Growing potatoes in USA

A case for POLY4

• USA grew 22 million tons of potatoes across 1 million acres in 2017.

• Wisconsin has the third greatest production by state with 1.4 million tons produced in 2017, while Minnesota produced 920,000 tons.

• Best practice in the region ensures crop K, Mg and S supply from a balanced fertilizer plan. Where potassium demand is high, current practice substitutes some MOP with SOP to limit chloride load since this known to impair tuber quality.

• POLY4 is a low-chloride fertilizer that delivers potassium, sulphate-sulfur, magnesium and calcium as well as micro nutrients in one product.

Key findings

• Increased marketable potato yield against MOP balanced

• Enhanced dry matter content

• Improved size grade

POLY4 BENEFITS

- Sustained nutrient delivery profile
- Low chloride content
- Blends, stores and spreads with conventional equipment
- Low carbon footprint
- Suitable for organic farming

A case for POLY4
poly4.com
Trial focus
To compare the response of potato crops to different POLY4 inclusions within a conventional, nutrient balanced fertilizer plan. Trials were repeated at five sites in Midwestern USA over four years.

Partner
University of Minnesota
University of Wisconsin

Location
Hancock, Wisconsin and Becker, Minnesota USA

Date
2014 – 2017

Increased marketable yield
POLY4 treatments had greater average yield than the MOP balanced in four out of five trials. Compared to a nutrient balanced MOP fertilizer plan with an average yield of 472 CWT ac⁻¹, the 25% inclusion of POLY4 increased yield by 2.4% (three trials), the 50% inclusion increased yield by 3.7% (four trials), and the 75% inclusion by 5.8% (five trials).
Improved quality

Tuber dry matter content is an important quality parameter for frying potatoes. High-chloride fertilizers can depress tuber dry matter content. Tuber dry matter was greater with MOP + POLY4 than with MOP balanced treatments.

Maintaining potato marketability

POLY4 treatments maintained the proportion of tubers that were marketable.

Besides high yield and suitable dry matter content, size grade is critical for the potato frying industry. Following the four trials in Minnesota, the Russet Burbank tubers were graded by size. POLY4-fertilized potatoes tended to have a greater proportion of marketable tubers than nutrient balanced MOP in the 3 – 14 oz size range.

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2014 – 2017
In a high potassium demand plan, POLY4 is an alternative low-chloride K source.

Yield maintained with POLY4 plan

POLY4 offered a commercially-viable alternative to support yield. Yields were similar, and dry matter and proportions within 6 and 10 oz size grades were improved with POLY4 treatment.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Nutrients applied (lb ac⁻¹)</th>
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<tbody>
<tr>
<td></td>
<td>K₂O</td>
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<tr>
<td>MOP + SOP (63:37)</td>
<td>510</td>
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<tr>
<td>MOP + POLY4 (60:40)</td>
<td>510</td>
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</tbody>
</table>

*All treatments received 80 lb urea ac⁻¹, 290 lb ESN ac⁻¹, and 25 Gals UAN ac⁻¹.

Notes (Research and Development Organization trials): 1) Potato variety: Umatilla Russet; initial soil analysis: pH 7.7, 1.0% SOM, 80 mg P kg⁻¹, 132 mg K kg⁻¹, 87 mg Mg kg⁻¹, 350 mg Ca kg⁻¹, 83 mg Mg kg⁻¹, 1460 mg Ca kg⁻¹, 13 mg S kg⁻¹. 2) 2014 trial: pH 7.7, 1.0% SOM, 80 mg P kg⁻¹, 132 mg K kg⁻¹, 87 mg Mg kg⁻¹, 350 mg Ca kg⁻¹, 83 mg Mg kg⁻¹, 1460 mg Ca kg⁻¹, 13 mg S kg⁻¹. 3) 2015 trial: pH 7.7, 1.0% SOM, 80 mg P kg⁻¹, 132 mg K kg⁻¹, 87 mg Mg kg⁻¹, 350 mg Ca kg⁻¹, 83 mg Mg kg⁻¹, 1460 mg Ca kg⁻¹, 13 mg S kg⁻¹. 4) 2016 trial: pH 7.7, 1.0% SOM, 80 mg P kg⁻¹, 132 mg K kg⁻¹, 87 mg Mg kg⁻¹, 350 mg Ca kg⁻¹, 83 mg Mg kg⁻¹, 1460 mg Ca kg⁻¹, 13 mg S kg⁻¹. 5) 2017 trial: pH 7.7, 1.0% SOM, 80 mg P kg⁻¹, 132 mg K kg⁻¹, 87 mg Mg kg⁻¹, 350 mg Ca kg⁻¹, 83 mg Mg kg⁻¹, 1460 mg Ca kg⁻¹, 13 mg S kg⁻¹.

Notes (University of Wisconsin trials): 1) Four trials in Minnesota (2014-2017) and one trial in Wisconsin (2014); 2) MOP balanced received Ca and Mg from gypsum and epsom salts; 3) Potato variety: Russet Burbank; 4) 25 and 50% POLY4 inclusions averaged for bar graphs as 25% POLY4 treatment only tested in 2014 and 2017 while 50% POLY4 treatment not tested in 2014 in Minnesota; 5) Initial soil analyses for Wisconsin: pH 7.2, 0.9% SOM, 358 mg Ca kg⁻¹, 90 mg Mg kg⁻¹, 90 mg K kg⁻¹, 350 mg Ca kg⁻¹, 48 mg Mg kg⁻¹; 2015 trial: pH 5.0, 1.4% SOM, 37 mg P kg⁻¹, 100 mg K kg⁻¹, 330 mg Ca kg⁻¹, 48 mg Mg kg⁻¹, 100 mg K kg⁻¹, 330 mg Ca kg⁻¹, 48 mg Mg kg⁻¹; 2016 trial: pH 6.1, 1.1% SOM, 17 mg P kg⁻¹, 55 mg K kg⁻¹, 550 mg Ca kg⁻¹, 87 mg K kg⁻¹, 580 mg Ca kg⁻¹, 83 mg Mg kg⁻¹; 2017 trial: pH 5.3, 1.5% SOM, 26 mg P kg⁻¹, 87 mg K kg⁻¹, 580 mg Ca kg⁻¹, 83 mg Mg kg⁻¹.