P-ISSN 2322 - 0678 & E-ISSN 3048 - 9946
https://doi.org/10.56572/gjoee.2026.41.2.0029 Gujarat Journal of Extension Education Vol. 41 : Issue 2 : June - 2026

KNOWLEDGE LEVEL OF FARMERS REGARDING IMPROVED KACHAI LEMON PRODUCTION PRACTICES

D. Koshuo Enah[1], Dipak Kumar Bose[2] and Keithellakpam Chanakya[3]

1 Ph.D. Scholar, Department of Agricultural Extension Education, Sardar Vallabhbhai Patel University of Agriculture & Technology, Meerut, U.P-250110
2 Professor, Department of Agricultural Extension and Communication, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P-211007
3 PG Scholar, Department of Agricultural Extension and Communication, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P-211007
Email: koshuoenah@gmail.com

ABSTRACT

The research was carried out during year 2023-24 in Ukhrul district of Manipur to assess the knowledge level of farmers regarding improved Kachai lemon production practices. A total of 120 respondents were randomly selected from Kachai Village under L.M. Block, as a large number of farmers in this area are involved in Kachai lemon cultivation. Primary data were gathered through a survey method using a pre-structured interview schedule, and suitable statistical tools were applied to analyze the data and find the results. The findings of the study indicate that 42.5 per cent of the respondents belonged to the middle age group (36–55 years), while 28.33 per cent had education up to Junior High School level, and 45 per cent were solely engaged in agriculture as their occupation. The results further reveal that a majority (53.33%) of the respondents fell under the medium knowledge category, followed by 24.17 per cent in the low knowledge category and 22.50 per cent in the high knowledge category. The study also showed that independent variables such as age, education, occupation, annual income, family type, landholding size, exposure to mass media, sources of agricultural information, innovativeness, and social participation had a positive and significant relationship with the knowledge level of farmers. In contrast, the housing pattern of the respondents was found to have a negative yet significant relationship with their knowledge level regarding improved Kachai lemon production practices. Overall, the findings suggest that there is a need for increased training programs and more frequent visits by extension personnel, Krishi Vigyan Kendras (KVKs), and relevant departments to enhance farmers' knowledge. Giving more importance on post-harvest management and processing practices would also help in minimizing yield losses and improving the income of Kachai lemon growers.

Keywords: *knowledge, improved production, kachai lemon*

INTRODUCTION

Kachai Lemon is considered as a symbol of pride for Manipur due to its distinct characteristics, and it has been granted a geographical indication (GI) registration (GI-466). As compared to other lemon varieties grown across India, Kachai Lemon is unique because of its high ascorbic acid content, which is about 51 percent the highest reported among citrus fruits while other lemon varieties generally contain only 20 to 30 percent. Each fruit contains approximately 36–56 ml of juice. During the harvesting season, the trees appear almost like they are in full bloom, giving a visually appealing scene that is vibrant, colourful, and attractive.

Kachai Village, located in the Ukhrul district, is known for its scenic beauty and is inhabited by the Tangkhul Naga tribe. Agriculture serves as the main livelihood for the people living in Kachai village. Every year, the Kachai Lemon Festival is celebrated in the second week of January which highlights the cultural and economic importance of this fruit. Kachai Lemon is rich in antioxidants and possesses several medicinal and therapeutic properties. It is commonly used for managing heart-related conditions, digestive problems, weight management, kidney stones, cancer, and dry scalp, and it is also utilized in the production of soaps and perfumes. The rind is used for extracting pectin, while the juice is a source of ascorbic acid. The Kachai lemon is also used to make a variety of value-added products such as pickles, candies, lemon juice, and squash are prepared from Kachai lemons.

Recently, more educated youth have started showing interest in lemon cultivation. They are moving towards commercial orchard farming and are planting between 500 to 3000 lemon trees, instead of the traditional backyard gardens that typically had only 30 to 60 trees. This shift has

led to a rapid increase in the number of lemon trees in the village. Such a trend is encouraging for the community and is expected to significantly improve the income and standard of living of the Kachai lemon growers in the future. Although Kachai lemon cultivation has long been a prominent fruit farming practice in the village, production levels have declined in recent years, largely due to the impacts of climate change. A major challenge faced by farmers is the lack of adequate knowledge and adoption of practices to cope with these changing climatic conditions.

The present study aims to generate scientific insights into the knowledge level of farmers regarding improved Kachai lemon production. It also will show us and identify the main sources of information that farmers rely on and to understand their communication patterns, including how they exchange information among themselves and the use of various ICT tools. Furthermore, the study will serve as an evidence-based suggestions for agricultural extension agencies, NGOs, and policymakers, enabling them to design focused interventions and develop appropriate strategies that will enhance knowledge, improve information dissemination systems, and ultimately increase the economic returns of farmers.

OBJECTIVE

(1) To access the socio-economic profile of the respondents

(2) To determine the knowledge level of the Kachai lemon growers towards improved Kachai lemon production practices

(3) To find out the relationship between socio-economic profile with the knowledge.

METHODOLOGY

The study adopted a descriptive research design, which focuses on describing the characteristics of a particular population or phenomenon under investigation. A multistage sampling technique was used to select the required samples, as it allows a large population to be gradually divided into smaller groups until the desired sample size is obtained. The locale of the study was in Manipur. Manipur consists of 16 districts. Among these, Ukhrul district was purposively selected due to having the largest area under Kachai lemon cultivation. Further, Kachai Village in the Lungchong Meiphai Block was also chosen purposively, as it has the highest net sown area for Kachai lemon. From this selected village, a total of 120 respondents were randomly selected for the study. Data collection was carried out through survey method using a pre-structured interview schedule in the form of a structured questionnaire, designed in line with the objectives of the study. The data obtained from the respondents were then systematically scored, classified, tabulated, and analyzed. Statistical tools such as frequency, percentage, and correlation were computed with the help of Microsoft Excel. The correlation coefficient was used to determine the relationship between variables, indicating both the strength and direction of their association.

RESULTS AND DISCUSSION

Table 1 : Socio-economic profile of the respondents (n=120)

Sr. No.	Attribute	Characteristic	f	%
1	**Age**	Young (Below 35 Years)	22	18.33
		Middle (36-55 Years)	51	42.50
		Old (Above 55)	47	39.17
2	**Education**	Illiterate	12	10.00
		Can Read and Write	09	07.50
		Primary School	16	13.33
		Junior High School	34	28.33
		Intermediate	24	20.00
		Graduate and above	25	20.84
3	**Annual income**	Upto Rs. 48,000	31	25.33
		Rs. 48,001 to Rs. 96,000	46	38.33
		Above Rs. 96,000	43	35.84
4	**Occupation**	Agriculture	54	45.00
		Agriculture + Labour	42	35.00
		Agriculture + Business	17	14.17
		Agriculture + Service	07	05.83

Sr. No.	Attribute	Characteristic	f	%
5	**Housing pattern**	Hut	90	75.00
		Semi - Cemented	17	14.17
		Cemented	13	10.83
6	**Land holding**	Up to 1 acre	22	18.33
		1-2 acres	53	44.17
		Above 2 acres	45	37.50
7	**Family type**	Nuclear	64	63.33
		Joint	56	36.67
8	**Mass media exposure**	Low (7-9)	46	38.33
		Medium (10-12)	45	37.50
		High (13-15)	29	24.17
9	**Source of Agriculture information**	Low (11-13)	24	20.00
		Medium (14-16)	53	44.17
		High (17-19)	43	35.83
10	**Innovativeness**	Low (12-14)	28	23.33
		Medium (15-17)	50	41.67
		High (18-20)	42	35.00
11	**Social participation**	Low (8-9)	03	02.50
		Medium (10-11)	71	59.17
		High (12-13)	46	38.33

F – Frequency % - Percentage

From the above table, it can be observed that 42.50 per cent of the respondents belong to the middle age group (36–55 years). It was further found that 28.33 per cent of the respondents were educated up to Junior High School level. The data also indicate that 38.33 per cent of the respondents have an annual income ranging between 48,001 to 96,000 rupees. It was observed that 45.00 per cent of the respondents are engaged solely in agriculture. It was also noted that a majority (75.00%) of the respondents live in hut-type houses. The table shows that 44.17 per cent of the respondents possess 1–2 acres of land. It was observed that most (63.33%) of the respondents belong to nuclear families. The findings further indicate that 38.33 per cent of the respondents have a low level of media exposure. It reveals that 44.17 per cent of the respondents fall under the medium category with respect to sources of agricultural information. Additionally, 41.67 per cent of the respondents exhibit a medium level of innovativeness. It was also found that a majority (59.17%) of the respondents have a medium level of social participation. Similar findings have been reported by Tiwari *et al.* (2024).

Table 2: Distribution of respondents based on the knowledge level regarding improved Kachai lemon production practices (n=120)

Sr. No.	Statements	Evaluation		
		Full Known F (%)	Partially KnownF (%)	Not KnownF (%)
1	**Land preparation**	77 (66.17)	34 (28.33)	09 (7.50)
2	**Suitable soil**	71 (59.17)	35 (29.16)	14 (11.67)
3	**Sowing or planting season is**	67 (55.83)	48 (40.00)	05 (4.17)
4	**Planting method**	28 (23.33)	82 (68.33)	10 (8.34)
5	**Space between plants should be kept**	61 (50.83)	48 (40.00)	11 (9.17)
6	**Name of fertilizer**	33 (27.50)	38 (31.67)	49 (40.83)
7	**Type of fertilizer used**	46 (38.33)	14 (11.67)	60 (50.00)
8	**Method of fertilizer**	18 (15.00)	43 (35.83)	59 (49.17)
9	**Intercropping**	20 (16.67)	55 (45.83)	45 (37.50)
10	**Types of manure used**	24 (20.00)	61 (50.83)	35 (29.17)
11	**Disease control used**	07 (5.83)	88 (73.33)	25 (20.84)
12	**Weeding methods**	08 (23.33)	86 (71.67)	06 (5.00)
13	**Weed control**	34 (28.33)	22 (18.33)	64 (53.34)

Sr. No.	Statements	Evaluation		
		Full Known F (%)	Partially KnownF (%)	Not KnownF (%)
14.	**Harvesting after attaining**	84 (70.00)	34 (28.33)	02 (1.67)
15.	**Post-harvest storage**	46 (38.33)	21 (17.50)	53 (44.17)
16.	**Recommended harvesting time**	73 (60.83)	45 (37.50)	02 (1.67)
17.	**Yield / acre**	55 (45.83)	32 (26.67)	33 (27.50)

F – Frequency % - Percentage

The above table stated that majority (66.17%) of the respondents fully knows the land preparation for Kachai lemon. It was revealed that majority (59.17%) of the respondents fully knows about suitable soil. It revealed that majority (55.83%) of the respondents fully knows the sowing time of Kachai lemon. It stated that majority (68.33%) of the respondents partially knows about planting method of Kachai lemon. It revealed that majority (50.83%) of the respondents fully know the spacing of Kachai lemon. It was observed that 40.83 per cent of the respondent does not knows about the name of fertilizer of Kachai lemon. It shows that majority (50.00%) of the respondents does not know about the types of fertilizer used. It was observed that 49.17 per cent of the respondent does not know the method of fertilizer application of Kachai lemon. It revealed that 45.83 per cent of the respondents partially knows about the crops to be intercropped with Kachai lemon. It shows that majority (50.83%) of the respondents partially knows the types of manure used. It was observed that majority (73.33%) of the respondent partially knows about the diseases of Kachai lemon. It stated that majority (71.67%) of the respondents partially knows about the weeding method. It shows that majority (53.34%) of the respondents does not know about weed control of Kachai lemon. It was observed that majority (70.00%) of the respondents fully knows about the maturity of the fruit. It stated that majority (60.80%) of the respondents fully knows about the harvesting time of Kachai lemon. It revealed that 44.17 per cent of the respondent does not know about post-harvest management of Kachai lemon. It was stated that 45.83 per cent of the respondents fully knows the expected yield of Kachai lemon.

Table 2.1 : Over all distribution of respondents based on the knowledge level regarding improved Kachai lemonproduction practices (n=120)

Sr. No.	Knowledge	Frequency	Percentage
1	Low (24-32)	29	24.17
2	Medium (33-41)	64	53.33
3	High (42-50)	27	22.50

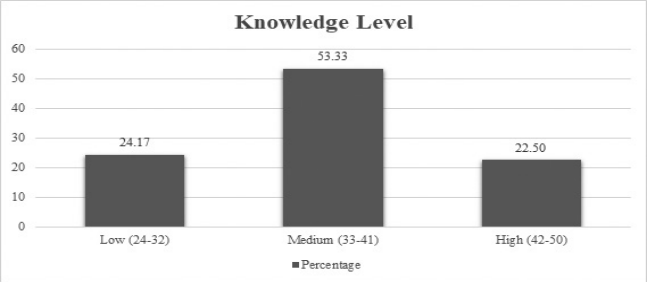

Fig 1.1 Overall distribution of respondents based on the knowledge level of farmers regarding improved Kachai lemon production practices.

The above table 2.1 reveals that majority (53.33%) of the respondents have medium knowledge level category, 24.17 per cent respondents were observed in the low knowledge level category and remaining 22.50 per cent respondents formed high knowledge level category. Similar result was reported by Saryam *et al.*, (2020), Bamon *et al., (*2022), Chaudhary *et al.,* (2024), Shatsang *et al.,* (2024); Kumar *et al.* (2025); Chanakya *et al.* (2025); Jangir *et al.* (2023); Vegad *et al.* (2021); Mallappa *et al.* (2023); Pratik & Vinaya, (2022) and Meena *et al.,* (2024).

Table 3 : Correlation between selected independent variable with knowledge (n=120)

Sr. No.	Variables	Correlation Coefficient ('r' Value)
X_1	**Age**	0.6123**
X_2	**Education**	0.6279**
X_3	**Occupation**	0.3379*
X_4	**Annual Income**	0.6175**
X_5	**Housing Pattern**	-0.4163**
X_6	**Land Holding**	0.6644*
X_7	**Family Type**	0.5567*
X_8	**Mass Media Exposure**	0.4962**
X_9	**Source of Agriculture Information**	0.7323**
X_{10}	**Innovativeness**	0.7466*
X_{11}	**Social Participation**	0.7496*
** = Significant at 0.01 level of probability		
* = Significant at 0.05 level of probability		
NS = Non Significant		

The above Table 3 revealed that out of eleven independent variables age, education, annual income, mass media exposure and source of agriculture information are positively and significantly correlated with knowledge level of farmers regarding improved Kachai lemon production practices at a probability level of 0.01% whereas the independent variable occupation, land holding, family type, innovativeness and social participation housing pattern of the respondents were also positively and significantly correlated with knowledge level but at a slightly lower probability level of 0.05%. And the independent variable housing pattern of the respondents was availed negatively significantly correlated with knowledge level of farmers regarding improved Kachai lemon production practices.

CONCLUSION

It can be concluded that a majority of the respondents fall under the middle age group, and most of them are educated up to the Junior High School level. A large proportion of the respondents are primarily engaged in agriculture as their main occupation. It was also found that most respondents have an annual income ranging between 48,001 to 96,000 rupees. In terms of housing, the majority live in hut-type houses. The data further indicate that a significant number of respondents possess 1-2 acres of land, and most of them belong to nuclear families. The findings also show that a large proportion of respondents have a low level of mass media exposure, while the majority fall under the medium category with respect to sources of agricultural information. Similarly, most respondents exhibit a medium level of innovativeness, and a majority have a medium level of social participation. It was further concluded that most of the respondents fall under the medium knowledge category regarding improved Kachai lemon production practices. The study also revealed that, out of the eleven independent variables namely age, education, occupation, annual income, landholding, family type, mass media exposure, sources of agricultural information, innovativeness, and social participation, all showed a positive and significant relationship with the knowledge level of farmers regarding improved Kachai lemon production practices. In contrast, the independent variable housing pattern was found to have a negative yet significant relationship with the knowledge level of the respondents. Overall, these findings suggest that there is a need to enhance the knowledge level of farmers regarding improved Kachai lemon production practices through increased extension contacts and regular interaction with officials from concerned departments. Improving farmers' knowledge is likely to have a direct and positive impact on their adoption behaviour, which in turn can lead to better productivity and livelihood outcomes.

RECOMMENDATION

The study revealed that overall knowledge level shows that more training and visit from extension agents, KVK's and concerned department is needed to improve the knowledge of the lemon growers to increase their production. Different types of training related to post harvest management and food processing will be helpful to the lemon growers to reduce loss after harvesting and boots their income. Government and concerned departments should take initiatives to aware the farmers about the significance and opportunities of improved production practices. Research and development division should focus on creating technologies that are best suited to the socio-economic characteristics of Kachai lemon farmers.

CONFLICT OF INTEREST

All authors declare that there is no conflict of interest among the researchers.

ACKNOWLEDGEMENT

The authors acknowledged Dr Dipak Kumar Bose (advisor), Associate Professor, Department of Agricultural Extension & Communication for his involvement and encouragement at every stage of the study. The author would like thank his Institute, Sam Higginbottom University of Agriculture, Technology and Sciences for giving him the opportunity to conduct this study. The author would also like to take this opportunity to express his gratitude to his parents Kh. Daiho Enah and Peace Rimai and to his friends Gaihemlung Thaimei and Keithellakpam Chanakya and to all the respondents of Kachai village for helping and supporting in the research work to get results of good quality.

REFERENCES

Bamon, K. M. and Bose, D. K. (2022) A Study on the Knowledge of the Farmers about Mandarin Cultivation Practices in East Jaintia Hills, Meghalaya. *Asian Journal of Agricultural Extension, Economics & Sociology*. 40(10):244-250.

Chanakya, K. and Mazhar, S. H. (2025) Adoption level of improved production management practices by farmers of MAROI NA KUPI (garlic chives) cultivation. *Gujarat Journal of Extension Education,* 39(1): 139–143. https://doi.org/10.56572/gjoee.2025.39.1.0022

Chaudhary, K. V., Pandya, S.P. and Rayal, K. N. (2024) Relationship between selected profile of the potato growers and the knowledge level of beneficiary

farmers about potato production technology. *Guj. J. Ext. Edu.* 37(1):157-162.

Digarse, U., Bisht, K. and Raut, A. A. (2025) Construction of a knowledge test to assess the knowledge levels of orange growers on orange cultivation practices. *Guj. J. Ext. Edu.* 39(1):1-7.

Government of Manipur (2018). Kachai Village/ Ukhrul district.

Jangir, Surbhi, Badhala, B. S. and Pandey, Saurabh (2023) Knowledge level of tribal and non-tribal farmers about improved production technology of Ajwain. *Gujarat Journal of Extension Education,* 36(2):130-133. https://doi.org/10.56572/gjoee.2023.36.2.0024.

Kumar, S., Das, E. P. K. and Sharma, R. N. (2025) Knowledge level of farmers about improved production technology of onion crop. *Gujarat Journal of Extension Education,* 39(2): 70–76. https://doi.org/10.56572/gjoee.2025.39.2.0012

Mallappa, V.K.H., Panigrahy, S.R., Nayak, A.K.; Pundir, R. S.; Kumari, P. (2023) Factors Influencing the Knowledge Level of Fish Consumers: An Explanatory Analysis. Sustainability 2023, 15, 10183. https://doi.org/10.3390/su151310183

Meena, S., Kaur, M. and Rathore, S. (2024) Knowledge of Kinnow growers about improved Kinnow production technology under national horticulture mission. *Guj. J. Ext. Edu.* 38(2):37-45.

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

Saryam, M. and Jirli, B. (2020) Socio economic status of orange farmers in Chhindwara district of Madhya Pradesh. *International Journal of Agricultural Science and Research (IJASR)*. 10:67-78.

Shatsang A. worngachan. (2024) A village dares to dream, one Kachai lemon at a time. *Villagesquare.in.*

Tiwari, M. V., Poshia, V. K. and Chauhan, N. M. (2024). Knowledge level of farmers on climate resilient agro-technologies in NICRA village. *Gujarat Journal of Extension Education.* 37(1):134-137.

Vegad, N. M., Chauhan N. B. and Vinaya Kumar H. M. (2021). Factors affecting knowledge about e-extension amongst the postgraduate scholars of agricultural extension and communication. *Guj. J. Ext. Edu.* 32 (2): 81-84.

Received : April 2026 : Accepted : June 2026