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ICT-enabled technology delivery for sustainable horticulture

Digital technology is revolutionizing the dissemination of information for promoting sustainable horticulture, providing farmers with timely, region-specific, and actionable insights to improve crop management and resilience. Digital tools such as mobile applications, artificial intelligence (AI), drones, and community radio channels enable farmers to make data-driven decisions that optimize resources and enhance productivity. Mobile advisory platforms, like Pusa mKRISHI, deliver personalized, real-time support to farmers, guiding them in weather-based crop care, pest management, and soil health practices, which collectively improve yield quality and reduce waste. This article presents several success stories illustrating the transformative impact of digital solutions on horticulture. For instance, KVK Gurugram's drone-based spraying demonstrations covered 19 hectares and showcased 80-84% pest reduction in a range of horticultural crops, outperforming traditional methods. Similarly, Digital Green's participatory video learning in Madhya Pradesh improved knowledge dissemination, leading to better adoption of agricultural practices. Community radio has emerged as a vital platform for delivering localized agro-advisories, with data showing higher knowledge retention among listeners compared to non-listeners. Furthermore, the Pusa mKRISHI mobile advisory system exemplifies the importance of personalized, two-way communication in addressing farmers' specific needs, enhancing decision-making and resilience. Collectively, these initiatives demonstrate how digitalization in horticulture is paving the way for sustainable farming and increased profitability for small-scale farmers.

HORTICULTURE, encompassing the cultivation of fruits, vegetables, flowers, and other plants, is vital for global food security and agricultural economies. As the demand for sustainable farming increases, the horticulture sector is embracing digital transformation. Technologies like artificial intelligence (AI), machine learning, drones, IoT (Internet of Things), and mobile apps are becoming essential to modern farming. These tools allow farmers to monitor, manage, and optimize production with enhanced precision. Through digital solutions, farmers can access data-driven insights to tackle climate variability, manage pests, optimize resources, and improve crop quality. Real-time monitoring and predictive analysis also aid in reducing crop losses and boosting productivity. In India, horticulture significantly contributes to the economy, accounting for 33% of agriculture's Gross Value Added (GVA), producing around 355.25 million tonnes of horticultural produce (2023-2024 estimates). The country's digital agriculture and horticulture strategies focus on four key goals: expanding information access, optimizing resource use, strengthening market linkages, and empowering farmers through digital education and training. Digital technologies are driving a shift towards precision farming, data-informed decision-making, and better market connections. Innovations such as remote sensing, satellite imagery, IoT devices, drones, and digital platforms have been pivotal in advancing digital horticulture, offering farmers critical insights into crop management and direct access to markets (Table 1).

The Government of India has launched various initiatives to promote digital agriculture and horticulture. The *Pradhan Mantri Kisan Sampada Yojana* (PMKSY) focuses on modernizing infrastructure, increasing value addition, and promoting agro-processing in the horticulture sector. The National Horticulture Mission (NHM) aims to

improve productivity, quality, and market access for horticultural crops by facilitating technology dissemination, training programmes, and market linkages. Initiatives like Digital India and the *Atmanirbhar Bharat Abhiyan* work towards closing the digital gap, promoting digital literacy, and equipping farmers with digital tools and platforms. The ICAR has compiled over 300 mobile apps from ICAR institutes, State Agricultural Universities, and Krishi Vigyan Kendras (KVKs), which are integrated into a single app, KISSAN 2.0, to provide technical knowledge to farmers. Platforms like Kisan Sarathi offer a two-way, multilingual communication system that connects farmers with agricultural experts to share technology, information, and advice through text, images, audio, and videos. These digital platforms help farmers access market prices and facilitate direct sales, boosting their income. AI-based sorting and grading systems ensure that produce meets quality standards for both domestic and export markets. In regions facing labour shortages, AI-driven robots and drones assist with planting, spraying, and harvesting, increasing operational efficiency. These technological advancements enhance the resilience, profitability, and sustainability of India's horticulture sector, helping farmers meet demand while conserving resources.

Table 1. Overview of digital horticulture technologies – Applications and field-level examples

Technology	Application	Field-Level Examples and Usage	Crops
		Apps/Portals	
Kisan Suvidha App	Provides farmers with essential weather updates, market prices, inputs availability, and expert advice for pest control and disease management. It helps farmers make informed decisions on crop management and resource allocation.	Farmers in states like Uttar Pradesh and Maharashtra use it to track daily weather, especially during critical periods like flowering and fruit set. The app provides mandi prices, helping farmers decide when to sell their crops to get the best prices.	Mango, Citrus and Pomegranate
IFFCO Kisan	This app offers real-time advisory on crop health, market trends, weather forecasts, and even animal husbandry practices. Farmers also receive personalized information regarding irrigation, fertilization schedules, and pest management.	Used extensively by fruit and vegetable growers in Maharashtra and Andhra Pradesh for timely pest control measures and accurate fertilizer application, which has reduced their input costs and improved crop quality.	Fruits and Vegetables
Mango cultivation App	The mobile app on mango cultivation is developed at Indian Institute of Horticultural Research (IIHR), 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 & climate requirements, propagation, spacing, planting, training & pruning, INM, irrigation and harvesting. The crop management aspects comprise of disease management for the various diseases affecting mango crops, viz., anthracnose, blossom blight, etc., and the pest management modules comprise of infestation of fruit fly, mango hopper, stone weevil, etc.	Mango
mKisan Portal	This portal delivers customized information to farmers via SMS and voice messages, including expert advice on pest and disease management, government schemes, and market information.	Farmers across India, especially those growing perishable horticultural crops, benefit from timely advisories on pest control and the weather, helping them mitigate crop losses during adverse weather conditions.	Various horticultural crops (Tomato, Chilli, Onion etc.)
		Artificial Intelligence (AI)	
CropIn (AI-based farm management)	An AI-driven platform offering predictive analytics for crop health monitoring, yield estimation, and pest management. CropIn's real-time data helps farmers optimize their resources, track crop stages, and improve farm operations.	Tomato farmers in Karnataka use this technology to detect early signs of diseases like powdery mildew or blight. The system also helps in making precise irrigation decisions by analyzing soil moisture data, improving yield and reducing water wastage.	Tomato, Grapes and Pomegranate
Intello Labs (Praman)	Praman is a ground-breaking agriculture produce trade exchange platform, with integrated quality assessment. It uses AI to automate the grading and sorting process based on quality parameters such as colour, shape, size, and external defects in fruits and vegetables. It enhances efficiency in post-harvest processes by ensuring uniform quality.	Deployed in Tamil Nadu's tomato and potato farms for sorting and grading produce before it is sent to markets or food processing units. This has improved marketability and ensured farmers get better prices for graded produce.	Tomato, Apple, Potato, Cardamom, Onion and Garlic
Fasal (AI-driven IoT platform)	An AI-enabled IoT platform that monitors weather, soil conditions, and pest activity. It sends farmers real-time alerts and recommendations for irrigation, fertilization, and pest control, based on hyper-local weather predictions and crop-specific data.	Grape and apple farmers in Maharashtra and Himachal Pradesh have integrated Fasal into their farming practices. The platform helps them prevent disease outbreaks like downy mildew by alerting them in advance based on weather conditions, thereby reducing chemical usage.	Grapes, Apple and Pomegranate

Technology	Application	Field-Level Examples and Usage	Crops
Geographic Information System (GIS) and Global Positioning System (GPS)	GIS utilizes drones and satellites to analyze crop position, soil conditions, and fertilization levels, enabling farmers to make informed decisions about crop placement and soil management.	In Himachal Pradesh, apple orchards have been mapped using high-resolution remote sensing data to develop management plans. Geospatial technology helps determine crop yield, quantify fertilizer and irrigation needs, estimate fruit quantity and quality, and manage pests and diseases effectively. In the citrus orchards of Punjab, GIS is being used to map soil fertility levels, track pest infestation zones, and analyze spatial patterns in crop yield. This data allows farmers to optimize fertilizer application and improve orchard management.	Citrus, Apple and Grapes
		Drones	
Garuda Aerospace	Drone technology is used for precision spraying of pesticides, fertilizers, and nutrients, significantly reducing chemical usage and improving crop health. Drones also carry out surveillance and crop monitoring.	Banana and grape farmers in Tamil Nadu and Andhra Pradesh use Garuda drones to spray micronutrients and pesticides over large areas. This reduces human exposure to chemicals, lowers application costs, and ensures uniform coverage, especially in hilly terrains and large orchards.	Banana, Grapes and Pomegranate
Aarav Unmanned Systems	Drones equipped with multispectral sensors capture high-resolution images of fields, helping farmers detect crop stress, nutrient deficiencies, and pest infestations. It facilitates timely intervention and improves yield.	In Maharashtra's mango and citrus orchards, drones help detect early signs of water stress or pest damage by analyzing the reflected light from crops. This information enables farmers to take preventive measures, saving them from potential yield losses.	Mango and Citrus
Skymet Weather Services	Drones are used to gather micro-climatic data to monitor weather patterns and assess crops' vulnerability to extreme weather events like droughts or floods. Over 250 Air Quality Sensors, and 1,000 Lightening Detector Sensors that can detect Lightening to Cloud to Ground which is required to predict the areas under thunderstorms and hailstorms. The data helps farmers plan better and adapt to climate risks.	Pomegranate and orange farmers of Nagpur in Maharashtra use this service to receive alerts on extreme weather conditions. This helps them take precautionary measures such as installing protective nets or adjusting irrigation schedules.	Pomegranate and Orange
		Robotic Harvesters	
Nanovel (Autonomous Tree Fruit Harvestor)	Robots designed for automated harvesting, can pick fruits like apples and citrus based on ripeness. They use sensors and AI to identify ripe fruits and ensure gentle handling to avoid damage.	In California, USA, fruit orchards are testing robotic harvesters for mango and citrus. These robots are capable of working for longer hours and handling labour shortages, reducing harvest time while maintaining fruit quality.	Citrus, Stone fruit, Avocado and Mango
Agribot (Multi-Tasking Agricultural Robots)	Agribot designs multi-tasking robots capable of performing activities such as planting, spraying, and harvesting in horticulture. These robots can be programmed to perform repetitive tasks with minimal human intervention.	In Tamil Nadu, Agribot is being used in lemon plantations for tasks like planting, spraying pesticides, and fertilizers. The robot's precision helps to optimize input usage, minimize wastage, and reduce manual labour in large citrus farms.	Citrus plantations
		Advanced Sensing and Imaging Technologies for Detection of Maturity Indices	
Near Infrared Spectroscopy (NIR)	A non-destructive method for assessing fruit ripeness by analyzing sugar content and other internal quality parameters. This helps in accurate determination of the best harvest time without damaging the fruit.	NIR is used to assess the sugar content and maturity of apples and peaches, helping farmers to plan harvest operations at the optimal time for better quality and market prices.	Apple, Peach
Hyperspectral Imaging	Uses light in different wavelengths to assess fruit ripeness and internal quality parameters like sugar content and acidity levels. This technology helps farmers pick fruits at the peak of ripeness, ensuring better quality.	Mango and banana growers in Maharashtra use hyperspectral imaging to detect ripeness without physically touching the fruit. This technology is especially beneficial for export markets, where uniform ripeness is critical.	Mango, Banana etc.
Thermal Imaging Cameras	Thermal cameras detect temperature differences in crops, allowing farmers to monitor crop stress and fruit maturity. These cameras help in identifying when fruits are ready for harvest by measuring heat signatures.	Farmers use thermal cameras to assess water stress and monitor fruit ripening, enabling them to optimize irrigation and plan timely harvests for better quality fruit.	Pomegranate, Grapes

Table 2. Demonstrations conducted in Gurugram district

Date	Name of village	Block	Area covered under demonstration (ha)	No. of farmers participated	Pesticide/ Nutrient applied
14-15 March, 2023	Uncha Majra, Safeda Nagar	Pataudi	19.0	28	Pesticide and nutrient application in cucurbit, cauliflower, okra

Application of digital tools in horticulture–Success stories

Success Story 1: Revolutionizing crop protection with drone technology

KVK, Gurugram conducted drone-based spraying demonstrations across various villages in the district to raise awareness and promote the use of drone technology in horticultural crops among farmers. A total of 19 demonstrations were carried out, covering 19 hectares of farmers' fields in the villages of Gurugram district during 2023 (Table 2).

The demonstrations were conducted on crops such as cauliflower, cucurbits and okra, where drones were used to spray insecticides, pesticides, and nutrient solutions on a rental basis. Across all crops, drone spraying consistently resulted in greater pest reduction and slightly higher yields compared to traditional manual spraying (Table 3), indicating that drone technology is more efficient in terms of both pest control and productivity. Farmers in Gurugram district typically spend ₹ 625 per hectare on manual spraying, which takes around 30 minutes per hectare, while drone spraying completes the task in just 15 minutes. Additionally, manual spraying often results in uneven pesticide application, poor penetration of active ingredients into dense crop canopies, and lower efficiency, leading to inadequate pest and disease control. During the demonstrations, farmers were sensitized about the benefits of drone technology in enhancing agricultural practices, including increased efficiency, reduced environmental impact, and improved productivity. Village women were also informed about entrepreneurship opportunities in agriculture for Self Help Groups through the use of drone technology in the near future.

Table 3. Drone vs. manual spraying–Efficiency and yield boost

Crop	Area covered	Name of Insects /pests	Avg. No. of insect / plant			Avg. yield (q/ha)	
			Control (Before spray)	Insecticide spray (Through knapsack)	Insecticide spray (Through drone)	Insecticide spray (Through knapsack)	Insecticide spray (Through drone)
Cauliflower	19.00 ha	Diamond back moth and Tobacco caterpillar	6.22 larvae	1.74 (reduction in population 72%)	1.05 (reduction in population 83%)	182.65	186.50
Summer squash (Round)		Red pumpkin beetle	7.04 beetle	1.83 (reduction in population 74%)	1.13 (reduction in population 84%)	130.62	136.40
Okra		Fruit borer and Jassids	4.98 larvae	1.20 (reduction in population 76%)	1.01 (reduction in population 80%)	126.60	131.80

Feedback from farmers: Farmers found the drone-based technology highly beneficial, noting improved control of insects and pests in various crops. Additionally, the drone spraying of insecticides and pesticides is safer for farmers, as it reduces direct physical exposure to harmful chemicals. However, farmers expressed a desire for government intervention to reduce the cost of agricultural drones, making them more affordable.

Spraying of insecticide in horticultural crops at village Uncha Majra (Gurugram district)

Success Story 2: Empowering farmers through participatory video learning

Digital Green began as a Microsoft Research project in Bengaluru in 2006, founded by Rikin Gandhi, to explore the use of technology for social development, specifically through participatory videos for agricultural extension. This approach, more effective than traditional methods, integrates information technology, video-based learning, and community engagement to share locally relevant agricultural practices. Formally established as an NGO in 2008, Digital Green provides a cost-effective and scalable platform, enabling rural communities to produce and exchange knowledge within public and private extension systems.

Digital Green, in collaboration with local NGO ACCESS and the village community, has developed short documentaries demonstrating best agricultural practices for farmers. These eight-to-ten-minute videos are made in the local language, featuring community members as actors, ensuring they are tailored for and by the community. According to the reports of Food and Agriculture Organization (FAO) of the United Nations (UN), Narsingh Lal, a farmer from Biaorakala village (Khilchipur block, Rajgarh District) in Madhya Pradesh, highlighted the advantages of this approach, stating that while previous verbal explanations by NGOs or government officials were useful, the videos provided a clearer understanding of the entire farming process by visually showcasing it on the field. This participatory video approach not only made it easier for farmers to comprehend and retain information but also overcame limitations in traditional extension systems, such as the lack of frequent interaction and local facilitation. Digital Green has shown that involving communities in a participatory process, coupled with straightforward technology solutions, empowers small-scale farmers to create and share knowledge on best agricultural practices for enhanced productivity and sustainable livelihoods. Early pilot studies demonstrated not only higher adoption rates through the video-based approach but also confirmed that Digital Green's model is more cost-efficient than traditional agricultural extension methods.

Success Story 3: Amplifying farmers' voices and knowledge sharing via community radio

Community radio is a grassroots broadcasting medium tailored to serve the unique needs of rural and marginalized communities. By operating in local languages and dialects, it enables individuals to access essential information on agriculture, health, education, and local events. This platform not only promotes knowledge-sharing but also fosters community involvement and empowerment, allowing listeners to participate actively by voicing their concerns, sharing success stories, and receiving timely, relevant advice. In areas with limited internet or mobile connectivity, community radio remains a vital tool for inclusive, accessible communication and social development.

The success of community radio is evident from the data, which highlights its effectiveness in delivering information, improving knowledge, and satisfying the diverse needs of rural listeners. In a study of listeners' perceived effectiveness, it was observed that 39.99% of listeners rated community radio as highly effective in providing agricultural advisories, with an overall mean effectiveness score of 0.519 (Table 4). It highlights the power of community radio in reaching remote farmers with practical information. However, 22.22% listeners found it moderately effective, indicating room for enhancing the relevance and frequency of content. This strong perceived effectiveness correlates with community radio's ability to engage listeners through familiar, relatable content.

Table 4. Listeners' perceived effectiveness of the advisories through community radio

Category	Community radio listeners (n=90)	
	Frequency	Percentage
Very less effective (<0.31)	14	15.55
Less effective (0.31-0.45)	20	22.22
Effective (0.45-.59)	20	22.22
Highly effective (>0.59)	36	39.99
Mean perceived effectiveness score	0.519	
Std. deviation	0.18766	

Farmer utilizing community radio for agricultural information and guidance

The knowledge test data also highlighting community radio's impact, showing that beneficiaries of community radio advisories scored higher (mean value of 10.14) on farming-related knowledge compared to non-listeners (mean value of 8.06). This statistically significant difference (t = 8.99) underscores how community radio enriches farmers' understanding of best practices and empowers them with valuable knowledge.

Listeners' satisfaction with community radio services was highest for agricultural information (51.11% highly satisfied) and entertainment programmes (76.66% highly satisfied) (Table 5). This satisfaction suggests that community radio effectively combines educational and engaging content, making agricultural learning accessible and enjoyable for farmers. Health-related information and social issues, while still valued, showed mixed levels of satisfaction, suggesting potential areas for enhanced content focus.

Table 5. Perceived satisfaction with the services of community radio

Service	Perceived level of satisfaction		
	Highly satisfactory (%)	Somewhat satisfactory (%)	Not satisfactory (%)
Agricultural information	51.11	32.22	16.66
Entertainment	76.66	14.44	8.80
Education programmes	25.55	51.11	23.33
Health related information	35.55	35.55	28.88
Social issues	37.77	32.22	30.00

Farmers' preferences for various *Krishi* (agriculture) programmes further showcase the relevance of specific formats. Success stories ranked highest (65%), followed by live interactive programmes (60%) and expert talks (57.5%) (Table 6). This indicates that farmers are particularly interested in relatable stories of success and direct interactions with experts, reflecting community radio's role in fostering a learning environment tailored to farmers' experiences and needs.

Listening behaviour data revealed that 52.5% of farmers tune in daily, mostly in groups with family or fellow farmers, and 57.5% listen while multitasking (Table 7). This reflects community radio's integration into daily rural life, promoting a collective learning culture that strengthens community ties. Overall, community radio is a practical, accessible, and community-driven platform for delivering essential farming information, facilitating knowledge exchange, and promoting sustainable practices among farmers.

Table 6. Farmers' preference for *Krishi* programmes

Krishi Programme	Percent	Rank
Agriculture (*Krishi vani*) success story	65.00	I
Live interactive programme	60.00	II
Expert talk (*Tadhnanche bol*)	57.50	III
Progressive farmers talk	45.00	VI
Theme-based talk (*Bandhyavarchya gappa*)	47.50	V
GK test in agriculture (*khara bola pahuna*)	57.50	III
Dissemination of agricultural information through Spiritual talk by folk artists (*Sansrititun Sheti*)	50.00	IV
Burning issues in agriculture	40.00	VII

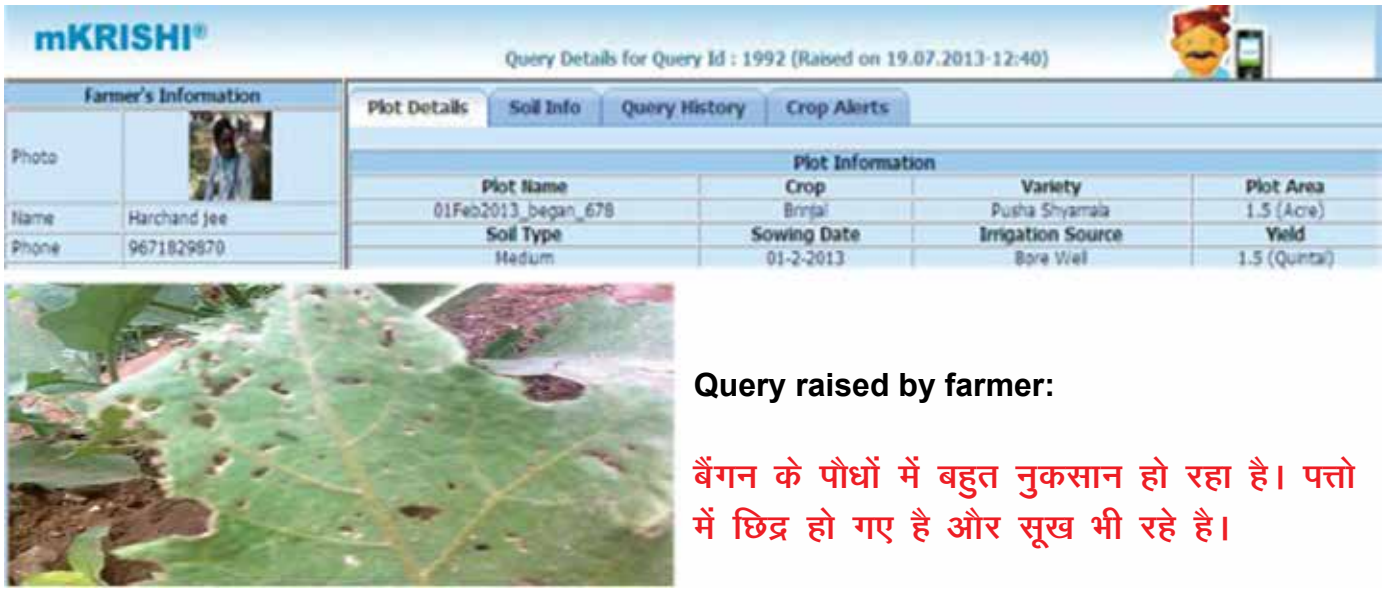
Tabe 7. Listening behaviour of the participants

Variable	Categorization	*f*	%
Listening frequency	Daily	21	52.50
	Weekly	12	30.00
	Fortnightly	7	17.50
Listening style	Alone	15	37.50
	With family members	7	15.00
	With fellow farmers	18	45.00
Listening pattern	Only listening	8	20.00
	Listening and simultaneously doing some work	23	57.50
	Listening and taking notes	9	22.50

Success Story 4: Pusa mKRISHI- A mobile based advisory system

Mobile-based agro-advisory systems have become essential tools for delivering information and technology to farmers, enhancing crop management practices. While numerous organizations use mobile advisories to address farmers' information needs, these systems often face significant limitations, such as unidirectional push-principle based SMS and voice messages, and a lack of tailored, relevant, and need-based content. To overcome these challenges, the Pusa mKRISHI platform was developed in collaboration with Tata Consultancy Services (TCS) Innovation Lab – Mumbai.

The success of Pusa mKRISHI lies in its dynamic, two-way communication system, which has transformed how farmers receive and apply farming advice. The platform integrates climate data, farm-specific details, and tailored technological recommendations, allowing farmers to access highly relevant information for their unique situations. Farmers can easily send field-related queries through photos, SMS, or voice messages, receiving swift guidance on issues from pest management to crop nutrition. Additionally, Pusa mKRISHI uses voice messages and visual content to simplify complex topics, overcoming illiteracy barriers and



Pusa mKRISHI Expert Console

improving understanding. A streamlined expert console further ensures that expert responses reach farmers quickly, promoting effective and timely decision-making. Through these innovations, Pusa mKRISHI empowers farmers by providing accessible, personalized advice, which enhances productivity and strengthens their resilience.

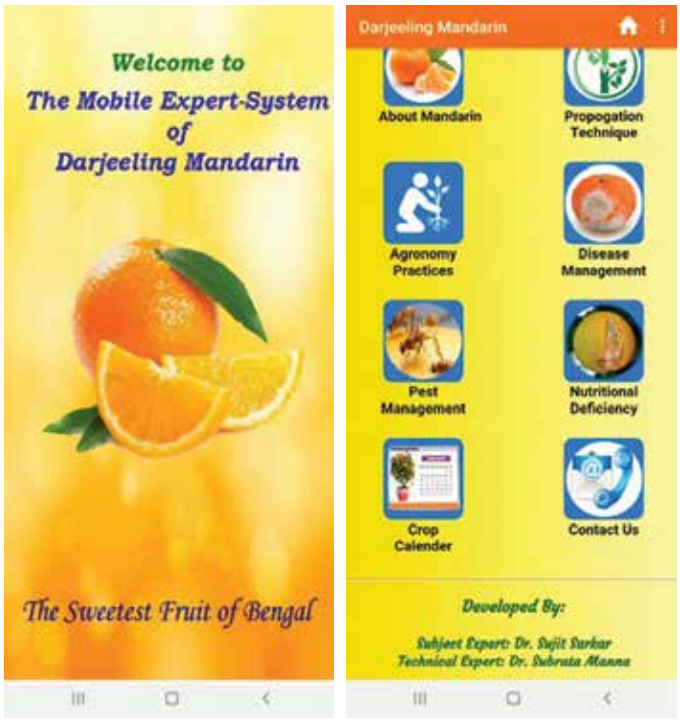
Technologies developed at ICAR-IARI Regional Station-Kalimpong

The integration of IoT and ICT has transformed rural development, especially in agriculture, by providing farmers with real-time data for better decision-making. In smart villages, IoT sensors and ICT tools support precision agriculture, boosting yields and sustainability. IARI Regional Station-Kalimpong has pioneered two mobile apps to deliver these technologies effectively in Darjeeling and Kalimpong.

Large Cardamom mobile app: The mobile app-based advisory service has significantly enhanced large cardamom cultivation in Darjeeling and Kalimpong hills by addressing key issues such as pest infestations, poor management, and lack of scientific knowledge. Previously, yields had dropped to 150–200 kg/ha from 300 kg/ha, but with guidance on scientific practices, yields have now risen to 350–400 kg/ha, with the Seremna cultivar showing the highest increase (45.94%). Income has also improved, with some cultivars yielding income increases over 40%. The app has boosted farmers' knowledge, with adoption of best practices in harvesting, weeding, shade management, and pest control rising from below 30% to over 90%. Adoption of recommended propagation, irrigation, and nutrient management practices has similarly increased, raising water use efficiency and reducing soil erosion. Overall, the app has enabled farmers to implement advanced techniques, driving both productivity and income improvements across the region.

Large cardamom app

Darjeeling Mandarin mobile app: In 2022, IARI launched an Android-based 'Darjeeling Mandarin App' to provide agro-advisory services for mandarin orange growers in the Darjeeling and Sikkim hills. Developed with React Native and Google Firebase, the app offers guidance on agronomy, pest and disease management, and soil health. The app's accessibility on low-spec devices, plus direct expert support via call or WhatsApp, has made it popular, with 563 installations and over 1,671 expert consultations. In 2023, content validation through Content Validation Index (CVI) with 250 farmers showed high satisfaction (CVI 0.83), noting improved clarity, relevance, and cultural suitability. The app has enabled a 20% yield increase, raising income from ₹1.5 lakh to 2.5 lakh per acre. Farmers adopted eco-friendly techniques, such as organic



Darjeeling mandarin app

fertilizers and neem-based pesticides, with knowledge on agronomy, water management, and pest control rising from 18% to 98%. This app fosters self-reliant, sustainable mandarin cultivation in the region.

Way Forward

The application of digital technology for information dissemination is transforming sustainable horticulture, offering farmers powerful tools for precision, efficiency, and connectivity. By leveraging mobile apps, AI, drones, blockchain, and community-based platforms, farmers can access real-time, location-specific data that guides them in making informed decisions to improve crop health, reduce resource use, and enhance yield quality. As digital horticulture continues to evolve, the future holds the promise of deeper integration of cutting-edge technologies, allowing farmers to fully leverage the capabilities of big data and AI-driven insights. Breakthroughs such as automated drones for precision farming, smart sensors for real-time monitoring, and blockchain for enhancing supply chain transparency will transform agricultural practices. By embracing these advancements, farmers can boost sustainability, reduce environmental impact, and enhance food security. Moving forward, it is essential to encourage collaboration among technology developers, agricultural specialists, and farmers to devise customized solutions that tackle specific challenges, thereby fostering a more efficient and resilient agricultural landscape for future generations.

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Varieties of vegetable crops for release and notification

Dolichos bean (Bush): VRBSEM 3-Days to first picking: 80–85 days, Peak fruiting period: December to March. DYMV disease free in cropping period with temperature tolerance up to 35°C. Yield: 360 q/ha in five pickings. Identified for cultivation in Zone VI (Rajasthan, Gujarat, Haryana and Delhi), Zone VII (Madhya Pradesh, Maharashtra and Goa) and Zone VIII (Karnataka, Tamil Nadu, Kerala and Puducherry).

Indian (Dolichos) bean/Sem: Arka Neelachal Pushti, is high yielding, pole type, round podded variety. The pods are rich in protein (4.61 g/100 g) and micronutrients (iron: 15 ppm, zinc 37 ppm). Duration of crop is 95 days from sowing to green harvest. Rabi season is ideal for its cultivation in Eastern India. Average yield is 24 tonnes/ha in 120 days.

French bean (Bush): VRFBB 91 is bush-type, early, short duration, flowers at 32–35 days after sowing. Pods are green and bright, fleshy, tender, straight, cylindrical and free from parchment. Bears about 20–25 pods/plant. Resistant to sclerotinia rot (Sclerotinia sclerotiorum). Tender pod yield potential is 125–150 q/ha. Recommended for Zone I: Humid Western Himalayan Region (Jammu and Kashmir, Himachal Pradesh and Uttarakhand).

Source: ICAR Annual Report 2021-22