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# INFORMATION NEED ASSESSMENT OF WATERMELON GROWERS IN CHENGALPATTU DISTRICT OF TAMIL NADU

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**ABSTRACT**
Agricultural information enabled farmers to make informed decisions on crop production and resource management. The present study was conducted during 2025-2026 in Chengalpattu district of Tamil Nadu to assess the information needs and preferred communication modes of watermelon growers. Chithamur block and three villages, namely Nallamur, Kattudevadur and Polambakkam, were purposively selected for extensive watermelon cultivation. A total of 120 watermelon growers were selected through simple random sampling, 40 from each village. Primary data were collected using a pre-tested structured interview schedule, and percentage analysis, ranking technique and the Kruskal-Wallis rank sum test were used for data analysis. Growth regulation and ripening management, nutrient management, seed treatment, irrigation and moisture management, transplanting, spacing and varietal selection emerged as the highest priority information needs, and a majority of growers (66.67%) recorded a medium level of overall information need. The Kruskal-Wallis test showed no significant difference in information needs among marginal, small and large farmers (chi-square = 0.555, p = 0.758). A combined audio-and-video mode was preferred for most cultivation practices, ranging from 60.00 to 80.00 per cent, while image-based communication was preferred for spacing and marketing information. Demand-driven, technology-enabled extension services could substantially improve farmers' information access and technology adoption.

**KEYWORDS:** Agricultural Information, Communication Preference, Extension Education, Information and Communication Technologies, Information Need Assessment, Watermelon Growers

## INTRODUCTION

Agriculture continues to play a crucial role in the Indian economy by contributing to food security, employment generation and rural livelihoods. Rapid technological change, climatic variability and fluctuating market prices have transformed agriculture into a knowledge-intensive enterprise, making timely access to accurate and need-based information indispensable for improving farm productivity and sustainable development (Glendenning et al., 2010; Babu et al., 2012; Nkebukwa, 2018).

Agricultural information encompasses production technologies, weather forecasts, market intelligence, input availability and extension advisories that assist farmers in making informed decisions across the crop production cycle. Reliable information enables farmers to adopt improved technologies and reduce production risks, whereas inadequate or untimely information often results in poor management decisions and reduced productivity (Tang et al., 2015; Adio et al., 2016). Extension has therefore evolved into a participatory, demand-driven system in which identifying farmers' actual information needs is an essential prerequisite for designing effective, location-specific advisory services (Glendenning et al., 2010; Madhavan, 2017; Benard et al., 2018).

Farmers require different types of information at different stages of crop production, including varietal selection, seed treatment, nutrient management, irrigation, plant protection and marketing, and these requirements are shaped by the farming system and local production constraints. Production-oriented information such as fertilizer management, irrigation and crop protection is generally accorded higher priority than general agricultural information because of its direct bearing on crop performance (Naveed and Anwar, 2015; Daramola et al., 2016; Omoregbee and Banmeke, 2014). Studies on farmers' engagement with institutional information networks similarly show that training exposure and access to reliable sources strongly shape the information-seeking behaviour of farming communities (Acharya et al., 2023).

Rapid advances in Information and Communication Technologies (ICTs) have transformed agricultural information dissemination, with mobile phones, internet-based platforms and social media becoming important channels for delivering weather, market and crop management advisories that complement conventional extension methods (Kameswari et al., 2011; Verma et al., 2012; Raza et al., 2020). Yet constraints such as poor connectivity, limited digital literacy and lack of

location-specific recommendations continue to limit effective utilisation of such information, reinforcing the need for demand-driven, farmer-oriented delivery mechanisms (Nkebukwa, 2018; Benard et al., 2018; Adio et al., 2016).

Watermelon (Citrullus lanatus) is an economically important commercial vegetable crop grown extensively under irrigated conditions for its short duration and attractive returns. In Chengalpattu district of Tamil Nadu, watermelon cultivation has expanded owing to favourable agro-climatic conditions and improved irrigation, yet successful production requires scientific knowledge of varietal selection, seed treatment, irrigation scheduling, nutrient management, crop regulation and marketing. Crop-specific information need assessments for watermelon growers remain scarce, and information on their preferred communication modes is limited. Understanding these aspects is essential for designing extension programmes that respond to the actual needs of watermelon growers and promote adoption of improved production technologies (Benard et al., 2018; Solano et al., 2003; Tang et al., 2015). The present study was therefore undertaken to assess the information needs and preferred communication modes of watermelon growers in Chengalpattu district.

## METHODOLOGY

The study was conducted during 2025-2026 in Chengalpattu district of Tamil Nadu to assess the information needs and preferred communication modes of watermelon growers. An ex post facto research design was adopted since the variables under study had already occurred naturally and were beyond the control of the researcher. Chengalpattu district was selected purposively owing to its extensive irrigated watermelon cultivation and growing commercial importance. Chithamur block was further selected purposively for its larger area under watermelon and concentration of commercial growers, and three villages within the block, namely Nallamur, Kattudevadur and Polambakkam, were purposively selected for the predominance of watermelon cultivation. A total of 120 watermelon growers constituted the sample, with 40 respondents selected from each village through simple random sampling, ensuring equal probability of selection and reducing sampling bias.

Primary data were collected using a pre-tested structured interview schedule through the personal interview method, which allowed direct interaction with respondents and clarification of queries. The schedule was pre-tested among non-sample respondents and suitably modified before the final survey. It comprised three sections covering the socio-economic characteristics of respondents, twenty-one information need statements spanning land preparation, varietal selection, seed treatment, transplanting, spacing, irrigation, nutrient management, crop regulation, plant protection, harvesting and marketing, and respondents' preferred communication mode among audio, video, image, text and audio-visual communication, recorded separately for each information item.

Respondents ranked each information item according to perceived importance, and the items were classified into highly required, moderately required and least required categories based on cumulative ranking scores. The cumulative need score of each respondent was further classified into low, medium and high information need categories using mean and standard deviation as cut-off. Respondents were further classified into marginal, small and large farmers according to operational landholding, and the Kruskal-Wallis rank sum test was employed to examine whether information needs differed significantly among the three categories. Percentage analysis was used to describe the information need index and communication preferences, ranking analysis was used to prioritise information needs, and the collected data were tabulated, statistically processed and interpreted in line with the objectives of the study.

## RESULTS

### Information needs of watermelon growers

To identify priority areas needing technical guidance, respondents ranked twenty-one information items related to watermelon cultivation, and based on cumulative ranking scores the items were categorised into highly required, moderately required and least required categories. The results are presented in Table 1.

**Table 1. Priority information needs of watermelon growers**

| Rank | Highly required | Rank | Moderately required | Rank | Least required |
|---|---|---|---|---|---|
| 1 | Growth regulation & ripening management | 8 | Harvest maturity indexing and picking | 15 | Bed formation |
| 2 | Nutrient (fertilizer) management | 9 | Machineries | 16 | Pollination enhancement |
| 3 | Seed treatment | 10 | Storage and transport | 17 | Training, pruning and vine management |
| 4 | Irrigation and moisture management (drip/furrow) | 11 | Land preparation | 18 | Fruit thinning and grading on the vine |
| 5 | Transplanting | 12 | Marketing and price realization | 19 | Nursery raising/direct seeding |
| 6 | Spacing | 13 | Mulching and plastic laying | 20 | Raised bed size |
| 7 | Varietal selection | 14 | Post-harvest handling | 21 | Weed management |

Growth regulation and ripening management was ranked as the highest priority information need, followed in order by nutrient (fertilizer) management, seed treatment, irrigation and moisture management, transplanting, spacing and varietal selection, which together constituted the highly required category. Harvest maturity indexing, machineries, storage and transport, land preparation, marketing and price realisation, mulching and plastic laying, and post-harvest handling were categorised as moderately required. Bed formation, pollination enhancement, training, pruning and vine management, fruit thinning and grading on the vine, nursery raising or direct seeding, raised bed size, and weed management received the lowest priority ranks and were categorised as least required.

Based on the cumulative need scores obtained across the twenty-one information items, respondents were further classified into low, medium and high information need categories, and the results are presented in Table 2.

**Table 2. Information need index of watermelon growers**

| S.No | Level of information need | Respondents (%) |
|---|---|---|
| 1 | Low | 15.00 |
| 2 | Medium | 66.67 |
| 3 | High | 18.33 |
| | Total | 100.00 (n=120) |

A majority of the respondents (66.67%) had a medium level of information need, followed by high (18.33%) and low (15.00%) levels of information need.

Difference in information needs among marginal, small and large watermelon growers

Respondents were classified into marginal, small and large farmers based on operational landholding, and the Kruskal-Wallis rank sum test was used to examine whether their information needs differed. The results are presented in Table 3.

**Table 3. Difference in information needs among different categories of watermelon growers**

| Category of farmers | Chi-square value | df | p-value | Interpretation |
|---|---|---|---|---|
| Marginal, small and large | 0.555 | 2 | 0.758 | Non-significant |

The chi-square value was 0.555 (df = 2, p = 0.758), which was not significant at the 5 per cent level; the null hypothesis was therefore accepted, indicating no statistically significant difference in information needs among marginal, small and large watermelon growers.

Preferred mode of receiving information on watermelon cultivation practices

Respondents were asked to indicate their preferred mode of receiving information separately for each of the twenty-one information items, and the results are presented in Table 4.

**Table 4. Preferred mode of receiving information on watermelon cultivation practices**

| S.No | Information | Preferred mode | Respondents (%) |
|---|---|---|---|
| 1 | Varietal selection | Audio and video | 60.00 |
| 2 | Seed treatment | Audio and video | 71.67 |
| 3 | Nursery raising / direct seeding | Audio and video | 65.00 |
| 4 | Land preparation | Audio and video | 68.33 |
| 5 | Bed formation | Audio and video | 74.17 |
| 6 | Spacing | Image | 69.17 |
| 7 | Transplanting | Audio and video | 71.67 |
| 8 | Mulching and plastic laying | Audio and video | 72.50 |
| 9 | Nutrient (fertilizer) management | Audio and video | 65.00 |
| 10 | Irrigation and moisture management (drip/furrow) | Audio and video | 76.67 |
| 11 | Weed management | Audio and video | 67.50 |
| 12 | Training, pruning and vine management | Audio and video | 71.67 |

| S.No | Information | Preferred mode | Respondents (%) |
|---|---|---|---|
| 13 | Pollination enhancement (bee-hive placement/hand pollination) | Audio and video | 65.00 |
| 14 | Raised bed size | Audio and video | 68.33 |
| 15 | Fruit thinning & grading on the vine | Audio and video | 61.67 |
| 16 | Growth regulation & ripening management | Audio and video | 71.67 |
| 17 | Harvest maturity indexing and picking | Audio and video | 80.00 |
| 18 | Post-harvest handling (curing, cleaning, sorting) | Audio and video | 62.50 |
| 19 | Storage and transport | Audio and video | 70.00 |
| 20 | Marketing and price realization | Image | 65.83 |
| 21 | Machineries | Audio and video | 68.33 |

A combined audio-and-video mode was the preferred mode of receiving information for nineteen of the twenty-one items, with the highest preference recorded for harvest maturity indexing and picking (80.00%), followed by irrigation and moisture management (76.67%), bed formation (74.17%) and mulching and plastic laying (72.50%). Image-based communication was preferred for spacing (69.17%) and marketing and price realization (65.83%), while the lowest preference for the combined audio-and-video mode was recorded for varietal selection (60.00%).

**DISCUSSION**

From Table 1. Growth regulation and ripening management, nutrient management, seed treatment, irrigation and moisture management, transplanting, spacing and varietal selection had a direct influence on crop establishment, flowering, fruit development and market quality. Since watermelon was cultivated mainly as a commercial crop, farmers placed greater emphasis on information that improved productivity and economic returns rather than general agricultural knowledge. The high priority given to growth regulation and ripening management reflected farmers' need for guidance on practices that improved fruit size, uniform ripening, sweetness and market quality, all of which bore directly on the price realised at the farm gate, since growers sold to intermediaries who graded fruit on size, shape and ripeness, and any knowledge gap here translated into lower returns.

Nutrient management ranked second because balanced fertilizer application was essential for vigorous vegetative growth, flowering and fruit development, and imbalanced application was a recurring constraint among commercial vegetable growers under similar irrigated conditions. Information on seed treatment, irrigation and moisture management, transplanting, spacing and varietal selection was also rated highly, reflecting farmers' growing awareness of scientific cultivation practices and their recognition that yield losses at these early stages were difficult to compensate for later. These findings agreed with Naveed and Anwar (2015), who reported that farmers primarily required information on seed selection, irrigation management and crop husbandry, and with Salau (2013), who found that improved seed, production practices and pest management constituted the major information needs of smallholder farmers. Daramola et al. (2016) similarly reported that vegetable growers gave high priority to irrigation, fertilizer management and harvesting, while Babu et al. (2012) emphasised that farmers preferred timely, location-specific and problem-oriented information over generalised recommendations, a pattern mirrored here in the priority accorded to production-stage rather than post-production information.

The moderate priority given to harvest maturity indexing, mechanization, storage and transport, land preparation, marketing and price realisation, mulching and plastic laying, and post-harvest handling indicated that farmers were primarily concerned with achieving successful crop production before focusing on post-harvest and marketing activities, and that many such operations were performed by hired labour, contracted operators or traders rather than farmers themselves, reducing the perceived urgency of first-hand technical knowledge. This was consistent with Tang et al. (2015) and Duhan and Singh (2017), who found farmers prioritised information affecting on-farm decision-making over downstream market functions mediated by other actors.

The lowest priority assigned to bed formation, pollination enhancement, training, pruning and vine management, fruit thinning and grading on the vine, nursery raising or direct seeding, raised bed size, and weed management suggested that farmers already possessed adequate practical knowledge of these routine operations through experience and informal learning within the farming community. Soyemi (2014) similarly found that farmers rated day-to-day cultural operations lower in information priority than technical, input-related and decision-intensive practices, since routine tasks were learned through observation rather than formal sources. Even so, extension agencies needed to keep reinforcing these operations through periodic demonstrations and farmer field schools, since incremental improvements in weed management, spacing and vine training could still contribute measurably to yield and quality gains, even where farmers did not perceive them as urgent gaps. Overall, the ranking pattern underscored the need to design extension curricula

weighted towards practices with the greatest bearing on yield, fruit quality and market price, while not entirely neglecting foundational agronomic operations.

The distribution of information needs across the three categories also bore on the sequencing of extension interventions over the crop season. Since the highly required items fell mostly within the early and mid stages of the crop cycle, extension functionaries stood to benefit most from concentrating advisory contact, training and demonstration activity in this window rather than distributing it evenly across the season. Pre-season group meetings on varietal selection and seed treatment, followed by field-level visits at transplanting, spacing, early vegetative growth and flowering, would align extension delivery with the periods of greatest demand identified in this study. By contrast, the moderately and least required items, concentrated around harvest, post-harvest handling and routine field operations, could be addressed through less intensive, periodic reinforcement, allowing extension personnel to allocate resources more efficiently across the watermelon-growing villages of the district.

From Table 2. The predominance of a medium level of information need among watermelon growers indicated that most farmers already possessed a working knowledge of cultivation practices gained through experience, informal peer learning and occasional contact with input dealers and extension functionaries, but continued to require reinforcement and updated technical guidance to refine specific operations. The smaller proportion reporting a high level of information need may have corresponded to relatively new entrants or larger-scale growers facing more complex decisions relating to input scheduling and market timing, while the small proportion with a low level of information need likely reflected experienced growers who had cultivated watermelon over several seasons and developed adequate practical competence. This distribution was consistent with Glendenning et al. (2010) and Babu et al. (2012), who reported that farmers' information needs were shaped by the extent of their prior exposure and access to reliable sources, reinforcing the case for extension strategies combining reinforcement of existing knowledge with targeted inputs on the high-priority practices identified in Table 1.

From Table 3. The non-significant Kruskal-Wallis result indicated that farmers across landholding categories required similar technical information, likely because they cultivated watermelon under comparable agro-climatic conditions, used similar hybrids and irrigation methods, and marketed produce through common channels. Watermelon in Chengalpattu district was grown predominantly under drip or furrow irrigation with purchased hybrid seed and a short crop duration, so the production calendar and technical vulnerabilities such as fruit set and irrigation scheduling were largely uniform regardless of scale.

This agreed with Babu et al. (2012), who reported that farmers cultivating similar crops under comparable environments generally required the same technical information regardless of farm size, and with Glendenning et al. (2010) and Benard et al. (2018), who observed that enterprise-specific information needs remained largely similar across farmers under comparable production conditions. This homogeneity may also have reflected marginal and small farmers following the practices of larger, more experienced growers nearby, so resource differences did not necessarily translate into different information needs, though they may have influenced the intensity of input use.

The results supported the concept of need-based, enterprise-specific extension, where advisory services were designed around the production requirements of a crop rather than farm size or resource category. Extension agencies could therefore develop common crop-specific advisory packages equally relevant to marginal, small and large farmers, while incorporating localised recommendations based on soil characteristics, water availability and local production constraints. This also implied that scarce extension resources need not be duplicated across farmer categories, and that group-based methods such as farmer field schools and shared demonstration plots could efficiently reach growers of all landholding sizes simultaneously. The absence of a significant difference across landholding categories did not imply that farm size was irrelevant to extension planning altogether; rather, it suggested that the type of information required was largely uniform, even though the intensity of engagement, scale of input use and capacity to bear risk still varied with farm size. Large farmers, for instance, were better positioned to invest in capital-intensive interventions such as drip irrigation once the underlying technical information was available, whereas marginal and small farmers required accompanying support such as credit facilitation or input subsidies to translate the same information into practice, so advisory content could remain broadly uniform while planning stayed sensitive to differences in the resources available to act upon it.

From Table 4. The consistent preference for a combined audio-and-video mode across most information items indicated that farmers preferred methods combining visual demonstration with verbal explanation for understanding technical recommendations, particularly for operations involving a precise sequence of actions such as harvest maturity indexing, irrigation scheduling, bed formation and mulching. This preference may have been attributed to the ability of audio-visual media to demonstrate practical operations in a single, sequential format closely mirroring an actual field demonstration, and it reflected the increasing use of smartphones, short-video platforms and messaging applications in rural areas. Unlike a static image or written instruction, a combined audio-and-video clip allowed farmers to observe the correct timing and method of an operation while hearing the underlying rationale, reducing the scope for misinterpretation, particularly among growers with limited formal education. This was also consistent with evidence that farmers accorded high credibility to result and method demonstrations and to impersonal audio-visual channels such as television among cosmopolite information sources (Yalakonda and Chandrasekaran, 2023), suggesting that credibility and comprehensibility jointly shaped farmers' communication preferences.

The preference for image-based communication for spacing and for marketing and price realization suggested that farmers found a single, clear photograph adequate for information that was essentially referential rather than sequential, such as comparing recommended plant-to-plant and row spacing or interpreting prevailing market prices and grades, where a static visual could be consulted repeatedly at the time of decision-making without requiring the fuller explanation an audio-visual demonstration provided. These findings agreed with Kameswari et al. (2011), who found ICT-based extension improved access through multimedia communication, with Raza et al. (2020), who found farmers considered digital sources highly useful for location-specific advisories, and with Verma et al. (2012) and Adio et al. (2016), who

found farmers increasingly used multiple, integrated communication channels suited to the nature of the information sought.

Large-scale analyses of farmer helpline queries confirmed that information demand was strongly shaped by crop, season and channel (Godara et al., 2024), supporting the case for offering complementary channels rather than a single standardised format. This implied that extension functionaries needed to prioritise short, vernacular-language audio-visual content on the highest-priority needs identified in this study, such as growth regulation, nutrient management and irrigation scheduling, disseminated through smartphone-based messaging groups, community viewing sessions or farmer-producer organisations, complemented by clear photographic material for spacing and marketing decisions, to improve reach, comprehension and adoption among growers in the district. Smartphone-based platforms allowed extension staff to distribute demonstration videos at low marginal cost compared with repeated physical visits, with progressive farmers and farmer-producer organisations acting as local nodes for redistribution without added workload. Content on growth regulation and nutrient management would have been more effective as short, stepwise demonstrations with locally relevant visuals from villages such as Nallamur, Kattudevadur and Polambakkam, since well-designed, locally contextualised audio-visual content was likely to yield higher returns than image-only or purely verbal formats for watermelon growers in the district.

## CONCLUSION

The study shows that watermelon growers place the highest priority on production-oriented information such as growth regulation and ripening management, nutrient management, seed treatment, irrigation and moisture management, transplanting, spacing and varietal selection, and a majority of growers record a medium level of overall information need on these practices. Farm size has little influence on these requirements, indicating that common crop-specific advisory modules can serve growers across all landholding categories, supplemented by localised recommendations where production conditions differ. Growers prefer a combined audio-and-video mode of communication for most cultivation practices, while a simple image-based mode suits reference information such as spacing and market prices, signalling growing acceptance of multimedia-based extension among watermelon growers. Strengthening demand-driven, technology-enabled extension systems built around these priority needs and preferred modes can improve technology adoption, productivity and the sustainability of watermelon cultivation in the region.

## Declarations

**Research ethics statement(s):** Informed consent was obtained from all respondents prior to the interview, and appropriate anonymisation of respondent identity has been ensured.

**Conflict of interest:** The authors declare that there is no conflict of interest.

**Consent for publication:** All authors have given consent for publication of this manuscript.

**Authors' contribution:** All authors contributed to the conceptualisation, data collection, analysis and preparation of the manuscript, and have read and approved the final version.

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## REFERENCES

1. Acharya, S., & Acharya, S. (2023). Information receiving behavior of farmers: the structural and functional analysis. Saumesh Acharya; SK Acharya; TK Mandal; BK Mohanty; Monirul Haque.
2. https://doi.org/10.48165/IJEE.2023.59311
3. Adio, E. O., Abu, Y., YUsuf, S. K., & Nansoh, S. (2016). Use of agricultural information sources and services by farmers for improve productivity in Kwara State. Library Philosophy and Practice, 1456(1), 1-18. https://digitalcommons.unl.edu/libphilprac/1456
4. Babu, S. C., Glendenning, C. J., Asenso-Okyere, K., & Govindarajan, S. K. (2012). Farmers' information needs and search behaviors: Case study in Tamil Nadu, India. https://hdl.handle.net/10568/153833
5. Benard, R., Dulle, F. W., & Hieromin, L. A. (2018). Information needs and accessibility by fish farmers in the southern highlands of Tanzania. Global Knowledge, Memory and Communication, 67(4-5), 209-225. https://doi.org/10.1108/GKMC-08-2017-0070
6. Daramola, C. F., Adebo, T., & Adebo, G. M. (2016). Challenges and information needs assessment of dry season vegetable farmers in Akure Metropolis, Ondo State. IOSR J. Agric. Vet. Sci, 9, 52-58.
7. Duhan, A., & Singh, S. (2017). Sources of agricultural information accessed by farmers in Haryana, India. International Journal of Current Microbiology and Applied Sciences, 6(12), 1559-1565. https://doi.org/10.20546/ijcmas.2017.612.175
8. Glendenning, C. J., Babu, S. C., & Asenso-Okyere, K. (2010). Review of agricultural extension in India: are farmers' information needs being met?. https://hdl.handle.net/10568/154873
9. Godara, S., Bana, R. S., Godara, S., Bishnoi, S., Nain, M. S., Parsad, R., & Marwaha, S. (2024). Data-driven insights for agricultural extension services in Rajasthan: A study of Kisan call center queries. Indian J. Ext. Educ, 60(1), 53-58. https://doi.org/10.48165/IJEE.2024.60110
10. Kameswari, V. L., Kishore, D., & Gupta, V. (2011). ICTs for agricultural extension: a study in the Indian Himalayan region. The Electronic Journal of Information Systems in Developing Countries, 48(1), 1-12.

https://doi.org/10.1002/j.1681-4835.2011.tb00339.x
11. Madhavan, S. R. U. T. H. Y. (2017). Agriculture information needs of farmers: An overview. International Journal of Science and Research (IJASR), 7(6), 209-216.
12. Naveed, M. A., & Anwar, M. A. (2015). Understanding cotton growers' information needs from rural Bahawalpur. Pakistan Journal of Information Management and Libraries, 16, 21-28.
13. Nkebukwa, L. L. (2018). Access and use of agricultural information in Muleba and Misenyi Districts, Tanzania. Business Education Journal, 4(1).
14. Omoregbee, F. E., & Banmeke, T. O. A. (2014). Information needs of cassava farmers in delta state of Nigeria. Tanzania Journal of Agricultural Sciences, 12(2), 20-25.
https://www.ajol.info/index.php/tjags/article/view/114269
15. Raza, M. H., Khan, G. A., Shahbaz, B., & Saleem, M. F. (2020). Effectiveness of information and communication technologies as information source among farmers in Pakistan. Pakistan Journal of Agricultural Sciences, 57(1). https://doi.org/10.21162/PAKJAS/19.8292
16. Salau, E. S. (2013). Agricultural information needs of small holder farmers in central agricultural zone of Nasarawa State. Journal of Agricultural extension, 17(2). https://doi.org/10.4314/jae.v17i2.15
17. Solano, C., León, H., Pérez, E., & Herrero, M. (2003). The role of personal information sources on the decision-making process of Costa Rican dairy farmers. Agricultural systems, 76(1), 3-18. https://doi.org/10.1016/S0308-521X(02)00074-4
18. Soyemi, O. D. (2014). Women farmers' agricultural information need and search behaviour in North Central Nigeria. In Information and Knowledge Management (Vol. 4, No. 8, pp. 39-44).
19. Tang, C. S., Wang, Y., & Zhao, M. (2015). The implications of utilizing market information and adopting agricultural advice for farmers in developing economies. Production and operations management, 24(8), 1197-1215. https://doi.org/10.1111/poms.12336
20. Verma, A. K., Meena, H. R., Singh, Y. P., Chander, M., & Narayan, R. (2012). Information seeking and sharing behaviour of the farmers: A case study of Uttar Pradesh State, India. Journal of recent Advances in Agriculture, 1(2), 50-55.
21. Yalakonda, R., & Chandrasekaran, K. (2023). Credibility of information sources and channels as perceived by paddy farmers in Telangana State. Indian Journal of Extension Education, 59(1), 170-173.
https://doi.org/10.48165/IJEE.2023.59137