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# Knowledge of the Members of Agnigarh Producer Company Limited towards Improved Litchi Cultivation Practices in Sonitpur District of Assam, India

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***Authors' contributions***

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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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 access Knowledge of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices in the 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 primary data for the study were collected by the personal interview. To assess the Knowledge level of the FPC members, the Managerial Ability Scale created by Jadav (2005) was used. The primary data for the study were collected during the month of February, 2023 to June, 2023.Findings revealed that majority of the respondents (43.75%) belonged to middle aged category. Majority of the respondents (41.25%) had formal education up to higher secondary/PU level and there were not any respondents from illiterate, can read only category in the study area. Most of the respondents (41.25%) belonged to small farmer in land holding category. Majority of the respondents (50.00%) were having area from 0.10 to 1.5 ha under litchi orchard with medium annual net farm income ranging from Rs. 94278.31 to Rs. 156528.93. Majority of the respondents (60.00%) had medium level of litchi yield, 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. Most of the respondents (53.75%) had 9-19 years of experience in litchi cultivation. Majority of the respondents (55.00%) were belonged from having membership in one organization. Majority of them had medium level of achievement motivation (68.75%), medium level of orientation towards the competition (67.50%), medium level of attitude towards modern agriculture (63.75), medium level of risk orientation (67.50%) and high level of exposure to training on litchi cultivation (50.00%). Findings revealed that majority of the respondents (50.00%) had medium level of knowledge on improved litchi cultivation practices followed by 27.50 per cent of the respondents had low level of knowledge on improved litchi cultivation practices and 22.50 per cent of the respondents had high level of knowledge on improved litchi cultivation practices. The mean knowledge score (49.78) indicated that on an average the respondents had low level of knowledge on improved litchi cultivation practices with standard deviation of 29.14. The value of co-efficient of variation (58.55) indicated that the respondents were relatively heterogeneous with respect to their knowledge on improved litchi cultivation practices.


*Keywords: Farmer Producer Company (FPC); knowledge level; Tezpur Litchi; Assam.*

## 1. INTRODUCTION

India had over 146.45 million farm holdings as per the Agricultural Census, in 2015-16 out of which about 93.8 million were marginal farm holdings i.e., farmers having an individual operational land holding of less than 1 hectare and about 25.8 million were small farm holdings with individual operational land holding size less than 2 hectares. In India, in 2015–16 the marginal and small agricultural holdings made up of 86.08 per cent of all farm holdings. According to estimates, due to persistent land fragmentation, 1.5 to 2.0 million new marginal and small farms are added year. In the present competitive business environment, it is very difficult for the marginal and small farmers to survive and sustain their agricultural activities on an individual scale as they lack professional expertise.

Cooperative societies were developed as a means of bringing together small and marginal farmers but they were not as successful as they were intended to be. 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). 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. As a result, the

concept of Farmer Producer Companies was incorporated in the Companies Act of 1956. In 2003 Farmer Producer Companies came into existence with the amendment of Section 581 of the Companies Act of 1956. 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). According to Part IXA of Companies Act, 1956 with reference to Section 465(1) of Companies Act 2013, "Producer Company means a body corporate having objects or activities specified in section 581B and registered as Producer Company under this Act".

A Farmer Producer Company is a hybrid mixture of a private company and a cooperative society which is mostly involved in agriculture activities. The Companies Act, 1956 has defined the Farmer Producer Company as a registered body corporate, set up by a group of producers who are involved in agriculture and allied activities such as:

(a) Production, harvesting, processing, procurement, grading, pooling, handling, marketing, selling, export of primary produce of the Members or import of goods or services for their benefit;
(b) Rendering technical services, consultancy services, training, education, research and development and all other activities for the promotion of the interests of its members;
(c) Generation, transmission, and distribution of power, revitalization of land and water resources, their use, conservation and communications relatable to primary produce;
(d) Promoting mutual assistance, welfare measures, financial services, insurance of producers or their primary produce.

The primary produces include- (a) the produce of farmers arising from agriculture (including animal husbandry, horticulture, floriculture, viticulture, forestry, forest products, re-vegetation, bee raising and farming plantation products), or from any other primary activity or service which promotes the interest of the farmers or consumers, or (b) produce of persons engaged in handloom, handicraft and other cottage industries any product resulting from any of the above activities, including by-products of such products, (c) any product resulting from an ancillary activity that would assist or promote any of the aforesaid activities, or anything ancillary thereto, and (d) any activity which is intended to increase the production of anything referred to in sub-clauses (a), (b) and (c) or improve the quality there of (Paty and Gummagolmath, 2018).

Thus, it can be said that the Farmer Producer Company is a company which is an association or a group of agriculture producers engaged with or relatable to any primary produce and have established it for the purpose of providing services to its shareholders who own and control it.

Producer Companies are also viewed as organizations that have all of the fundamental qualities of a private firm as well as a cooperative-like mission that combines the ideals of mutual assistance. FPCs include shareholders into commercial supply networks to reduce transaction and other process-related expenses and ensure that economy of scale is achieved. FPCs primarily target the small and marginal farmers because of the severe limitations brought on by the uneconomical scale of their businesses (Barman, 2021). Some of the key features of FPC are mentioned below: -

## 1.1 Key features of FPC

- The goal of the FPC concept is to unite farmers into a collective to strengthen their negotiating position.
- They are managed by qualified managers and owned and governed by shareholder farmers.
- In addition to attempting the shortcomings of the cooperative structure, they employ all the beneficial cooperative principles and the effective corporate business methods.
- The member's equity cannot be traded publicly and may only be transferred with the Board of Directors' consent. The producing company's obligation is only up to the value of the issued share capital.

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(Statistical Hand Book Assam, 2022). 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. The present study covered the members of Agnigarh Producer Company Limited, located at Sonitpur district of Assam which is dealing with commercial litchi cultivation.

Litchi (Litchi chinensis Sonn.) belongs to the Sapindaceae family and it is commonly known as the “Queen of fruits”. Litchi was originated in near South China and North Vietnam in the year 1500 BC (Menzel, 2000; Rajwanshi et. al., 2017). Litchi is a vigorous evergreen perineal tree, which attains approximately height of five meter with broad apical spreading branches and conjoint leaves with a dense green shining leaf. Unripen fruits are light or dark green in color. Maturity indices is easily seen by ripened green fruit into juicy dark red-brown color. Edible part of litchi is fleshy aril, with excellent flavors, juicy or firm, sweet and pleasant aroma. (Chaikham et al., 2017; Prakash et al., 2017; Yang et. al., 2011). Fruits of Litchi are mostly preferred fresh and fleshy. Many processed foods i.e., jam, beverages (juice, nectar, carbonated drinks) and canned fruits are flooding the market. India ranks the second in the world in terms of production, after China. In India Bihar, Jharkhand, Assam and West Bengal accounts for 64.20 per cent of the country’s total litchi production. The other litchi producing states of India are whereas in north western part of India Chhattisgarh, Uttarakhand, Punjab, Odisha, Tripura, Himachal Pradesh and Jammu & Kashmir. Litchi varieties cultivated in the country are highly variable due to different climatic and soil conditions. Shahi variety is the most popular cultivar of Indian litchi. Cv. China is the second most popular variety of litchi. Litchi farmers are moreinterested in making new orchards of cv. China, because it gives high productivity and more profitability. Cv. Shahi is the early variety, harvested between 15 May to 31 May, while cv. China is considered as the late variety. Other major varieties are Rose scented, Bombai, Elaichi, Dehradun, Bedana, late large red, late seedless, Calcuttia, Purbi etc. (Sahniet. al., 2020).

Tezpur is an ancient town on the banks of the river Brahmaputra which is the administrative head quarter of Sonitpur district of Assam(Anonymous, 2021). Tezpur is especially famousfor one horticultural crop viz.Litchi for its unique characteristics for which it got. The popular varieties of Litchi tree grown in Tezpur are Bombay, Bilati, Shahi, Elaichi, Piyaji and China which are grown with some excellent qualities. Apart from this, its agro-climatic conditions make Assam a favourable area for the cultivation of the litchi tree. Flowering of the trees starts from February and is harvested in the month of June - July. Bearing habit of the trees varies according to the varieties. These Tezpur litchi are exported to Bombay, Delhi, Kolkata, and Rajasthan and also to USA. Tezpur Litchi is characterized by its pleasant flavour, juicy pulp (aril) with attractive colour and small seed with tight pulp which makes the fruit different from other litchi varieties grown in the country and so it got the coveted Geographical Indication (GI) in the year 2015 (Gogoi *et al.,* 2020). After getting the Geographical Indication (GI) tag of Tezpur litchi in 2015, the domestically demand of the crops has grown rapidly. Thus, there is a need to increase the production and productivity of Tezpur litchi in the state.

## 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, 18 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, adoption of recommended litchi production technology**,** Achievement motivation, Orientation towards the competition, Attitude towards modern agriculture, Risk orientation, Extension contact, Exposure to training on litchi cultivation (Press Information Bureau, 2021).

### 2.1 Dependent Variable – Knowledge Level

Knowledge was defined as the things known to an individual and represented cognitive domain.

The dependent variable included in the study was the knowledge level of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices, which was measured by using the managerial ability scale developed by Jadav (2005). The indicator knowledge level of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices had 35 statements with maximum score value = 35 and Scale value = 8.70 (Jadav, 2005).

The Knowledge of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices given against two response categories, viz., full knowledge and no knowledge. If the farmer gave right answer to a given practice as per recommendation, it was considered as 'full knowledge' which was assigned a score of 1. Farmers who did not gave right answer to a given practice; it was considered as 'no knowledge' and assigned a score of 0. The knowledge level was calculated for improved litchi cultivation practices as recommended by Assam Agricultural University, Jorhat.

The formula used for calculating the Knowledge level of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practice was as under:

Managerial Ability Index (MAI) for Knowledge level indicator-

$$MAI=\frac{\text{Score obtained for indicatorx Scale value of indicator}}{\text{Maximum score for indicatorXScale value of indicator}}\text{X100}$$

$$MAI=\frac{\text{OSi X SVi}}{\text{MSi X SVi}}\text{ X100}$$

Where,
$OS_i$= Obtained score value for $i^{th}$ indicator
$SV_i$ = Scale value of $i^{th}$ indicator
$MS_i$ = Maximum score value of $i^{th}$ indicator
i= 1, 2, 3……..n

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

| **Categories** | **Score range** |
|---|---|
| Low level of knowledge | Below $(\overline{X}-1.S.D.)$ |
| Medium level of knowledge | $(\overline{X}-1.S.D.)$ to $(\overline{X}+1.S.D.)$ |
| High level of knowledge | Above $(\overline{X}+1.S.D.)$ |

## 3. RESULTS AND DISCUSSION

### 3.1 Socio-Economic Profile of the Members of Agnigarh Producer Company Limited

A total of 18 personal, socio-economic and psychological characteristics of the respondents were included in the study. 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, Adoption of recommended litchi production technology, Achievement motivation, Orientation towards the competition, Attitude towards modern agriculture, Risk orientation, Extension contact and Exposure to training on litchi cultivation. The respondents were categorized and their frequency and percentage were worked out in relation to each characteristic. The mean ( $\overline{X}$ ) and standard deviation (S.D) were calculated and relative extent of homogeneity and heterogeneity among respondents with respect to each variable were examined with the help of co-efficient of variation (C.V). The findings of each of these characteristics are presented here under.

### 3.2 Age

Findings revealed that the majority of the respondents (43.75%) were in the middle aged group followed by 36.25 per cent of respondents in old group. Only 20.00 per cent of respondents fell into the group of young category. The mean age value (46.42) indicated that on an average the respondents belonged to middle aged category with standard deviation of 10.72. The co-efficient of variation (23.09) indicated that the respondents were relatively homogeneous with respect to their age. Li *et al.* (2020) reported that 10.23 per cent of the respondents cultivating litchi were mostly below 45 years of age, followed by 42.68 per cent respondents were 45 to 60 years and 47.90 per cent respondents more than 60 years of age respectively.

**Table 1. Distribution of respondents according to age**

| Category | Score range | Frequency | (%) | Mean | S. D | CV |
|---|---|---|---|---|---|---|
| Young | 18-35 years | 16 | 20.00 | 46.42 | 10.72 | 23.09 |
| Middle aged | 36-50 years | 35 | 43.75 | | | |
| Old | 51 years& above | 29 | 36.25 | | | |
| Total | | 80 | 100.00 | | | |

## 3.3 Educational Level

can be observed that the majority of the respondents (41.25%) had higher secondary passed/ PU level of education followed by 31.25 per cent respondents with high school level of education, 15.00 per cent respondents with middle school level and 5.00 per cent of primary level of education. 7.50 per cent of respondents comprised of graduate level of education. There was no 'illiterate' and 'can read only' category respondent in the sample of the study. The value of co-efficient of variation (22.92) indicated that the respondents were relatively homogeneous with respect to their educational level. Rakesh and Naik (2022) found that 50.80% of respondents had secondary education, 35.80% had primary education, and 13.40% had college or higher education. The majority of respondents (86.60%) have primary to secondary level of education.

## 3.4 Size of Operational Land Holding

The findings revealed that majority of the respondents (41.25%) were small farmers followed by 33.75 per cent respondents were marginal farmers. 17.50 per cent of respondents belonged to medium category of farmers. Only 7.50per cent of respondents were semi-medium farmers. The mean value (1.77 ha) indicated that on an average the respondents were small farmers with standard deviation of 1.07 ha. The value of co-efficient of variation (60.37) indicated that the respondents were relatively heterogeneous with respect to their size of operational land holding. Kumar *et al.* (2015) observed that 39.00 per cent of the grape growers were having medium while 32.00 per cent and 29.00 per cent of them had small and large size of land holding respectively. Barman et al., (2005) observed that majority (52.50 per cent) of the NICRA beneficiaries were with marginal land holding (0-1ha).

## 3.5 Area under Litchi Cultivation

Data presented in Table 4 revealed that majority of the respondents (50.00%) operated on land area from 0.10 ha to 1.5 ha for litchi cultivation followed by 37.50 per cent operated on land area up to 0.10 ha for litchi cultivation. The rest 12.50 per cent of respondents operated on land area above 1.5 ha for litchi cultivation. The mean value indicated that on an average the respondents had an area of 0.83 ha under litchi cultivation with standard deviation of 0.73 ha. The value of co-efficient of variation (87.89) indicated that the respondents were relatively heterogeneous with respect to their area under litchi cultivation. Bhoyar *et al.* (2020) showed that the 63.34 per cent of the pomegranate growers were having small area under pomegranate cultivation (1.01 to 2.00 ha), 32.50 per cent were having semi-medium area under pomegranate cultivation (2.01 to 4.00 ha), 02.50 per cent were having medium area under pomegranate cultivation (4.01 to 10.00 ha), 01.66 per cent were having marginal land under pomegranate cultivation (Up to 1.00 ha).

**Table 2. Distribution of respondents according to education level**

| Category | Score | Frequency | (%) | Mean | S. D | CV |
|---|---|---|---|---|---|---|
| Illiterate | 0 | 0 | 0.00 | | | |
| Can read only | 1 | 0 | 0.00 | | | |
| Primary school level | 2 | 4 | 5.00 | | | |
| Middle school level | 3 | 12 | 15.00 | --- | --- | --- |
| High school level | 4 | 25 | 31.25 | | | |
| Higher secondary passed | 5 | 33 | 41.25 | | | |
| Graduate/diploma & above | 6 | 6 | 7.50 | | | |
| Total | | 80 | 100 | | | |

**Table 3. Distribution of respondents according to size of operational land holding**

| Category | Score range | Frequency | (%) | Mean | S. D | CV |
|---|---|---|---|---|---|---|
| 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 | 1.77 | 1.07 | 60.37 |
| Semi-medium | 4.1-10 ha | 6 | 7.50 | | | |
| Big | Above 10 ha | 0 | 0.00 | | | |
| Total | | 80 | 100.00 | | | |

**Table 4. Distribution of respondents according to the land area under litchi cultivation**

| Category | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|
| Up to 0.10 ha | 30 | 37.50 | | | |
| 0.10 to 1.5 ha | 40 | 50.00 | 0.83 | 0.73 | 87.89 |
| Above 1.5 ha | 10 | 12.50 | | | |
| Total | 80 | 100.00 | | | |

## 3.6 Annual Net Farm Income

From the Table 5 it has observed that majority of the respondents (66.00%) had medium annual net farm income followed by 23.75 per cent respondents with high annual net farm income. The remaining proportion of respondents (16.25%) had low annual net farm income. The mean annual net farm income was Rs. 125403.62 indicated that on an average the respondents had medium annual net farm income with standard deviation of Rs. 31125.31. The value of co-efficient of variation (24.82) indicated that the respondents were relatively homogenous with respect to their annual net income from the farm. Li *et al.* (2020) found that the litchi income as a percentage of total family income, in the largest group (37.57%), litchi income accounted for less than 25.00 per cent of their total income. However, in the second largest group (31.75%), it accounted for more than 75.00 per cent of total income.

## 3.7 Litchi Yield

The findings presented in Table 6 indicate that majority of the respondents (60.00%) had medium level of litchi yield followed by 23.75 per cent of the respondents with low level of litchi yield and remaining 16.25 per cent of the respondents had high level of litchi yield. The value of co-efficient of variation (34.40) indicated that the respondents were relatively homogenous with respect to their litchi yield.

**Table 5. Distribution of respondents according to annual net farm income**

| Category (Score range) | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|
| Low annual net farm income (Up to Rs. 94278.31) | 13 | 16.25 | | | |
| Medium annual net farm income (Rs. 94278.31-Rs. 156528.93) | 48 | 60.00 | 125403.62 | 31125.31 | 24.82 |
| High annual net farm income (Above Rs.156528.93) | 19 | 23.75 | | | |
| Total | 80 | 100.00 | | | |

**Table 6. Distribution of respondents according to litchi yield**

| Category (Score range) | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|
| Low litchi yield (Below 65.50) | 19 | 23.75 | | | |
| Medium litchi yield (65.50- 134.40) | 48 | 60.00 | 100.00 | 34.40 | 34.40 |
| High litchi yield (Above 134.40) | 13 | 16.25 | | | |
| Total | 80 | 100.00 | | | |

### 3.8 Farm Mechanization

The findings presented in Table 7 indicate that majority of the respondents (70.00%) had medium level of farm mechanization followed by 16.25 per cent of the respondents with low level of farm mechanization and remaining 13.75 per cent of the respondents had high level of farm mechanization. The value of co-efficient of variation (13.15) indicated that the respondents were relatively homogenous with respect to their level of farm mechanization.

### 3.9 Irrigated Area under Litchi Cultivation

Data presented in Table.8 revealed that the majority of the respondents (77.50%) had medium level of irrigated area under litchi cultivation followed by 12.50 per cent of respondents had low level of irrigated area under litchi cultivation. Only 10.00 per cent of the respondents had high level of irrigated area under litchi cultivation. The value of co-efficient of variation (62.78) indicated that the respondents were relatively heterogeneous with respect to their level of irrigation potentiality.

### 3.10 Level of Wage Payment Related to Litchi Cultivation

Data presented in Table 9 revealed that the majority of the respondents (80.00%) had medium level of wage payment related to litchi cultivation followed by 15.00 per cent of respondents had high level of wage payment. Only 5.00 per cent of the respondents had low level of wage payment related to litchi cultivation. The value of co-efficient of variation (66.36) indicated that the respondents were relatively heterogeneous with respect to their level of wage payment related to litchi cultivation.

### 3.11 Experience in Litchi Cultivation

Data presented in Table 10 revealed that the majority of the respondents (53.75%) had 9-19 years' experience in litchi cultivation followed by 31.25 per cent of respondents with Up to 9 years' experience in litchi cultivation. Only 15.00 per cent of the respondents had 21 years and above experience in litchi cultivation. The value of co-efficient of variation (38.81) indicated that the respondents were relatively homogenous with respect to their experience in litchi cultivation. Jakkawad *et al*. (2017) observed that 62.50 per cent of the pomegranate cultivation respondents were in low category (experience up to 5 years), 26.25 per cent of the respondents were in medium experience category (experience of 5.1 to 7 years) and 11.25 per cent of the respondents were in high category of experience (above 7 years).

**Table 7. Distribution of respondents according to level of farm mechanization**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | | | |
| Total | | 80 | 100.00 | 72.36 | 9.52 | 13.15 |

**Table 8. Distribution of respondents according to irrigated area under litchi cultivation**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | | | |
| Total | | 80 | 100.00 | 49.52 | 31.09 | 62.78 |

**Table 9. Distribution of respondents according to level of wage payment related to litchi cultivation**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| Low level of wage payment | Up to 6353.94 | 4 | 5.00 | | | |
| Medium level of wage payment | 6353.94-31429.50 | 64 | 80.00 | 18891.72 | 12537.78 | 66.36 |
| High level of wage payment | Above 31429.50 | 12 | 15.00 | | | |
| Total | | 80 | 100.00 | | | |

**Table 10. Distribution of respondents according to experience in litchi cultivation**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | 13.55 | 5.26 | 38.81 |
| Total | | 80 | 100.00 | | | |

## 3.12 Social Participation

Data presented in Table 11 revealed that the majority of the respondents (55.00%) had membership in one organization followed by 22.50 per cent of them were members of more than one organization. 15.00 per cent of respondents were found to be office bearers of one organization. Only 7.50 per cent of them were found to be office bearers of more than one organization. The value of co-efficient of variation (38.86) indicated that the respondents were relatively homogenous with respect to their level of social participation. Singh *et al.* (2020) found that 53.64 per cent mango growers showed no participation in any organization followed by 32.27 per cent mango growers who were participated in one organization, 10.91 per cent mango growers who were participated in two organizations and remaining 3.18 per cent mango growers who were participated in more than two organization, respectively and no one was found as office bearer member of any organization.

## 3.13 Adoption of Recommended Litchi Production Technology

It is evident from Table 12 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. 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**.**

## 3.14 Achievement Motivation

Data presented in Table 13 revealed that majority of the respondents (68.75%) had medium level of achievement motivation, followed by 17.50 per cent of the respondents had high level of achievement motivation and 13.75 per cent of the respondents had low level of achievement motivation. The mean achievement motivation score (17.43) indicated that on an average the respondents had medium level of achievement motivation with standard deviation of 3.08. The value of co-efficient of variation (17.65) indicated that the respondents were relatively homogenous with respect to their achievement motivation.

## 3.15 Orientation towards the Competition

Data presented in Table 14 revealed that majority of the respondents (67.50%) had medium level of orientation towards the competition, followed by 23.75 per cent of the respondents had low level of orientation towards the competition and 8.75 per cent of the respondents had high level of orientation towards the competition. The mean orientation towards the competition score (15.73) indicated that on an average the respondents had medium level of orientation towards the competition with standard deviation of 3.54. The value of co-efficient of variation (17.65) indicated that the respondents were relatively homogenous with respect to their orientation towards the competition.

**Table 11. Distribution of respondents according to social participation**

| Category | Score | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| No membership | 0 | 0 | 0.00 | | | |
| 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 | 1.46 | 0.57 | 38.86 |
| Total | | 80 | 100.00 | | | |

**Table 12. Distribution of respondents according to 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 | | | |
| 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 | 32.63 | 5.81 | 17.82 |

**Table 13. Distribution of respondents according to their achievement motivation**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | 17.43 | 3.08 | 17.65 |
| Total | | 80 | 100.00 | | | |

**Table 14. Distribution of respondents according to their orientation towards the competition**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | 15.73 | 3.54 | 17.65 |
| Total | | 80 | 100.00 | | | |

## 3.16 Attitude towards Modern Agriculture

Data presented in Table 15 revealed that majority of the respondents (63.75%) had medium level of favorable attitude towards modern agriculture, followed by 23.75 per cent of the respondents had low level of favorable attitude towards modern agriculture and only 12.50 per cent of the respondents had high level of favorable attitude towards modern agriculture. The mean attitude towards modern agriculture score (29.66) indicated that on an average the respondents had medium level of attitude towards modern agriculture with standard deviation of 5.01. The value of co-efficient of variation (16.91) indicated that the respondents were relatively homogenous with respect to their attitude towards modern agriculture.

## 3.17 Risk Orientation

Data presented in Table 16 revealed that majority of the respondents (67.50%) had medium level of risk orientation, followed by 18.50 per cent of the respondents had high level of risk orientation and 13.75 per cent of the respondents had low level of risk orientation. The mean risk orientation score (14.15) indicated that on an average the respondents had medium level of risk orientation with standard deviation of 3.42. The value of co-efficient of variation (24.43) indicated that the respondents were relatively homogenous with respect to their risk orientation.

## 3.18 Extension Contact

Data presented in Table 17 revealed that majority of the respondents (63.75%) had medium level of extension contact, followed by 21.25 per cent of the respondents had high level of extension contact and 15.00 per cent of the respondents had low level of extension contact. The mean extension contact score (13.68) indicated that on an average the respondents had medium level of extension contact with standard deviation of 3.07. The value of co-efficient of variation (22.43) indicated that the respondents were relatively homogenous with respect to their extension contact.

**Table 15. Distribution of respondents according to their attitude towards modern agriculture**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | | | |
| Total | | 80 | 100.00 | 29.66 | 5.01 | 16.91 |

**Table 16. Distribution of respondents according to risk orientation**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | 14.15 | 3.42 | 24.43 |
| Total | | 80 | 100.00 | | | |

**Table 17. Distribution of respondents according to extension contact**

| Category | Score range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| 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 | | | |
| Total | | 80 | 100.00 | 13.68 | 3.07 | 22.43 |

## 3.19 Exposure to Training on Litchi Cultivation

Data presented in Table 18 revealed that majority of the respondents (50.00%) had medium level of exposure to training on litchi cultivation, followed by 37.50 per cent of the respondents had high level of exposure to training on litchi cultivation and 12.50 per cent of the respondents had low level of exposure to training on litchi cultivation. The value of co-efficient of variation (51.87) indicated that the respondents were relatively heterogeneous with respect to their exposure to training on litchi cultivation. Saryam and Jirli (2020) revealed that, the majority of orange growers (42%) had medium training exposure, having 3 to 4 days of training attend of farmers, followed by 33.5 percent orange growers had high training exposure, having more than above 4 days' training, whereas 24.5 percent had low training exposure, having 2 days training attend by the farmers.

## 3.20 Knowledge Level of the Members of Agnigarh Producer Company Limited towards Improved Litchi Cultivation Practices

Findings revealed that majority of the respondents (50.00%) had medium level of knowledge, followed by 27.50 per cent of the respondents had low level of knowledge and 22.50 per cent of the respondents had high level of knowledgetowards improved litchi cultivation practices. This finding was in agreement with the findings of those Alagesan and Sumathi (2002), Kappala and Bolla (2022), Sahoo et al., (2021), Diptesh and Chauhan (2016), Moulasab *et al.,* (2006)

**Table 18. Distribution of respondents according to exposure to training on litchi cultivation**

| Category | Score Range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| Low training exposure | 0-1 | 10 | 12.50 | | | |
| Medium training exposure | 2-3 | 40 | 50.00 | | | |
| High training exposure | 4-5 | 30 | 37.50 | | | |
| Total | | 80 | 100.00 | 2.07 | 1.07 | 51.87 |

**Table 19. Distribution of respondents according to – Knowledge level of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices**

| Category | Score Range | Frequency | (%) | Mean | S.D | CV |
|---|---|---|---|---|---|---|
| Low level of knowledge | Up to 20.64 | 22 | 27.50 | 49.78 | 29.14 | 58.55 |
| Medium level of knowledge | (20.64-78.92) | 40 | 50.00 | | | |
| High level of knowledge | Above 78.92 | 18 | 22.50 | | | |
| Total | | 80 | 100.00 | | | |

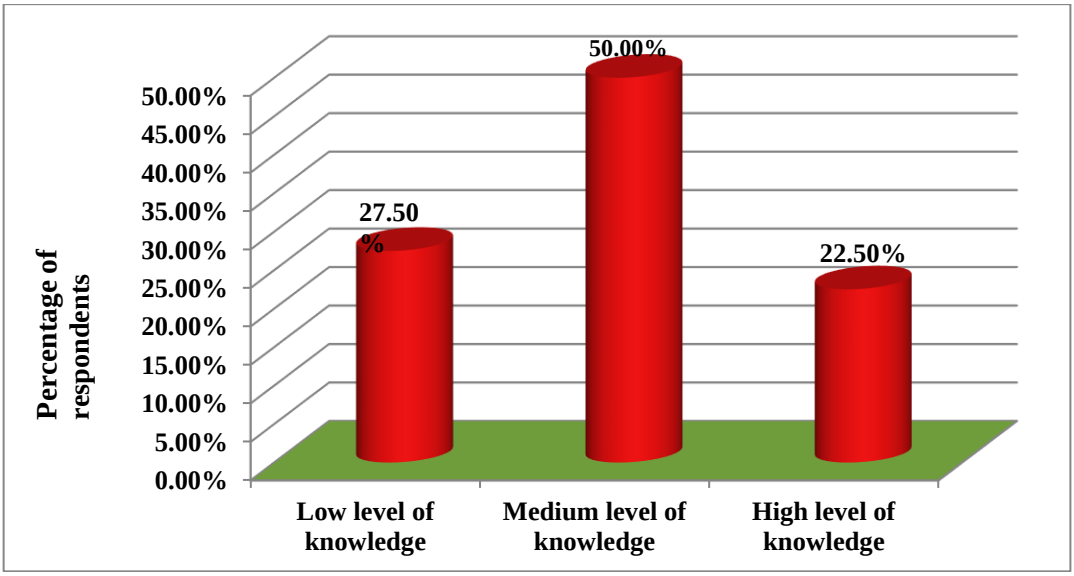


**Fig. 1. Distribution of respondents according to – Knowledge level of the members of Agnigarh Producer Company Limited towards improved litchi cultivation practices**

The mean knowledge score (49.78) indicated that on an average the respondents had low level of knowledge on improved litchi cultivation practices with standard deviation of 29.14. The value of co-efficient of variation (58.55) indicated that the respondents were relatively heterogeneous with respect to their knowledge on improved litchi cultivation practices.

### 3.21 Statements on Knowledge Level of the Members of Agnigarh Producer Company Limited towards Improved Litchi Cultivation Practices

Several statements pertaining to various aspects of improved litchi cultivation practicesof litchi orchards are given below. Scored used to confirm the answer given by the respondents (Right=1, Wrong=0)

1) When organic manure is mixed with soil and filled in the pit?

   (Before monsoon / winter / after monsoon)

2) How much Planting distance is kept for spreading litchi variety in fertile soil?

   (10 X 10 m / 15 X 15 m / 18 X 18 m)

3) If there is no rain after planting of litchi, what is the recommendation for irrigation?

   (Immediately / after week / after fortnight)

4) What is the recommendation for selecting the twig for air layering?

   (Twig of about 1 year old and 2.5 to 4cm in diameter / twig of about 3-year-old 2.5 to 4cm in diameter / twig of about 4-year-old and 2.5 to 4cm in diameter)

5) How many weeding operations are recommended in litchi orchard in one year?

   (3, 4, 5)

6) When newly planted litchi plants should be irrigated in winter and summer in litchi orchard?

(Winter 6 to 7 days / 10 to 13 days / 13 to 17 days; summer 2 to 3 days / 5 to 7 days / 9 to 12 days)

7) In which type of atmosphere fruits should not be harvested from litchi orchard?

(Hot / cool /rainy)

8) Green manuring improves physical condition and soil fertility of litchi orchard.

(Yes / no)

9) Pre- monsoon ploughing reduces soil erosion and maximizes water percolation of litchi orchard.

(Yes / no)

10) During which stage the fruit dropping causes maximum reduction in litchi production?

(Pre-bloom / bloom, fruit set / post-set stage)

11) Name at least two variety of litchi recommended for the Tezpur region of Assam?

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12) Which type of commercial propagation method for litchi is recommended in the Assam state?

(Air layering / marcotting / grafting)

13) What should be the size of the pit for litchi planting?

(80x80x80 cm / 1x1x1m / 85x85x85cm)

14) What is the cause of Fruit Cracking in litchi orchard?

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15) Which method of irrigation is followed in litchi plantation?

(Flood method / Basin method / Furrow method)

16) To get maximum litchi production in the next year, in which month the manure and fertilizer should be applied?

(April / June / August)

17) What is the recommended irrigation interval for fruiting litchi tree?

(10 to15 days / 20 to 25 days / 25 to 30 days)

18) How much irrigation should be given to fruiting litchi tree in one month?

(4 days / 6 days / 8 days)

19) For how many years intercropping is possible in new litchi orchard?

(3 to 4 years / 5 to 6 years / 6 to 7 years)

20) Which points should be taken into consideration while intercropping?

…….

21) In which month litchi mite attack in litchi orchard?

(October to January /March to June /August to October)

22) Leaf curl or Erinose is caused due to attack of litchi mite.

(True / False)

23) Which pesticide should be recommended to control litchi mite?

(Kelthane or dimethoate / imidacloprid / monocrotophos)

24) What measure should be taken to control Fruit Cracking in litchi?

(Spray 2,3,5-T or NAA at 35-100 ppm / Spray of 2,4-D / Spray IAA)

25) Which is the most appropriate time period for air layering in litchi?

(Rainy season / winter season / summer season)

26) What should be done to promote new growth in litchi plant?

……
…….

27) Which materials can be used as soil mulch in litchi plantation?

(Dry leaves or rice straw / Rock mulch / Rubber mulch)

28) Which pesticide is recommended to control litchi fruit borer?

    (Ragor /mono /cyper)

29) At which stage litchi tree is affected by bats and birds?

    (Ripening stage / flowering stage / Fruiting stage)

30) Bone Meal should be applied to bearing litchi tree every year.

    (True / False)

31) Apiculture with litchi orchard helps in pollination in litchi tree.

    (True / False)

32) How much nitrogenous fertilizer / Urea should be applied per bearing tree of litchi?

    (100g /300g / 500g)

33) How much phosphatic fertilizer/ Super Phosphate should be applied per bearing tree of litchi?

    (250g / 400g / 500g)

34) Oil Cake and Wood Ash should be applied to bearing litchi tree every year.

    (True / False)

35) What is the average production of litchi from one tree?

    50 to 100 kg / 150 to 200 kg / 250 to 300 kg)

## 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 risk orientation, attitude towards modern agriculture, and orientation towards the competition fostering a positive attitude towards new ideas, practices and varieties. Majority of the respondents had medium level of achievement motivation (68.75%). Therefore, the concerned agencies should focus on providing motivational training programmes to the respondents so that they could foster and engage themselves to learn and develop new skills. Majority of the respondents had medium extent of adoption (70.00%) of recommended litchi production technology, It implies that proper extension strategies like method demonstration, awareness cum training campaigns, etc. should be used. The concerned department and agencies should motivate the members of FPC by providing proper scientific and technical guidance regarding recommended litchi production technology. 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 (50.00%) had medium level of knowledge, followed by 27.50 per cent of the respondents had low level of knowledge and 22.50 per cent of the respondents had high level of knowledge. The mean knowledge score (49.78) indicated that on an average the respondents had low level of knowledge on scientific practices of litchi with standard deviation of 29.14. The value of co-efficient of variation (58.55) indicated that the respondents were relatively heterogeneous with respect to their knowledge on scientific practices in litchi. It implies that concerned departments/agencies and extension functionaries should take training programmes,

demonstration into consideration so that members of FPC can be equipped with proper knowledge on recommended scientific practices of litchi. The concerned state department and agencies should motivate the members of FPC by providing appropriate guidance and necessary essential in proper time. 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.

## CONSENT

As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

## ETHICAL APPROVAL

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

## 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 the writing or editing of this manuscript.

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## COMPETING INTERESTS

Authors have declared that they have no known competing financial interests or non-financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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