Potato

Trial results in Minnesota, US (2016)

- Improved tuber size
- Improved yield and quality
- Reduced fertilizer spreading cost
- Greater financial margin
Trial objective

to determine the effectiveness of POLY4 as a fertilizer for potato production.

<table>
<thead>
<tr>
<th>TREATMENTS</th>
<th>AMOUNT OF NUTRIENT APPLIED (kg ha(^{-1}))</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(N)</td>
</tr>
<tr>
<td>CONTROL</td>
<td>152</td>
</tr>
<tr>
<td>MOP+GYPSUM</td>
<td>152</td>
</tr>
<tr>
<td>MOP+Ca+Mg+s</td>
<td>152</td>
</tr>
<tr>
<td>MOP+POLY4 (50:50)</td>
<td>152</td>
</tr>
<tr>
<td>POLY4</td>
<td>152</td>
</tr>
</tbody>
</table>

**overview**

**PARTNER:** UNIVERSITY OF MINNESOTA

**LOCATION:** MINNESOTA, US

**YEAR:** 2016

- The United States is the fifth largest potato producer in the world.\(^1\)

- In 2014 the US produced approximately 20 million tonnes of potato.\(^1\)

- Minnesota ranked eighth in the United States in potato production in 2016\(^2\).

- POLY4 can be an important fertilizer for potato since it is chloride sensitive and requires large quantities of K and Ca.

- The trial was a randomised complete block design with four replications.

- Fertilizers were applied in a split application of 224 kg K\(_2\)O ha\(^{-1}\) pre-planting and 224 kg K\(_2\)O ha\(^{-1}\) at emergence.
Yield based on tuber size

- The proportion of marketable tuber size (>85 g) was highest under POLY4, compared to the alternative commercial fertilizer programmes, which resulted in improved economic return.

Specific gravity and dry matter

- Specific gravity and dry matter are quality indicators in potato production.
- POLY4 produced potato tubers with the highest dry matter content and improved fryability.
- POLY4 maintains potatoes’ important quality parameters.

Marketable yield

- With POLY4, potato yield increased by up to 15% compared MOP+gypsum option and 4% above the MOP+Ca+Mg+S option.
- The increase in yield reflects the potential of POLY4 to offer potato farmers more economic benefit than MOP-based fertilizer plans.
Net return

- POLY4+MOP blend achieved a greater yield with a lower nutrient input. This indicated greater fertilizer use efficiency.
- POLY4 increased margin by between US$1,095 and US$264 compared to MOP+gypsum and MOP+Ca+Mg+S options respectively.
- The POLY4 + MOP blend increased the financial margin by US$160 compared to using MOP+Ca+Mg. The improvement in net return under MOP+POLY4 (50:50) was partly due to reduction in spreading cost.

Transforming potato fertilizer plans

- Increased application flexibility for fertilizer programmes with POLY4
- POLY4 provides sustained nutrient delivery
- POLY4 reduces chloride application
- POLY4 decreases fertilizer spreading passes and cost

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Product by kg ha⁻¹</th>
<th>Application</th>
<th>Cl content kg ha⁻¹</th>
</tr>
</thead>
<tbody>
<tr>
<td>MOP+Ca+Mg+S</td>
<td>6035</td>
<td>7</td>
<td>359</td>
</tr>
<tr>
<td>POLY4</td>
<td>3970</td>
<td>5</td>
<td>96</td>
</tr>
<tr>
<td>Difference</td>
<td>-2065</td>
<td>-2</td>
<td>-263</td>
</tr>
</tbody>
</table>

Note: 1) Food and Agricultural Organisation Statistics, FAOSTAT (2017); 2) USDA (United States Department of Agriculture, 2017); 3) Initial soil analysis: pH 6.1, K 58 mg kg⁻¹, Ca 550 mg kg⁻¹, Mg 123 mg kg⁻¹, S 2.0 mg kg⁻¹; 4) Results presented are from GENSTAT analysis based on ANOVA means; 5) Fertilizer prices were obtained from CRU and are based on US Mid-West 2016 annual prices: MAP (US$546 t⁻¹), MOP (US$239 t⁻¹), POLY4 (US$200 t⁻¹), gypsum (US$25 t⁻¹), limestone (US$25 t⁻¹). The environmentally safe nitrogen (ESN) (Agrium Inc.) (US$232 t⁻¹) is an implied price based on urea price. The epsom price is implied price based on kieserite price (US$250 t⁻¹). The UAN price is based on Europe price converted to US$ (US$161 t⁻¹). Fertilizer spreading cost: US$16.16. The price of potato obtained from FAOSTAT: US$193 t⁻¹; 6) net return = crop output – (cost of fertilizer material + cost of fertilizer application).

Sources: University of Minnesota (2016) 14000-UMN-14014-16.