EVALUATION OF POLYHALITE (POLY4) IN COMPARISON TO MURIATE OF POTASH FOR CORN GRAIN YIELD IN TANZANIA

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OBJECTIVES

To evaluate POLY4 as a multi-nutrient fertilizer for corn under Southern Highland conditions in Tanzania and quantify the probability of yield response by changing the potassium source from MOP to POLY4.

INTRODUCTION

A search for alternate potassium sources led to the exploration of polyhalite (K,SO4,MgSO4,2CaSO4,2H2O) in North Yorkshire in the United Kingdom (POLY4).

There is a need for more evidence on the agronomic performance of POLY4 and its understanding is essential for the Southern Highlands region of Africa due to the cost of resources and under-applied nutrient conditions in this area. This could ultimately lead to decreased reliance on MOP as a potassium source.

The Southern Highlands is an agriculturally important area growing a range of crops such as corn, beans, wheat and potatoes. The majority of the soils from Tanzania’s humid and sub-humid regions were categorised as severely weathered, acidic, infertile and had limited but variable nutrient releasing capacities to sustain low-input agriculture.

Current fertilizer recommendations to offset nutrient deficiencies in most parts of the region for corn are 80–120 kg N ha−1 in two splits; and 23–68 kg P2O5 ha−1 as basal application. However, critical nutrient deficiencies of N, P, K, S and Ca were observed.

Ismani did not respond to fertilizer application thus is excluded from analysis.

RESULTS

• Data analysis by location indicated significantly lower yields for MOP when compared with NP, POLY4 and MOP+Kieserite at 1, 2 and 2 instances out of 5 responding sites. MOP recorded lower yields than NP, POLY4 and MOP+Kieserite numerically at 4, 5, and 4 out of 5 locations respectively (Figure 1).

• No significant differences between NP, POLY4 or MOP+Kieserite were observed at all locations. However, POLY4 recorded numerically higher yield than NP at 4 out of 5 responding locations. The average difference across the locations was 218 kg ha−1 (Figure 1).

• In comparison, MOP+Kieserite recorded numerically higher yields than the NP treatment at 3 out of 5 responding locations. The average difference across the locations was 53 kg ha−1 (Figure 1).

• POLY4 recorded numerically higher vigour than NP, MOP and MOP+Kieserite at 4, 3 and 1 locations out of 6 respectively.

• POLY4 significantly increased yield at 1 of 5 responding sites and numerically enhanced yield at 5 of 6 sites under the Southern Highland conditions of Tanzania. MOP+Kieserite generally performed in a similar way to POLY4, indicating the significance of sulphur nutrition when looking to increase corn grain yield.

CONCLUSION

• Straight MOP application did not increase corn grain yield at any of the six locations tested, but significantly depressed yield in one instance. MOP recorded numerically lower yields than the NP treatment in 4 out of 6 instances.

• POLY4 significantly increased yield at 1 of 5 responding sites and numerically enhanced yield at 5 out of 6 sites under the Southern Highland conditions of Tanzania. MOP+Kieserite generally performed in a similar way to POLY4, indicating the significance of sulphur nutrition when looking to increase corn grain yield.

• Comprehensive research including tissue and post-harvest soil nutrient analysis is essential for confirming, explaining the reasons and mechanisms of the observed results.