**Performance of Poly4 Blends Compared to Mop Blends for Rice in Different Agro-Ecological Zones of Tanzania**

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**Overview and trial design**

- Tanzania was the third largest rice producer in Africa producing 1.2 million hectares per year in 2016.1
- Tanzanian exchangeable soil K is widely variable2 ranging from <8 to >800 mg kg⁻¹. Sites were chosen to represent this range.3
- Local rice farmers apply limited amounts of fertilizers with N being the most commonly applied.
- K fertilizers are not generally used in Tanzania for rice and local advice suggested K does not increase yields.
- Each trial was a randomised block design with four replicates.

**Economic benefit**

- Grain yield is presented for the K₂O application that achieved maximum yield.
- The rice at Dakawa and Mwanza responded to more K fertilizer and had less available soil K than other sites.
- At two of the four sites MOP-K had lower yield than the N + P (control), and across all sites only increased yield by 137 kg ha⁻¹ on average.
- Including Poly4 in the fertilizer plans produced the largest yield at all four sites.
- At maximum yield, Poly4 increased yield by 787 kg ha⁻¹ (+12%) compared to MOP.

**Economic cost and benefit of fertilizers**

Was it worth changing standard fertilizer practice?
- Poly4 increased fertilizer margins at all sites.
- Farmer returns were US$21 for every extra US$ spent on Poly4 compared to the standard N + P programme. This is the benefit:cost ratio.

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Kamsamba Margin (US$/ha)</th>
<th>Dakawa Margin (US$/ha)</th>
<th>Mwanza Margin (US$/ha)</th>
<th>Moshi Margin (US$/ha)</th>
<th>Average Margin (US$/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>N + P (control)</td>
<td>11</td>
<td>29</td>
<td>13</td>
<td>32</td>
<td>21</td>
</tr>
<tr>
<td>Poly4</td>
<td>311</td>
<td>1,194</td>
<td>497</td>
<td>934</td>
<td>709</td>
</tr>
</tbody>
</table>

**Good fertilizer practice**

Yield:
- Adding MOP to N + P fertilizer increased yield, but this was inconsistent.
- Adding Poly4 to the N + P (control) increased yield at all four sites when Poly4 was added to standard N + P programme.
- Poly4 and MOP increased margins at all sites.
- Poly4 increased fertilizer margins at all sites.
- Poly4 and MOP increased margins at all sites compared to MOP-K.
- Poly4 added Mg, Ca and S to supplement crop nutrition and boost crop yield when required.
- Modest applications of Poly4 (15 and 30 kg K₂O ha⁻¹) can be recommended for rice growers in Tanzania.
- Fertilizer recommendations should follow soil analysis and good local agronomic advice.

Financial return:
- Addition of Poly4 to standard practice (N + P fertilizer only) increased margins at all four sites.
- Addition of Poly4 increased margins at all four sites compared to MOP-K.

Notes:
1) FAOSTAT (2016); 2) Meliyo et al (2015) Variability of exchangeable potassium in soils of Tanzania: A soil fertility challenge for sustainable crop production; 3) Paddy field experiments carried out at 120 kg K₂O ha⁻¹ from urea in two application times. Initial soil analysis: Dakawa, pH 6.0, 8 mg P kg⁻¹, 477 mg K kg⁻¹, 9 mg S kg⁻¹; Kamsamba, pH 6.5, 6 mg P kg⁻¹, 746 mg K kg⁻¹, 3 mg S kg⁻¹; Moshi, pH 6.5, 11 mg P kg⁻¹, 746 mg K kg⁻¹, 3 mg S kg⁻¹; Mwanza pH 7.0, 7 mg P kg⁻¹, 534 mg K kg⁻¹, 8 mg S kg⁻¹; 4) General ANOVA means presented. Fisher’s least significant difference (LSD) post hoc test was used to separate means when the ANOVA was significant (p < 0.05). Different letters denote treatments were significantly different; 5) Fertilizer cost: urea = US$303/t; DAP (diammonium phosphate) = US$473/t; MOP (muriate of potash) = US$372/t; POLY4 = US$266/t; fertilizer spreading cost = US$709/ha; 6) Sale price for rice: US$33/50kg.

Source: Tanzania 201000-25111-16