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# Empowering farmers through mobile applications: An assessment of their role in crop improvement

**Abhashdeep Kakoty[1], Ojas Jyoti Borah Hazarika[2], Aditya Borah[3], Ayan Hazarika[4] and Pallabi Das[5*]**

[1,2,3,4] PG Scholar, Department of Extension Education, College of Agriculture, Assam Agricultural University, Jorhat-785013, Assam

[5] Assistant Professor, Department of Extension Education, College of Agriculture, Assam Agricultural University, Jorhat-785013, Assam

## Abstract

The rapid expansion of mobile-based platforms has transformed agricultural extension and advisory services, providing farmers with real-time access to information, markets, and decision-support systems. These platforms have emerged as vital tools in bridging the information gap and enabling farmers to adopt improved crop management practices. This paper critically examines the role of mobile-based platforms in enhancing crop productivity and profitability. Drawing from existing literature, case studies, and field-level interventions, it highlights how mobile applications, SMS services, voice-based advisories, and interactive digital platforms have empowered farmers with knowledge on weather forecasts, pest and disease management, soil health, and improved crop varieties. The study concludes that mobile-based platforms play a pivotal role in crop improvement by facilitating timely decision-making, reducing input costs, and enhancing yields, though challenges such as digital literacy, network connectivity, and localized content delivery remain significant barriers.

***Keywords:*** Digital agriculture Mobile platforms, Crop improvement, Farming community.

## Introduction

Agriculture is the key strength of rural livelihoods in India and many developing countries. Agriculture remains a cornerstone of India's economy, employing nearly 45 percent of the workforce and contributing around 18 percent to the national GDP as of 2025. Despite rapid urbanization and industrial growth, rural livelihoods continue to depend heavily on farming. The sector is witnessing a technological shift, with over 60 percent of farmers now using mobile apps for weather updates, market prices and crop advisories. Government initiatives

like the Pradhan Mantri Krishi Sinchayee Yojana and the National Mission on Natural Farming have expanded irrigation coverage to 62 percent and promoted sustainable practices. However, challenges such as climate variability, fragmented land holdings and post-harvest losses persist, underscoring the need for continued innovation and policy support along with limited access to extension services, unreliable weather forecasts and lack of timely information on pest outbreaks and markets. Traditional extension services while important, are often less impactful in addressing the needs of the farmers.

The invention of various Information and Communication Technologies (ICTs), particularly mobile applications has revolutionized agricultural extension services in India. With over 1.2 billion mobile connections and smartphone penetration exceeding 60 percent in rural areas by 2025, mobile phones have emerged as a powerful tool for disseminating personalized, real-time and agro-ecological situation specific information to farmers. These platforms bridge the gap between scientific research and field level implementation, offering farmers access to weather forecasts, pest alerts, market prices and crop advisory services at their fingertips.

Mobile based platforms have enabled farmers to make informed decisions about crop selection, irrigation scheduling and fertilizer application. Mobile apps have significantly improved user engagement and satisfaction, with over 24 percent of farms in India now using crop specific apps to enhance productivity. These apps leverage satellite imagery, AI-driven diagnostics and IoT sensors to monitor crop health and soil conditions, helping farmers reduce input costs and increase yields. AI-powered advisory tools have been shown to boost agricultural output by up to 30 percent, while reducing water usage by 40 percent and post-harvest losses by 25 percent.

Government initiatives such as the *Digital Agriculture Mission* and partnerships with Agri tech startups have further accelerated the adoption of mobile technologies in farming. These efforts aim to democratize access to agricultural knowledge, especially for smallholder farmers who constitute over 85 percent of India's farming community. As climate change and resource constraints challenge traditional farming methods, mobile based platforms offer scalable, data-driven solutions for crop improvement and sustainable agriculture. Therefore, studying their impact is not only timely but essential for shaping the future of Indian agriculture.

**Important mobile based application used it agriculture**

1. ***Kisan Suvidha***: It is a flagship mobile application launched by the Government of India to empower farmers with timely and relevant agricultural information. Developed by the Department of Agriculture & Cooperation under the Ministry of Agriculture and

Farmers Welfare, this app serves as a one stop digital platform offering a wide array of services including real time weather forecasts, market prices, fertilizer and pesticide recommendations, seed variety details and expert advisories. Available in multiple Indian languages, the app ensures accessibility across diverse linguistic regions, helping farmers make informed decisions tailored to their local conditions. One of the standout features of Kisan Suvidha is its region-specific crop management tips, which guide farmers on optimal sowing dates, irrigation schedules and harvesting timelines based on agro-climatic data.

2. ***IFFCO Kisan App***: It is widely adopted digital platform developed by IFFCO Kisan Sanchar Ltd., aimed at transforming agricultural extension services for Indian farmers. Launched in 2015, the app delivers market-related information, weather updates and agronomic advisories through SMS and voice messages in more than 11 regional languages, ensuring accessibility even for farmers with limited literacy or internet access. One of the app's most impactful features is its pest and disease outbreak alert system, which uses real-time data and predictive analytics to notify farmers about emerging threats in their fields. These alerts are tailored to specific crops and agro-climatic zones, enabling timely interventions that can prevent significant yield losses. According to a 2025 report in *Agri Magazine*, farmers using IFFCO Kisan's pest monitoring tools reported a 20-25 percent reduction in crop damage, especially in high-risk crops like cotton and paddy.

3. ***Plantix***: It is a farmer's friendly, AI powered mobile application designed to revolutionize crop health management through image-based diagnostics. Developed by the German aggrotech company PEAT GmbH, Plantix enables farmers to simply upload a photo of the affected crop area, after which the app uses advanced machine learning algorithms to identify diseases, pest infestations and nutrient deficiencies. Once diagnosed, the app provides tailored solutions, including treatment recommendations and preventive measures, helping farmers take timely action to protect their yields. As of 2025, Plantix has been downloaded by over 25 million farmers worldwide including 60,000 agri retailers in India and is available in 18 languages, making it highly accessible across diverse linguistic and regional backgrounds. The app has expanded its diagnostic capabilities from an initial 30 combinations to nearly 800 crop pest disease scenarios covering over 60 different crops.

Field trials in India have demonstrated a diagnostic accuracy of 85-90 percent, significantly improved early detection and reduced crop losses.

4. ***Meghdoot:*** It is a mobile application developed jointly by the India Meteorological Department (IMD) and the Indian Council of Agricultural Research (ICAR), designed to deliver localized weather based agro-advisories to farmers across India. Launched under the Digital India initiative, Meghdoot provides five-day weather forecasts**,** crop specific advisories and alerts on extreme weather events such as droughts, floods and hailstorms, all in regional languages, ensuring accessibility for farmers in diverse linguistic zones. By integrating meteorological data with agricultural models, the app helps farmers make informed decisions on sowing, irrigation, fertilization and harvesting, thereby reducing the risk of crop failure due to unpredictable weather. As of 2025, Meghdoot has reached over 8 million users, with active engagement in states like Maharashtra, Punjab and Tamil Nadu. Studies have shown that farmers using Meghdoot advisories have experienced a 12-18 percent increase in crop productivity and a 25 percent reduction in weather-related losses, particularly in rainfed areas. The app also includes features like soil moisture status, wind speed and humidity levels**,** which are crucial for managing sensitive crops such as pulses, cotton and horticultural produce.

5. **E-NAM Mobile App:** It is a transformative digital tool developed under the National Agriculture Market (e-NAM) initiative by the Government of India, aimed at streamlining agricultural trade and enhancing transparency in pricing. Operated by the Small Farmers Agribusiness Consortium (SFAC)*,* the app connects farmers directly to a nationwide network of 1,473 Agricultural Produce Market Committees (APMCs) as of August 2025. Through its user-friendly interface, farmers can access real-time market prices**,** commodity availability and bid histories, empowering them to make informed decisions and negotiate better deals. According to the Press Information Bureau*,* over 4,392 Farmer Producer Organizations (FPOs) have been onboarded onto the e-NAM platform, enabling small and marginal farmers to aggregate their produce and achieve economies of scale. Moreover, the app supports inter-state and inter-mandi trade allowing farmers to sell beyond their local markets and access competitive pricing.

**Challenges faced by farmers in using mobile apps**

1. ***Limited digital literacy***: Many farmers, especially older ones, struggle with navigating app interfaces and understanding technical terms. A study in Tamil Nadu found that 68.33 percent of farmers lacked familiarity with voice assistants and app navigation.
2. ***Language barriers****:* Although many apps offer regional language support, not all dialects are covered and translations can be inconsistent. This limits accessibility for farmers in linguistically diverse regions.
3. ***High internet costs and connectivity issues:*** 60.83 percent of farmers reported that expensive mobile data plans hindered regular app usage. Rural areas often suffer from poor network coverage, affecting real-time access to advisories.
4. ***Lack of offline functionality****:* Many apps require continuous internet access, which is not feasible in remote villages. 65 percent of surveyed farmers suggested adding offline access to improve usability.
5. ***Insufficient customization and local relevance:*** Generic advisories may not suit local crop varieties or soil conditions. Farmers expressed the need for more regional specific agro advisory services as indicated by 77.5 percent of users.
6. ***Limited multimedia features****:* Absence of visual aids like videos and photo galleries was cited by 73.33 percent of farmers as a major drawback. These features are crucial for understanding complex farming techniques.
7. ***Trust and reliability issues***: Some farmers are skeptical about the accuracy of app-based recommendations, especially when they contradict traditional practices or local expert advice.
8. ***Low awareness and promotion***: Despite government efforts, many farmers remain unaware of available apps. 70.83 percent of users recommended better promotion via social media and local campaigns.

**Conclusion**

Mobile based platforms have undeniably reshaped the landscape of agricultural extension in India, offering scalable, data-driven solutions that empower farmers with timely, localized and actionable information. With increasing smartphone penetration and supportive government initiatives, these tools have enhanced decision-making in crop selection, pest management,

irrigation and market access, ultimately contributing to improved productivity and sustainability. However, the full potential of these technologies can only be realized by addressing persistent challenges such as digital literacy gaps, connectivity issues, language barriers and limited awareness. Bridging these divides requires a multi-pronged approach involving user-centric app design, offline functionality, targeted outreach and capacity-building programs. As India continues to modernize its agricultural sector, mobile platforms will play a pivotal role in ensuring inclusive growth, climate resilience and food security for millions of smallholder farmers.

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