

# **Factors considered for possible management of nutrients in soil using EC sensor**

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Precision agricultural management system for nutrients is required to enhance crop yield and prevent contamination of surrounding environments. However, there is no in-situ based sensor for direct measurement and monitoring of nutrients in soil. Instead, commercial sensor for soil electrical conductivity (EC) can be used for nutrient monitoring because EC is related to nutrients in soil solution. Although EC can be used for the estimation of available nutrients in soil, EC is affected by several soil factors including soil organic matter, texture, and water content. Therefore, the objective of this study is to evaluate factors to be considered when soil EC sensor is used for monitoring nutrient levels in soil. Ten soil samples with various properties were selected and saturated with water. To evaluate the effect of organic matter on soil, humic acid and manure were added to the soil. The EC of the soil was monitored in accordance with volumetric water content while drying the soil. Soil EC values linearly decreased with decreasing volumetric water content at 10-25% indicating that EC can be calibrated against soil water content. The EC increased when organic matter was added to soils and EC calibration factor for water content also increased. The sensor EC values in sandy loam soil and loam soil were related to nutrient contents in pore water and exchangeable nutrients in soil, respectively. The principal component analysis showed that sensor EC values were highly related to organic matter and K contents in soil. Therefore, EC sensor can be used to monitor plant available nutrient levels in soil for precision agricultural management.