P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
https://doi.org/10.56572/gjoee.2025.40.2.0008 Gujarat Journal of Extension Education Vol. 40 : Issue 2 : December - 2025

IMPACT OF DIGITAL FORMATS ON FARMERS' KNOWLEDGE OF SUGARCANE CULTIVATION

Rahul Pawar[1], Devendrappa S.[2] and Nithya Shree D. A.[3]

1 Research scholar, Dept. of Agril. Ext. Edu., University of Agricultural Sciences, Dharwad-580005
2 Professor, Dept. of Agril. Ext. Edu., University of Agricultural Sciences,, Dharwad-580005
3 Professor, Dept. of Ext. and Communication Management, University of Agricultural Sciences, Dharwad-580005
Email : pawarrahul401@gmail.com

ABSTRACT

The present experimental study was carried out in Athani taluk, located in the Belagavi District, Karnataka. It employed a 'Before-After' without control group experimental design to assess the impact of digital formats on farmers' knowledge of sugarcane cultivation. The subject matter focused on "Sugarcane Cultivation Practices," and three digital formats were developed: a Mobile App, a Video, and a WhatsApp message, all containing similar content. These formats served as treatments, which were administered to the sugarcane growers over a period of 15 days. Three villages were randomly selected, and from each village, 50 sugarcane farmers were chosen through random sampling, thus total sample size of 150 participants. The study assessed the impact of digital formats on knowledge gain. The results showed that the mean knowledge gain was highest for the Video format (30.00), followed by the Mobile App (25.30) and the WhatsApp message (22.20). All formats were effective in enhancing knowledge, although there were notable differences in their effectiveness. There is a significant difference in knowledge acquisition resulting from the use of different digital formats.

Keywords : *impact, knowledge gain, sugarcane cultivation practices and different digital formats*

INTRODUCTION

Sugarcane (Saccharum officinarum L.) is a major commercial crop cultivated in nearly 75 countries worldwide, with Brazil, India, China, and Thailand being the leading producers. The sugar industry holds a vital position in India's agricultural economy. Today, sugarcane cultivation and the sugar sector serve as key pillars supporting the nation's economic framework. India is currently the world's second-largest producer of sugarcane. In the year 2023–24, sugarcane was cultivated across 56.48 lakh hectares in India, resulting in a total production of approximately 446.43 million tonnes, with an average yield of 79.03 tonnes/hectare. (2023-24). Karnataka benefits from favorable climatic conditions for sugarcane cultivation, which has led to an expansion of the crop's coverage to 6.26 lakh hectares. The state produces approximately 53.20 million tonnes of sugarcane, with an average yield of 85 tonnes/hectare (2023-24). Belagavi, Bagalkote, Mandya, and Kalaburagi are the major sugarcane-producing districts in Karnataka. Among them, Belagavi is emerging as a key district, with sugarcane cultivation spread across 278487 hectares. It records a production of 26734714 tonnes and a productivity rate of 96 tonnes per hectare. (2022-23).

Agriculture remains the primary occupation and lifestyle for over half of India's population, contributing significantly to the nation's GDP. The sustainable prosperity of farmers and agricultural laborers is crucial for enhancing the overall human resource development landscape in the country. Until the first waves of the Green Revolution in the late 1960s, Indian agriculture followed traditional practices. The Green Revolution provided a significant boost to agricultural production and productivity, making India self-sufficient in food grain production. However, with the growing population, we cannot afford to be complacent. There is an urgent need to enhance agricultural production and productivity. Therefore, Indian farmers must stay informed about the latest farming techniques, new crop varieties, agricultural machinery, and market trends (Pratik et al., 2021; Pratik et al., 2022). The extension personnel of the Agriculture Department disseminate technologies and information to farmers using various outreach methods. However, these approaches often fail to reach the majority of farmers across the country, with a staggering ratio of one extension worker for every 1,000 farmers (Chitra and Shankaraiah, 2012). This gap continues to pose a challenge for the extension system today. Reaching 120 million farmers across more than 500 districts is a daunting task. The diverse agro-ecological conditions further complicate this issue, as farmers have varied needs that exceed the capabilities of grassroots extension workers. In this context, various digital formats are essential for engaging underserved communities

and enhancing extension efforts (Pratik et al., 2022; Anusha et al., 2023). Keeping this in mind, the present experimental study was carried out to impact of digital formats on farmers' knowledge of sugarcane cultivation.

OBJECTIVES

(1) To measure the gain in knowledge of sugarcane cultivation practices

(2) To compare the effectiveness of different digital formats on knowledge gain of sugarcane cultivation practices

METHODOLOGY

The present experimental study was conducted in Athani taluk, located in the Belagavi District, Karnataka state. 'Before-After' without control group experimental design was employed to assess the impact of digital formats on farmers' knowledge of sugarcane cultivation. The subject matter focused on "Sugarcane Cultivation Practices," and three digital formats were developed: a Mobile App, a Video, and a WhatsApp message, all containing similar content. These formats served as treatments, which were administered to the farmers over a period of 15 days. Thus, different digital formats were used as treatments in the study. Based on the largest area of sugarcane cultivation, three villages from Athani taluk of Belagavi district were randomly selected for the study. From each village, 50 sugarcane farmers were chosen for each treatment using random sampling, thus total sample size of 150. The impact of the different digital formats was assessed by measuring knowledge gain through pre-tests and post-tests. A standardized interview schedule was employed for final data collection, which was conducted through personal interviews. The collected data were tabulated and analyzed using mean, ANOVA and statistical tools were used for the study.

RESULTS AND DISCUSSION

Table 1: Knowledge level of sugarcane growers before exposure to different digital formats

(n = 150)

Sr. No.	Treatments	Mean Knowledge score
1	**Mobile App** (n=50)	21.80
2	**Video** (n=50)	20.52
3	**WhatsApp message** (n=50)	22.50

Mean initial knowledge scores of the respondents for the Mobile App, Video, and WhatsApp message treatments were 21.80, 20.52, and 22.50 respectively (Table 1). The initial knowledge of respondents on sugarcane cultivation practices before exposure to the interventions did not differ significantly across groups (F = 2.154, NS; Table 2), indicating that all groups had a comparable baseline understanding of the subject. All the selected villages had similar demographic, agro-ecological, and socioeconomic conditions, with sugarcane as the predominant crop. The sources of information accessible to farmers in these villages were largely uniform, which likely contributed to the observed homogeneity in pre-intervention knowledge. Given this uniformity, the study adopted a 'Before-After' design without a control group. While the absence of a control group may limit causal attribution, it was intentionally omitted due to practical and ethical constraints in real-world extension settings. Withholding potentially beneficial information from a control group in a farming community would be inappropriate, especially when the intervention involves need-based content on improved cultivation practices. Furthermore, creating a truly "untouched" control group would have been difficult due to the informal sharing of information among neighboring villages. To compensate, a within-group pre- and post-test design was employed to assess the impact of each treatment, thereby enabling a valid assessment of knowledge gain despite the lack of an external control.

Table 2 : Analysis of variance for the knowledge level of sugarcane growers before exposure to different digital formats (n = 150)

Source of variation	SS	df	MSOS	F	F critical value
Between treatment	100.813	2	50.406	2.154^{NS}	3.057
Within treatment	3438.98	147	23.394		
Total	3539.793	149			

NS- Non significant

Table 3: Knowledge of sugarcane growers after exposure to different digital formats (n = 150)

Sr. No.	Treatments	Mean Knowledge score
1	**Mobile App** (n=50)	47.10
2	**Video** (n=50)	50.52
3	**WhatsApp message** (n=50)	44.70

Table 3 revealed that video emerged as an effective method for knowledge gain. The video format integrates

visuals, text, music, and colour, making it engaging and relatable. Filmed in a familiar environment, it allows respondents to connect easily with their own conditions, enhancing their understanding and retention of information. Videos can effectively bring the world into a viewer's space, reaching diverse groups while providing a sense of reality that influences knowledge, attitudes, and motivation. Kapil (1973), in his article "The Agricultural Film," noted that among various mass media used for farmer communication, film is regarded as the most effective. It combines all audio-visual elements and communication techniques. In this study, the use of visuals depicting actual farming conditions likely contributed to increased knowledge acquisition and motivation among respondents. By showcasing real-life scenarios, the video format effectively supports learning and engagement.

Table 4 : Analysis of variance on knowledge of sugarcane growers after exposure to different digital formats (n = 150)

Source of variation	SS	df	MSOS	F	F critical value
Between treatment	867.8533	2	433.926	33.443**	3.057
Within treatment	1907.32	147	12.974		
Total	2775.173	149			

** Significant at 1% level

Table 4 demonstrated a significant difference at the 0.01 level of probability among various digital formats regarding knowledge gain in sugarcane cultivation practices (F value: 33.443). This indicates that the selected digital formats were not equally effective in imparting knowledge to the respondents. Additionally, the computed critical difference value revealed substantial variation in the impacts of the different digital formats on the respondents' knowledge gain.

These findings indicate that the same message can have varying impacts on respondents depending on the digital format used for presentation. To understand the underlying reasons for this variation, it is important to consider the characteristics of the communication methods employed as experimental stimuli, as they differ in scope, preparation, and comprehension. Each method has its own advantages and limitations, which contribute to the differing effects observed. Consequently, the knowledge gain varies across methods due to the distinct stimulation provided by each format.

Table 5 : Extent of knowledge gained by respondents after exposure to different digital formats

(n = 150)

Sr. No.	Treat-ments	Mean knowledge score		Mean Know-ledge gain	Paired 't' value
		Before exposure	After exposure		
1	**T1 Mobile App** (n=50)	21.80	47.10	25.30	54.37**
2	**T2 Video** (n=50)	20.52	50.52	30.00	49.08**
3	**T3 WhatsApp message** (n=50)	22.50	44.70	22.20	39.40**

** Significant at 1% level

Table 5 indicates a significant difference in the respondents' knowledge levels before and after the treatment. The mean knowledge gain was highest with the Video format (30.00), followed by the Mobile App (25.30) and WhatsApp messages (22.20). This increase can be attributed to the scientific practices, the validity of the information provided, and the respondents' interest in content presented in their native language, Kannada. Additionally, the high land context may have encouraged the audience to explore new practices, leading to greater knowledge acquisition. These findings underscore the importance of visual literacy, as visual content can effectively engage learners. The combination of text, images, videos, and audio in the MCD has successfully captured the respondents' interest and fostered engagement. These findings align with the results reported by Kadian and Gupta (2006), who found that the Video Compact Disc (VCD) method was more effective for teaching dairy calf management practices compared to traditional methods such as "lecture only," "audio only," and "literature only." These results are consistent with the findings of Radhakrishnan (2000), who reported that a significant majority (82.00 percent) of respondents fell into the high knowledge category after being exposed to Instructor Controlled Interactive Video. Similarly, Selvaraj (1997) and Vidya and Manivannan (2010) noted that video presentations significantly enhanced knowledge acquisition regarding the technologies shared. This highlights the effectiveness of video as a tool for improving understanding of recommended practices in pig farming. Marshall (2002) found that individuals retain only 10 percent of what they read, 20 percent of what they hear, 30 percent of what they see, and 50 percent of what they both

hear and see. The emergence of technologies that integrate images, text, and audio can potentially increase retention beyond 50 percent. These tools allow learners to engage with content at their own convenience and in their preferred environments. Additionally, Bansal and Joshi (2014) reported that 73 percent of students appreciated the flexibility of learning anytime and anywhere.

Table 6 : Comparative effectiveness of different digital formats on knowledge gain (n = 150)

Sr. No.	Treatments	Mean Knowledge gain	F value	Critical Difference
1	**T1 Mobile App** (n=50)	25.30	51.46**	1.53
2	**T2 Video** (n=50)	30.00		
3	**T3 WhatsApp message** (n=50)	22.20		

** Significant at 1% level

In the Mobile App treatment**,** the knowledge gain was lower than that of the Video treatment**.** This may be attributed to the respondents' limited motivation or digital literacy, which may have hindered their ability to open, navigate, read, and comprehend the app content effectively. Although mobile apps are designed to deliver interactive and structured information, the lack of familiarity with smart phones and digital platforms among many farmers appears to be a significant barrier to their optimal use for learning agricultural practices. Furthermore, unlike videos that offer visual demonstrations and audio explanations, the mobile app format lacks visual appeal and real-time interaction, which may have limited users' understanding and engagement. The absence of opportunities to clarify doubts or seek personalized guidance further diminishes the learning effectiveness of mobile-based content. These findings highlight that despite the growing availability of mobile technologies, many farmers are still transitioning to the use of digital tools**,** and their comfort level with such formats plays a crucial role in determining knowledge acquisition.

In the WhatsApp message treatment**,** respondents demonstrated the lowest mean knowledge gain (22.20)**.** Although need-based messages related to sugarcane cultivation practices were shared via WhatsApp, it appears that participants showed limited interest in engaging with the content. The asynchronous and text-heavy nature of WhatsApp messages may have led to passive reception**,** where messages were either not opened, skimmed superficially, or ignored altogether**.** Consequently, no conscious effort may have been made by the respondents to read, reflect upon, or discuss the information either individually or collectively with fellow farmers. The lack of interactivity and visual reinforcement in the WhatsApp format may have further contributed to reduced engagement and retention. As Leagans (1961) rightly emphasized, the combination of audio and visual stimuli is more effective in creating impact and promoting behavioral change than text alone. The absence of these elements in WhatsApp messages likely impaired the learning process**,** resulting in limited knowledge acquisition. In contrast, the video format, which integrates both visual and auditory cues**,** is inherently more engaging and easier to comprehend, thereby making it more effective in enhancing knowledge when shown in full or segmented form.

However, a key finding was that there was no statistically significant difference in knowledge gained among respondents across the three treatments. This suggests that all three digital formats have a comparable impact on knowledge acquisition. The similarity in visuals used across all tools may contribute to this outcome. Nevertheless, the choice of tools can be tailored based on specific conditions and the intended approach for the training program.

The results furnished in Table 6 indicated that comparison of knowledge gain with respect to different digital formats. Videos were found to be most effective in imparting knowledge compared to other formats. All formats proved effective in imparting knowledge, though there was notable variation in their levels of effectiveness. Additionally, the 'F' value was significant at the 1% level for knowledge gain, indicating a notable difference in knowledge acquisition across various digital formats. The critical difference analysis revealed that the Video and WhatsApp message formats exhibited the highest significant difference, while the Mobile App and WhatsApp message formats showed the least significant difference in knowledge gain attributed to the different digital formats. These findings align with the conclusions reported by Chaudhari et al. (2021), Tadavi et al. (2024), and Panasara et al. (2023) and Parneet et al. (2025); Agarwal et al. (2024); Sanjay et al. (2024); Sanjay et al. (2024); Chauhan et al. (2025) who also observed higher effectiveness of Video-based content, Smartphone application and WhatsApp messages in enhancing farmers' knowledge.

CONCLUSION

The study concludes that the video format resulted in the highest mean knowledge gain, followed by mobile apps and WhatsApp messages. The findings indicate that videos are

an effective format for sharing agricultural technologies with farmers. Consequently, extension agents should prioritize using information and communication technology tools, particularly videos, to educate farmers about recommended scientific farming practices, thereby enhancing their benefits. Thus, utilizing videos could transform 'sugarcane growers' into 'resource-rich farmers.'

POLICY IMPLICATIONS

(1) Video alone can be effective digital format for creating awareness and popularizing other crops due to its novelty effects. Video can be economical in terms of time, energy and money and also useful for developing country like India which is overpopulated and lacks resources and has widespread illiteracy. Video should be used by the concerned agencies involved in transfer of technology of sugarcane crop to farmers.

(2) Video, Mobile App and WhatsApp message, all these resulted in increased knowledge gain with considerable variation in their effectiveness. This indicates that any of these three formats should be used by the agencies involved in transfer of technology of sugarcane crop to farmers. Selection of these tools should be made based on the type of extension contact (individual, group and mass contact methods) envisaged for educating farmers. Educational materials on sugarcane should be processed to fit into any of these formats to reach and educate sugarcane farmers.

(3) Video resulted in highest level of knowledge gain. This is the strong ICT platform available today which should be best exploited by developing short educational Videos by the concerned agencies and this gives an advantage for the farmers to learn about the technology individually and also save it for future use.

ACKNOWLEDGEMENT

The authors gratefully acknowledge the support of the Department of Agricultural Extension Education, College of Agriculture, University of agricultural sciences, Dharwad**,** Karnataka**,** for facilitating this study. We extend our sincere thanks to the members of the advisory committee for their valuable guidance and timely support throughout the research work. Above all, we express our deepest gratitude to the rural women who participated as respondents and generously spared their valuable time to contribute to this study.

CONFLICT OF INTEREST

All authors declare that they have no conflict of interest.

REFERENCES

Agarwal, D., Chahal, P. K., Mukteshwar, R. (2024) Ascertaining the technological GAP in adoption of sugarcane production technology. G*ujarat Journal of Extension Education*, 38(1):35-40. https://doi.org/10.56572/gjoee.2024.38.1.0007.

Anusha, V. V. S. S., S. R. Patel and Vinaya Kumar, H. M. (2023). Unlocking agricultural information networks: A social network analysis approach. *Gujarat Journal of Extension Education,* 36 (2): 104-111. https://doi.org/10.56572/gjoee.2023.36.2.0019

Bansal, T. and Joshi, D. (2014) A study of students' experiences of mobile learning. *Global Journal of Human Society Science*, 14(4), pp. 217–231.

Chaudhari, R., Patel, J. B. and Patel, P. C. (2021) Utilization of smartphone applications by farmers in agriculture. *Gujarat Journal of Extension Education* 32(1):38-42

Chauhan, Y. R., Khodifad, P. B. and Patel, R. A. (2025) Technological gap and its relationship with profile characteristics of sugarcane growers in recommended sugarcane cultivation technologies. *Gujarat Journal of Extension Education*, 39(2): 178–188. https://doi.org/10.56572/gjoee.2025.39.2.0029.

Chitra and Shankaraiah (2012) ICT initiatives in Indian agriculture. *A Newsletter of the IFIP WG 9.4 and Centre for Electronic Governance IIM, Ahmedabad*, 22(3), pp. 28–29.

Directorate of Economics and Statistics, Ministry of Agriculture and Farmers Welfare, Government of India (2022–23) Area, Production and Yield report Available at: https://data.desagri.gov.in/website/crops-apy-report-web (Accessed: 10 July 2025).

Directorate of Sugarcane Development, Ministry of Agriculture and Farmers Welfare, Government of India (2023–24) *State-wise APY of sugarcane: 2019–20 to 2023–24*. Lucknow: Directorate of Sugarcane Development, Ministry of Agriculture and Farmers Welfare. Available at: https://sugarcane.dac.gov.in/schemes/StatewiseAPYofSugarcane2019-20to2023-24.pdf (Accessed: 10 July 2025).

Kadian, S.K. and Gupta, S.K. (2006) Effectiveness of a video compact disc (VCD) on dairy calf management practices. *International Journal of Engineering Science and Innovation*, 1, pp. 57–62.

Kapil, K. (1973) 'The agricultural film', in *Agriculture Communication*. Farm Information Unit, Directorate of Extension, Ministry of Agriculture, New Delhi (India).

Leagans, J.P. (1961) 'The communication process', in *Extension Education in Community Development*. Directorate of Extension, Ministry of Food and Agriculture, Government of India, New Delhi.

Marshall, J. (2002) Learning with technology. Evidence that technology can, and does, support learning. Psychology, 74: 666-677.

Panasara, U. S., Shekhar, Serene and Vyas, J. N. (2023) Development and standardization of media packages on consumer rights and certification mark for rural consumers. *Gujarat Journal of Extension Education,* 36(2):145-151.

Parneet, M., Kanwaljit, K. and Sukhdeep, K. M. (2025) Effectiveness of media package for creating awareness among rural women regarding use of tulsi plant. *Gujarat Journal of Extension Education,* 39(1):153-159.

Pratik K. Patel, Vinaya Kumar, H. M., Patel J. B. (2023). Determinant factors for social media utilisation behaviour of farmers for sustainable agriculture development. *Journal of Global Communication* 16(1):16-21. http://doi.org / 10.5958 / 0976-2442. 2023. 00004.6

Pratik Kiritkumar Patel and Vinaya Kumar, H. M. (2021). Farmers socio- econimic status and constraints using social media for sustainable agriculture development. *Gujarat Journal of Extension Education* 32 (1): 34-39.

Pratik Kiritkumar Patel and Vinaya Kumar, H. M. (2022). Predictive Factors for Farmers' Knowledge of Social Media for Sustainable Agricultural Development. *Indian Journal of Extension Education*, 58 (4): 55-59. http://doi.org/10.48165/IJEE.2022.58412

Radhakrishnan, D. (2000) Effectiveness of instructor controlled interactive video (ICIV) in dissemination of farm technology. M.Sc. (Agri.) Thesis. Kerala Agricultural University, Thrissur (India).

Sanjay, V. C., Mondal, S. and Demila, T. (2024) Nexus between socio-contextual factors and crisis awareness of sugarcane growers. *Gujarat Journal of Extension Education*, 38(2):139-143. https://doi.org/10.56572/gjoee.2024.38.2.0022.

Sanjay, V. C., Mondal, S. and Patel, P. N. (2024) A study of profile characteristics of sugarcane growers on their crisis awareness. *Gujarat Journal of Extension Education*, 38(2):201-205. https://doi.org/10.56572/gjoee.2024.38.2.0032.

Selvaraj, C. (1997) Instructor controlled interactive video programme – An experimental study. M.Sc. (Agri.) Thesis. Tamil Nadu Agricultural University, Coimbatore (India).

Tadavi, Sameer A., Kadam, Rajesh. P. and Manvar, Vidyanand. S. (2024) Use of social media as a source of market information by the farmers. *Gujarat Journal of Extension Education,* 37(2):110-114

Vidya, P. and Manivannan, C. (2010) Development of an educational interactive video DVD on dairy health management practices. *International Journal of Education Development*, 6(1), pp. 43–87.

Received : July 2025 : Accepted : September 2025