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Practice wise adoption of recommended litchi production technology by the members of Agnigarh producer company limited in Sonitpur district of Assam, India

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Abstract

Farmer Producer Company is a company formed by a group of farmers who are producers come together to form a company. The present investigation was conducted out with the objective to measure the adoption of recommended litchi production technology by the members of Agnigarh Producer Company Limited in Sonitpur district of Assam, India. Agnigarh Producer Company Limited was selected purposively, as the Farmer Producer Company dealing with commercial litchi production was operating in this district. A sample of 80 respondents was chosen from 13 selected villages in Sonitpur district using a proportionate random sampling method. The extent of adoption was measured by the procedure used by structure schedule. The findings of the study revealed that majority of the respondents (43.75%) belonged to middle aged category with higher secondary level of formal education (41.25%). Majority of respondents (41.25%) belonged to small size of operational land holdings category and (60.00%) had medium level of litchi yield index with medium level of farm mechanization (70.00%) and medium level of irrigated area under litchi cultivation (77.50%). Majority of them (80.00%) had medium level of farm wage payment related to litchi cultivation with (53.75%) of respondents had medium level of experience in litchi cultivation. Whereas (63.75%) of respondents had medium level of attitude towards modern agriculture with high level of training exposure (50.00%). Majority of the respondents (70.00%) had medium level of extent of adoption of recommended litchi production technology followed by 16.25 per cent respondents had high level of extent of adoption of recommended litchi production technology. The value of co-efficient of variation (17.82) indicated that the respondents were relatively homogenous with respect to their adoption of recommended litchi production technology.

Keywords: Farmer Producer Company (FPC), extent of adoption, Tezpur litchi, Sonitpur

1. Introduction

In India, cooperatives have primarily been state promoted, with an emphasis on welfare rather than business or commercial objectives, making the cooperative experience unpleasant (Prabhakar *et al*., 2012) [11]. In 1999, a high-powered committee was set up by the Government of India under the chairmanship of Y. K. Alagh to formulate a solution to the problems faced by earlier farmer's organizations. In 2002 the Alagh Committee came up with the solution that cooperatives should be reorganized as a corporate body with a hybrid mixture of both cooperative and a company. Farmer Producer Companies were subsequently introduced into the Companies Act of 1956 as a direct consequence of this. Through the modification of Section 581 of the Companies Act of 1956, farmer producer companies were established in the year 2003.This concept was proposed in order to empower farmers and enable them to work together in the organization. Farmer Producer Company is a company formed by a group of farmers who are producers come together to form a company (Barman, 2021) [2].

There is a need to facilitate our farmers with access to improved technology, credit, better input and more markets to incentivize them to produce better quality commodity. The grouping of small, marginal, and landless farmers into Farmer Producer Organizations (FPOs) strengthened their economic position and market connections, thereby increasing their revenue. In light of this, the Government of India has initiated a new Central Sector Scheme named "Formation and Promotion of 10,000 Farmer Produce Organizations (FPOs)," which includes a definitive strategy and allocated resources to establish and promote 10,000 new

FPOs nationwide, with a financial allocation of Rs 6865 crore. Up to 2022, 25 numbers of FPCs have been formed in Assam under the Central Sector Scheme "Formation and Promotion of 10,000 FPOs" with financial support from NABARD. Technical and handholding supports are being provided to these FPCs by Assam Agricultural University (AAU). For this purpose, a number of CBBOs have been set up at the state and cluster level to form and promote the FPCs in the state. At the state level there is Programme Implementation Unit (PIU) of CBBO, located at AAU-HRS, Kahikuchi, Guwahati, Assam which is coordinating among all the CBBOs of the state under AAU (PIB, 2021) [13].

The present study covered the members of Agnigarh Producer Company Limited, located at Sonitpur district of Assam which is dealing with commercial litchi cultivation. The litchi crop has special climatic requirements, which likely accounts for its commercial cultivation being restricted to a small number of tropical and subtropical countries. India is the second-largest producer of litchi globally, after China. Litchi cultivation provides livelihood security for a substantial population in litchi-producing states by offering both on-farm and off-farm work opportunities (Sahni *et al*., 2020) [15]. In India, 7, 20,200 metric tons of litchis are produced annually from 98,000 hectares in 2020-21. Assam produces 60181 metric tons of litchis covering an area of 6095 hectares in 2020-21 (Statistical handbook of Assam, 2022) [17]. Tezpur is particularly renowned for its horticulture crop, Litchi, due to its distinctive attributes. The prevalent cultivars of Litchi trees cultivated in Tezpur include Bombay, Bilati, Shahi, Elaichi, Piyaji, and China. Tezpur Litchi is distinguished by its delightful flavor, succulent pulp (aril) with appealing coloration, and diminutive seed enveloped in firm pulp, setting it apart from other litchi types cultivated in the country, hence earning it the esteemed Geographical Indication (GI) status in 2015 (Gogoi *et al*., 2020) [6]. After getting the Geographical Indication (GI) tag of Tezpur litchi in 2015, the domestically demand of the crops has grown rapidly. Because of this, there is a pressing requirement to raise the level of Tezpur litchi output and productivity within the state.

Adoption is a decision to make full use of an innovation as the best course of the action available. Adoption process is the mental process through which an individual passes from hearing about an innovation to final adoption. Rate of adoption of a social system, usually measured as the number of members of the system that adopt the innovation in a given time period. It depends on the innovativeness of the individual that is the relative earliness-lateness with which an individual adopts an innovation or recommended litchi production technology when compared with other members of his social system. Bharath (2022) [4].

2. Methodology

The study was undertaken in 2023 in the Sonitpur district of Assam which was selected purposively, as the Farmer Producer Company dealing with commercial litchi production was operating in this district namely, Agnigarh Producer Company Limited. A sample of 80 respondents was selected from the 13 selected villages following a proportionate random sampling technique. The primary information for the study was gathered through personal interviews utilizing a predefined research schedule. The primary data for the study were collected during the month of February 2023 to June 2023.

Keeping in view the objectives of the study, 17 independent variables and 1 dependent variable were included in the study. The independent variable included in the study were Age, Education level, Size of operational land holding, Area under litchi cultivation, Annual net farm income, Litchi yield, Farm mechanization, Irrigated area under litchi cultivation, Level of farm wage payment related to litchi cultivation, Experience in litchi cultivation, Social participation, Achievement motivation, Orientation towards the competition, Attitude towards modern agriculture, Risk orientation, Extension contact, Exposure to training on litchi cultivation.

Rogers (1983) [14] defined adoption as a decision to make full use of an innovation as the best course of action available. In the present study, 'extent of adoption' was treated as the dependent variable and was computed by adding the scores obtained by the respondents on individual practices. The extent of adoption was measured by following the procedure used by structured schedule. Extent of adoption of selected litchi production technology practices by the farmers has been conceived as the adoption of recommended litchi production technology practices against three response categories, *viz*., full adoption, partial adoption and no adoption. If the farmer was found to use a given practice as per recommendation, it was considered as 'full adoption' which was assigned a score of 2. A deviation from the recommended practice was considered as 'partial adoption' practice which was assigned a score of 1. Farmers who did not follow the recommended practice at all was considered as 'no adoption' and assigned a score of 0.The extent of adoption was calculated for litchi production technology practices as recommended by Assam Agricultural University, Jorhat. The total score obtained by a respondent was calculated by adding the adoption scores for all the practices followed by that respondent.

On the basis of the mean ($\bar{X}$) and standard deviations (S.D.) of obtained scores, respondents were classified into three categories as follows:

Categories	Score range
Low extent of adoption	Below $(\bar{X} - 1.S.D.)$
Middle extent of adoption	$(\bar{X} - 1.S.D.)$ to $(\bar{X} + 1.S.D.)$
High extent of adoption	Above $(\bar{X} + 1.S.D.)$

3. Results and Discussion

Socio-economic profile of the members of Agnigarh Producer Company Limited

For the purpose of this study, a total of 17 personal, socio-economic, and psychological variables of the respondents were taken into consideration. These were- Age, Education level, Size of operational land holding, Area under litchi cultivation, Annual net farm income, Litchi yield, Farm mechanization, Irrigated area under litchi cultivation, Level of farm wage payment related to litchi cultivation, Experience in litchi cultivation, Social Participation, Achievement motivation, Orientation towards the competition, Attitude towards modern agriculture, risk orientation, Extension contact and Exposure to training on

litchi cultivation.

Findings revealed that majority of the respondents (43.75%) were in the middle-aged group followed by 36.25 per cent of respondents in old group and 20.00 per cent of the respondents in young group. A similar type of observation was also reported by Thakuria *et al*., (2024) [19] and Laldampuii *et al*., (2023) [8]. Most of the respondents (41.25%) had higher secondary/ PU level of education followed by 31.25 per cent respondents with high school level of education. Majority of the respondents (41.25%) belonged to the small farmer category followed by 33.75 per cent in marginal and 17.50 per cent of the respondents in medium land holding category. Only 7.50 per cent of the respondents belonged to the semi-medium land holding category. In case of area under litchi cultivation, majority of the respondents (50.00%) were having a land area above 0.10-1.5 ha followed by 37.50 per cent respondents having land area up to 0.10 ha. Only 12.50 per cent of the respondents were having a land area above 1.5 ha under litchi cultivation. Most of the respondents (60.00%) had medium annual net farm income ranging from Rs 94278.32 to Rs 156528.93 followed by 23.75 per cent respondents with high annual net farm income above Rs 156528.93. Majority of the respondents (60.00%) had medium level of litchi yield followed by 23.75 per cent respondents with low level of litchi yield. Most of the respondents (70.00%) had medium level of farm mechanization followed by 16.25 per cent respondents with low level of farm mechanization. Majority of the respondents (77.50%) had medium level of irrigated area under litchi cultivation followed by 12.50 per cent respondents with low level of irrigated area under litchi cultivation. Most of the respondents (80.00%) had medium level of wage payment related to litchi cultivation followed by 15.00 per cent respondents with high level of wage payment related to litchi cultivation. Majority of the respondents (53.75%) had 10-20 years' experience in litchi cultivation followed by 31.25 per cent respondents with up to 9 years of experience in litchi cultivation. In case of social participation, majority of the respondents (55.00%) were member of one organization, followed by 22.50 per cent respondents having membership with more than one organization institutions. Majority of the respondents (68.75%) had medium level of achievement motivation followed by 17.50 percent respondents with high level of achievement motivation and 13.75 per cent respondents with low level of achievement motivation. Majority of the respondents (67.50%) had medium level of orientation towards the competition followed by 23.75 per cent respondents with low level of orientation towards the competition and 8.75 per cent respondents with high level of orientation towards the competition. A large number of the respondents (63.75%) had medium level of attitude towards modern agriculture followed by 23.75 per cent respondents with low level of attitude towards modern agriculture and 12.50 per cent respondents with high level of attitude towards modern agriculture. Majority of the respondents (67.50%) had medium level of risk orientation followed by 18.50 per cent respondents with high level of risk orientation. Majority of the respondents (63.75%) had medium level of extension contact followed by 21.25 per cent respondents with high level of extension contact. Most of the respondents (50.00%) had medium level of exposure to training on litchi cultivation followed by 37.50 percent respondents with high level of exposure to training on litchi cultivation and 12.50 percent respondents with low level of exposure to training on litchi cultivation.

Table 1: Socio-economic profile of the members of the Agnigarh Producer Company Limited

Sl. No.	Variables	Categories	Score range	Frequency	Percentage
1.	Age	Young	Upto 35 years	16	20.00
		Middle	36-50 years	35	43.75
		Old	51 years& above	29	36.25
2.	Education level	Primary school level	1	4	5.00
		Middle school level	2	12	15.00
		High school level	3	25	31.25
		Higher secondary passed	4	33	41.25
		Graduate/diploma & above	5	6	7.50
3.	Size of operational land holding	Marginal	Up to 1.0 ha	27	33.75
		Small	1.1-2.0 ha	33	41.25
		Medium	2.1-4.0 ha	14	17.50
		Semi-medium	4.1-10 ha	6	7.50
4.	Area under litchi cultivation Mean - 0.83 S.D. - 0.73	Up to 0.10 ha	Up to 0.10	30	37.50
		0.10 to 1.5 ha	0.10-1.5 ha	40	50.00
		Above 1.5 ha	Above 1.5 ha	10	12.50
5.	Annual net farm income Mean - 125403.62 S.D. -31125.31	Low annual net farm income	Up to Rs. 94278.31	13	16.25
		Medium annual net farm income	Rs. 94278.32-Rs. 56528.93	48	60.00
		High annual net farm income	Above Rs.156528.93	19	23.75
6.	Litchi yield Mean - 100.00 S.D. -34.40	Low litchi yield	Below 65.50	19	23.75
		Medium litchi yield	65.50- 134.40	48	60.00
		High litchi yield	Above 134.40	13	16.25
7.	Farm Mechanization Mean - 72.36 S.D. - 9.52	Low farm mechanization	Up to 62.84	13	16.25
		Medium farm mechanization	62.84-81.88	56	70.00
		High farm mechanization	Above 81.88	11	13.75
8.	Irrigated area under litchi cultivation Mean - 49.52 S.D. - 31.09	Low irrigated area	Up to 18.43	10	12.50
		Medium irrigated area	18.43-80.61	62	77.50
		High irrigated area	Above 80.61	8	10.00
9.	Level of wage payment related	Low level of wage payment	Up to 6353.94	4	5.00

	to litchi cultivation Mean - 18891.72 S.D. - 12537.78	Medium level of wage payment	6353.94-31429.50	64	80.00
		High level of wage payment	Above 31429.50	12	15.00
10.	Experience in litchi cultivation Mean - 13.55 S.D. - 5.26	Up to 8 years	3- 8	25	31.25
		9-19 years	9-19	43	53.75
		20 years & above	20-28	12	15.00
11.	Social participation	Membership in one organization	1	44	55.00
		Membership in more than one organization	2	18	22.50
		Office bearers of one organization	3	12	15.00
		Office bearer of more than one organization	4	6	7.50
12.	Achievement motivation Mean - 17.43 S.D. - 3.08	Low achievement motivation	Up to 14.35	11	13.75
		Medium achievement motivation	14.35-20.53	55	68.75
		High achievement motivation	Above 20.53	14	17.50
13.	Orientation towards the competition Mean - 15.73 S.D. - 3.54	Low orientation towards the competition	Up to 12.19	19	23.75
		Medium orientation towards the competition	12.19-19.27	54	67.50
		High orientation towards the competition	Above 19.27	07	8.75
14.	Attitude towards modern agriculture Mean - 29.66 S.D. - 5.01	Low favorable attitude	Up to 24.65	19	23.75
		Medium Favorable attitude	24.65-34.71	51	63.75
		High favorable attitude	Above 34.7	10	12.50
15.	Risk Orientation Mean - 14.15 S.D. - 3.42	Low risk orientation	Up to 10.73	11	13.75
		Medium risk orientation	10.73-17.57	54	67.50
		High risk orientation	Above 17.57	15	18.50
16.	Extension contact Mean - 13.68 S.D. - 3.07	Low extension contact	Up to 10.61	12	15.00
		Medium extension contact	10.61-16.75	51	63.75
		High extension contact	Above 16.75	17	21.25
17.	Exposure to training on litchi cultivation	Low training exposure	0-1	10	12.50
		Medium training exposure	2-3	40	50.00
		High training exposure	4-5	30	37.50

Extent of adoption of recommended litchi production technology

Findings revealed that majority of the respondents (70.00%) had medium extent of adoption of recommended litchi production technology, followed by 16.25 per cent of the respondents had high level of adoption of recommended litchi production technology and 13.75 per cent of the respondents had low level of adoption of recommended litchi production technology. This finding was in agreement with the findings of those Prajapati *et al*. (2002) [12], Venkataramalu (2003) [20], Sunilkumar (2004) [18], Meena *et al*. (2005) [9], Sonare (2008) [16], Chethan (2011) [5] Yadav (2010) [21], Baghel (2013) [1], Bennur (2011) [3], Navyashree (2016) [10] Jakkawad *et al*. (2017) [7].

The value of co-efficient of variation (17.82) indicated that the respondents were relatively homogenous with respect to their adoption of recommended litchi production technology**.**

Table 2: Distribution of respondents according to extent of adoption of recommended litchi production technology

Category	Score range	Frequency	(%)	Mean	S.D	CV
Low extent of adoption	Up to 26.82	11	13.75	32.63	5.81	17.82
Medium extent of adoption	26.82-38.44	56	70.00			
High extent of adoption	Above 38.44	13	16.25			
Total		80	100.00			

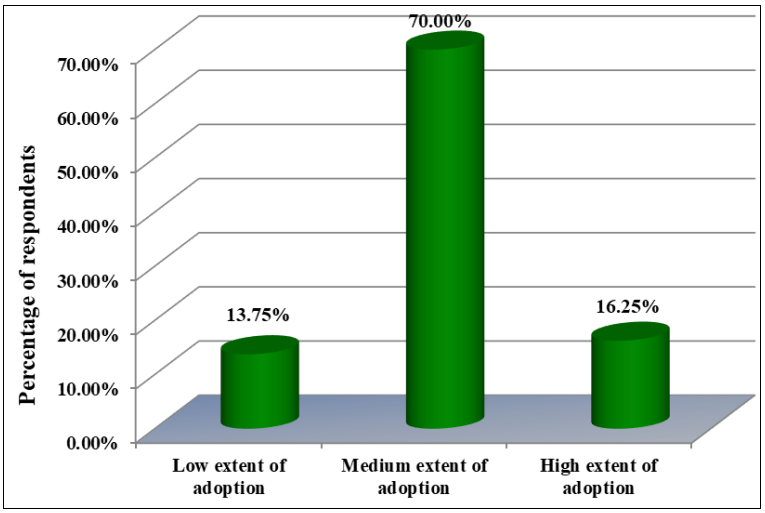

Fig 1: Distribution of respondents according to extent of adoption of recommended litchi production technology

Practice wise extent of adoption of recommended litchi production technology

Findings revealed that majority of the respondents (80.00%) fully adopted the recommended time of planting, planting materials, type of propagation and harvesting, followed 65.00 per cent of the respondents fully adopted the recommended pruning practices, 60.00 per cent of the respondents fully adopted the recommended method of irrigation, 58.75 per cent of the respondents fully adopted recommended control measure against mite,56.25 per cent of the respondents fully adopted recommended intercultural operations,53.75 per cent of the respondents fully adopted recommended dose of Urea/ Nitrogenous fertilizer for bearing tree, 43.75 per cent of the respondents fully adopted recommended planting distance, 41.25 per cent of the respondents fully adopted recommended mulching materials used, 40.00 per cent of the respondents fully adopted recommended control measure against fruit borer and size of planting pit, 38.75 per cent of the respondents fully adopted recommended dose of super phosphate/ Phosphatic fertilizer for bearing tree and 31.25 per cent of the respondents fully adopted recommended dose of sulphate of potash/ potassic fertilizer for bearing tree . Only 22.50 per cent of the respondents fully adopted recommended interval of irrigation in commercial litchi production.

In case of partial adoption of recommended litchi production technology, majority of the respondents (68.75%) were partial adopters of recommended dose of sulphate of potash/ potassic fertilizer for bearing tree, 61.25 followed by per cent of the respondents were partial adopters of recommended dose of super phosphate/ Phosphatic fertilizer for bearing tree, 60.00 per cent of the respondents were partial adopters of recommended control measure against fruit borer, 46.25 per cent of the respondents were partial adopters of recommended dose of Urea/ Nitrogenous fertilizer for bearing tree, 43.75 per cent of the respondents were partial adopters of recommended intercultural operations, 41.25 per cent of the respondents were partial adopters of recommended control measures against mite, 40.00 per cent of the respondents were partial adopters of recommended method of irrigation, 36.25 per cent of the respondents were partial adopters of recommended mulching materials used, 35.00 per cent of the respondents were partial adopters of recommended pruning practices, 30.25 per cent of the respondents were partial adopters of recommended planting distance, 28.75 per cent of the respondents were partial adopters of recommended interval of irrigation, 27.50 per cent of the respondents were partial adopters of recommended size of planting pit,15.00 per cent of the respondents were partial adopters of recommended intercropping period. only 10.00 per cent of the respondents were partial adopters of recommended quantity of wood ash for bearing tree.

In case of no adoption of recommended litchi production technology, majority of the respondents (80.00%) were non adopters of recommended quantity of oil cake for bearing tree, quantity of oil cake for bearing tree and control measures for bats and birds followed by 90.00 per cent of the respondents were non adopters of recommended quantity of oil cake for bearing tree, 85.00 per cent of the respondents were non adopters of recommended intercropping period, 48.75 per cent of the respondents were non adopters of recommended interval of irrigation, 32.50 per cent of the respondents were non adopters of recommended size of planting pit, 25.00 per cent of the respondents were non adopters of recommended planting distance. Only 22.50 per cent of the respondents were non adopters of recommended mulching materials used in commercial cultivation of litchi.

Table 3: Distribution of respondents according to practice wise extent of adoption of recommended litchi production technology (n=80)

Sl. No.	Practices	Full Adoption	Partial Adoption	No Adoption
1.	Time of planting	80 (87.50)	0 (0.00)	0 (0.00)
2.	Planting material	80 (100.00)	0 (0.00)	0 (0.00)
3.	Planting distance	35 (43.75)	25 (30.25)	20 (25.00)
4.	Size of planting pit	32 (40.00)	22 (27.50)	26 (32.50)
5.	Type of propagation	80 (100.00)	0 (0.00)	0 (39.58)
6.	Intercultural operations	45 (56.25)	35 (43.75)	0 (0.00)
7.	Interval of irrigation	18 (22.50)	23 (28.75)	39 (48.75)
8.	Intercropping period	0 (0.00)	12(15.00)	68 (85.00)
9	Method of irrigation	48 (60.00)	32 (40.00)	0 (0.00)
10	Mulching materials used	33 (41.25)	29 (36.25)	18 (22.50)
11	Pruning practices	52 (65.00)	28 (35.00)	0 (0.00)
12	Control measure against Mite	47 (58.75)	33 (41.25)	0 (0.00)
13	Control measure against Fruit Borer	32 (40.00)	48 (60.00)	0 (0.00)
14	Dose of Urea/ Nitrogenous fertilizer for bearing tree	43 (53.75)	37 (46.25)	0 (0.00)
15	Dose of super phosphate/ Phosphatic fertilizer for bearing tree	31 (38.75)	49 (61.25)	0 (0.00)
16	Dose of sulphate of potash/ potassic fertilizer for bearing tree	25 (31.25)	55 (68.75)	0 (0.00)
17	Quantity of Oil Cake for bearing tree	0 (0.00)	0 (0.00)	80 (100.00)
18	Quantity of Bone Meal for bearing tree	0 (0.00)	0 (0.00)	80 (100.00)
19	Quantity of Wood ash for bearing tree	0 (0.00)	8 (10.00)	72 (90.00)
20	Control measures for bats and birds	0 (0.00)	0 (0.00)	80 (100.00)
21	Harvesting	80 (100.00)	0 (0.00)	0 (0.00)

4. Conclusion

The study revealed prevalence of diverse profile characteristics among the members of Agnigarh Producer Company with reference to commercial litchi production in Assam, emphasizing several key insights. The majority of farmers belonged to the middle-aged category, possessed

higher secondary level of education, with marginal and small land holdings with majority of the respondents area lies in the range of small farmers. Almost (60.00%) of the litchi growers had medium annual net farm income and medium litchi yield. Farm mechanization revealed that majority of the respondents had medium level of farm mechanization (70.00%), so the farmers should take advantage of the farm machineries and implements provided to FPC by NABARD. The shareholders should also be encouraged to take advantage of the machineries and implements provided by the concerned agencies. Majorly near about (70.00%) of the respondents were having a good experience in litchi cultivation which helps them to follow a good package and practices including irrigation facilities with medium level of wage payment. Despite a predominance of social participation with only membership one organization, the majority respondents exhibited medium level of achievement motivation, risk orientation, attitude towards modern agriculture, and orientation towards the competition fostering a positive attitude towards new ideas, practices and varieties. Nearly (87.50%) of the respondents received medium to high level of training exposure. The concerned department should initiate action to conduct more numbers of massive training or capacity building programmes for members of FPC so that they are motivated to adopt the recommended scientific practices of litchi. Findings revealed that majority of the respondents (70.00%) had medium extent of adoption of recommended litchi production technology, followed by 16.25 per cent of the respondents had high level of adoption of recommended litchi production technology and 13.75 per cent of the respondents had low level of adoption of recommended litchi production technology. It implies that with proper extension strategies, training programmes and required demonstrations the production of litchi can be enhanced. The concerned state department and agencies should motivate the members of FPC by providing appropriate guidance and necessary essential in proper time.

In future directions, the same could be administered to any other litchi growers in other districts of Assam for measuring the adoption level of the litchi growers. The limitation of the study is that considering the restraint of time and resources of the investigator, only one district and one FPC is covered in one agro climatic zones of the state of Assam were brought under the purview of the study. In future a similar study may be undertaken covering more number of districts in all the agro climatic zones of Assam with a larger sample size.

Disclaimer (Artificial Intelligence)

Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of this manuscript.

Competing Interests

Authors have declared that no competing interests exist.

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