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# **Comparative Seed Yield Response of Oilseed, Cereal and Pulse Crops to Sulphate-S Fertilizer on S-Deficient Soils in Northeastern Saskatchewan**

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## **BACKGROUND**

- In the Prairie Provinces, there are approximately 4 M ha of agricultural land deficient in plant-available S (most of the S-deficient soils are in the Parkland region) and more soils are likely to experience S limitations for optimum crop yield in the future.
- Texture, organic matter content and soil-climatic zone, along with soil supplies of available sulphate affect the crop response to S fertilization. Highly leached, sandy soils of low organic matter are especially prone to S deficiency.
- Because of high S requirements, canola is more prone to S deficiency than cereals.
- Cereals and pulses have lower S requirement than canola.
- There is limited field research information on the relative response of different crop species to S fertilization in the Parkland region.

## **OBJECTIVE**

- To compare the relative response of canola, wheat, oat and pea to S fertilization in S-deficient soils, so as to optimize seed yield and economic benefits.

## **MATERIALS AND METHODS**

- Results from various field experiments related to seed yield response of canola, wheat, oat and pea to S fertilization are summarized in this poster.
- All field experiments were conducted on S-deficient Gray Luvisol (Boralfs) soils in northeastern Saskatchewan, Canada.

- A randomized complete block design (RCBD) was used to arrange plots in four replications.
- The source of S fertilizer used was ammonium sulphate or potassium sulphate.
- All plots in experiments received a blanket application of N, P and K fertilizers.
- All fertilizers were applied in spring prior to or at seeding.
- Data were recorded on seed yield, total S concentration, S uptake in seed and straw, and protein and oil concentration in seed.

### **SUMMARY AND CONCLUSION**

- For canola, there was a substantial response of seed yield and S uptake to S fertilization in all years.
- There was a reduction in seed yield, and S and N uptake of canola when N at high rates was applied in the absence of S fertilizer.
- For wheat, the response of seed yield and S uptake to S fertilization was smaller and less frequent than canola.
- For oat, there was a significant increase in seed yield from S fertilizer at one site, but little increase at the other S-deficient site.
- For pea, there was little or no increase in seed yield from S fertilizer.
- In conclusion, canola was much more responsive to S fertilization than wheat, oat or pea, which indicated the need for different fertilizer S rates for each crop species.

### **ACKNOWLEDGEMENTS**

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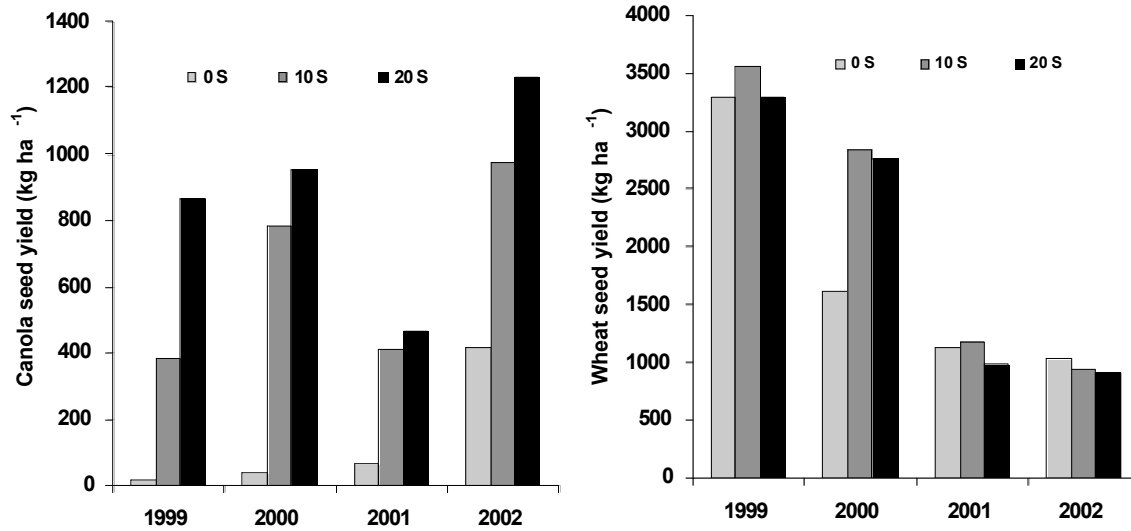


Figure 1. Seed yield of canola and wheat with sulphate-S fertilizer application ( $\text{kg S ha}^{-1}$ ) on a soil of low available sulphate content at Tisdale in northeastern Saskatchewan.

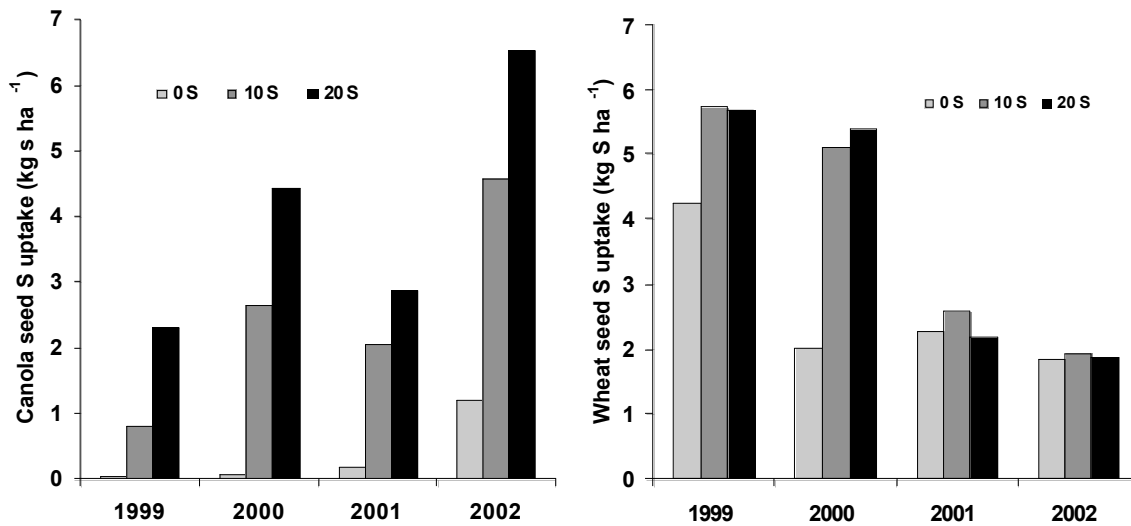


Figure 2. Uptake of S in canola and wheat seed with sulphate-S fertilizer application ( $\text{kg S ha}^{-1}$ ) on a soil of low available sulphate content at Tisdale in northeastern Saskatchewan.

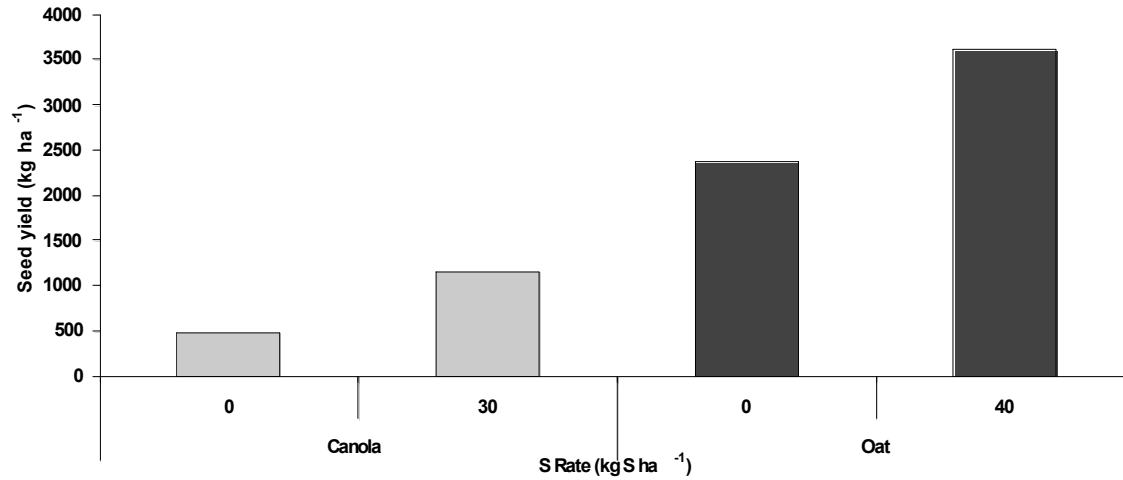


Figure 3. Seed yield of canola and oat with sulphate-S fertilizer application (along with 120 kg N ha<sup>-1</sup> for canola in 1998 and 90 kg N ha<sup>-1</sup> for oat in 2002) on a soil of low available sulphate content in 2005 near Star City in northeastern Saskatchewan.

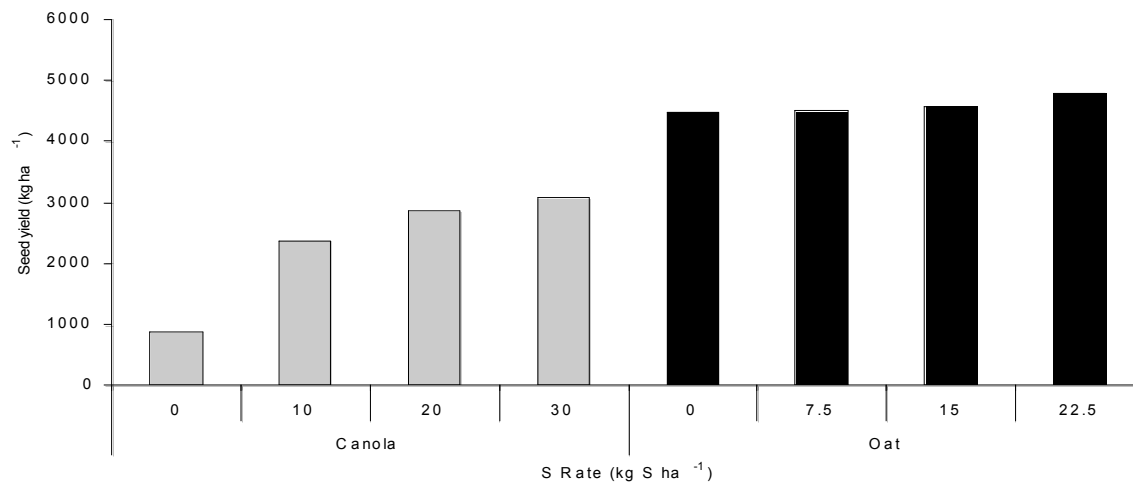


Figure 4. Seed yield of canola and oat with sulphate-S fertilizer application (along with 100 kg N ha<sup>-1</sup>) on a soil of low available sulphate content in 2005 at Star City in northeastern Saskatchewan.

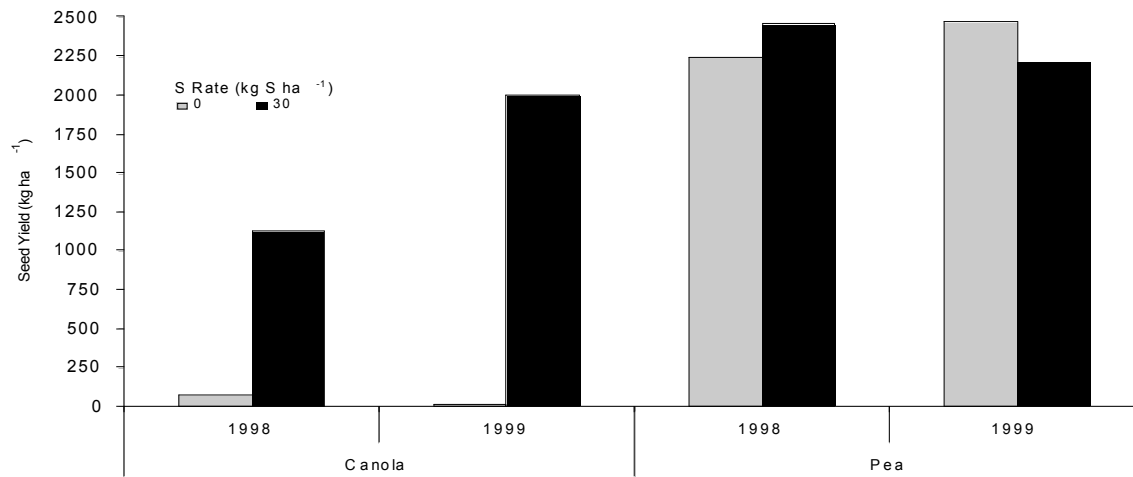


Figure 5. Seed yield of canola and pea with sulphate-S fertilizer application (along with 120 kg N ha<sup>-1</sup> for canola and 0 kg N ha<sup>-1</sup> for pea) on a soil of low available sulphate content near Porcupine Plain in northeastern Saskatchewan.

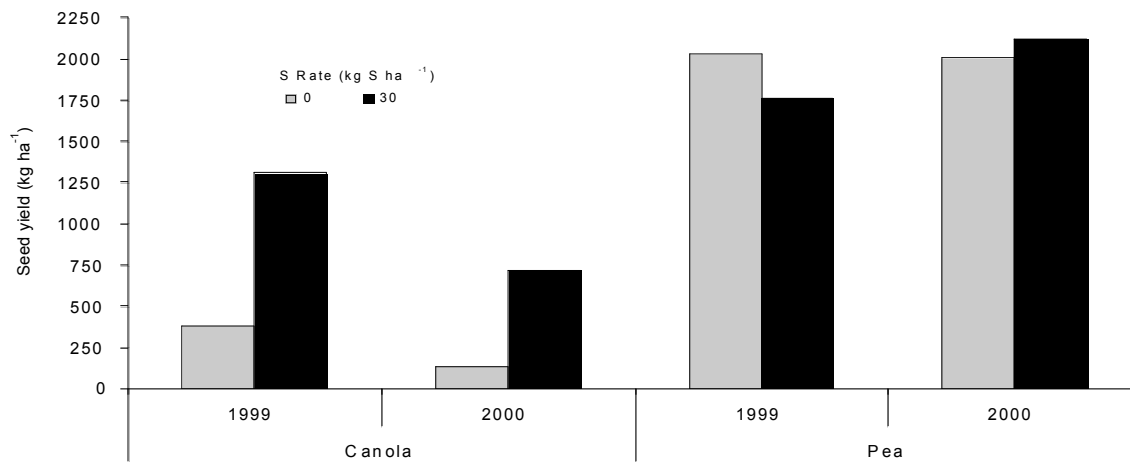


Figure 6. Seed yield of canola and pea with sulphate-S fertilizer application (along with 120 kg N ha<sup>-1</sup> for canola and 0 kg N ha<sup>-1</sup> for pea) on a soil of low available sulphate content near Tisdale in northeastern Saskatchewan.