



Sprayable elemental sulphur has potential

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A sprayable micronized elemental sulphur fertilizer applied prior to seeding showed potential for correcting nutrient deficiencies in canola compared to application of ammonium sulphate fertilizer. However, not even ammonium sulphate resulted in a significant difference in yield due to constraints of dry or excessively wet weather.

Ammonium sulphate fertilizer (AS) (21-0-0-24) is commonly applied to canola because the sulphur (S) is in the sulphate (SO_4^{2-}) form and is available to plants as soon as it dissolves in soil solution. Elemental S (ES) fertilizers are also widely used, but require time to oxidize into forms available for plant uptake.

Micronized ES that is sprayed on the soil surface supports rapid oxidation due to its small particle size and dispersed distribution. The objective of this study was to determine if the rate of S supply from sprayable micronized ES (Sulgro 70 from Sultech in Calgary, AB) was sufficient to meet canola S requirements in the year of application in Alberta.

Field experiments were conducted at Glenwood, Foremost, Raymond and St. Mary in southern Alberta, and Radway, Gardenview, Lotholz, and Thorhild in central Alberta over a period of two years in 2018 and 2019.

The commercial fields selected for the study were low to medium in soil extractable SO_4^{2-} , with 12 to 38 lbs./ac (14 to 43 kg S/ha) to 12 inches (0.3 m) prior to seeding. The fields were cropped to cereals in the previous year and under conventional long-term zero- or minimum-tillage management.

Sulphur was applied in three different treatments as banded granular AS (21-0-0-24) at seeding, spray application of AS (spray grade) as early as possible in the spring, and spray application of Sulgro 70 as early as possible in the spring.

Sulphur fertilizer was applied at 0, 18 or 36 lbs. S/ac (0, 20 or 40 kg S/ha).

The 18 lbs. S treatments of both AS and Sulgro 70 were applied in total spray volumes of 17.8 Imp. Gal/ac (200 L/ha) through TeeJet flat fan nozzles. The 36 lbs. S treatments of both AS and Sulgro 70 were applied by making two spray passes at 17.8 Imp. Gal each. There was no incorporation of sprayed products other than what occurred with low-disturbance direct seeding.

All other recommended fertilizer nutrients and granular AS were applied at seeding. Rates of N fertilizer were adjusted to achieve 160 lbs. N/ac (180 kg N/ha) of fertilizer N plus extractable soil test $\text{NO}_3\text{-N}$ to 24 inches (0.6 m).

Plant Root Simulator (PRS) probes from Western Ag Innovations, Saskatoon, SK were used to monitor the supply of S to ion-exchange membranes *in situ* over two four-week periods immediately after seeding, during the critical time for S uptake by canola.

Micronized ES less efficient but no yield difference

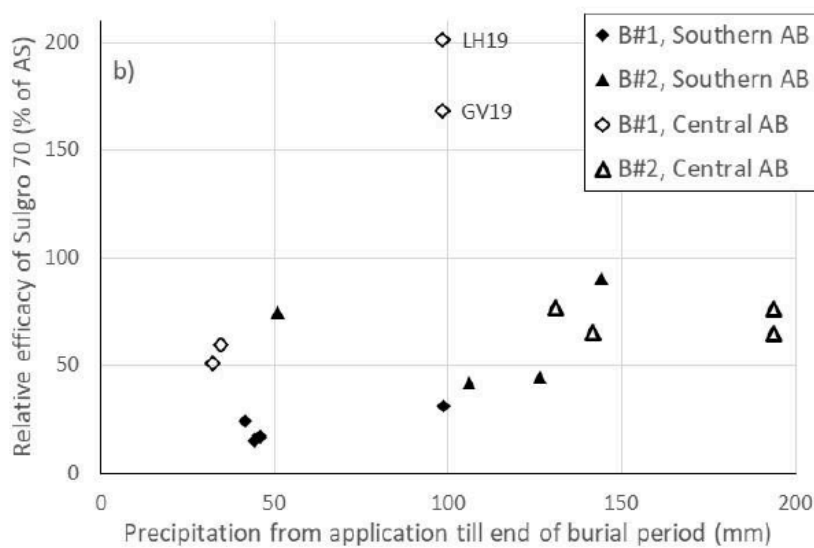
In southern Alberta, application of AS provided the greatest increase in S supply in both burial periods, but S supply and treatment differences were lower in the second burial period due to limited precipitation and declining soil moisture. Under dry conditions in southern Alberta, the increase in S supply due to Sulgro 70 application was 22% of that for AS during the first burial period and 53% of that for AS in the second burial period compared to ammonium sulphate sprayed on the soil surface.

Under wetter conditions in central Alberta, the relative efficacy of Sulgro 70 to increase S supply was variable from 51 to 201% during the first four-week period after seeding and 56% during the

second four-week period after seeding. At the two sites where Sulgro 70 outperformed ammonium sulphate, excessive rainfall delayed seeding after S application, likely resulting in leaching of $\text{SO}_4\text{-S}$ from AS below the depth of the ion-exchange membranes. The rainfall also likely stimulated ES oxidation into plant available forms without the corresponding leaching.

On average, the increase in soil S supply of Sulgro 70 was 75% of that of ammonium sulfate between 4 and 8 weeks after seeding for trials that received a minimum of 5 inches (127 mm) of rainfall.

The ability of Sulgro 70 to increase S supply relative to AS at each site as a function of cumulative precipitation



Source: Bremer et al. 2020

Fertilizer treatment only affected canola biomass at one site, and did not affect seed yield at any site. Canola yields were constrained by drought stress at the southern Alberta sites and by excessive moisture stress at central Alberta sites in 2019

The results showed that Sulgro 70 sprayed on the soil surface oxidized appreciably during the first eight weeks after seeding and, with suitable management, has the potential to meet canola S requirements in the year of application.

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E.Bremer, D.Pauly, S.M.Strydhorst, and R.H.McKenzie. Evaluation of a sprayable elemental sulphur fertilizer under field conditions in Alberta. *Canadian Journal of Soil Science*. **e-First**
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Photo by Murray MacKinnon.