted to determine chickpea, mustard, and durum grain and straw yield, K and Cl uptake, and shoot and root disease incidence without and with potash fertilizer addition (40 kg KCl per hectare (ha) which provides 24 kg K<sub>2</sub>O/ha and 18 kg Cl/ha) at two contrasting landscape positions: drier upslope convex knoll vs. an adjacent moister downslope concave depression. A controlled environment growth chamber pot study (in progress) is using three Saskatchewan soils collected from South-Central Saskatchewan, varying in physical and chemical properties, to compare the yield and disease incidence in these three crops as influenced by banded KCl fertilizer (24 kg K<sub>2</sub>O/ha, 18 kg Cl/ha), with and without banded monoammonium phosphate (20 kg P<sub>2</sub>O<sub>5</sub>/ha) and copper sulfate (5 kg Cu/ha) fertilizers. An MSc graduate student from University of Manitoba was recruited and joined the project in September 2022, which will become her MSc research.

The 2022 small plot field trials conducted at two landscape position sites, knoll and depression, in a farm field in Southern Saskatchewan revealed no yield or disease incidence response to addition of 40 kg KCl/ha side banded at time of seeding of chickpea, mustard, and durum at either of the sites. The lack of response is consistent with dry conditions in 2022 that were not conducive to shoot or root disease infection of the crops at either site. Despite having lower soil supplies of available K and Cl in the knoll site, the drier conditions on the knoll also limited crop demand for these nutrients, explaining lack of response to addition of K and Cl on the knoll site. While the depression site had significantly greater growth and yield of all crops than the knoll site mainly due to better moisture, the soil supply of available K and Cl at this site was also greater due to higher inherent soil fertility and moisture, which subsequently eliminated the need for additional fertilizer K and Cl at this site as well. The findings of the 2022 field season indicate that under dry conditions, differences in crop demand relative to soil supply across typical undulating farm field landscapes may not be large enough to warrant varying rates of application of KCl among slope positions for sufficiency. However, crop removal data is likely to indicate that higher rates of KCl may be needed in depressions to maintain K and Cl fertility for these crops over the longer term.

### Research Objective

#### OBJECTIVE 1

To assess impact of starter potash fertilizer on yield, soil fertility and crop health in chickpea, mustard and durum.