The response of UK grown silage corn to polyhalite fertilizer

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Background

- Polyhalite is a naturally occurring evaporative mineral containing 12% K, 19% S, 12% Ca and 4% Mg;
- The fertilizer value of polyhalite has long been recognized but the discovery of large reserves, circa 220 million tonnes, in the UK has prompted a re-evaluation of its use as a source of plant nutrients;
- The aim of the study was to examine the performance of polyhalite on silage corn with comparison to other commercial potassium fertilizers; sulphate of potash (SOP) and potassium chloride/muriate of potash (MOP).

Granular polyhalite fertilizer

Field trial

- A replicated field trial was established at Warwick Crop Centre in May 2014 and harvested in October 2014;
- Soil nutrient status at drilling: adequate P (36 mg/l), low K (157 mg/l), adequate Mg (157 mg/l); Ca (1554 mg/l);
- All fertilizer treatments were applied at drilling (May 2014);
- All plots received 100 kg N/ha (as ammonium nitrate) split equally in two equal applications (May and June 2014).

Treatments

- **Control**. No K_2O or SO_3
- Polyhalite (**PH**) at 75, 150, 225 & 300 kg/ha K_2O
- Sulphate of potash (**SOP**) at 75, 150, 225 & 300 kg/ha K_2O
- Potassium chloride (**MOP**) at 75, 150, 225 & 300 kg/ha K_2O

Figure 1 – Total Dry Weight yield (t/ha)

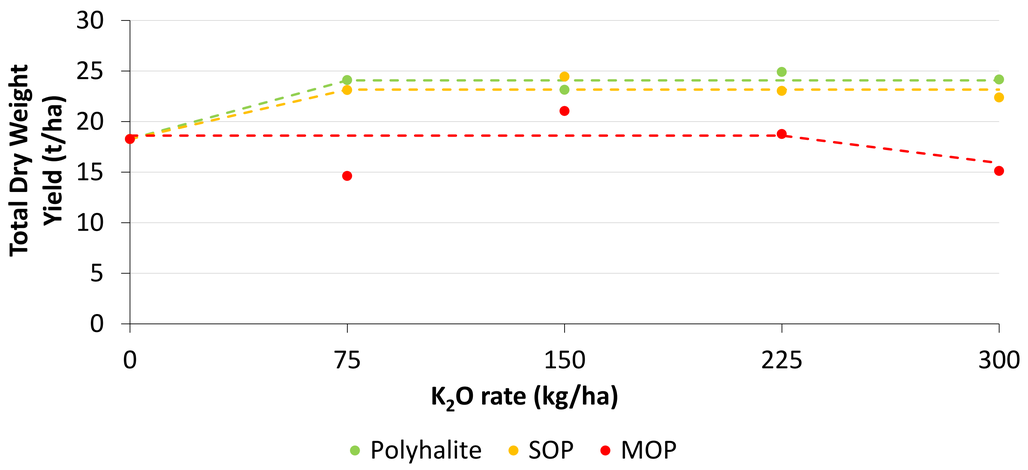

Table 1 – Average Total Dry Weight yield (t/ha) and nutrient uptake (kg/ha) with 95% confidence Tukey results as letters

Treatment	Total DW yield (t/ha)	K uptake (kg/ha)	S uptake (kg/ha)	Ca uptake (kg/ha)	Mg uptake (kg/ha)
Control	**18.3_a**	**195_a**	**14.3_{ab}**	**35.9_{ab}**	**26.1_{ab}**
PH	**24.1_b**	**238_b**	**19.9_b**	**42.4_b**	**35.1_c**
SOP	**23.2_b**	**224_{ab}**	**18.5_{ab}**	**38.5_{ab}**	**31.8_{bc}**
MOP	**17.4_a**	**185_a**	**13.3_a**	**29.0_a**	**24.1_a**
***p* value**	**<0.001**	**0.024**	**0.004**	**0.003**	**<0.001**

Results

- PH and SOP significantly out yielded the control and provided comparable crop performance ($p<0.001$);
- MOP performed poorly. Given its relatively low S uptake, it is likely that availability of S might have been a limiting factor to yield;
- K uptake was significantly different PH , MOP and control but similar to SOP ($p = 0.024$);
- S uptake for PH and SOP was higher compared to MOP and the control;
- PH recorded the highest Ca and Mg uptake.

Conclusions

- Overall, silage corn responded positively to the application of both K and S;
- Polyhalite is an effective source of both K and S as measured by crop yield and nutrient uptake;
- Polyhalite is comparable in performance to SOP and better than MOP;
- Based on Ca and Mg uptake, there may some synergy between the nutrients in polyhalite that enhances silage corn performance.

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