Polyhalite use in pasture
Maize and grass integrated system fertilized with polyhalite and KCl
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Introduction

Crop-livestock integrated systems (CLIS) have been used as a strategy of sustainable agricultural intensification which integrates annual crops and livestock activities on the same area and in the same season.

Providing an adequate supply of nutrients is important for high yields and is essential to maintain high quality and profitable yields in integrated systems.

Potassium chloride potash (58 to 62% K2O) is the most potash fertilizer used in Brazil accounting for over 95% of the market.

However, there are other minerals composed of sulfates = langbeinite, kainite, and polyhalite.

Polyhalite (K2MgCa3(SO4)4·2H2O) is a mineral of natural occurrence with large existing deposits and has potential to be a multi-nutrient (ratio of 11.7%-K, 19%-S, 3.6%-Mg, and 12.1%-Ca) fertilizer for forage crop production.

Little information is available for the response of maize and grass to polyhalite.

Polyhalite may provide a slow-release fertilizer source of K, Ca, Mg, and S.

Goal

The objective of this research was to evaluate the effect of K sources fertilizer on maize Piátà grass yield and nutritional status in the ICLS.

Material & methods

• Embrapa Pecuária Sudeste in São Carlos, Brazil (21° 57’S, 47° 50’W, 860 m)
• Growing season of 2016/2017 and 2017/18.
• ICLS: sown with maize (Zea mays cv. AG 8690-Pro3) together with Piátà grass (Urochloa brizantha).

Red-yellow Latosol, i.e. Naplorthox.

Soil testing samples (0-0.2 m):

- pHCaCl2 = 5.6, organic matter = 46 g/dm3, Pmax = 11 mg/dm3, K = 1.5 mmol/dm3, Ca = 36 mmol/dm3, Mg = 14 mmol/dm3, CEC = 72 mmol/dm3. V= 73%; S:SO4 = 5 mg/dm3. 580 g/kg of sand, 46 kg/kg of silt and 374 kg/kg of clay.

Goal

• Lime was not necessary.
• Sowing fertilization: N, 40 kg/ha; P2O5, 140 kg/ha; K2O, 80 kg/ha
• Topdressing fertilizations: N, 100 kg/ha, P2O5, 20 kg/ha; K2O, 100 kg/ha
• Treatments comprised two K sources: polyhalite and KCl (60% K2O), five ratios (polyhalite:KCl).

- K2O levels (0, 50, 10 & 200 kg/ha) with 4 replications:
  - i) Control (no K, S, Mg or Ca);
  - ii) KCl 100%;
  - iii) KCI 87.5% + Polyhalite 12.5%;
  - iv) KCI 50% + Polyhalite 50%;
  - v) KCI 12.5% + Polyhalite 87.5%;
  - vi) Polyhalite 100%;

Introduction

Testings were also efficient in increasing S in soil and exportation of K, Mg, and by polyhalite.

This study demonstrated that polyhalite is an alternative source of K, Ca, Mg, and S and can meet the nutritional requirements of annual crops and pastures in a CLIS for healthy growth and production.

Conclusion

Maize and grass yield obtained with the polyhalite and KCl mixture was significantly higher (p < 0.05) than the control.

The best results of dry matter yield of maize and Piátà grass were obtained with the treatments with the highest ratios of polyhalite.

These values were 20% to 36% higher than the best yield obtained in control (without fertilization).

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