INTERNATIONAL CONFERENCE ON RESEARCHES IN ENGINEERING, SCIENCE, MANAGEMENT AND HUMANITIES (ICRESMH – 2025)

Delhi, India on 27th April, 2025

CERTIFICATE NO : ICRESMH /2025/C0425426

Nitrogen and Temperature Sensing Through Chlorophyll Mapping in Precision Agriculture

Saudagare Pushpaja Vilasrao

Research Scholar, Department of Electronics & Communication Engineering,
P.K University, Shivpuri, M.P., India.

ABSTRACT

Precision agriculture aims to enhance crop productivity and sustainability through accurate monitoring of plant health and environmental conditions. Among the critical factors influencing crop growth, nitrogen availability and temperature variation play a decisive role in determining photosynthetic efficiency, biomass accumulation, and final yield. Traditional field-based assessment methods are often time-consuming, labor-intensive, and limited in spatial coverage. This seminar presents an advanced sensing framework that utilizes chlorophyll maps to monitor nitrogen status and temperature stress in crops under precision agriculture systems. Chlorophyll content serves as a reliable physiological indicator of nitrogen concentration in plant tissues because nitrogen is a major component of chlorophyll molecules. By generating high-resolution chlorophyll maps through multispectral imaging, drone-based remote sensing, or satellite data, spatial variability in nitrogen levels can be accurately detected across agricultural fields. Simultaneously, thermal imaging techniques are integrated to capture canopy temperature variations, enabling early identification of heat stress conditions that directly affect crop metabolism and nutrient uptake. The proposed approach combines image processing, geospatial analysis, and machine learning techniques to correlate chlorophyll intensity with nitrogen deficiency and temperature fluctuations. This integrated sensing system facilitates real-time decision-making for site-specific fertilizer application and climate-responsive crop management. By optimizing nitrogen use efficiency and mitigating temperature-induced stress, the system contributes to improved yield, reduced input costs, and enhanced environmental sustainability. The study highlights the potential of chlorophyll mapping as a non-destructive, scalable, and cost-effective solution for intelligent nutrient and temperature monitoring in modern precision agriculture.

Keywords: *Chlorophyll, Nitrogen, Temperature, Remote Sensing.*