Polyhalite: a new multi nutrient fertilizer with sulphur, potassium, magnesium and calcium - for better nitrogen use efficiency

Imas, P., ICL Fertilizers, Israel, Morell, F.J., ICL Fertilizers Europe

Polyhalite: 4 nutrients in one single fertilizer

- Balanced supply of available N and S is essential for the synthesis of proteins from the precursor amino acids.
- A lack of S limits the production of two of the amino acids which are required constituents of all proteins – cysteine and methionine.
- The deposition of S from industry to agricultural land was historically well in excess of crop and animal requirements. Thus, S was not discussed as a crop nutrient. However, nowadays the S emissions had declined sharply and the need for S fertilizer is recognized and applied by many growers.
- Most of the fertilizer S requirement to date has been met using ammonium sulphate. Containing both N and S, this is a useful product for use on crops which require both nutrients, but ammonia volatilisation may be a concern in soils with pH > 7 (Powlson, 2019). On the other hand crops like legumes which, because of their Rhizobial associations, do not need any N fertilizer. Polyhalite can effectively supply S, with a performance equivalent to well-established S fertilizers (Dugast, 2015).

Polyhalite from Boulby mine: Polysulphate®

- Polyhalite has the additional benefit of three other essential nutrients – K, Mg and Ca – is thus a useful fertilizer for many soil and crops with these requirements (Vale, 2016; Yermiyahu et al., 2017).
- High quality forage: In a leguminous crop, a Lucerne trial in Scotland, the N:S ratio in the Polysulphate® treatment was improved to the 12:1 target value required for optimal digestibility, while at the same time the crude protein content improved by about 10%.
- Baking quality: In wheat trials in USA, application of Polysulphate® resulted in smaller N:S ratios in grains inferring better baking quality for optimum dough and bread making properties.
- Nutritional value: S deficiency or an N surplus may lead to asparagine and glutamine accumulations. During the baking process, free asparagine may promote acrylamide synthesis, a compound considered to be a neurotoxin and potential carcinogen. Thus, Polysulphate® not only increases wheat yield but also promotes a more nutritional processed product.

References

Figure 1. Release of sulphate in Polysulphate (granular grade), versus other S sources (Jiang et al., 2016)

- Polyhalite has prolonged nutrient availability

Figure 2. Depth to bedrock and Potash and Polysulphate mine levels.