TRIAL RESULTS
CORN
NORTH DAKOTA, US (2014)
poly4.com
TRIAL OBJECTIVE

To evaluate corn response to low application rates of $K_2O$ fertilizers with and without S.

HIGHLIGHTS

DEMONSTRATION OF VALUE IN SULPHUR FOR CORN

DRIER AND 6% HEAVIER GRAINS

3% IMPROVEMENT IN STARCH CONTENT

UP TO 18% HIGHER CORN YIELD

HIGHER NUTRIENT INPUT WITH LESS MATERIALS

HIGHER YIELD VALUES IMPROVES FARMERS RETURNS

TRIAL DESIGN

PARTNER: NORTH DAKOTA STATE UNIVERSITY

LOCATION: US

YEAR: 2014

- The US accounts for 29% of the global corn market\(^1\), equating to US$265 billion annually in 2012.
- US consumes 89 kg $K_2O$ ha\(^{-1}\) corn equating to 22.3 million tonnes of POLY4.
- Soils in the US corn belt suffer from a range of nutrient deficiencies that vary between states.
- Field trial conducted in North Dakota, US on a loam soil with good drainage.
- The trial was planted with the round-up ready corn variety DKC-33-77.

TREATMENT TABLE

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>NUTRIENTS APPLIED (kg ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$K_2O$</td>
</tr>
<tr>
<td>Control</td>
<td>0</td>
</tr>
<tr>
<td>Control+AS</td>
<td>0</td>
</tr>
<tr>
<td>MOP</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>22</td>
</tr>
<tr>
<td>MOP+AS</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>22</td>
</tr>
<tr>
<td>POLY4</td>
<td>11</td>
</tr>
<tr>
<td></td>
<td>22</td>
</tr>
</tbody>
</table>
**GRAIN MOISTURE (%)**

- POLY4 achieves a significant grain moisture reduction over MOP and MOP+AS.
- Lower grain moisture supports early harvest and reduces post harvest drying cost.

**SPECIFIC GRAIN WEIGHT (g hl⁻¹)**

- High specific grain weight coupled with low grain moisture ensures crop value through financial returns to the farmer.
- POLY4 achieves a 5% higher specific grain weight over MOP.

**STARCH CONTENT (%)**

- Energy from photosynthesis is used to make sugars, which are converted to and stored as starch, providing an energy store for the young plant.
- POLY4 improves the starch content of corn by 3% over MOP.
- Starch is an important component in food, pharmaceutical, animal feed and manufacturing industries.

**CORN YIELD (t ha⁻¹)**

- Sulphur deficiencies on US farms increase demand for a sulphur fertilizer source.
- Sulphur has a positive effect on corn plants and grain characteristics at low K₂O levels.
- MOP alone limits corn yields to 5.7 t ha⁻¹ in this trial.
- On soil with adequate K supply, adding sulphur increases yield by 13%.
- Despite adequate soil Mg and Ca, POLY4 delivers nutrients as required which enhances yield by 3% beyond a K and S nutrient supply or 18% over control.
**FERTILIZER PLAN AND ECONOMIC ASSESSMENT**

- POLY4 improves the fertilizer plan through nutrient balance with improved yields.
- Farmers using POLY4 would gain US$25 ha⁻¹ from improved yields.
- For an average farm in North Dakota of 507 ha⁻¹ that translates into US$12,675 ha⁻¹ extra income.
- POLY4 option requires three material inputs compared to four from MOP option.

---

Notes: 1) FAO 2017; 2) GENSTAT mean yields for 0–22 kg K₂O ha⁻¹; 3) All treatments received 197 kg N ha⁻¹ and 28 kg P₂O₅ ha⁻¹; 4) Corn Refiners Association 2015; 5) Fertilizer prices based on quoted CRU U.S. prices Q2-2015; Urea (US$422/t), TSP (US$473/t), AS (US$302/t), MOP (US$384/t), POLY4 price (US$200/t); 6) Prices based on USDA commodity prices 2014 of US$3.51 bushels for corn adjusted for yields of 6.3 t ha⁻¹ using traditional plan and 6.5 t ha⁻¹ using POLY4 plan including input costs; 7) Weight of material inputs for MOP option is 567 kg compared to 609 kg for POLY4 option. Initial soil analysis: pH 7; Organic Matter 2.8%; P 3 mg kg⁻¹; K 140 mg kg⁻¹; S 5 mg kg⁻¹; Ca 2352 mg kg⁻¹; Mg 464 mg kg⁻¹; Zn 6.32 mg kg⁻¹; CEC 16 meq/100g.

Source: North Dakota State University (2014), Sirius Minerals, CRU, USDA 15000-NDS-15010-14