IN-SOIL POTASSIUM SENSOR SYSTEM

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Potassium is a versatile nutrient involved in plants in many metabolic processes such as enzyme activation, osmotic control of the water economy, carbohydrate production and the anion/cation balance. It plays an important role in processes that ensure carbon assimilation, and also in the transportation of photosynthates throughout the plant for its growth and in the storage of sugar and proteins. Furthermore, the presence of this cation in sufficient amounts ensures resistance to frost, drought and certain diseases. Potassium is necessary during all stages of growth, specially, in the development of fruit. A deficiency of potassium is observed in older leaves that turn dark yellow and die.

This nutrient is a key agriculture parameter due to their influence on the crop growth, for that reason, the aim of this work is the development of a analytical procedures that can provided *in-situ* chemical information of this cation. Knowledge acquired about soil condition using in situ monitoring can optimise the addition of fertilisers and minimize their environmental impact [1].

A potentiometric method based on potassium ion selective electrode was developed. The sensors were produced using the graphite-epoxy composites and PVC ion selective membranes [2] and a copper track was used as the reference electrode [3].

A two-stages electronic circuit was developed to operate with these sensors. This instrumentation enabled automated measurements that were contained three ion selective electrodes to measure potassium at depths of 15, 30 and 60 cm respectively. A current follower circuit was connected to the sensors and placed inside the tube. The amplifier was placed in an airtight box located in the upper part of the probe.

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The composition of the PVC membrane was (in w/w): 30 % PVC (Fluka), 67 % plastificant (DOS) (Fluka), 2.5 % of potassium ionophore (Valinomicine), and 0.5% of an ionic additive.

The analytical system was evaluated in field showing good performance in that condition. Extracts of soil samples analysed by Atomic Emission Standard Method (FAAS) were compared with results from the probe [4]. Results obtained demonstrate its viability for agricultural applications and simultaneously allow us to validate the instrumentation developed to measure the potential, to store the data and transmit them via ratio.

References.

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