Impact of phosphorus fertilizer forms on nutrition of wheat, pea and canola, soil fate, and losses in run-off water

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SPG Contributions	Project Status	Duration/Timeline of Project (Year to Year)	Co-funders	Total Project Cost
$57,020.00	Active	March 2021 – September 2024	Saskatchewan Canola Development Commission; Saskatchewan Wheat Development Commission; Western Grains Research Foundation; 4R Research Fund of the Foundation for Agronomic Research	$339,892.00

Project Description

To assess how fertilizer phosphorus forms, placement and rate affect crop responses, fate, and run-off losses in Saskatchewan soils.

Outcome

The research project activities planned for the first and second field seasons of the study (2021 and 2022) were successfully completed as part of the PhD research work being conducted by Blake Weiseth. Wheat was the crop grown in the first year of rotation (2021) and field pea in the second year (2022). The 2022 growing season was better than the 2021 season with severe drought, but moisture stress was also evident at all sites later in the 2022 season which especially impacted grain yields. Laboratory studies and analysis of 2021 season samples underway at time of publication of first progress report have been completed, including reporting on fall 2021 (residual) soil phosphorus status and SRPi release in simulated snow melt runoff water. The ability of field pea to efficiently scavenge and utilize soil phosphorus (P) is evident, with few statistically significant differences in grain or straw yield as influenced by fertilizer P source, rate, or placement strategy in 2022, compared to 2021 with wheat, where several significant yield responses were observed. However, observations of P uptake in grain and straw of peas grown in 2022 season, and residual soil P status from 2021 season highlight trends in differences in plant-availability among fertilizer P sources and its potential mobility in snow melt runoff water. The observed differences in plant availability are attributed to differences in solubility among sources and are consistent with results from the 2021 season. The influence of site-specific soil characteristics on plant-available soil P is also evident with greater fixation of P fertilizer into less soluble forms observed at Langham compared to Central Butte sites, consistent with higher pH of the Langham
soil.

Research Objective

OBJECTIVE 1

To assess how fertilizer phosphorus forms, placement and rate affect crop responses, fate, and run-off losses in Saskatchewan soils.