

EFFECTIVENESS OF ELEMENTAL SULPHUR FERTILIZERS ON CANOLA IN THE FIRST YEAR OF APPLICATION

S.S. Malhi and D. Leach

**Agriculture and Agri-Food Canada,
P.O. Box 1240, Melfort, Saskatchewan S0E 1A0
Phone: 306-752-2776, Ext. 230; Fax: 306-752-4911;
E-Mail: malhis@em.agr.ca**

BACKGROUND

- **Canola is the major cash crop in the Parkland zone, where many soils are deficient in plant-available S for high seed yields.**
- **Canola has high requirements for S. Deficiency of S at any growth stage can cause drastic reduction in seed yield.**
- **Plants feed only on sulphate-S ($\text{SO}_4\text{-S}$).**
- **Traditionally, S supplied in fertilizers was usually present in the sulphate form (which is readily available to plants).**
- **Now, there are a wide variety of commercial fertilizers that contain S in an unoxidized or elemental form.**
- **These elemental S fertilizers cost less per unit of S than the sulphate-S fertilizers, but the effectiveness of these fertilizers depends on how quickly the S is oxidized in soil for effective plant uptake.**

OBJECTIVE

- **To determine the relative effectiveness of elemental S and sulphate-S fertilizers on yield and quality of canola seed.**

MATERIALS AND METHODS

- **Locations:** Porcupine Plain and South Tisdale
- **Soil:** Gray Luvisol
- **Mean Precipitation:** 450 mm
- **Growing Season:** May to August
- **Sulphur Sources:**
 - ES-90 (Elemental S)
 - ES-95 (Elemental S)
 - Agrium Plus (Elemental S + Sulphate-S)
 - Ammonium Sulphate
- **Rates of S:** 10 and 20 (or 15) kg S/ha
- **Times and Methods of Application:** Fall (surface-broadcast in fall and incorporated into soil at seeding) Spring (Incorporated into soil at seeding)
- **Other Fertilizers:** Blanket Application of N, P and K Fertilizers

- **Data Recorded: Seed Yield, Protein Content, Oil Content and Total S in Seed and Straw**

SUMMARY AND CONCLUSION

- **At both sites, canola showed severe S deficiency and seed yields increased substantially with ammonium sulphate (AS).**
- **Agrium Plus S fertilizer (containing both sulphate-S and elemental S) increased seed yields of canola considerably but were less than ammonium sulphate.**
- **With the elemental S fertilizers, there was little or no increase in seed yield of canola when applied in spring at seeding at both sites. But at one site, fall application of elemental S fertilizers increased canola seed yield moderately and was significantly greater than spring application, but was still much less than ammonium sulphate.**
- **At one site, fall-applied AS was less effective in increasing canola seed yield than spring-applied AS. This indicates over-winter losses of sulphate-S from soil root zone.**
- **In conclusion, the elemental S fertilizers were not effective in correcting S deficiency on canola in the initial year of application (especially for spring application).**

ACKNOWLEDGEMENTS

- **The authors would like to thank Agrium, Sulfer Works and WESTCO for financial assistance; and C. Hutchison, T. Donald, and K. Hemstad-Falk for technical help; and ENVIROTEST Laboratories Saskatoon for soil and plant analyses.**

Table 1. Seed yield of canola with elemental S and sulphate-S fertilizers applied at 15 kg S/ha in spring or in previous fall at Porcupine Plain in 1999 (1.8 mg SO₄-S/kg in 0-15 cm soil).

Fertilizer	Seed yield (kg/ha)	
	Fall	Spring
ES-90	623	27
ES-95	864	32
Agrium Plus	1664	1388
Ammonium Sulphate	1928	2108
Control (no S fertilizer)	21	

Table 2. Seed yield of canola with elemental S and sulphate-S fertilizers applied at 10 and 20 kg S/ha in spring or in previous fall at South Tisdale in 1999 (2.0 mg SO₄-S/kg in 0-15 cm soil).

S source	Rate of S (kg S/ha)	Seed yield(kg/ha)	
		Fall	Spring
Tiger-90	10	37	27
	20	59	20
Sulfer-95	10	59	23
	20	117	19
Agrium Plus	10	101	91
	20	278	510
Ammonium Sulphate	10	120	383
	20	309	865
Control (no S fertilizer)			37