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Popular Article

Precision Farming in Andhra Pradesh: Current Progress and Future Directions

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Abstract

Precision farming, which integrates cutting-edge technologies like drones, AI, IoT sensors, and satellite imagery, is rapidly transforming agriculture in Andhra Pradesh. With a robust policy push and the success of initiatives such as Community Managed Natural Farming (APCNF), the state has emerged as a frontrunner in digital agriculture. This article examines the evolving landscape of precision farming, highlighting major government programs like APAIMS 2.0 and the Kisan Drone initiative, as well as the deployment of smart irrigation, IoT-based monitoring, and satellite analytics. Institutional collaborations and private sector participation are accelerating innovation and accessibility, while early outcomes point to improved input efficiency, higher yields, and enhanced environmental sustainability. Despite challenges related to cost, infrastructure, and digital literacy, Andhra Pradesh is addressing them through strategic subsidies, training programs, and public–private partnerships. The state's integrated and inclusive approach positions it as a model for precision farming adoption in India's smallholder-dominated agricultural economy.

Key words: Precision farming, Andhra Pradesh, APCNF, Sustainability

Introduction

According to Robert et al. (1995), precision farming is defined as information and technology based agricultural management system to identify, analyze and manage site-soil, spatial and temporal variability within fields for optimum profitability, sustainability and protection of the environment. Precision farming approach is required to ensure that the requisite resources for crop growth are available and crop protection needs are met without deficiency or excess at each point in time during the growing season (Patil and Shanwad, 2009). Precision farming shift allows farmers to save time and money and helps them offset the rising cost of chemicals, nutrients, fuel and fertilizer (Subrata and Atanu, 2013).

Precision farming, leveraging technology such as drones, AI, IoT sensors, and satellite analytics has emerged as a transformative force in Andhra Pradesh's agricultural sector. Amid traditional practices and the success of Community-Managed Natural Farming (APCNF), the state government has accelerated the integration of digital tools to increase productivity, improve resource efficiency, and foster climate resilience. This article evaluates the existing ecosystem, technological interventions, impact, challenges, and future outlook of precision farming in Andhra Pradesh.

1. Policy Framework and Institutional Support

a) APAIMS 2.0: A Comprehensive Digital Platform

Announced in June 2025, **APAIMS 2.0** (Andhra Pradesh Agriculture Information Management System) is poised to fully digitize agricultural operations from Kharif 2025. Built on AI/ML frameworks, APAIMS 2.0 facilitates plot-level advisories, pest and disease alerts, real-time notifications, e-market integration, and streamlined subsidy and insurance workflows

b) Smart Precision Policies in the 2025–26 Budget

The 2025–26 state budget allocated ₹48,341 crore to agriculture, with explicit emphasis on smart and precision technologies.

Initiatives include:

- **APSS App**: for AI/ML-based pest/disease detection
- **e-Panta** and farmer registries for crop monitoring
- **Kisan Drone Technology** via custom-hiring centers

2. Deployment of Key Technologies

2.1 Kisan Drone Program

A total of **875 Kisan Drone Centers** will be operational during Kharif 2025, subsidizing drone purchase (40–80%) for farmers and SHGs.

The Centre has additionally allocated **90 drones** under the "Namo Drone Didi Yojana," primarily to women self-help groups, promoting rental-based usage.

Andhra Pradesh MSME Minister recently distributed 24 drones in Vizianagaram, highlighting their role in significantly reducing fertilizer and seed costs.

2.2 Smart Irrigation and IoT Sensors

Pilot projects deploying **soil-moisture sensors** and automated drip irrigation systems have been initiated in Chittoor, Kadapa and other drought-prone districts, optimizing water consumption—a vital concern for water-stressed agricultural zones.

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2.3 Satellite and Drone Monitoring Ecosystem

The state has partnered with private agri-tech platforms to utilize **remote sensing and satellite imagery** for field-level decision-making. These tools allow for:

- **Crop health tracking** using vegetation indices (e.g., NDVI)
- **Early warning systems** for drought or pest outbreaks
- **Yield estimation** and planning based on real-time data

Drone technology is being adopted at scale through both government and private sector initiatives:

- The **Kisan Drone Program** aims to deploy **875 drone centers** by Kharif 2025, offering subsidized drone services to farmers.
- At the **Amaravati Drone Summit 2024**, the government showcased the use of drones in **fertilizer spraying**, **seed broadcasting**, and **crop scouting**. The summit also attracted investment proposals worth approximately ₹2,000 crore, signaling strong private sector interest.
- Local drone service providers, such as **AgriWings**, are now offering on-demand drone spraying and monitoring services across key agricultural districts.

3. Institutional & Private Sector Collaborations

The expansion of precision farming in Andhra Pradesh is being actively supported through strategic partnerships between the government, research institutions, and private agri-tech companies.

a) Public–Private Partnerships (PPPs)

To catalyze technological adoption across the agriculture value chain, the Government of Andhra Pradesh has established a Public–Private Partnership for Agriculture Value Chain Development (PPPAVCD) Committee. This initiative facilitates:

- **Collaborative investment** in precision tools and infrastructure
- **Value chain integration**, including processing, storage, and market access
- **Skill development** through joint training and technology demonstration programs
- Research and Training Institutions

Agricultural universities, such as Acharya N.G. Ranga Agricultural University (ANGRAU), play a pivotal role in developing and testing precision tools tailored for local agro-climatic conditions. The university, in collaboration with private drone manufacturers and IoT developers, supports:

- Field trials for sensor-based irrigation and drone spraying
- Capacity-building workshops for extension agents and farmers

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- Curriculum upgrades incorporating digital agriculture

b) Private Sector Engagement:

Startups and agri-tech firms are actively deploying scalable solutions in collaboration with the state. Companies such as **AgriWings**, **Cropin**, and **Fasal** provide services ranging from satellite crop diagnostics and drone-based spraying to AI-driven farm advisory platforms. These entities work closely with Farmer Producer Organizations (FPOs) to deliver affordable and localized solutions.

4. Impact and Early Outcomes

Initial implementation of precision farming technologies in Andhra Pradesh has yielded promising results, both economically and environmentally.

i. Agronomic and Economic Benefits:

a) **Input efficiency**: Drone-based spraying has led to **reductions of 25–50%** in pesticide and fertilizer use, while improving uniformity and coverage.

b) **Water savings**: Smart irrigation systems have demonstrated up to **40% reduction in water use**, particularly in high-stress zones like Rayalaseema.

c) **Yield improvements**: Farmers utilizing satellite-based advisories report **20–30% increases in crop yields**, particularly for paddy, cotton, and groundnut.

ii. Adoption and Accessibility

The state's **drone rental model**, backed by 40–80% government subsidies, has enhanced access for small and marginal farmers who could not afford advanced technologies.

Digital tools such as **e-Panta** and the **AP CM APP** have seen widespread uptake, offering farmers real-time data on crop status, market prices, and input recommendations in local languages.

iii. Environmental Sustainability

By minimizing chemical input use and encouraging data-driven decisions, precision agriculture is contributing to improved **soil health**, reduced **runoff pollution**, and better **climate resilience** - supporting the state's broader sustainability goals in alignment with the APCNF initiative.

5. Challenges and Mitigation Strategies in Precision Farming Adoption

Challenges	Strategic Response
High Capital Investment	The Government of Andhra Pradesh offers subsidies ranging from 40% to 80% for precision technologies, including drones and IoT systems, supported through public funding initiatives

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Digital Literacy gap	Skill development programs are being conducted through institutions such as Acharya N.G. Ranga Agricultural University (ANGRAU) and private partners like "Drogo Drones", focusing on the operational training of farmers and extension personnel.
Infrastructure Constraints	Pilot projects are being implemented through Public–Private Partnerships (PPP) to improve digital connectivity and rural infrastructure in targeted agricultural zones
Regulatory compliance	The state is adhering to DGCA-approved protocols for drone operations, including empanelment procedures and standardization frameworks to ensure safety and compliance

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