TRIAL OBJECTIVES
To compare the use of MOP and MOP+POLY4 at a ratio of 75:25 K₂O as potassium and sulphur sources.

HIGHLIGHTS

US$247 INCREASE IN RETURN PER HECTARE

UP TO 15% INCREASE IN YIELD

UP TO 9% INCREASE IN DRY KERNEL WEIGHT

GRAIN QUALITY MAINTAINED OR IMPROVED

INCREASE IN PLANT POPULATIONS

45% DECREASE IN WEED PRESENCE

TRIAL DESIGN

PARTNER: UNIVERSITY OF MINNESOTA
LOCATION: MINNESOTA, US
YEAR: 2015
CROP VARIETY:
WENSMAN W80841VT2RIB (STAPLES SITE)
PIONEER P0157 AM1 (ST CHARLES SITE)

- Nine US states with over 1 million hectares of corn area were observed to have low soil sulphur content (circa 6 ppm) in 2015.¹²
- Minnesota is the fourth largest corn producing state in the United States with 3.32 million hectares of production in 2014.
- In addition to NPK, sulphur is recommended for most soil types (28 kg S ha⁻¹) in the form of sulphate.
- Corn trials were established at two separate sites (St Charles and Staples) with similar soil nutrient statuses.⁹
- All fertilizer was broadcast and incorporated prior to planting.
- The Staples site was planted at the rate of 86,500 plants per hectare; St Charles site at 87,700 plants per hectare.

TREATMENT TABLE (kg ha⁻¹)

<table>
<thead>
<tr>
<th>N</th>
<th>P₂O₅</th>
<th>K₂O</th>
<th>MgO</th>
<th>CaO</th>
<th>S</th>
<th>Cl</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>224</td>
<td>70</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MOP</td>
<td>224</td>
<td>70</td>
<td>90</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>MOP+POLY4 (75:25 K₂O)</td>
<td>224</td>
<td>70</td>
<td>90</td>
<td>10</td>
<td>27</td>
<td>31</td>
</tr>
</tbody>
</table>
• Using MOP+POLY4 (75:25 K2O) significantly improved yields at Staples by 15% and St Charles by 5% compared to MOP.

• At both sites the sulphur supply in the soil was very low indicating the need for a broad-spectrum fertilization strategy.

• The additional sulphur, supplied by POLY4, enhanced corn yield.

<table>
<thead>
<tr>
<th>TREATMENT TABLE (kg ha⁻¹)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
</tr>
<tr>
<td>Staples</td>
</tr>
<tr>
<td>St Charles</td>
</tr>
</tbody>
</table>

**YIELD RESULT (t ha⁻¹)¹⁻⁵⁻⁹**

- Staples
- St Charles

**AVERAGE DRY KERNEL WEIGHT (mg DM kernel⁻¹)¹⁻³⁻⁶**

- staples
- St Charles

• The use of POLY4 to supply a quarter of the K₂O requirement led to significant increases in kernel weight over MOP.

• The MOP+POLY4 (75:25 K₂O) treatment gave the highest kernel weight at both sites.
A simple NPK plan lacks sulphur, exposing a crop to a yield-limiting deficiency. Therefore, using POLY4 as a substitute for a portion of the K₂O from MOP provided higher returns than MOP alone.

Using MOP+POLY4 at the recommended 28 kg S ha⁻¹ rate returns an extra US$247 per hectare compared to MOP.

A sulphur application of 14 kg ha⁻¹, at the lower end of the recommendation window, delivers the same maximum yield plus a further US$23.

The use of POLY4 to supply part of the K₂O and all sulphur requirements supports high quality corn.

Maintaining corn quality gives a farmer access to more diverse markets. For example, starch and oil content are important considerations in many food, industrial and pharmaceutical products.

Corn is a common base ingredient for human foodstuffs that requires good levels of protein and fibre.

### GRAIN QUALITY RESULT

- The use of POLY4 to supply part of the K₂O and all sulphur requirements supports high quality corn.
- Maintaining corn quality gives a farmer access to more diverse markets. For example, starch and oil content are important considerations in many food, industrial and pharmaceutical products.
- Corn is a common base ingredient for human foodstuffs that requires good levels of protein and fibre.

### ECONOMIC SUMMARY (US$/ha)

<table>
<thead>
<tr>
<th>Farmer return (US$/ha)</th>
<th>Control</th>
<th>MOP</th>
<th>Recommended rate MOP+POLY4 at 28 kg S ha⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>Control</td>
<td>1,662</td>
<td>1,597</td>
<td>1,845</td>
</tr>
</tbody>
</table>

### QUALITY PARAMETER

<table>
<thead>
<tr>
<th>QUALITY PARAMETER</th>
<th>STAPLES</th>
<th>ST CHARLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starch (g kg⁻¹)</td>
<td>799.0</td>
<td>790.4 796.8</td>
</tr>
<tr>
<td>Protein (g kg⁻¹)</td>
<td>94.2</td>
<td>96.7 97.3</td>
</tr>
<tr>
<td>Oil (g kg⁻¹)</td>
<td>33.3</td>
<td>33.4 33.7</td>
</tr>
<tr>
<td>Fibre (g kg⁻¹)</td>
<td>19.4</td>
<td>17.9 18.6</td>
</tr>
</tbody>
</table>

Notes: 1) GENSTAT means; 2) All treatments received 224 N kg ha⁻¹ and 70 P₂O₅ kg ha⁻¹ from UAN and DAP; 3) MOP+POLY4 was used in a ratio of 75:25 to meet K₂O requirement; 4) Average grain moisture was 17% at both sites; 5) Staples – p = <0.001; St Charles – p = 0.044; 6) Staples – p = 0.003 ; St Charles – p = 0.001; 7) Fertilizer prices based on US Mid-West 2015 annual prices: MOP (US$411/t), POLY4 (US$200/t); 8) Analysis accounts for yield changes and fertilizer application cost of US$16.16/t. 9) Initial soil analysis at Staples pH 7; Organic matter 0.23%, P 86 mg kg⁻¹, K 71 mg kg⁻¹, Mg 300 mg kg⁻¹, Ca 1504 mg kg⁻¹, S 4.86 mg kg⁻¹. Initial soil analysis at St Charles: pH 6.9; Organic matter 0.27%, P 33 mg kg⁻¹, K 86 mg kg⁻¹, Mg 300 mg kg⁻¹, Ca 1504 mg kg⁻¹, S 1.65 mg kg⁻¹.

Source: University of Minnesota (2015) 14000-UMN-14012-15

siriusminerals.com | +44 1723 470 010 | commercial@siriusminerals.com
Registered Address: 3rd Floor Greener House, 66-68 Haymarket, London SW1Y 4RF, UK
Company Registered Number: 4948435