

****PAPER TITLE:** Smart Farming Revolution: Portable and Real-Time Soil Nitrogen and Phosphorus Monitoring for Sustainable Agriculture**

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****PROBLEM MENTIONED/SOLUTION OBTAINED:****

The paper addresses the challenge of inefficient soil nutrient assessment in agriculture, particularly regarding nitrogen and phosphorus levels. Traditional methods are expensive and time-consuming, leading to imprecise fertilizer application. The proposed solution is a chip-level colorimeter integrated into a handheld device, capable of real-time soil analysis. This enables farmers to optimize crop yield and minimize fertilizer use efficiently.

****TOOLS USED/IMPLEMENTED:****

- Arduino Uno
- IoT
- LDR (Light-Dependent Resistor)
- LED (Light-Emitting Diode)
- Macro-nutrient sensors

****RESULTS AND DISCUSSION:****

The research successfully developed a portable and real-time soil nutrient monitoring device using modern sensor technology and IoT. Test samples from various farmlands were collected and validated against laboratory analysis using spectrophotometers. Statistical analysis confirmed significant differences between group means, supporting the efficacy of the device in soil nutrient assessment.

****IMPORTANT REFERENCE:****

The study demonstrates promising environmental and biological applications of the developed technology, offering a cost-effective and efficient solution to soil fertility management in agriculture.