

Polyhalite as an alternative potash source in Brazil

Robert Meakin^{1*}, Kiran Pavuluri¹ and Timothy D Lewis¹

¹ Sirius Minerals, UK

* Presenting author and correspondence: robert.meakin@siriusminerals.com

Abstract

Polyhalite ($K_2SO_4 \cdot MgSO_4 \cdot 2CaSO_4 \cdot 2H_2O$) offers an alternative potash source for Brazilian farmers as an organic multi-nutrient fertilizer. Comprising potassium (14% K_2O), magnesium (6% MgO), calcium (17% CaO) and sulphur (19% S), polyhalite, commercially known as POLY4, might be effective in tropical environments where gypsum is used to condition the soil prior to fertilization. Sirius Minerals and Kemp *et al.* (2016) identified over 2.5 billion tonnes of polyhalite in the UK with an estimated supply of over 50 years. Polyhalite research in tropical environments is inadequate; therefore, research trials are required to determine the effects of polyhalite on a range of broadacre and high value crops.

Field trials in Mato Grosso, Bahia, Minas Gerais and São Paulo states have been established demonstrating polyhalite's effectiveness on corn, soybeans, potatoes, sugarcane and tomatoes. Using local NPK fertilizer recommendations, polyhalite fertilizer plans were evaluated against standard practices. Corn and soybean trials assessed local NPK blends compared to polyhalite NPK blends. Tomato and potato trials were designed as a K rate response study with fixed N and P local recommendations. A sugarcane trial using a liquid start fertilizer compared 1t of gypsum to 0.75t of polyhalite to assess yield, soil conditioning and nutrient retention.

Corn and soybean trials have shown similar yield responses using polyhalite NPK blends. In some situations, results indicate that farmers might be able to apply less polyhalite NPK blend and achieve the same yield as local NPK blends. For tomato and potato trials, results highlight the benefit of using a multi-nutrient fertilizer plan with calcium and magnesium being important inclusions for tomatoes and potato respectively. Sugarcane yields were improved by 9% where polyhalite was used. Increases in soil residues post-harvest were observed for Ca, S, K and Mg highlighting the added value of polyhalite over gypsum in soil conditioning.

References

Kemp, S. J., Smith, F. W., Wagner, D., Mounteney, I., Bell, C. P., Milne, C. J., Gowing, C. J. B. and Pottas, T. L. (2016) 'An Improved Approach to Characterize Potash-Bearing Evaporite Deposits, Evidenced in North Yorkshire, United Kingdom', *Economic Geology*, 111(3), pp. 719–742. doi: 10.2113/econgeo.111.3.719.