Sulfur (S) fertilizers may be applied to wheat, canola and yellow pea crops in the seed-row at the time of seeding. S fertilizers available to growers on the Canadian Prairies include soluble sulfate forms (ammonium sulfate and potassium sulfate); partially soluble forms (calcium sulfate or ‘gypsum’); insoluble forms that undergo oxidation (elemental S); and liquid ammonium thiosulfate (ATS) that forms sulfate and elemental S upon application to soil.

Such fertilizers may be applied in the seed-row at the time of seeding in the spring as a starter nutrient source. Depending on fertilizer S form, rate and crop, there is a limit to how much can be safely placed in the seed-row.

**Study Objectives**

- To evaluate the crop response in yield and plant S uptake to different S fertilizer forms added in the seed-row over two growing seasons.

**Materials and Methods**

- **Study Sites:**
  1. Brown Chernozem; Ardill Association loam near Central Butte, SK.
  2. Gray Luvisol; Waitville Association loam near Star City, SK.

Crop history of the two sites was typical, with fields well managed and having history of fertilizer use. Soil available S was considered marginal while soil available P was marginal to sufficient.

- **Seeding and Fertilization:**
  - Plots (3.0 m x 1.0 m) were seeded at a row spacing of 25 cm (Fig. 1) to: HRS wheat (Waskeda), canola (Liberty Link-150) and yellow peas (Meadow).
  - S and P (as P2O5, 11-52-0, MAP) fertilizer treatments were applied in the seed-row during seeding (Table 1).
  - Treatments were replicated 4 times for each crop. Prior to seeding, wheat and canola plots were broadcast fertilized with 100 kg N ha⁻¹ as urea.

- **Plant Sampling:**
  - 1.0 m row-length crop samples (Fig. 2) were harvested in each treatment.

**Results and Discussion**

- **Addition of sulfate and ATS increased S uptake in wheat, canola and pea, at Brown Chernozem and Gray Luvisol sites in 2013 (Table 2).**
- **S uptake in canola at Brown Chernozem site for all treatments in 2014 was greater than 2013, reflecting better growing conditions and grain yields in 2014, compared to 2013.**
- **Calcium sulfate (gypsum) plus MAP, and potassium sulfate plus MAP added to canola at Gray Luvisol site in both years increased yields (Fig. 3).**
- **The addition of MAP fertilizer did not significantly affect wheat, canola and yellow pea grain yields, consistent with adequate soil available P at sites (Fig. 3).**
- **Addition of ATS + MAP in seed row reduced germination and emergence of canola and pea at both sites in 2013 and 2014, owing to problems in separation between liquid fertilizer and seed.**
- **Limited response of wheat to addition of S fertilizers at Brown Chernozem and Gray Luvisol sites in both years of the study suggests that of the three crops evaluated, wheat is least responsive to S fertilization.**
- **Subsoil reserves of sulfate in the Brown Chernozem soil likely contributed to lack of response of any crop to added S fertilizer in 2013, while high moisture conditions in 2014 resulted in response to S, despite the presence of sulfate at depth.**

**Conclusions**

- Thiourea and sulfate sources, especially calcium sulfate (gypsum), applied in the seed-row at 20 kg S ha⁻¹ were generally effective in enhancing S uptake and yield of canola in these marginally S deficient soils.
- **Responses to seed-placed S fertilizer depend on S fertilizer form, crop, growing conditions, soil S status and factors affecting seed safety.**

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