

**INVITED ARTICLE**  
**Unveiling the Potential of Unmanned Aerial Vehicles (UAVs) in Precision  
Agriculture: An Overview**

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**ABSTRACT**

Precision Agriculture (PA) relies heavily on advanced tools and technologies to monitor soil and crop variability both within and between fields. By employing site-specific management, this approach aims to optimize agronomic inputs and achieve higher productivity. The integration of Remote Sensing (RS) technology marks a crucial juncture for PA, propelling the adoption of Variable Rate Technology (VRT). RS technology provides essential spatial input metrics, such as soil nutrients, crop conditions, weed and disease infestations, and yield, among other things. These measures facilitate the implementation of site-specific input application rates, a fundamental goal of the PA. Farm management is aided by various technologies, each with its own advantages and disadvantages. Ground-based proximal RS systems are confronted with accessibility and coverage scale limitations, while satellite systems are confronted with issues such as cloud cover and coarse resolution. In contrast, unmanned aerial vehicles (UAVs) remote sensing offers a promising solution, potentially surmounting the constraints of ground-based and satellite RS. UAVs are a preferred choice due to their exceptional resolution, detailed vegetation insights, multi-angle observations, and growing acceptance among the research community and industry stakeholders. However, the use of UAVs in agriculture is still a costly investment, especially for small farmers, which makes it inaccessible to them. Moreover, the absence of a standardized method or workflow for the use of UAVs in precision agriculture deters their widespread adoption. This article provides an overview of the advancements and potential applications of UAV in precision agriculture, while highlighting the obstacles to widespread adoption.

**Keywords:** *Precision agriculture, remote sensing, unmanned aerial vehicle, sensors*