Sulphur Fertilizer Response Trials 2018
GFO and OMAFRA/UG Funding - Interim Report

Purpose:

To determine the existence of sulphur deficiency and yield response to sulphur fertilization across a wide variety of soil and climatic conditions in Ontario for corn, winter wheat and soybeans following their typical rotational crops in each of 3 years. The project also aims to develop a sulphur soil test for the province.

Methods:

On-Farm Trials:
The on-farm strip trials were a simple with and without sulphur trial that were replicated three times in a grower’s field. The treatment recommendations for each crop are as follows:

- **Treatments**
  1. Winter Wheat:
     a. Check - No S: 0 lbs S; additional 17.5 lbs/ac N to account for N in AMS
     b. With Sulphur: 20 lbs S (83 lbs of dry AMS)
  2. Corn:
     a. Check - No S: 0 lbs S, additional 17.5 lbs/ac N to account for N in AMS
     b. With Sulphur: 20 lbs S (83 lbs of dry AMS)
  3. Soybean:
     a. Check - No S: 0 lbs, additional 17.5 lbs/ac N to account for N in AMS
        i. 63 lbs of Calcium Ammonium Nitrate
     b. With Sulphur: 20 lbs (83 lbs of dry AMS)

- 3 replications minimum: field length strips (minimum 200 m), randomized

- **Timing of sulphur application:**
  - Wheat: spring applied, with nitrogen
  - Corn: pre-plant or no later than traditional side-dress timing (V5)
  - Soybeans: before or after planting

The on-farm trials were located in Bornholm, Arkona, Sombra, Merlin, Winchester, Stayner, and Thorndale.

Small Plot Trials:
The small plot trials were set up in corn, soybean and wheat with the following treatments at the Elora Research Station:

- 0 kg S/ha sulphate of potash
- 10 kg S/ha sulphate of potash
- 20 kg S/ha sulphate of potash
- 30 kg S/ha sulphate of potash
- 40 kg S/ha sulphate of potash
Results:

Winter Wheat:

Table 1: 2018 winter wheat yield response to sulphur at various locations across Ontario.

<table>
<thead>
<tr>
<th>Site</th>
<th>Fertilizer Source</th>
<th>Sulfur Rate (lbs/ac)</th>
<th>Yield – Check (bu/ac)</th>
<th>Yield – Sulfur (bu/ac)</th>
<th>Difference (bu/ac)</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sombra</td>
<td>ATS</td>
<td>15</td>
<td>86.0</td>
<td>81.6</td>
<td>-4.4</td>
<td>No</td>
</tr>
<tr>
<td>Stayner</td>
<td>KMag</td>
<td>22</td>
<td>104.4</td>
<td>105.5</td>
<td>+1.1</td>
<td>No</td>
</tr>
</tbody>
</table>

Figure 1: Winter Yield Response to Sulphur Application at the Elora Research Station.
Corn:

Figure 2: Corn Yield Response to Sulphur Application at the Elora Research Station.

Corn Grain Yield (t/ha) Versus Sulfur Fertilizer Rate (kg S/ha) at the Elora Research Station, 2018
Soybean:

**Table 2: 2018 Soybean Yield Response to Sulphur at Various Locations Across Ontario.**

<table>
<thead>
<tr>
<th>Site</th>
<th>Fertilizer Source</th>
<th>S Rate (lbs/ac)</th>
<th>N Rate Adjusted</th>
<th>Yield – Check (bu/ac)</th>
<th>Yield – Sulphur (bu/ac)</th>
<th>Difference (bu/ac)</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arkona</td>
<td>ATS Pre-plant</td>
<td>14</td>
<td>No</td>
<td>58.4</td>
<td>60.0</td>
<td>+1.6</td>
<td>No</td>
</tr>
<tr>
<td>Bornholm (Titus)</td>
<td>AMS Banded</td>
<td>24</td>
<td>No</td>
<td>72.5</td>
<td>74.0</td>
<td>+1.5</td>
<td>No</td>
</tr>
<tr>
<td>Bornholm (S12PX3)</td>
<td>AMS Banded</td>
<td>24</td>
<td>No</td>
<td>69.6</td>
<td>77.9</td>
<td>+8.3</td>
<td>Yes</td>
</tr>
<tr>
<td>Elora</td>
<td>AMS Banded</td>
<td>24</td>
<td>No</td>
<td>45.5</td>
<td>46.3</td>
<td>+0.8</td>
<td>No</td>
</tr>
<tr>
<td>Merlin</td>
<td>AMS Broadcast</td>
<td>24</td>
<td>No</td>
<td>55.8</td>
<td>57.0</td>
<td>+1.2</td>
<td>No</td>
</tr>
<tr>
<td>Winchester</td>
<td>AMS Banded</td>
<td>24</td>
<td>No</td>
<td>56.9</td>
<td>55.9</td>
<td>-1.0</td>
<td>No</td>
</tr>
</tbody>
</table>

**Figure 3: Ammonium Sulphate (AMS) Applied Broadcast at 24 lbs/ac vs no Sulphur Applied.**

Merlin, July 27, 2018
Table 3: 2018 Soybean Yield Response to Sulphur at Thorndale, Ontario.

<table>
<thead>
<tr>
<th>Sulphur Rate (lbs S/ac) as ATS Preplant</th>
<th>0</th>
<th>10</th>
<th>20</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yield (bu/ac)</td>
<td>90.2</td>
<td>79.8</td>
<td>87.9</td>
<td>87.9</td>
</tr>
</tbody>
</table>

Figure 4: Soybean Yield Response to Sulphur Application at the Elora Research Station.

Summary:
1. There was no response seen in soybeans at Elora, Thorndale or Winchester. There was a response noted in Arkona, Bornholm (Titus), Elora (AMS), and Merlin but the response was not significant. There was a significant response seen in Bornholm (SP12PX3), but it is unknown if this was due to additional N or S.
2. There was no response observed in corn.

3. There was also no response seen in winter wheat in Elora or Sombra although there was a non-significant response observed in Stayner.

This is the first year of this research project; therefore, single year data should be interpreted with caution. The project will be conducted for another two years so if you are interested in participating please contact Joanna Follings at joanna.follings@ontario.ca.

Acknowledgements:
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