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Mobile applications for real time market information and decision support in horticultural crops

The transformative impact of mobile applications on the horticultural sector, highlighting their role in providing real-time market information and decision support has been well established. With the increasing adoption of smartphones among farmers, mobile based applications have become essential tools for accessing vital data, including weather forecasts, market prices, and crop management practices. By bridging the information gap, mobile apps empower farmers to make informed decisions, enhance productivity, and optimize their operations. User-friendly design, offline functionality, and robust data security are essential features that enhance the accessibility and trustworthiness of these applications, especially for farmers in remote areas. Ultimately, the integration of mobile technology into horticulture represents a significant advancement towards sustainable agricultural practices and improved livelihoods for farmers worldwide.

IN the recent years, Information and Communication Technology (ICT) has proved to be extremely beneficial for farmers and helped them in getting easy access to customized digital information regarding improved varieties, cropping pattern, use of high-yielding seeds, fertilizer application, pest management, marketing, entrepreneurship etc. Digitalization through ICT can have a leading role in the dissemination of right information to needful farmers at right time. There have been some successful initiatives in India, where digitalization of agricultural information was attempted. In most of these projects, agriculture is only a small component. India has gathered successful and enriching experiences with such IT projects like Gyandoot project (Madhya Pradesh), Warna Wired Village project (Maharashtra), Information Village project of the M.S. Swaminathan Research Foundation (MSSRF) (Puducherry), ITC e-Choupal, i-Kisan project of the Nagarjuna group of companies (Andhra Pradesh), Automated Milk Collection Centres of Amul Dairy Co-operatives (Gujarat), Land Record Computerization (Bhoomi) (Karnataka), Knowledge Network for Grass-root Innovations – Society for Research and Initiatives (SRISTI) (Gujarat), application of Satellite Communication for Training Field Extension Workers in Rural Areas (Indian Space Research Organisation).

There has been paradigm shift in digitalization with advent of smart mobile phones. In India, total active telephone (mobile and fixed) subscribers are about 1,169 million, out of which 524.39 million are from rural areas. Since last six years, the share of rural telephone subscribers increased from 40.14% to 44.87% and rural internet subscribers from 92.18 million to 302.35 million, which is a huge increase of 228%. Mobile telephone is the most influential and omnipresent tool of agriculture extension to disseminate information and to give advisories to farmers. Push and Pull SMS, Interactive voice response system, and Kisan Call Centre are the mobile telephony initiatives to cater to the diverse need of farmers and information dissemination. To harness the potential of mobile telephone under National e-Governance Plan-Agriculture (NeGP-A), Ministry of Agriculture and Farmers Welfare, GoI has launched various modes of delivery of e-enabled services including mobile telephony. Mobile applications serve as a one-stop solution for farmers, providing essential information and resources to enhance horticultural productivity.

Mobile-based applications in horticulture

In the past decade, smartphone applications have become invaluable tools for smallholder farmers, bridging the gap between traditional farming practices and the rapidly evolving digital landscape. These apps have transformed how farmers access and share information, leveraging the widespread use of mobile phones and the internet to empower them like never before. The increasing adoption of smartphones among farmers has created new opportunities for accessing vital information. With mobile technology, farmers can obtain real-time data, track market trends, and receive timely weather alerts. Specifically designed mobile applications for horticulture offer an accessible means for farmers to optimize their operations and make informed decisions, enhancing productivity and sustainability.

Real-time weather forecasts: Access to real-time weather forecasts is crucial for effective farming, and mobile

applications have transformed how farmers utilize this information. With localized weather updates at their fingertips, farmers can make timely decisions that directly impact their operations. These apps enable farmers to anticipate and prepare for changing weather conditions, allowing them to take precautionary measures to protect their crops. By receiving alerts about approaching severe weather, farmers can adjust their activities, such as planting or harvesting schedules, to mitigate potential damage. Additionally, accurate forecasts help optimize irrigation practices, ensuring that crops receive the right amount of water at the right time. With access to current weather data, farmers can enhance their productivity and resilience, ultimately leading to better yields and improved food security.

Meghdoot weather App: Meghdoot, a joint initiative of India Meteorological Department (IMD), Indian Institute of Tropical Meteorology (IITM) and Indian Council of Agricultural Research (ICAR) aims to deliver critical information to farmers through a simple and easy to use mobile application. The mobile application was developed by the Digital Agriculture research theme at International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, Telangana in collaboration with IITM, Pune and IMD, Delhi. The app seamlessly aggregates contextualized district and crop wise advisories issued by Agro Met Field Units (AMFU) every Tuesday and Friday with the forecast and historic weather information to the fingertips of the farmers. The advisories are also issued in vernacular languages wherever available.

Efficient and effective market linkages for horticultural crops: Mobile applications have significantly empowered farmers of horticultural crops by transforming market linkages and enhancing price realization. By enabling direct communication between farmers and buyers, these apps eliminate intermediaries, allowing farmers to negotiate prices that accurately reflect the quality and demand for their produce. This direct access ensures that farmers receive a fair share of the profits while consumers benefit from fresh, competitively priced products. These applications also enhance market selection specifically for horticultural crops by providing real-time data on consumer preferences and market trends. With insights into which fruits and vegetables are in high demand, farmers can make informed decisions about where to sell their crops, maximizing their earnings based on current market conditions. Price discovery is further facilitated through these platforms, giving farmers access to information on prevailing prices for various horticultural products in different markets. This transparency enables competitive bidding, allowing farmers to select the best offers from multiple buyers and optimize their income potential.

Meghdoot app interface

e-NAM App: The National Agriculture Market (eNAM) is a ground-breaking pan-India electronic trading portal that connects existing Agricultural Produce Market Committees (APMCs) to establish a unified national market for agricultural commodities. This innovative platform allows farmers to sell their produce directly to buyers across the country, breaking down geographical barriers and promoting fair competition. By providing access to real-time market prices, e-NAM empowers farmers to make informed decisions about when and where to sell their crops, maximizing their income potential. The e-NAM app facilitates seamless transactions by offering features such as online bidding, price discovery mechanisms, and instant payment options. Additionally, it supports the integration of various services like quality testing and warehousing, enhancing the overall efficiency of the agricultural supply chain. With its user-friendly interface and robust support systems, e-NAM aims to transform the agricultural marketing landscape in India, ensuring that farmers receive better prices for their produce while improving overall market transparency.

Kisan Bandi: It is an e-Market place for farmers and a start-up venture introduced by innovative team of technocrats, operating from Navi Mumbai, Maharashtra.

It is designed to conduct direct online marketing among farmers, consumers and traders. Kisan Bandi supports farmer to set the selling price and co-ordinate with farm-based marketing for his produce. Consumers will be in direct reach of farmers for the purchase of bumper produce at reasonable price.

Crop management for horticultural farmers

Mobile applications provide comprehensive crop management tools that enable horticultural farmers to optimize their production processes effectively. These tools include information on seed and seedling availability for transplantation, helping farmers plan their planting strategies effectively. Additionally, farmers can access scheduled fertilizer doses, ensuring that their crops receive the necessary nutrients at the right times based on local conditions. The apps also offer alerts for pest control measures, enabling timely action against potential threats and minimizing damage. By integrating these features, mobile apps empower farmers to make informed decisions, apply precision agricultural practices, and enhance overall productivity.

Arka Bagwani App: The Arka Bagwani app, developed by the Indian Council of Agricultural Research - Indian Institute of Horticultural Research (ICAR-IIHR), Bengaluru, serves as a vital resource for farmers, showcasing a wealth of technologies and research findings tailored to enhance horticultural practices. This user-friendly app provides access to a wide range of information, including best practices for horticultural crop cultivation, pest management strategies, and innovative

Arka Bagwani app

farming techniques. Available in three languages such as English, Kannada, and Hindi, this app aims to reach a diverse audience, ensuring that farmers across different regions can benefit from the knowledge shared.

Mango cultivation app: The mobile app on mango cultivation is developed at Indian Institute of Horticultural Research, Bengaluru. This mobile app has been developed for the benefit of farmers and stakeholders involved in mango cultivation. The application includes crop production including soil and climate requirements, propagation, spacing, planting, training and pruning, integrated nutrient management, irrigation and harvesting. The crop management aspects comprises of disease management for the various diseases affecting mango crops, viz., anthracnose, blossom blight, leaf blight, powdery mildew, dieback etc., and the pest management modules comprises of infestation of fruit fly, mango hopper, stone weevil, mealy bug, shoot borer, stem borer etc.

Papaya cultivation app: The Mobile app on papaya cultivation has been developed at Indian Institute of Horticultural Research, Bengaluru, which provides crop management solutions such as crop production aspects diseasd management, pest management and newly release varieties information.

Cashew India App: The app is developed by the ICAR-Directorate of Cashew Research, Puttur, Karnataka, India with the inputs from centers of All India Coordinated Research Project on Cashew in different states of the country. The app is developed under the program on Mission for Integrated Development of Horticulture (MIDH), Ministry of Agriculture and Farmers Welfare, Government of India. This app serves as a comprehensive resource for cashew farmers, providing valuable information on best practices for cultivation, pest management, and post-harvest techniques. Features include crop management guidelines, disease identification, and treatment recommendations, all aimed at enhancing productivity and sustainability in cashew farming. The app also promotes efficient resource use and helps farmers improve their overall yields. With its user-friendly interface, the Cashew India app empowers farmers to make informed decisions.

Farm Calculator app: The Farm Calculator app is a vital resource for horticultural farmers looking to implement precision farming techniques. Accurate application of inputs such as seeds, fertilizers, and pesticides is essential for maximizing yields while minimizing costs and protecting soil health. This app provides detailed calculations for key agricultural inputs, including NPK (nitrogen, phosphorus, potassium) ratios, pesticide application rates, plant population, and seed rates. Farmers can enter specific details about their crops, planting area, and local soil conditions to receive tailored recommendations for the precise quantities of NPK fertilizers. Additionally, the app helps determine the optimal seed rate for various horticultural crops, ensuring that farmers plant the right number of seeds for effective growth and yield. The pesticide calculator offers guidance on the appropriate amounts and application timings for various pest control products, helping farmers safeguard their crops while minimizing environmental impact. To cater to a diverse farming community, the app is available in seven regional languages, making it accessible to farmers across different regions. This multilingual support ensures that farmers can easily understand and utilize the information provided, empowering them to make informed decisions.

Crop Doctor app: The Crop Doctor app is an innovative android-based mobile application designed to serve farmers at the national level. Its primary objective is to provide wide-reaching and easy access to crucial crop information and services. The app disseminates vital data regarding diseases, insect infestations, and nutrient

Crop doctor

deficiencies across a broad spectrum of major crops, including paddy, vegetables, pulses, and oilseeds. With a user-friendly interface, the app is available in both English and Hindi, ensuring accessibility for a diverse farming community. Farmers can query specific issues by uploading images of affected plants, allowing them to receive tailored solutions for various nutrient deficiencies, diseases, and insect problems. In its latest version, the app has expanded its functionality to include information on agricultural schemes, farm implements, and the latest agricultural news, further empowering farmers with the knowledge they need to make informed decisions.

Enhanced extension services

The provision of extension services has become indispensable for farmers, serving as a link between modern farming methods and rural areas. The introduction of mobile applications has further transformed this sector by enabling professionals to provide support that is not limited by geographical location. Farmers can obtain up-to-date information, professional guidance, and customized solutions for their unique problems by utilizing interactive platforms. Furthermore, by facilitating the sharing of best practices, these apps create a vibrant network of farmer-to-farmer learning. This digital strategy encourages resource conservation and sustainable behaviours in addition to increasing agricultural productivity. The combination of mobile applications and extension services will surely be a key factor in driving global agricultural development as technology develops.

Kisan Suvidha app: Kisan Suvidha is a comprehensive mobile application developed by the Department of Agriculture & Cooperation, Ministry of Agriculture and Farmers Welfare, designed to provide timely information to farmers across India. Available in multiple Indian languages, the app offers essential features such as real-time weather reports, five-day forecasts specific to users' districts, and alerts for extreme weather conditions. It provides details about local dealers of seeds, pesticides, fertilizers, and farm machinery, as well as market price information for various crops in different *mandis*. The app also includes pest management advice, allowing farmers to upload images of affected crops for expert guidance. Additionally, it offers agro-advisories from local agricultural experts, a direct link to the kisan call centre, information on soil health cards, and details about local cold storage and warehouses.

SUMMARY

Mobile applications for real-time market information and decision support are revolutionizing the horticultural sector. These innovative tools provide farmers with critical resources, such as accurate market insights, weather forecasts, and tailored decision-making support, enabling them to address the complexities of modern agriculture effectively. To maximize their impact, developers should prioritize user-friendly design, offline functionality, and robust data security, ensuring that these applications remain accessible and trustworthy, especially for farmers in remote areas with limited connectivity. As technology continues to evolve, the potential for further advancements in agricultural practices will only grow, significantly enhancing the economic viability of smallholder farmers and contributing to the sustainability of rural economies. This digital transformation is beneficial for individual farmers and essential for advancing global food security and improving the overall livelihoods of those in the horticulture sector. Adopting these tools will pave the way for a more productive and sustainable agricultural future.

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Movable screens in rose production

- Use movable screen, an important tool for rose cultivation.
- It can help growers manipulate environment conditions — lowers temperature, changes humidity and influences production numbers.
- The movable screens can be used year-round and in a variety of climates — from the Netherlands to India.