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ADAPTATION OF POTASSIUM FERTILIZATION IN CALCIUM (LIME) DEFICIENT SOILS – EXPERIMENTAL AND STATISTICAL EVALUATION

ABSTRACT

The application of lime to soils is obligatory when either the soil calcium content or the pH value is low. But liming is known to affect nutrient extractability from the soil and nutrient availability to plants. Such effects are not yet considered in current fertilizer recommendation systems. Therefore, the influence of lime on the extractability/availability of potassium (K) was investigated with field trials in 62 lime deficient and equal environments in Germany. 24 weeks after the application of 3 and 12 t CaO ha⁻¹ the soil nutrient content was analyzed using electro-ultrafiltration. Subsequently, sugar beet was grown in 10 of the 62 environments with a varied K fertilization. The yield of beets and tops was measured and quality parameters and nutrient contents were determined. A principle component and a cluster analysis was applied to soil analysis data of the 62 environments before trial establishment in order to compact data and to identify groups of environments. The statistical evaluation resulted in two groups of clusters. The first group (G1236) comprised environments with low calcium contents, the second group (G45) contained lime deficient environments with higher calcium contents. In G1236 the soil K content increased 24 weeks after the application of lime by 1.8 mg (100 g)⁻¹ whereas in G45 the soil K content remained unchanged after liming. The K content of sugar beet was not influenced due to liming neither in tops nor in beets. However, in G45 the K uptake decreased after liming without a compensatory K fertilization. Over all, the differentiation of equal environments was achieved and enables the improvement of the fertilizer recommendation.
