



## Knowledge and Adoption of Good Management Practices Among Litchi Farmers in Muzaffarpur District of Bihar

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### ABSTRACT

Litchi is one of the nutritionally rich and economically significant fruit of Indian subcontinent. With the advent of Good Management Practices (GMPs), litchi farming technology has advanced drastically. The study was conducted in 2022 in the Muzaffarpur district of Bihar to assess the level of knowledge and adoption of GMPs among litchi farmers and their relationship with the socio-economic profile of litchi growers. The primary data were personally collected through a well-structured interview schedule from 120 respondents. Knowledge and adoption were determined, practicewise on 19 different parameters of GMPs. The highest number of litchi growers (77.50%) had a medium level of knowledge while 71.67 per cent had a medium adoption level of the recommended GMPs in litchi production. Variables viz., the area under litchi, cosmopolitanness, farming experience, risk preference, innovativeness, and attitude towards GMPs were positively and significantly related to knowledge as well as adoption. Primary work and education were positively and significantly related to adoption. Dissemination of information about modern agricultural practices is necessary for the adoption of GMPs in litchi production.

### INTRODUCTION

India is popularly known as fruit basket of world and stands 2<sup>nd</sup> in fruit production after China. Litchi is one of important fruit grown in tropical and sub-tropical regions of the world due to its specific climate and soil needs. Litchi is one of the popular fruits of Indian subcontinent and known for its high mineral and vitamin content. Litchis have a significant economic impact in addition to their nutritional value (Kumar et al., 2023). In recent years, global demand for litchi has steadily increased, resulting in increased production and export. Litchi cultivation employs millions of people worldwide, particularly in China, India, Thailand, and Vietnam, which are the world's largest producers of litchis. Litchi cultivation is also culturally important in many parts of the world. Litchis are traditionally associated with the Lunar New Year in China and are regarded as a symbol of good fortune and prosperity.

However, there are some challenges to litchi cultivation. The fruit is susceptible to a variety of diseases and pests, which can result in significant crop losses if not managed properly. Climate change and extreme weather events, such as floods and droughts, can also have a significant impact on litchi productivity. India accounts for 727,000 metric tonnes of litchi production with about 95,000 hectares of area under cultivation (Anonymous, 2018). Litchi contributes significantly to grower's economy in Bihar, West-Bengal, Assam and Jharkhand states of India that accounts for 78 per cent of total production in the country. Bihar stands first and accounts for production of 43 per cent of total litchi and covers 38 per cent of country's land area under litchi cultivation (NHB, 2018).

With the advent of Good Management Practices (GMPs), litchi farming technology has advanced dramatically. It has social impacts as it takes care about workers health, safety and welfare

(Nain et al., 2020). No doubt we came a long way but still there is more to achieve in production, productivity, and quality parameters. There still exists a significant gap between current productivity (6.1 tone ha<sup>-1</sup>) and potential output (Sahni et al., 2020). Litchi has been cultivated for a long time, and farmers are relying on traditional farm practices for litchi cultivation. Only 0.4 per cent farmers have access to public extension workers for information on modern farm technologies in Bihar against 5.7 per cent at national level (NSSO, 2005). There exists a knowledge gap and slow adoption rate of Good Management Practices among farmers. The goal of study is to determine the level of knowledge and adoption of GMPs for litchi. The study also offers to investigate the relationship between socio-economic profile of farmers and knowledge and adoption of GMPs. The study will help in awareness of gaps and acceptable ways for encouraging the use of improved litchi production.

**METHODOLOGY**

According to the FAO (2003), Good Management Practices (GMPs) is a science-driven application of available knowledge to address environmental, economical and social sustainability aspect of on-farm and post-production processes for safe and healthy agricultural products. The study was conducted in year 2022 to determine the knowledge and adoption level regarding recommended GMPs for litchi cultivation and relationship of socio-economic variable of respondents with knowledge and adoption. Muzaffarpur district in Bihar was purposively selected for the study owing to maximum area and production of litchi in India. In the second stage two blocks Mushari & Bochaha were selected purposively based on high area and production of litchi. Two villages with maximum number of Litchi growers were purposively selected from each block making four villages. From each village 30 farmers were selected randomly, constituting a total sample size of 120.

For determining the level of knowledge, a set of 19 items relevant to GMPs of were included in the schedule. The responses were recorded on a two-point continuum as possess knowledge or not and were given 2 and 1 score, respectively. Similarly, for determining the extent of adoption of respondents regarding the recommended GMPs of litchi, all the 19 aspects (as mentioned in the knowledge test) were included. The responses were recorded on three-point continuum as fully adopted, partially adopted and not adopted and were given 3, 2 and 1 scores, respectively. The maximum achievable score in case of knowledge was 38 and in case of adoption maximum achievable score was 57. The respondents were categorized into three categorized based on mean and standard deviation from individual score obtained. The three categories were low (<Mean - SD), medium (between Mean ± SD), high (>Mean + SD). Further in order to assess the extent of relationship between level of knowledge and adoption and socio-economic profile of farmers correlation coefficient were calculated with the help of Pearson’s formula of correlation coefficient.

**RESULTS AND DISCUSSION**

Knowledge greatly influences decision-making process at the individual level. It is pre-requisite before any innovation is adopted. Knowledge and adoption go hand in hand, without initial knowledge

regarding the technology it may be challenging to predict the extent of adoption. After analyzing the practice wise knowledge and adoption of GMPs and their relationship with socio-economic variables the outcome interpreted in this part of result and discussion.

**Practice-wise knowledge of the respondents about GMPs**

Knowledge of the litchi farmers about GMPs of litchi was analysed for nineteen practices namely, soil type, pH, variety, planting technique, spacing, protection of young plant, intercropping, training, pruning, nutrient management, irrigation methods, irrigation interval, flowering, major pest, insecticides, major diseases, management practices, stage and time of harvesting (Table 1). An overwhelming majority (90%) of the respondents had knowledge about soil type, followed by appropriate pH requirement (79.16%), correct time (75.00%), stage of harvesting (70.00%) and recommended variety (68.33%). The table further shows that respondents had fair knowledge about appropriate intercropping (66.66%), protection of young plant (66.66%), major pest attack (65.00%) irrigation method (63.33%), spacing (62.50%), irrigation interval (60.00%) and nutrient management (60.00%). Furthermore data also indicate that certain fraction of respondents had no knowledge regarding training (56.67%), flowering and insecticides (57.50%), pruning (40.84%) and nutrient management (39.10%). We can conclude that for these variable most of respondents are still relying on old traditional practices and are not able to realize the potential yield of litchi. It is apparent that high percentage of respondents adopted practices like recommended variety, spacing, protection measures for young litchi, intercropping, irrigation methods and intervals as these are very crucial inputs which impact yield level. The findings partially supported by

**Table 1.** Knowledge level of Litchi growers with respect to recommended GMPs of litchi cultivation

S.No.	Recommended practices	Knowledge level	
		Aware F (%)	Not-aware F (%)
1	Soil type	108(90.00)	12(10.00)
2	pH (6-6.5)	95(79.16)	25(20.84)
3	Recommended variety	82(68.33)	38(32.00)
4	Planting technique	54(45.00)	66(55.00)
5	Spacing	75(62.50)	45(37.50)
6	For protection of young plant	80(66.66)	40(33.30)
7	Intercropping	82(68.33)	38(31.67)
8	Training	52(43.33)	68(56.67)
9	Pruning	71(59.16)	49(40.84)
10	Nutrient management	73(60.90)	47(39.10)
11	Irrigation method	76(63.33)	44(36.67)
12	Irrigation interval	72(60.00)	48(40.00)
13	Flowering	69(57.50)	51(42.50)
14	Major pest	78(65.00)	42(35.00)
15	Recommended insecticides	69(57.50)	51(42.50)
16	Major disease	88(73.30)	32(26.70)
17	Management practices	61(50.84)	59(49.16)
18	Appropriate stage of harvesting	84(70.00)	36(30.00)
19	Time of harvesting	91(75.84)	29(24.16)

F= Frequency, %= Percentage, Figure in parenthesis shows percentage

Nirmala (2015); Pandit et al., (2017); Jat et al., (2022); Shambhvi et al., (2022).

### Practice-wise adoption of the respondents about GMPs production technology

Results from Table 2 had been used to provide information of distribution of respondent according to practice wise extent of adoption of recommended GMPs for litchi cultivation. Regarding the 'recommended soil type' an overwhelmingly (94.00%) had fully adopted followed by medium (4.00%). Regarding the adoption of 'recommended pH', 50.84 per cent of litchi growers had high adoption followed by medium (45.84%) and low (3.33%). About the 'recommended variety', 48.34 per cent of respondents had fully adopted followed by partially (47.84%) and 4.17 per cent not adopted. For the practice 'planting technique', (36.67%) litchi growers had partially adopted followed by not-adopted (34.17%) and fully adopted (29.17%). Regarding the adoption of 'required spacing', 45.86 per cent had partially adopted followed by fully (31.66%) and not adopted (22.50%). Regarding 'protection of young plants', 49.17 per cent had fully adopted the recommended technique followed by partially (35.00%) and not adopted (15.84%). For the adoption of 'intercropping', 43.34 per cent had fully adopted followed by partially (40.00%) and not adopted (16.67%). For the practice 'training and pruning', (44.17%) had partially adopted followed by fully (35.00%) and not adopted (20.00%). Regarding 'Nutrient management' half of the litchi growers had partial adoption followed by complete (32.50%) and no adoption (17.50%). About the 'irrigation method', the majority of litchi growers (49.16%) had partial adoption followed by complete (39.17%) and no adoption (11.67%). For 'irrigation interval', 50.54 per cent had partially adoption followed by complete (38.33%) and no adoption (10.33%). Regarding the practice of 'spray for flowering induction', 41.67 per cent of litchi growers had complete adoption followed by partial

(33.34%) and no adoption (25.00%). About 'recommended insecticides', 50.84 per cent had partial adoption followed by complete (35.83%) and no adoption (13.34%). Regarding 'disease management', 52.50 per cent had partial adoption followed by complete (30.00%) and no adoption (17.50%). For adoption of 'appropriate stage of harvesting' majority of litchi growers (56.67%) had adopted followed by partial (30.84%) and no adoption (12.50%). Regarding adoption of 'appropriate harvesting time', 46.67 per cent litchi growers complete adoption followed by partial (35.00%) and no adoption (18.34%). It is evident that a fair number of litchi growers adopted practices recommended variety, spacing, protection measure for young litchi plants, intercropping, irrigation methods and irrigation interval. As compared to this the practices like propagation methods, planting technique, training and pruning, nutrient management and plant protection measures have comparatively less percentage of litchi growers who had completely adopted. The findings are partial agreement with the study of Deshmukh et al., (2007).

### Overall knowledge and adoption level of litchi growers

Table 3 shows the distribution of respondents based on their overall knowledge and adoption level. The findings of study indicates that majority of respondents (77.50%) had a medium level of knowledge followed by 14.17 per cent had high knowledge level and 8.33 per cent had low level of knowledge about recommended GMPs of litchi. Kumar et al., (2020) in his study on knowledge of mango growers about management practices in western Uttar Pradesh observed similar findings. Knowledge of the innovation is a prerequisite before it can be adopted (Rogers, 2003). Lack of knowledge about improved farming techniques directly affects the level of adoption. Table 3 further shows that maximum number of respondents (71.67%) had medium level of adoption followed by high (16.66%) and low (11.67%). Similar findings were supported by Yadav et al., (2010) in his study on Adoption Behaviour of

**Table 2.** Adoption of Litchi farmers with respect to recommended GMPs

S.No.	Recommended Practices	Adoption level		
		Fully F (%)	Partially F (%)	Not adopted F (%)
1.	Soil type	113(94.00)	7(6.00)	0
2.	pH	61(50.84)	55(45.84)	4(3.33)
3.	Recommended variety	58(48.34)	57(47.84)	5(4.17)
4.	Planting technique	35(29.17)	44(36.67)	41(34.17)
5.	Spacing	49(31.66)	45(45.86)	26(22.50)
6.	Protection measure for young plant	59(49.17)	42(35.00)	19(15.84)
7.	Intercropping	52(43.34)	48(40.00)	20(16.67)
8.	Training	41(34.17)	53(44.17)	26(21.67)
9.	Pruning	42(35.00)	53(44.17)	25(20.00)
10.	Nutrient Management	39(32.50)	60(50.00)	21(17.50)
11.	Irrigation method	47(39.17)	59(49.16)	14(11.67)
12.	Irrigation interval	46(38.33)	61(50.84)	13(10.33)
13.	Spray for flowering induction	50(41.67)	40(33.34)	30(25.00)
14.	Major pest	57(47.67)	45(37.50)	18(15.00)
15.	Recommended insecticides	43(35.83)	61(50.84)	16(13.34)
16.	Major disease	66(55.00)	34(28.34)	20(16.67)
17.	Disease Management	36(30.00)	63(52.50)	21(17.50)
18.	Appropriate stage of harvesting	68(56.67)	37(30.84)	15(12.50)
19.	Time of harvesting	56(46.67)	42(35.00)	22(18.34)

F= Frequency, %= Percentage, Figure in parenthesis shows percentage

**Table 3.** Overall knowledge and adoption level

S.No.	Categories	Percentage	Mean	SD	Percentage	Mean	SD
1.	Low < (mean - SD)	8.33	12.84	2.34	11.67	22.57	4.40
2.	Medium (mean ± SD)	77.50			71.67		
3.	High > (mean + SD)	14.17			16.66		
	Total	100			100		

Commercial Potato Growers in Ghaziabad district of Uttar Pradesh. Singh et al., (2015) in his study on adoption of modern agricultural technologies at farm level in Bihar observed that farmers are in low adoption category in adopting modern farm technologies. An improvement in knowledge is necessary factor in adoption of an innovation.

**Association of socio-economic variables with knowledge and adoption**

The total knowledge score of GMPs of litchi for each respondent were put to correlation analysis with personal, farm, communication, and psychological characteristics. Independent variables such as farm size, productivity of Litchi, income from litchi and achievement motivation are non-significant relationship with knowledge. On the other hand, independent variable like Area under litchi, cosmopolitness, experience in farming were significantly correlated with knowledge at 1 per cent level of significance. While Risk preference, Innovativeness and Attitude towards GMPs were significantly correlated with knowledge at 5% level of significance. Sweta et al., (2019) observed that risk taking ability of farmer and achievement motivation are positively and significantly associated with the knowledge level of farmers about drip irrigation system. Diksha et al., (2023) viewed that cosmopolitness of farmers has a direct and positive relationship with the knowledge level of litchi growers in Punjab.

Variables such as area under litchi, primary work, cosmopolites, experience in farming, risk preference, achievement motivation, innovativeness and attitude towards GMPs are significantly related with level of adoption at 5% level of significance. Sai (2021) in his study found that area under litchi and experience in the farming

**Table 4.** Relationship between profile characteristics of Litchi growers with their knowledge level

S.No.	Characteristics	Knowledge value of r	Adoption value of r
1.	Area under Litchi	0.945**	0.939**
2.	Cosmopolitness	0.928**	0.969**
3.	Experience in Farming	0.939**	0.959**
4.	Farm Size	0.059 <sup>NS</sup>	0.086 <sup>NS</sup>
5.	Productivity of Litchi	0.051 <sup>NS</sup>	0.141 <sup>NS</sup>
6.	Income from Litchi	0.010 <sup>NS</sup>	0.027 <sup>NS</sup>
7.	Risk preference	0.226*	0.355**
8.	Achievement Motivation	0.057 <sup>NS</sup>	0.396**
9.	Innovativeness	0.191*	0.421**
10.	Attitude towards GMPs	0.192*	0.315**
11.	Level of education	0.752 <sup>NS</sup>	0.143 <sup>NS</sup>
12.	Primary work	0.586 <sup>NS</sup>	0.285*

\*Correlation is significant at the 0.05 level (2-tailed)  
 \*\*Correlation is significant at 0.01 level (2- tailed), NS: Non-significant

significantly associated with adoption of modern litchi production technologies. Warshini et al., (2022) viewed that risk orientation of farmer and sources of information has a significant role in adoption of banana production technologies.

**CONCLUSION**

It can be concluded that majority of farmers have medium level of knowledge and majority falls in medium adoption level of GMPs of litchi cultivation. Thus, it becomes important for extension agencies to play a crucial role to create awareness among litchi growers about GMPs. This can be done through training, result demonstration, field trips as well as group discussions. In coming years litchi can play a pivotal role in export, so there is need to enhance litchi in terms of quantity as well as quality and adopting GMPs of litchi can be a crucial step.

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