Publisher Name: ZenToks Publication
Editorial Book: Global Perspectives on ICT for Development
ISBN: 978-81-986895-7-3
DOI: https://doi.org/10.5281/zenodo.21332755

Chapter 7

Digital Agricultural Extension and Social Media-Based Pest Advisory Systems in India

Sanjeet Kumar Singh[1], Ankit Kumar Gaur[2] and Abhay Singh[2*]

[1]*Assistant Professor, Department of Entomology, Shri Murli Manohar Town Post Graduate College, Ballia, Uttar Pradesh – 277001, India.*
[2]*Department of Agricultural Extension Education, Acharya Narendra Deva University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh – 224229, India.*
[*]*Corresponding Author.*

Abstract

Digital technologies are transforming agricultural extension systems worldwide, and social media has emerged as a significant tool for the rapid dissemination of pest management information among farming communities. In India, the widespread adoption of smartphones and affordable internet services has enabled farmers to access real-time advisory support through platforms such as WhatsApp, YouTube, Facebook, Instagram, and Telegram. These platforms facilitate the exchange of field observations, pest photographs, voice messages, and expert recommendations, thereby reducing information gaps between researchers, extension agencies, and farmers.

This chapter examines the role of social media in strengthening pest management communication and enhancing the reach of digital extension services. It discusses platform-specific functions, farmer engagement patterns, and emerging applications in pest surveillance, diagnosis, and decision-making. Evidence from different regions of India demonstrates how social media-based advisory systems contribute to timely pest identification, improved awareness of Integrated Pest Management (IPM) practices, and better communication among stakeholders. The chapter also highlights challenges associated with misinformation, digital literacy limitations, and uneven access to digital infrastructure.

Furthermore, the chapter explores future opportunities arising from artificial intelligence, image-based pest diagnostics, and data-driven advisory systems integrated with social media platforms. It concludes that while social media cannot replace conventional extension services, it can substantially complement them by providing faster, more interactive, and location-specific pest management information. Strengthening digital literacy, promoting verified advisory networks, and integrating scientific institutions with online farmer communities will be critical for realizing the full potential of social media in sustainable crop protection and agricultural development.

Keywords: Digital extension, Social media, Pest management, Agricultural communication, Integrated Pest Management, Digital advisory services, India.

Introduction

Agricultural production is continuously challenged by a wide range of insect pests, diseases, and emerging biotic stresses that threaten crop productivity and farm profitability. Effective pest management depends not only on the availability of scientific solutions but also on the timely delivery of relevant information to farmers. Traditionally, agricultural extension systems, field demonstrations, farmer meetings, radio broadcasts, and printed advisory materials have served as the primary channels for transferring pest management knowledge. Although these approaches remain important, their reach is often constrained by limitations of time, manpower, and geographical coverage.

The rapid expansion of digital technologies has created new opportunities for agricultural communication. Over the last decade, increasing smartphone ownership, affordable mobile internet services, and widespread use of social networking platforms have transformed

How To Cite: S.K. Singh, A.K. Gaur and A. Singh. *Digital Agricultural Extension and Social Media-Based Pest Advisory Systems in India.* In A. Rai (Ed). Global Perspectives on ICT for Development. Pages 34-40, 2026. ZenToks Publication, India. ISBN: 978-81-986895-7-3

the way information is accessed and shared in rural areas. Farmers are no longer dependent solely on periodic visits from extension personnel; they can now obtain information, exchange experiences, and seek expert advice through digital platforms at any time.

Social media has emerged as one of the most influential components of this digital transformation. Platforms such as WhatsApp, YouTube, Facebook, Instagram, and Telegram are increasingly being used for agricultural learning, farmer-to-farmer interaction, and dissemination of crop protection advisories. These platforms support the rapid sharing of photographs, videos, voice messages, and field observations, enabling faster identification of pest problems and quicker dissemination of management recommendations. The interactive nature of social media also encourages participation, allowing farmers to discuss local challenges and learn from the experiences of others.

In the context of pest management, timely communication is particularly important because delays in diagnosis and intervention can result in significant crop losses. Social media platforms offer opportunities for real-time information exchange, early warning dissemination, and promotion of Integrated Pest Management (IPM) practices. At the same time, concerns related to misinformation, digital literacy, and information quality highlight the need for scientific oversight and responsible use of digital communication tools.

This chapter explores the growing role of social media in pest management information dissemination in India. It examines the major platforms used by farmers and extension agencies, discusses their strengths and limitations, presents evidence from field experiences, and highlights future prospects for integrating digital technologies with agricultural extension systems to support sustainable crop protection.

The Digital Turn in Desi Farming

Indian farming is not one thing. A basmati paddy grower in Haryana operates in a completely different reality from a small areca nut farmer in Dakshina Kannada or a tribal vegetable cultivator in Nandurbar, Maharashtra. Soil types differ. Pest species differ. Languages differ. The crops grown in a single district of eastern Uttar Pradesh can span paddy, sugarcane, maize, vegetables, and pulses each with its own pest calendar and management demands. Yet one thread increasingly connects these diverse contexts: the smartphone.

Farmers embraced social media first for entertainment and family communication. But the visual, shareable, and real-time nature of these platforms made them naturally suited to one of farming's oldest practices — talking about crop problems. A disease on wheat photographed in Sirsa, Haryana, and posted to a WhatsApp group at 7 AM can attract responses from agricultural graduates, experienced farmers, and KVK scientists across three states before the morning tea has cooled. This kind of collective knowledge speed would have been unimaginable fifteen years ago.

Research confirms that crop protection is among the top three topics farmers actively seek on digital platforms alongside weather forecasts and mandi prices (Sharma et al., 2023). Questions about pest identification, spray timing, pesticide selection, and resistance management flow into farmer groups daily, in every crop season, from paddy to potato to pomegranate. Social media has not replaced the extension system. Instead, it has created an informal parallel system—one that operates at the farmers' pace, in their own language, and with their trust.

WhatsApp Kisan Groups: The New Baithak of the Village

In many Indian villages, the baithak — the evening gathering where farmers sit, share crop worries, and trade advice — has been slowly fading. Physical distance, changing schedules, and evolving social structures have reduced face-to-face exchange. WhatsApp groups, in many places, have become the digital baithak. They do not replace the warmth of a physical gathering, but they compress time and geography in ways that matter enormously for pest management.

A typical Kisan WhatsApp group in Uttar Pradesh or Bihar might include 30 to 150 members: farmers from several villages in a block, one or two retired agricultural officers, a few progressive growers who keep pace with new varieties and technologies, a local pesticide dealer, and increasingly, a representative from a nearby KVK. When a member posts a photograph of pest damage, the group responds. Response quality varies; some answers are accurate and helpful, while others may be incorrect. Nevertheless, the peer-to-peer knowledge-sharing dynamic remains active and highly functional.

KVKs across India have begun formalizing this structure into a planned extension tool. Many now operate verified WhatsApp broadcast groups through which scientists push timely, crop-stage-specific pest alerts directly to farmer phones. The voice message feature is particularly valuable here: a scientist speaking in Bhojpuri, Awadhi, or Maithili carries instant credibility and removes the literacy barrier that written text always imposes. A Ballia district farmer who cannot read comfortably can still receive, understand, and act on a voice-note advisory about Brown Plant Hopper thresholds in paddy the same day it is recorded. WhatsApp Broadcast Lists allow official advisories to reach hundreds of verified contacts simultaneously without the noise and misinformation risk of an open two-way group (Kumar & Sharma, 2023). As shown in Figure 1.

YouTube: Khet Ka Guru Hai Mobile Mein

If WhatsApp is the digital baithak, YouTube is the digital pathshala of Indian agriculture. Farmers who want to learn rather than simply ask a quick question increasingly turn to YouTube for visual, step-by-step pest management content that text and even photographs cannot convey.

The specific power of YouTube for pest management lies in demonstration. Identifying a pest from a written description alone is genuinely difficult even for experienced agronomists. A video showing the characteristic leaf rolling caused by Rice Leaf Folder (Cnaphalocrocis medinalis), the silver feeding streaks left by Thrips (Thrips tabaci) on onion leaves, or the tell-tale frass and dead hearts caused by Early Shoot Borer (Chilo infuscatellus) in sugarcane presented with clear narration in a regional language gives farmers the tools for independent field identification that no printed bulletin has ever managed to achieve at comparable scale.

IARI, IISR Lucknow, and several state agricultural universities run active YouTube channels with millions of combined subscribers. Beyond official channels, young agriculturally-educated creators many of them farm sons who studied at state agriculture colleges and returned to their villages have built substantial rural audiences with content that official channels often cannot match in local tone and dialect authenticity. A study of digital learning patterns among young farmers in Maharashtra found that 54% of respondents aged 18–30 had changed a pest management practice at least once after watching a YouTube video, and that content delivered in Marathi was completed 2.3 times more often than equivalent content in Hindi (Deshmukh & Patil, 2024). As shown in Figure 2.

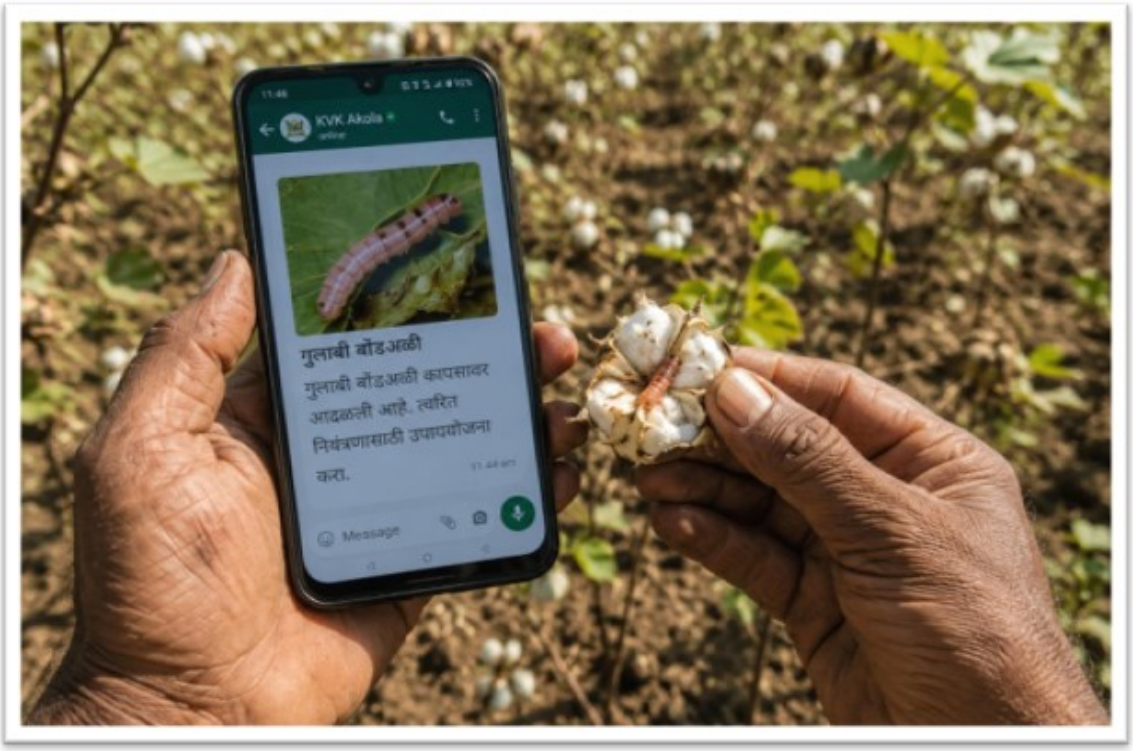

Figure 1: WhatsApp-based pest advisory in cotton farming

Figure 2: YouTube-based pest management learning in Indian agriculture

Facebook, Instagram, and Telegram: Completing the Platform Picture

Facebook maintains strong relevance, particularly among farmers aged 35 years and above, and in states including Tamil Nadu, Kerala, West Bengal, and Karnataka where it established early rural footholds. State agriculture departments use Facebook pages to publish pest alerts, spray calendars, and weather-linked advisories. Farmer commodity groups — cotton groups, tomato growers' communities, spice crop forums — function as informal regional pest surveillance networks where members share field observations from across their districts in real time, often ahead of formal surveillance systems.

Table 1: Comparative Overview of Social Media Platforms for Pest Management Information Dissemination in Indian Agriculture

Platform	Target Users	Content Format	Rural Reach in India	Best Use in Pest Management	Main Limitation
WhatsApp	All age groups	Text, photo, voice, video	Highest	Real-time pest alerts, photo diagnosis, KVK broadcast groups, voice advisory in local dialect	No content verification; misinformation travels equally fast
YouTube	18–45 years	Long & short videos	High	Pest ID tutorials, IPM demos, pesticide use, biocontrol agents in regional languages	Needs mobile data & basic digital navigation skill
Instagram/Reels	18–30 years	Short video (60 sec max)	Growing fast	Pest awareness, quick identification clips, agri-influencer reach among young farmers	Limited depth; not suited for complex advisory messages
Telegram	Students, extension staff	Channels, documents, polls	Moderate	Pest bulletins, ICAR advisories, plant protection directorate circulars, crop calendars	Low penetration among older and semi-literate farmers
Kisan Suvidha App	Smartphone-owning farmers	Structured text + alerts	Moderate	Weather-linked pest forecasts, spray schedules, soil health, mandi prices	App adoption remains low in many districts

Source: Compiled from ICAR Digital Extension Review (2023); Kumar & Sharma (2023); Mishra et al. (2024); TRAI (2024).

Instagram Reels have found an unexpected audience among young, semi-educated farm youth across states. Short videos on insect identification, natural plant protection recipes, and IPM awareness produced with basic smartphone cameras but high energy and clear visuals travel rapidly through share chains.

Many agricultural college graduates are building Reels-based agri-content as a parallel livelihood alongside their farming, creating a new class of informal extension communicators that the formal system has not yet figured out how to engage.

Telegram channels are used primarily by more technically oriented audiences — extension workers, agricultural students, progressive farmer leaders — who prefer curated, document-heavy content including ICAR pest surveillance bulletins, plant protection directorate notifications, and weather-crop calendars. Unlike WhatsApp groups, Telegram's broadcast channel model allows verified administrators to push content to large subscriber bases without two-way noise, significantly reducing misinformation risk in that environment (Mishra et al., 2024). As shown in Figure 3.

The Kisan Suvidha App, a government-supported mobile platform, complements these social media channels by providing structured, alert-based advisory content on weather-linked pest forecasts, spray schedules, soil health, and mandi prices for smartphone-owning farmers, though its adoption still lags behind the informal reach of WhatsApp and YouTube in many districts.

Figure 3: Role of social media platforms in pest management communication and digital agricultural extension in India

Platform Preferences of Indian Farmers: What the Data Shows

Figure 4 presents farmer-reported preferences for social media platforms as sources of pest management information, drawn from a composite survey of 520 respondents across five states Uttar Pradesh, Maharashtra, Punjab, Telangana, and Karnataka (Mishra et al., 2024). WhatsApp dominates clearly across all age groups and regions, driven by near-universal adoption and the deep peer trust generated by sharing within known social networks. YouTube holds a strong second position, particularly among paddy, sugarcane, and vegetable farmers who benefit most from visual pest identification content.

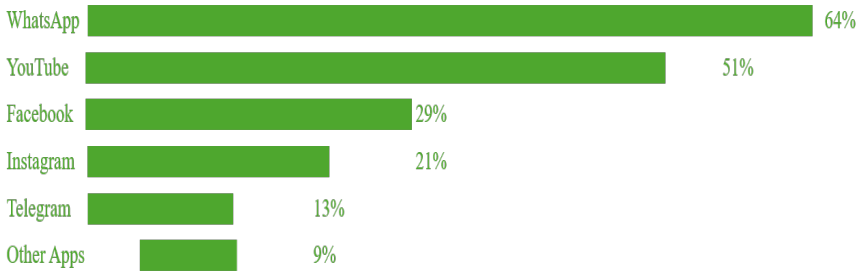

Figure 4: Farmer Preference for Social Media Platforms as Sources of Pest Management Information (% of Respondents, n = 520, Five Indian States)

Source: Adapted from Mishra et al. (2024). Each block represents approximately 1%. Survey covered Uttar Pradesh, Maharashtra, Punjab, Telangana, and Karnataka.

Three Stories from Indian Fields Worth Telling

Field evidence matters more than theory when assessing any extension tool. Three cases from different Indian farming contexts demonstrate the measurable impact of social media-based pest management communication when applied with purpose and expert oversight.

Vidarbha, Maharashtra — Cotton and Pink Bollworm: Pink Bollworm (Pectinophora gossypiella) pressure on Bt cotton in Vidarbha remained severe through the 2022–23 kharif season, with field-evolved resistance to Cry proteins widening year on year. CICR, Nagpur, in coordination with local KVKs, activated a WhatsApp-based pheromone trap monitoring network. Farmers received weekly trap catch data with threshold-based spray decision guidelines directly on their phones. Participating farmers averaged 1.8 fewer pesticide applications per season compared to non-participants, with comparable yield outcomes representing both economic savings and significant reduction in chemical load on the agro-ecosystem (CICR, 2023).

Andhra Pradesh — Paddy and Groundnut Advisory Network: The state agriculture department partnered with a digital extension organisation to deliver voice-message-based pest advisories in Telugu to over two lakh registered paddy and groundnut farmers across three districts during kharif 2023. Messages were scripted by KVK entomologists, timed to crop growth-stage milestones, and dispatched via WhatsApp broadcasts. Early-season pest scouting activity increased measurably among participating farmers, and the incidence of unnecessary prophylactic spraying dropped by approximately 24% compared to control villages (Reddy & Naidu, 2023).

Uttar Pradesh — Sugarcane Biocontrol Adoption via YouTube: IISR Lucknow's Hindi-language YouTube videos on Early Shoot Borer (Chilo infuscatellus) management in sugarcane accumulated over three lakh views across farmer groups in western and central U.P. by early 2024. Adoption of Trichogramma chilonis egg parasitoid releases a biocontrol practice demonstrated in the videos increased visibly in KVK demonstration zones across Muzaffarnagar, Meerut, and Barabanki districts, partly displacing calendar-based organophosphate applications that had been the default response to borer pressure for years (Yadav et al., 2024). This shift carried both economic and environmental benefits for cane growers.

When the Screen Misleads: Misinformation and Its True Cost

The same openness that makes social media powerful for extension makes it a vehicle for misinformation. The two travel on the same network. This is not a minor concern — it is a structural challenge for digital extension that the extension profession has not yet addressed adequately.

Unverified pesticide recommendations suited to one pest on one crop in one agro-climatic zone get shared as universal advice. Counterfeit agrochemicals are promoted using photographs of genuine label packaging. Pest photographs are routinely misidentified a common leaf disease mistaken for a viral infection, a nutritional deficiency presented as a fungal attack. Calendar-based spraying schedules, the exact practice that IPM has worked for decades to replace with threshold-based decision-making, circulate freely in farmer groups as authoritative 'expert tips.'

A study across three districts of Uttar Pradesh found that 31% of farmer respondents had received at least one factually incorrect pest management recommendation through social media during the previous kharif season, and that 18% had acted on that recommendation with some resulting financial loss (Pandey & Singh, 2024). These numbers represent a real and growing hidden cost to the digital extension boom. The answer is not to restrict social media use — that is neither feasible nor desirable. The answer is to build farmer capacity for intelligent digital navigation: to teach cultivators how to cross-verify a recommendation, how to identify a credible source, and how to flag and question suspicious content within their own networks. Digital information literacy must become a formal component of farmer training, not an afterthought.

Making Social Media Work: A Practical Roadmap for Extension Professionals

Extension professionals who treat social media as a secondary task—something to post only when time allows—are missing one of the most scalable communication opportunities available today. Below are practices that consistently produce results across Indian extension contexts.

Create content in the farmer's actual dialect: A video in Bundelkhandi Hindi will always outperform one in standard textbook Hindi among farmers of Jhansi and Tikamgarh. A message recorded in Bhojpuri builds trust in eastern U.P. in a way that no official advisory circular can replicate. Content in the farmer's own language signals respect. Farmers share content that sounds like their own voice.

Anchor Advisories to the Crop Calendar: The most effective digital extension is anticipatory rather than reactive. A WhatsApp advisory reaching farmers about Pink Bollworm monitoring before the pest's typical egg-laying window is worth more than five messages sent after damage is visible. Every major crop has a known pest pressure calendar. Extension agencies should build their social media advisory schedule around it, crop by crop, month by month.

Run moderated broadcast channels during peak pest pressure: Open groups carry misinformation risk, especially during kharif August–September and rabi January–February when pest pressure peaks and farmer anxiety runs high. During these critical windows, extension agencies should shift to moderated broadcast channels with verified scientist-authored advisories only. Farmers submit observations and queries privately; expert-verified answers are broadcast publicly. This structure maintains the responsiveness of social media while controlling information quality.

Read farmer queries as pest surveillance intelligence: The questions farmers ask in WhatsApp groups which pests, on which crops, from which blocks are real-time early warning data. Extension workers who monitor these patterns can identify emerging pest incidences before formal survey systems detect them, direct field visits to the right locations, and issue preemptive district-level alerts. Social media, used this way, is not just a broadcast channel. It is an early warning network.

Build digital literacy alongside digital content: Teaching farmers to distinguish a credible advisory from a misinformation-laden forward, to cross-check pest identification before spraying, and to report incorrect recommendations in their own groups must become part of every farmer training programme. An informed farmer not only uses social media more effectively but also helps protect the quality of information shared within every group they belong to.

Conclusion and Future Perspectives

In recent years, social media has become an important part of agricultural communication in India, especially in the area of pest management. Farmers across different regions are increasingly using platforms such as WhatsApp, YouTube, Facebook, and Instagram to obtain timely information about insect pests, crop diseases, and control measures. The rapid spread of smartphones and affordable internet services has enabled cultivators to connect directly with fellow farmers, extension workers, scientists, and agricultural experts in real time.

The chapter highlights that social media is no longer limited to entertainment or personal communication; it is now functioning as a practical extension tool in Indian agriculture. Farmers share photographs of damaged crops, receive voice-based advisories in local languages, watch demonstration videos on pest identification and Integrated Pest Management (IPM), and exchange field experiences through digital groups and online communities. Evidence from different states such as Maharashtra, Andhra Pradesh, and Uttar Pradesh shows that properly managed digital advisory systems can reduce unnecessary pesticide use, improve pest monitoring, lower production costs, and encourage adoption of eco-friendly pest management practices.

At the same time, this chapter also highlights the growing problem of misinformation on social media. Incorrect pesticide recommendations, unverified pest identification, and misleading farming advice can create financial losses for farmers. Therefore, along with digital outreach, improving farmers' digital literacy and strengthening expert-led advisory systems are equally important.

Overall, social media platforms are transforming the way pest management information reaches Indian farmers. With proper scientific guidance, local language communication, and timely advisories, these platforms can strengthen agricultural extension services and support more sustainable and informed farming practices in the future.

Future integration of artificial intelligence, image-based pest diagnostics, machine learning, and multilingual advisory systems can further strengthen social media-based agricultural extension.

The convergence of digital technologies with scientific pest surveillance may enable faster, more accurate, and farmer-centric decision support systems in the coming years.

References

[1] CICR. (2023). Pest management outcomes in Bt cotton: Digital advisory network performance. Annual Report, Central Institute for Cotton Research, Nagpur, Maharashtra.

[2] Deshmukh, R.V. and Patil, V.B. (2024). Digital learning patterns among young farmers in Maharashtra: Platform preferences and behaviour change in pest management. Journal of Agricultural Education and Extension, 30(2): 145–158.

[3] ICAR. (2023). Annual Report: KVK Digital Extension Initiatives 2022–23. Indian Council of Agricultural Research, New Delhi.

[4] Kumar, R. and Sharma, P. (2023). Role of social media in agricultural information dissemination: A systematic review with focus on crop protection. Indian Journal of Extension Education, 59(3): 45–52.

[5] Mishra, S., Yadav, R.K. and Pandey, A. (2024). Social media platforms and farmer decision-making in pest management: Composite evidence from five Indian states. Journal of Agricultural Informatics, 15(1): 33–41.

[6] Pandey, A. and Singh, R.K. (2024). Misinformation in agricultural WhatsApp groups: Extent, type and on-farm consequences in Uttar Pradesh. Annals of Agricultural Research, 45(1): 78–85.

[7] Reddy, K.R. and Naidu, V.S. (2023). Scaling pest management advisory through voice-message WhatsApp networks: Evidence from Andhra Pradesh. Agricultural Extension in India, 18(2): 61–68.

[8] Sharma, V., Rana, R.K. and Tiwari, K. (2023). Digital information-seeking behaviour of Indian farmers: Crop protection, market and weather. Indian Research Journal of Extension Education, 23(1): 9–18.

[9] TRAI. (2024). Telecom Subscription Report and Rural Internet Data, March 2024. Telecom Regulatory Authority of India, New Delhi.

[10] Yadav, H., Sharma, D. and Gupta, S. (2024). Social media-enabled biocontrol adoption in sugarcane: Evidence from Uttar Pradesh KVK zones. Sugar Tech, 26(1): 88–94.

[11] Zainuddin, M. and Khan, A.M. (2023). WhatsApp as an agricultural extension medium for South Asian smallholder farmers: Opportunities, constraints and design implications. Journal of Rural Studies, 98: 104–113.