INTRODUCTION:

- Applying enough phosphorus (P) to Canola especially at early growing stage is essential in meeting the increasing demand for canola yield (CCC, 2017).
- Generally, the P fertilizer is applied in the prairies as granular mono-ammonium phosphate (MAP, 11-52-0). However, MAP can be toxic if concentration near the seed is too high (Qian et al., 2012).
- There is little or no information on the relationship between opener width, maximum safe rate of seed placed P, and the recovery and efficiency of utilization of the applied P fertilizer by the crop (Mooleki et al., 2010).

Hypothesis

- The greater spread will result in more soil-fertilizer contact and reduce the efficiency of utilization of the added P fertilizer, resulting in lower recovery of P fertilizer and yield per unit of P fertilizer added.
- Struvite, which is a source of P fertilizer that is less soluble than MAP, will allow higher safe rate of seed row application rates of P with canola due to less salt effect, but the lower solubility of struvite will result in reduced uptake and efficiency of use by canola and following wheat and pea crops grown on struvite amended soil, especially at low rates.

Objective

Assess how P fertilizer form (MAP versus struvite), P rate and opener spread affects emergence, early biomass yield, P uptake and recovery by canola, wheat and pea grown in rotational sequence in controlled environment conditions.

Assess how P fertilizer form (MAP versus struvite), P rate and opener spread affects emergence, early biomass yield, P uptake and recovery by canola, wheat and pea grown in rotational sequence in controlled environment conditions.

Methods

- The soil used is a P deficient Brown Chernozem soil of Assiniboia association collected from the field during fall of 2018. The pH is 7.7 and the MK extractable P concentration is 11 mg P kg⁻¹.
- Canola (hybrid B. napus Invigor Liberty Link variety) was grown in the U of S phytotron facilities under controlled environment conditions and emergence, with collection of 30-day biomass yield, P uptake, recovery, and efficiency determined as a function of treatment. Wheat (hard red spring wheat var Brandon) and pea (dry green class var Stryker) were grown in sequence following the canola tested for in the same soil tray, respectively.
- Treatment includes: 1" and 3" opener spreads, MAP (11-52-0), Crystal Green™ struvite (5-28-0 with 10%Mg), and application rate 0, 20, 40, and 60 kg/ha.
- To duplicate fertilizer application as it would occur in the field, N and S were also side banded at 200 kg N/ha and 20 kg S/ha respectively as urea and ammonium sulfate.

Result and Discussion

- Both 40 and 60 kg P₂O₅ ha⁻¹ offer significantly higher P uptake in Canola. Struvite with 1" spread has the highest P uptake result which may be the result of narrower spread has reduced soil-fertilizer contact and fixation offers an advantage in P uptake over the 3" spread and increases the availability of Struvite (Fig.2).
- P recover result of Canola shows no significant different between MAP and Struvite. However, total P recovered from MAP is significantly higher than Struvite, which may be due to diluted fertilizer concentration caused by seeding the following crop (Fig 3 & 4).

There is no significant negative effect of seed row placed fertilizer on Canola emergence at up to 60 kg P₂O₅ ha⁻¹. 1" opener spread results in a better P fertilizer availability and utilization compared to a 3" opener spread. MAP and Struvite have similar performance when placed in seed row with canola, especially at the rate of 40 and 60 kg P₂O₅ ha⁻¹, which is possibly due to a lower degree of soil fixation associated with the struvite product.

Conclusion

We are grateful to Canola Agronomic Research Program and AAFC for funding. Many thanks to C. Fatteicher, J. Schoenau, R. Kar, S. Mooleki.

Reference


Acknowledgement

We are grateful to Canola Agronomic Research Program and AAFC for funding. Many thanks to C. Fatteicher, J. Schoenau, R. Kar, S. Mooleki.