TRIAL RESULTS

BARLEY

WARWICKSHIRE, UK (2014)
TRIAL OBJECTIVE

To determine the effectiveness of POLY4 as a potassium and sulphur fertilizer on barley and assess different fertilizer timing applications.

HIGHLIGHTS

IMPROVES YIELD BY 125% OVER MOP AND 10% OVER SOP

PROVIDES FLEXIBILITY IN THE TIMING OF FERTILIZER APPLICATION

IMPROVES MACRO AND MICRO NUTRIENT UPTAKE

ECONOMICAL ALTERNATIVE FOR FARMERS

TRIAL DESIGN

PARTNER:  WARWICK UNIVERSITY
LOCATION:  WARWICKSHIRE, UK
YEAR:  2014
CROP VARIETY:  FLORENTINE

• Barley is one of the world’s top broadacre crops by area used as a foodstuff, malt production and animal feed, amounting to a global coverage of 49.4 million hectares in 2014¹.

• European barley can be planted in either spring or winter offering farmers flexibility in crop production

• Treatments were selected to supply potassium and/or sulphur and applied as a rate response study at rates of 50, 100 or 150 kg K₂O ha⁻¹ and applied in the autumn.

• An additional set of potassium rate response POLY4 treatments were established with fertilizer applied in the spring.

• All plots received 100 kg N ha⁻¹ from Ammonium Nitrate and P was not recommended³.

• Florentine is a two-row feed barley that offers a stiff straw and has good disease resistance.

• Plots were established in a randomised block design.

TREATMENT TABLE

<table>
<thead>
<tr>
<th>FERTILIZER</th>
<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>
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<td>0</td>
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<td>0</td>
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<td>0</td>
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<tr>
<td>MOP</td>
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<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>80</td>
</tr>
<tr>
<td>SOP</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td>6</td>
</tr>
<tr>
<td>POLY4</td>
<td>100</td>
<td>0</td>
<td>100</td>
<td>43</td>
<td>120</td>
<td>55</td>
<td>21</td>
</tr>
</tbody>
</table>
YIELD RESULT (t ha⁻¹)

- MOP replaced potassium offtake but had little direct effect on yield without sulphur.
- Local recommendations support the use of additional sulphur. The benefit can be seen in this trial, with SOP outperforming MOP by 125% and POLY4 improving yield by a further 10%.

APPLICATION TIMING YIELD (t ha⁻¹)

- The performance of POLY4 was maintained, regardless of the timing of application.
- Flexibility in timing of application allows farmers to overcome practical application constraints and can have positive implications for a farm’s workload and economics.
**NUTRIENT UPTAKE**

- POLY4 improved macro nutrient uptake of nitrogen, potassium, sulphur, magnesium and calcium by 75%, 54%, 257%, 146% and 114% respectively.

- POLY4 also appeared to significantly improve uptake of a range of micro-nutrients.

**ECONOMIC SUMMARY** (US$ ha\(^{-1}\))

- Traditional fertilizer practice would include an application of MOP with a separate application of DoubleTop\(^3\) to satisfy the sulphur requirement.

- POLY4 as a sulphur source reduces the overall cost of meeting the potassium requirement with sulphur and includes beneficial magnesium, calcium and a range of micro nutrients.

- Even at a high input cost of US$250 per tonne, POLY4 provides a US$12 saving over MOP.

Notes: 1) FAO 2017; 2) GENSTAT exponential regression; 3) RB 209 HMSO 2010; 4) GENSTAT exponential regression; 5) GENSTAT ANOVA \(P=0.876\); 6) Mean results 50-150kg K\(_2\)O ha\(^{-1}\) of POLY4 as a percentage increase compared to MOP; 7) GENSTAT ANOVA \(P=0.001\); 8) Assumed costs based on retail pricing available October 2014: MOP US$450/t, Urea US$480/t, POLY US$250/t, TSP US$408/t commercial N/S top dressing US$450/t; 9) DoubleTop is a trademarked name for ammonium nitrate/ammonium sulphate blends from GrowHow. Initial soil analysis: pH 6.7, N 17.97 mg kg\(^{-1}\), P 30.0 mg kg\(^{-1}\), K 52.3 mg kg\(^{-1}\), SO\(_4\) 7 mg kg\(^{-1}\), Mg 118.0 mg kg\(^{-1}\).

Source: University of Warwick (2014) 8000-WCC-8010-14