

Soil tests as a tool for monitoring soil variability in crop production: Bibliographic analysis

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ABSTRACT

Soil properties significantly impacts crop productivity. Soil properties vary by geographical location, climate, management practices, among other factors. Therefore, understanding latest the focus of research on soil variability monitoring becomes paramount. The objective of this review was to identify the latest research focus on soil tests as a tool for monitoring soil variability globally. Literature was searched in Scopus database covering 2020-2023. Data was exported and analyzed using Vosviewer software. In total, 815 documents were retrieved comprising of research, review and conference articles, and books. Results showed increased investigations in soil variability monitoring. Countries such as China, USA, Canada, India, Australia, and France were leading in soil variability monitoring using soil tests. In Africa, Ethiopia, Kenya, South Africa, Morocco, Nigeria, Egypt and Tanzania led in soil testing and monitoring. Broadly, funding of soil monitoring research was from America and Asia. The main soil changes monitored were; soil nitrogen, phosphorus, potassium, organic carbon, moisture and microorganisms. Agricultural robots were utilized to perform certain soil testing processes. Remote sensing and machine learning were utilized to predict future soil property changes. The major limitation in the use of these technologies was the costs involved. Generally, continuous soil nutrient monitoring is necessary to increase nutrient use efficiency and agronomic efficiency, reduce environmental pollution and ensure sustainable use of soil resources for crop production. Therefore, it is recommended that countries develop mobile precision equipment that are cost effective and user friendly for sustainable soil monitoring.

Keywords: Monitoring, remote sensing, soil tests, soil variability