

**A STUDY ON KNOWLEDGE & ADOPTION OF  
RECOMMENDED LITCHI PRODUCTION  
TECHNOLOGY AMONG THE FARMERS OF JASHPUR  
DISTRICT OF CHHATTISGARH**

**M. Sc. (Ag.) Thesis**

**by**

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COLLEGE OF AGRICULTURE,  
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INDIRA GANDHI KRISHI VISHWAVIDYALAYA  
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**A STUDY ON KNOWLEDGE & ADOPTION OF  
RECOMMENDED LITCHI PRODUCTION  
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DISTRICT OF CHHATTISGARH**

**Thesis**

**Submitted to the**

**Indira Gandhi Krishi Vishwavidyalaya, Raipur (C.G.)**

**by**

**Savita Nandan Sai**

**IN PARTIAL FULFILMENT OF THE REQUIREMENTS**

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**in**

**Agriculture**

**(Agricultural Extension)**

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## CERTIFICATE - I

This is to certify that the thesis entitled “**A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH**” submitted in partial fulfillment of the requirement for the degree of **Master of Science in Agriculture** of the Indira Gandhi Krishi Vishwavidyalaya, Raipur is a record of the bonafide research work carried out by **Savita Nandan Sai** under my guidance and supervision. The subject of the thesis has been approved by Student’s Advisory Committee and the Director of Instructions.

No part of the thesis has been submitted for any other degree or diploma or has been published/published part has been fully acknowledged. All the assistance and help received during the course of the investigations have been duly acknowledged by him.

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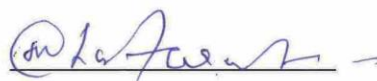
  
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### THESIS APPROVED BY THE STUDENT’S ADVISORY COMMITTEE


Chairman Dr. D.K. Suryawanshi




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Member Dr. Vijay Kumar



Member Dr. Sindhu Shukla



## CERTIFICATE-II

This is to certify that the thesis entitled “A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH” submitted by Savita Nandan Sai to the Indira Gandhi Krishi Vishwavidyalaya, Raipur, in partial fulfilment of requirement for the degree of Master of Science in Agriculture Department of Agricultural Extension has been approved by the external evaluator and Student’s Advisory Committee after oral examination, under the chairmanship of head of the Department/ Dean.



Signature of Head of the Department/Dean

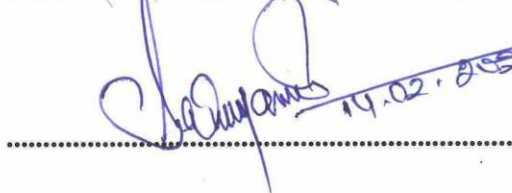
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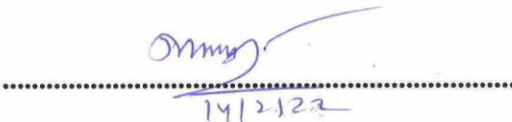
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*Savita Nandan Sai*

*Department of Agricultural Extension*

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*Date:*

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## LIST OF ABBREVIATIONS AND SYMBOLS

Abbreviation	Description
/	Per
%	Percentage
$\Sigma$	Summation
<i>viz.</i>	Namely
&	And
<i>et. al.</i>	And others
F	Frequency
P	Percentage
$\bar{X}$	Mean
S.D.	Standard deviation
r	Correlation coefficient
ha.	Hectare
MT	Million tons
Rs.	Rupees
Fig.	Figure
Cv.	Cultivar variety
K.I.	Knowledge index
A.I.	Adoption index
N	Number
etc.	Etcetera
S. No.	Serial Number
i.e.,	That is
NPV	Net present value

## THESIS ABSTRACT

- 
- a) Title of the thesis: "A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH"
- b) Full Name of the students: Savita Nandan Sai
- c) Major Subject: Agricultural Extension
- d) Name and Address of the Major Advisor: Dr. D.K. Suryawanshi  
Associate Professor, Department of Agricultural Extension College of Agriculture, IGKV Raipur (C.G.) 492012
- e) Degree to be Awarded: M.Sc. (Ag.) Agricultural Extension

  
Signature of Major Advisor

  
Signature of the Student

Date: 22/10/2021

  
Signature of Head of the Department

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The present investigation titled "A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH" was made during 2020-21 in Jashpur district of Chhattisgarh state two blocks Jashpur and Bagicha, were selected for investigation. Eighty respondents were selected randomly and interviewed individually with the help of a structured interview schedule. The study concluded that more than half of the respondents who had a high school level of education were of middle age, moderate family size and membership in an organization. Most (52.50%) of the litchi cultivators had between 8-16 years of litchi cultivation experience.

Further, present study showed that most of the respondents were considered agriculture as their main occupation, majority of the litchi cultivators reported an income of Rs 50,001 to 1,00,000 per year from litchi and most were of semi-medium (2.01 to 4.00 ha) land holdings. Maximum number of litchi cultivators were selling litchi fruits through three level of marketing channel (Producer – Agent broker – Wholesaler – Retailer – Consumer). Farmers used various media like mobiles, agricultural magazines and mass media like Krishi Mela to get information. Majority of the litchi cultivators reported low levels of cosmopolitaness. Also, most of the litchi cultivators (61.25%) had a moderate knowledge level of the recommended litchi production technology.

The majority of the litchi cultivators had litchi cultivation in an area of 0.11-0.34 hectares. The maximum number had 20 to 40 litchi trees and most of the litchi cultivars had a litchi orchard of 0.20 to 0.40 ha in size. Most of the litchi cultivators had told that they had a litchi orchard of 8 to 20 years old age. Maximum (71.25%) number of litchi cultivators had moderate level of adoption of the recommended litchi production technology.

Among the selected variables i.e., age, education, land holding, annual income of litchi fruit crop, experience of litchi cultivation, area under litchi cultivation, number of trees, size of orchard, year of orchard and media utilization were found to be positive and significant. The remaining variables were found to be non-significant with respect to the recommended litchi production technology with the extent of adoption. Similarly, the selected variables i.e., education, land holding, annual income of litchi fruit crop, experience of litchi cultivation, area under litchi cultivation, number of trees, size of orchard, year of orchard and media utilization were found to be positive and significant. The remaining variables were found to be non-significant with respect to the recommended litchi production technology with the level of knowledge.

The major problems faced by the litchi cultivators regarding litchi production technology were not receiving a fair price for their produce, lack of knowledge, lack of cold storage facilities, long distance market access, high transportation cost and lack of processing unit are the important constraints faced by the litchi cultivators in adopting recommended litchi production technology.

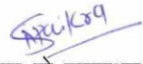
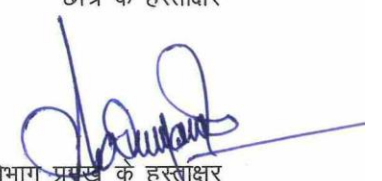
The considerable suggestions given by the litchi cultivators to get over the constraints faced by them are availability of proper marketing facilities, proper storage facility should be made by the government, all inputs used in cultivation of litchi crop should be available at timely and affordable price for getting maximum yield, latest information to growers by the concerned departments and processing units by the government should be at least at the block level.

## शोधग्रन्थ सारांश

अ) शोध का शीर्षक:	“छत्तीसगढ़ के जशपुर जिले के किसानों के बीच अनुशंसित लीची उत्पादन तकनीक के ज्ञान और अपनाने पर एक अध्ययन”
ब) छात्र का पूरा नाम:	सविता नंदन साय
स) प्रमुख विषय:	कृषि विस्तार
द) प्रमुख सलाहकार का नाम और पता:	डॉ. डी. के. सूर्यवंशी एसोसिएट प्रोफेसर, कृषि विस्तार विभाग इंदिरा गांधी कृषि विश्वविद्यालय रायपुर, (छ.ग.) 492012
य) उपाधि का नाम:	एम. एस. सी. (कृषि) कृषि विस्तार

  
प्रमुख सलाहकार के हस्ताक्षर

दिनांक: 22/10/2021

  
छात्र के हस्ताक्षर  
  
विभाग प्रमुख के हस्ताक्षर

छत्तीसगढ़ राज्य के जशपुर जिले के दो ब्लॉक जशपुर और बगीचा में 2020-21 के दौरान “छत्तीसगढ़ के जशपुर जिले के किसानों के बीच अनुशंसित लीची उत्पादन तकनीक के ज्ञान और अपनाने पर एक अध्ययन” शीर्षक से वर्तमान जांच को जांच के लिए चुना गया था। एक संरचित साक्षात्कार अनुसूची की सहायता से अस्सी उत्तरदाताओं को यादृच्छिक रूप से चुना गया और व्यक्तिगत रूप से साक्षात्कार किया गया। इस अध्ययन से यह निष्कर्ष पता चला कि आधे से अधिक उत्तरदाता जिनके पास उच्च विद्यालय स्तर की शिक्षा थी, वे मध्यम आयु, मध्यम परिवार के आकार और एक संगठन में सदस्यता के थे। लीची की खेती करने वालों में से अधिकांश (52.50%) को लीची की खेती का 8-16 वर्षों का अनुभव था।

इसके अलावा, वर्तमान अध्ययन से पता चला है कि अधिकांश उत्तरदाताओं ने कृषि को अपना मुख्य व्यवसाय बताया था, लीची की खेती करने वालों में से अधिकांश ने लीची से प्रति वर्ष 50,001 से 1,00,000 रुपये की आय की सूचना दी और अधिकांश अर्ध-मध्यम (2.01 से 4.00 हेक्टेयर) भूमि जोत के थे। लीची की खेती करने वालों की अधिकतम संख्या तीन स्तरों के विपणन चैनल (उत्पादक – एजेंट दलाल – थोक व्यापारी – खुदरा विक्रेता – उपभोक्ता) के माध्यम से लीची फल बेच रही थी। किसानों ने जानकारी प्राप्त करने के लिए विभिन्न माध्यमों जैसे मोबाइल, कृषि पत्रिकाओं और कृषि मेला जैसे जनसंचार माध्यमों का उपयोग किया। अधिकांश लीची की खेती करने वालों ने महानगरीयता के निम्न स्तर की सूचना दी। इसके

अलावा, अधिकांश लीची की खेती करने वालों (61.25%) के पास अनुशासित लीची उत्पादन तकनीक का मध्यम ज्ञान स्तर था।

लीची की अधिकांश खेती करने वालों के पास 0.11– 0.34 हेक्टेयर क्षेत्र में लीची की खेती थी। अधिकतम संख्या के पास 20 से 40 लीची के पेड़ थे और लीची की खेती करने वालों में अधिकांश के पास 0.20 से 0.40 हे आकार का लीची बाग था। अधिकांश लीची की खेती करने वालों ने बताया था कि उनके पास 8 से 20 साल पुराना लीची का बाग है। लीची की खेती करने वालों की अधिकतम (71.25%) संख्या में अनुशासित लीची उत्पादन तकनीक को अपनाने का मध्यम स्तर था।

चयनित चरों में अर्थात् आयु, शिक्षा, भूमि जोत, लीची फल की फसल की वार्षिक आय, लीची की खेती का अनुभव, लीची की खेती के तहत क्षेत्र, पेड़ों की संख्या, बाग का आकार, बाग का वर्ष और मीडिया उपयोग सकारात्मक और सार्थक पाया गया। शेष चरों को अपनाने की सीमा के साथ अनुशासित लीची उत्पादन तकनीक के संबंध में गैर-महत्वपूर्ण पाया गया। इसी प्रकार, चयनित चर अर्थात् शिक्षा, भूमि जोत, लीची फल की फसल की वार्षिक आय, लीची की खेती का अनुभव, लीची की खेती के तहत क्षेत्र, पेड़ों की संख्या, बाग का आकार, बाग का वर्ष और मीडिया उपयोग सकारात्मक और महत्वपूर्ण पाया गया। शेष चर ज्ञान के स्तर के साथ अनुशासित लीची उत्पादन तकनीक के संबंध में गैर-महत्वपूर्ण पाए गए।

लीची उत्पादन तकनीक के संबंध में लीची की खेती करने वालों को उनकी उपज का उचित मूल्य नहीं मिल पाना, ज्ञान की कमी, शीत भंडारण सुविधाओं की कमी, लंबी दूरी की बाजार पहुंच, उच्च परिवहन लागत और प्रसंस्करण इकाई की कमी महत्वपूर्ण बाधाएं थी जो लीची की खेती करने वालों द्वारा अनुशासित लीची उत्पादन तकनीक को अपनाने में आयी।

लीची की खेती करने वालों द्वारा उनके सामने आने वाली बाधाओं को दूर करने के लिए दिए गए महत्वपूर्ण सुझाव उचित विपणन सुविधाओं की उपलब्धता, उचित भंडारण की सुविधा सरकार द्वारा की जानी चाहिए, लीची की फसल की खेती में उपयोग होने वाले सभी आदानों को अधिकतम उपज प्राप्त करने के लिए समय पर और सस्ती कीमत पर उपलब्ध होना चाहिए, संबंधित विभागों द्वारा उत्पादकों को नवीनतम जानकारी और सरकार द्वारा प्रसंस्करण इकाइयाँ कम से कम ब्लॉक स्तर पर होनी चाहिए।

## CHAPTER – I

### INTRODUCTION

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Agriculture and its allied sector are the backbone of Indian economy. Horticulture is an art science and business; it is a branch of agriculture and an intensive cultivation part used by humans for food and aesthetic purposes. Horticulture plays a vital role in booming this industry and helps in exponential growth of the Indian economy.

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. Litchi are rich in carbohydrates, vitamins (A, B and C). They are also good source of minerals like potassium, calcium, magnesium, phosphorous and iron. Excessive feeding may lead to diabetes. Small proportion in daily diet helps in digestion.

India ranks the second in the world in terms of production, after China. The production of 727000 MT from the area of 95000 ha had been reported in 2018-19 (Anonymous 2019). 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 more

interested 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. (Sahni, *et. al.*, 2020).

Litchi is making its place not only in India but in the whole world because of its attractive colour, taste and quality. Its export potential has developed immensely in the last several years, but in the international market, there is a high demand for fruits of large and similar size and quality. Hence, the need for special attention towards production of good quality fruits. For its cultivation there is a need of specific climate which is not available at all places. Its fruits ripen and are available from 10 may to the end of July in different parts of the country. First of all, litchi fruits are prepared by ripening in Tripura after these fruits are ready by ripening in Ranchi, east Jharkhand, west Bengal, Uttar Pradesh, Dehradun and valley of Pithoragarh respectively.

In different states of India, due to getting non-agricultural employment other than agriculture there is an alternative means of livelihood for a large population which is the farmers of the lower class they get some extra income from litchi. In this way of cultivation of litchi brings employment to lakhs of people. Thus, with special consideration of the benefits of this fruit crop development programmes were selected to promote its production and to provide technical assistance emphasis was laid on marketing including rendering and management.

Chhattisgarh is geographically located in central India, between 17°46'-24°5' north latitude and 80°15'-84°20' east longitude, with a total geographic area of approximately 13.79 million hectares. The main fruit crops grown in Chhattisgarh includes mangoes, guava, lime, litchi, cashew-nut and cheku etc. In addition to these secondary fruits such as Sitafal, Bael, Ber and Anola, etc., are also grown. Agro-climatically litchi can be successfully grown in the hilly area of northern Surguja. Also, it can be grown in Surguja, Jashpur, Surajpur, Balrampur district of Chhattisgarh. In Chhattisgarh Litchi occupies 7965 hectares of area with total production 55907 MT and productivity of 7 MT per hectares in 2019-20 (Anonymous, 2020).

Jashpur district is located in the northern hill zone of the state of Chhattisgarh, neighboring state are Jharkhand and Odisha on the eastern side. Litchi is good for production in the Jashpur district. The area of Litchi cultivation in Jashpur district is 1520 hectares and production are 6840 MT, respectively, with an average yield of 4.5 MT per hectare (Anonymous, 2020). The increasing area under Litchi in Jashpur has brought a significant change in the social as economic condition of the farmer. The present study showed that Jashpur district of Chhattisgarh is one of the major Litchi-growing districts. (Major Litchi growing blocks in Jashpur district are Bagicha, Jashpur, Duldula and Pathalgaon etc.).

Obviously, the production and productivity of litchi needs to be increased in matching proportion or even more to cope up with the ever-increasing demand of our growing population. There can be many reasons responsible for low yield, but knowledge of the farmers and adoption rate of improved litchi production technology seem to be one of the main hindrances which depriving the farmers in attaining maximum yield. Knowledge and adoption, in fact, varies from individual to individual and innovation to innovation depending upon their various characteristics. The availability of men, money and material resources also influence the rate of adoption substantially. There is, therefore, a need to study the level of knowledge and adoption of scientific practices of litchi. Such a study would be helpful in understanding this important factor and its implications on the production of litchi in the Chhattisgarh state.

In light of this, the current research initiative, titled **“A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH”** was designed with the following specific objectives.

1. To study the socio-economic profile of litchi cultivators
2. To study the information media utilization pattern of the respondents.
3. To find out the knowledge level of recommended litchi production technology among the litchi cultivators.
4. To determine the extent of adoption of recommended litchi production technology among the litchi cultivators.

5. To identify the problems faced by the litchi cultivators and obtain suggestions to overcome these problems.

### **Scope and limitations of the study**

The purpose of this study is to determine the extent to which litchi growers in Chhattisgarh's northern hill region had adopted litchi producing technologies.

Apart from cereals and pulses crops, there is another option in the state to improve the economic condition of the people. There is a lot of scope for expansion of the area under litchi fruits in the northern hilly region and it becomes essential to study the latest production scenario of litchi in the State.

The need for fruits is increasing rapidly in the country due to the increasing population and the high standard of living of the people. The area under litchi in India has increased over time, but its productivity and production have declined. The advanced production technology of litchi cultivation fully adopted by the farmers and is mainly grown in the traditional way. There is a need to fully adopt the advanced production technology of litchi so that the production and income of the farmers will be increased.

Since the study is confined to only two blocks of Jashpur district in the state of Chhattisgarh, the generalization based on the findings may not be true for larger area of different climatic, soil structure etc. Also, instead of covering all litchi growing farmers, the investigation was restricted to only select litchi growing farmers.

The major limitation of the study is that besides studying the production of litchi, other field like marketing and processing also needs to be investigated which would have been beneficial for the policy makers in the present agricultural scenario for forming suitable strategies.

### REVIEW OF LITRATURE

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Review of literature is one of the most important aspects in research process because it act as a yard stick to the new researchers in caring out the research. It is important to look in to the past researches, so as to have sound foundation for the research study. In a view of the above subject, efforts have been made to review the relevant literature about the subject. The present chapter incorporates all the relevant literature developed in India and abroad related to adoption of agriculture production technology by the farmers under following heads:

#### 2.1 Socio-personal Characteristics

##### 2.1.1 Age

Li *et. al.* (2020) showed 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.

Meena and Sharma (2019) showed that more than half of the respondents were belonging to middle age group i.e., between 36 to 60 years (66.67%). Further, 20.83 per cent and 12.50 per cent of the respondents were from young and old age groups, respectively. The data showed that 34 (62.96%) small guava growers and 46 (69.70%) big guava growers belonged to middle age group. On the other hand, 15 (27.78%) small guava growers and 10 (15.15%) big guava growers were found to be from young age group. It was further noted that 5 (9.26%) small guava growers and 10 (15.15%) big guava growers were reported to be from old age group.

Sharma and Singh (2018) showed that out of the total 60 respondents, majority of them 40.00 per cent belonged to the age group of 40-50 years. About 38.00 per cent of the total sampled respondents belonged to relatively old age group more than 50 years, while about 22.00 per cent of them belonged to relatively younger age group up to 40 years. Thus, majority of the litchi cultivation respondents were less than 50 years of age.

Raghuprasad *et. al.* (2018) noticed that 65.00 per cent of the pomegranate cultivation respondents belonged to middle age group. Whereas, 18.33 per cent of the respondents belonged to old age group and 16.67 per cent of respondents were belonged to young age group.

Kumar *et. al.* (2015) revealed that majority of the grape cultivation respondents (54.00%) were in the middle age group followed by the young (37.00%) and old (9.00%) age groups respectively. The working farmers normally belonged to the middle age group.

### **2.1.2 Education**

Li *et. al.* (2020) observed that most of the farmers had a middle school education, accounting for 61.90 per cent, and very few had a higher education (1.77%). 36.33 per cent farmers only had a primary education, and most of them had not even completed that.

Meena and Sharma (2019) revealed that 12 (22.22%) small guava growers and 14 (21.21%) big guava growers were illiterate. It was further observed that 28 (51.85%) small guava growers and 28 (42.43%) big guava growers were found from the literate group, while 14 (25.93%) small guava growers and 24 (36.36%) big guava growers were educated up to middle and above standard level.

Sharma and Singh (2018) found that the educational profile of a total of 60 respondents, most of them that is about 42.00 per cent had attained matriculation, 36.67 per cent of them had completed 10+2 education. At the level, 16.67 per cent were graduates and the remaining five per cent were post-graduates.

Kumar *et. al.* (2015) revealed that the 10.00 per cent respondents were illiterate (cannot read and write) whereas 49.00 per cent and 41.00 per cent were literate (can read write up to primary) and educated (middle and above) respectively.

Ashraf *et.al.* (2015) indicated that almost one third (29.20%) of the citrus cultivation respondents were illiterate, while 70.80 per cent of respondents were having formal education of different levels. Regarding the educational level, maximum per centage (30.00%) of respondents found had primary to middle level education while 12.50 per cent respondents were found with the maximum educational level.

### **2.1.3 Family size**

Singh *et. al.* (2020) observed that the highest per centage (67.27%) of the mango growers was belongs to the family who had 4 to 6 members in their family. 27.73 per cent mango grower's family belongs to that family who had three members and 5.00 per cent mango grower's family belongs to that family who had more than 7 family members. It may be concluded that still there is dominancy of joint family system with 4 to 6 members in the study area. Similarly, to reported that the most of mango growers were lived in joint family system and had 4 to 6 family members.

Bhoyar *et. al.* (2020) observed that 55.00 per cent of the pomegranate growers belongs to small family size (up to 4 members), while 40.00 per cent of the respondents belongs to medium family size (5-7 members) and 05.00 per cent of the respondents belongs to large family size (above 7 members) respectively.

Jamir and Jahanara (2019) showed that 66 pineapple growers, which is 55.00 per cent have less than 5 members in their family, while 45.00 per cent that is 54 pineapple growers have more than 5 members in the family.

Raghuprasad *et. al.* (2018) noticed that less than half of the respondents 42.50 per cent belongs to medium size family with 7-9 members followed by 35.83 per cent of respondents had small family size up to 6 members and 21.67 per cent of respondents belongs to the big family size with more than 9 members.

### **2.1.4 Litchi cultivation experiences**

Li *et. al.* (2020) revealed that 39.51 per cent respondents had not received even one training. However, 66.84 per cent of them had more than 20 years of litchi planting experience, and only 11.99 per cent respondents had less than 10 years of experience. The average experience in litchi planting was 22 years.

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).

Singh and Singh (2017) observed that the majority (58.00%) of the respondents belonged to 16 to 30 year's of experience of mango cultivation followed

by (up to 15 years) twenty-two per cent and (31 years and above) twenty per cent of respondents had experience of mango cultivation respectively.

Dessalegn *et. al.* (2014) showed that the length of mango cultivation experience of respondents ranged from 2 to 38 years with mean of 12 years. About 91.40 per cent of the total respondents had less than 21 years mango cultivation experience. However, the production of mango in the study area is relatively new as compared to the production of field crops. Therefore, mango growers with small holdings have limited practical experience in mango production.

### **2.1.5 Social participation**

Singh *et. al.* (2020) indicated that out of 220 mango growers, 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.

Dadkhwah and Demiryürek (2020) reported that 90.80 per cent of the producers do not belong to any organization, 7.50 per cent of the farmers are members of the cooperative, and 1.70 per cent of the farmers are members of the associations. However, the organizational membership of farmers, from 8.20 per cent members of the organization, 7.50 per cent of farmers have cooperatives membership, and the remaining 1.70 per cent of farmers have the association membership.

Ansari *et. al.* (2020) observed that majority of the respondents, 50.00 per cent had no membership in any organization, followed by 42.50 per cent of the respondents had membership of one organization and 07.50 per cent of the respondents had two or more organizations was a membership.

Jakkawad *et. al.* (2017) indicated that 67.50 per cent of the respondents were having medium social participation. Further 15.00 per cent of them having high level social participation. 17.50 per cent respondents were having low social participation.

Kumar *et. al.* (2015) observed that the 58.00 per cent of respondents were participating in the activities of more than one organization that is gram panchayats, co-operative societies, youth clubs etc. while 38.00 per cent of them belonged to

only one organization and remaining 4.00 per cent of grape growers were servicemen.

## **2.2 Socio-economic Characteristics**

### **2.2.1 Occupation**

Singh *et. al.* (2020) revealed that the mango growers were the main occupation 72.27 per cent followed by service 12.73 per cent, business 6.82 per cent, agro-based enterprises 5.45 per cent and caste-based occupations 2.73 per cent, respectively. In case of subsidiary occupations, the maximum 58.18 per cent of the mango growers belong to agriculture mango family category followed by business mango family 25.00 per cent, agro based enterprises 14.55 per cent and caste-based occupations 2.27 per cent, respectively and anyone was responses were given by mango growers as an agriculture labour and service.

Bhojar *et. al.* (2020) observed that 67.50 per cent of the pomegranate growers did only farming as a occupation followed by 28.34 per cent respondents were involved in farming + business and 04.16 per cent respondents were involved in farming + service.

Jamir and Jahanara (2019) found that the pineapple growers were the main occupation 45 per cent farming followed by farming + business 44.17 per cent and farming + labour 10.83 per cent, respectively.

Raja (2015) indicated that, the agriculture (mango farming) was the main occupation 93.00 per cent followed by service 04.00 per cent, business 02.00 per cent and caste-based occupation 01.00 per cent, agro-based enterprise and agriculture labour were not any response of the orchardists. In case of subsidiary occupation, the maximum 08.00 Per cent of the orchardists were belonging to business category, followed by agriculture (mango farming) 05.00 per cent, caste-based occupation 02.00 per cent, agro-based enterprise 01.00 per cent and not anywhere responses were given by orchardists as a service and agriculture labour respectively.

### **2.2.2 Land holding**

Singh *et. al.* (2020) found that the maximum mango growers, 50.91 per cent were found in the land holding category of large mango growers above 5.0 ha.

Followed by 29.55 per cent mango growers have medium land holding categories (2 to 5 ha.), 14.09 per cent mango growers have small land holding category (1 to 2 ha.) and 5.45 per cent marginal mangrove mango growers who had less than 1 hectare land. Some researcher also found the same trend that large land holding families grows mango.

Jakkawad *et. al.* (2017) revealed that 45.00 per cent were having medium land holding that is 2.1 to 4 ha., followed by 30.00 per cent were found under semi medium land holding category that is 4.1 to 10 ha., 17.50 per cent were having small land holding category that is 1.1 to 2 ha., 5.00 per cent were having marginal land holding category that is up to 1 ha., and 2.50 per cent were having big land holding category that is above 10 ha.

Singh and Singh (2017) found that the majority (64.50%) of the respondents belonged to marginal category of land holding followed by small category (24.00%), semi medium category (9.00%) and medium category (2.50%) of 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.

Kalra *et. al.* (2006) found that the 50.00 per cent of the respondents were having medium size of operational land holdings (5 – 15 acres) followed by 16.36 per cent of the respondents were having small land holding (3 – 5 acres) and 33.64 per cent of the respondents were having large land holding (15 – 35 acres).

### **2.2.3 Annual income of litchi growers**

Singh *et. al.* (2020) found that most (38.18%) mango growers had an annual income of more than Rs 3,00,000 from mangoes. After that 25.91 per cent farmers whose income is 2,00,001 – 3,00,000 lakhs, 18.64 per cent farmers whose income is between 1,00,001 to 2,00,000 and 17.27 per cent mango growers whose income is up to 1,00,000 respectively. The above conclusion shows that about 38.18 per cent mango growers fall in the income group above Rs. 3,00,000.

Li *et. al.* (2020) found that the litchi income as a per centage 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.

Das *et. al.* (2019) reported that 87.50 per cent of pineapple farmers had an income of less than Rs 30,000 from pineapple cultivation. Whereas, the same percentage of respondents (4.17%) earned income of Rs 30,000-70,000, Rs 70,000-1,10,000 and Rs 1,10,000-1,50,000.

Pabuayon *et. al.* (2016) revealed that the average income contributions of litchi production were approximately 80.00 per cent and 55.00 per cent of the total household income in Luc Ngan and Luc Nam districts, respectively.

Kalra *et. al.* (2006) observed that the majority of the respondents (59.09%) belongs to under 10,000 – 60,000 Rs. Followed by 16.36, 12.73 and 11.82 per cent under Rs. 60,000 – 1,10,000, Rs. 1,10,000 – 1,60,000 and no income respectively.

#### **2.2.4 Marketing process**

Acharjee *et. al.* (2021) revealed that the major share (66.66%) of produce traded through market intermediaries. However, 33.34 per cent of farmers were found to be direct selling in local market.

Sharma and Singh (2018) observed that the annual rate of returns was higher for pre-harvest contractor and was 65.35 per cent and for direct sale in the market, it was 64.08 per cent. NPV in case when sold through pre-harvest contractor and directly by farmers was recorded Rs.238294 and Rs. 388124 per hectare, respectively.

Pabuayon *et. al.* (2016) reported that the outside traders from Lao Cai province play an important role in the operation of this channel. They come to the trading centers and directly participate in the chain to select and buy litchi from the farm households or local traders.

Sivananth *et. al.* (2016) showed that the 50.00 per cent of guava cultivation respondents sell their produce through whole sale market, 10.00 per cent through farmers market, 10.00 per cent of farmers sell their produce directly to merchants and 30.00 per cent through local market.

Lan (2010) reported that 48 per cent of domestic consumption of fresh litchi was done in Luc Ngan district, Bac Giang province and 52.00 per cent to China.

Tru (2008) reported that in China where saw the value chain of fresh litchi in Thanh Ha district, Hai Duong province indicate that about 2.00 per cent of litchi produced in the area of China, 80.00 per cent of litchi sold in Chinese southern

provinces and Cambodian markets, and 18.00 per cent was sold to northern provinces such as Hai Duong, Hai Phong, Hanoi and other provinces.

## **2.3 Communicational Characteristics**

### **2.3.1 Media utilization**

Jamir and Jahanara (2019) reported that a majority 72.50 per cent of respondents had used both mobile and television media, followed by 16.67 per cent using both mobile, television and internet media, 5.83 per cent using mobile, radio/newspapers and television, 5.00 per cent used mobile, radio/newspaper.

Prashant *et. al.* (2018) showed that 53.34 per cent of the respondents had a moderate level of mass media use, followed by 31.66 per cent and 15.00 per cent with a low and high level of mass media use, respectively.

Moulasab *et. al.* (2006) reported that majority of the respondents (62.50%), participated in Krishi mela and exhibitions on agriculture (61.67%) and exposed to knowledge about improved cultivation practices.

Nadre (2000) reported that the important information getting source was Gramvistarak, who was mentioned as a source of information by 80.70 per cent respondents, other important sources were; radio and television as mentioned by 76.90 per cent and 71.60 per cent respondents, respectively.

## **2.4 Socio-psychological Characteristics**

### **2.4.1 Cosmopolitaness**

Meena and Sharma (2019) revealed that 42 (77.78%) small guava growers and 10 (15.15%) big guava growers had less degree of cosmopolite orientation. While, more degree of cosmopolite orientation was found in case of 12 (22.22%) small guava growers and 56 (84.85%) big guava growers.

Raghuprasad *et. al.* (2018) showed that slightly less than half of the respondents 42.50 per cent belonged to medium cosmopolitaness category, while, 33.33 per cent of the respondents fall under high cosmopolitaness and 24.17 per cent had low cosmopolitaness category.

## **2.5 Other Characteristics**

### **2.5.1 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).

Jakkawad *et. al.* (2017) observed that the area under Pomegranate 53.75 per cent of respondents were having small area under Pomegranate cultivation that is up to 1.58 ha., 26.25 per cent were having medium land under Pomegranate cultivation that is 1.59 to 2.67 ha and 20.00 per cent of respondents were having high land under Pomegranate cultivation that is above 2.68 ha.

Kalra *et. al.* (2006) found that the majority of the respondents (67.27%) were having one to three acres of land under orchard and sixty per cent of the respondents had one to two acres of land under peach cultivation.

### **2.5.2 Number of trees**

Acharjee *et. al.* (2021) found that most of the litchi growers belong to marginal (83.10%) and small (16.90%) category and their shares in total number of plants were 73.82 per cent and 26.17 per cent, respectively.

Sharma and Singh (2018) revealed that as per Punjab Agricultural University recommendation, 180 litchi plants can be planted in one hectare of area for optimum yield. But in practice, the sampled litchi growers were found to maintain only 93-107 plants in one hectare.

Mehta (2017) observed that the survey of litchi cultivation in 13ymbi and Waynad areas revealed that more than 200 growers are growing litchi on a smaller scale with 1-10 trees in their gardens / plantation / backyard. But there are few farmers who have planted 1 acre to 10 acres of litchi as intercrop with coffee.

Dorji *et. al.* (2016) reported that 20 small citrus growing respondents had 63 trees (less than 100 trees). As well as 10 medium citrus growing respondents had

141 trees (101–200 trees) and 10 large citrus growing respondents had 210 trees (above 201 trees) respectively.

### **2.5.3 Size of orchard**

Amanullah *et. al.* (2020) observed that 224 apple-growing respondents (80.30%) had 1–4 jerub small sized farms, 48 respondents (17.20%) had 5–8 jerub medium sized farms and 7 Respondents (2.50%) had large farms of more than 9 jerubs.

Li *et. al.* (2020) found that the average litchi orchard size per household was 1.09 ha. However, more than half of the farmers (57.32%) had less than 0.7 ha of litchi orchard; 28.21 per cent had 0.7–2 ha, and 6.87 per cent had 2–3.4 ha, with 7.58 per cent farmers having more than 3.4 ha of litchi orchard.

Pabuayon *et. al.* (2016) revealed that the average litchi farm size was 0.6 hectare in Luc Ngan district and 0.51 hectare in Luc Nam district. There was a significant difference at 1.00 per cent level in the density of litchi trees per hectare in Luc Ngan and Luc Nam districts.

Dorji *et. al.* (2016) reported that 20 small citrus growers had 0.45 ha. Size of orchard. While, 10 medium citrus growers have 1.13 ha. Size of orchard and 10 large citrus growers have 6.3 ha. Orchard size.

### **2.5.4 Age (Year) of orchard**

Kalra *et. al.* (2006) reported that majority of the respondents 85.46 per cent were having more than three-year age of peach orchard followed by one, two and three years were having 6.36, 5.45 and 2.73 per cent respectively.

## **2.6 Dependent Variables**

### **2.6.1 Extent of knowledge**

Ansari *et. al.* (2020) indicated that majority 67.50 per cent of the respondent had medium level of knowledge, followed by 26.67 per cent respondents had low level of knowledge, and remaining 5.83 per cent of respondents had high level of knowledge.

Singh *et.al.* (2019) revealed that majority (51.67%) of the litchi growers had medium level of knowledge of litchi cultivation while rest 48.33 per cent respondents had low level of continuum.

Prashanth *et.al.* (2018) indicated that about majority (55.83%) respondents have medium level knowledge regarding improved pomegranate practices followed by 23.33 per cent high level knowledge and 20.84 per cent low level knowledge respectively.

Yadav *et.al.* (2013) concluded that the 69.00 per cent of mandarin growers were having medium knowledge level, 20.00 per cent of farmers having high knowledge level and 11.00 per cent farmers having low knowledge level about improved production technology of mandarin cultivation.

Jadhav and Manjunath (2011) revealed that 39.33 per cent of the mango growers belonged to medium level of knowledge about recommended practices of mango cultivation, whereas, 34.00 per cent and 26.67 per cent of the mango growers belonged to high and low knowledge level, respectively.

Moulasab *et. al.* (2006) revealed that majority of the mango growers (72.50%) had medium level of knowledge with a mean knowledge score of 17.67, whereas 14.17 per cent and 13.33 per cent of them had low and high level of knowledge, respectively.

### **2.6.2 Extent of adoption of recommended litchi production technology**

Sawant *et. al.* (2019) found that the majority of the farmers (72.50%) were having moderate level of adoption, while only 12.50 per cent farmers had high levels of adoption and low adoption was noticed in 15.00 per cent farmers.

Das *et. al.* (2019) revealed that 39.58 per cent of the pineapple growers completely adopted the recommended practices of grading the pineapple fruits. Also 81.25 per cent of them did partially climate and soil adopted, whereas 97.92 per cent of the respondents did not adopt the practice like chemical induction of flowering, proper method of chemical application and pest and insect management practices and treating planting material.

RaghuPrasad *et. al.* (2018) observed that about 38.33 per cent of the farmers belonged to high adoption category followed by 31.67 per cent of the respondents

belong to low adoption category and 30.00 per cent of respondents belongs to medium adoption category.

Yadav *et. al.* (2013) reported that about 64.00% of farmers were found to be medium adopters, while 15.00% farmers were low adopters and 21.00% of farmers were high adopters, respectively.

Hasan (2006) reported that about three-fifths 63.00 per cent of the growers had medium adoption while 17.00 per cent had low adoption and 20.00 per cent had high adoption of improved practices in litchi cultivation.

## **2.7 Constraints**

Singh *et. al.* (2020) reported among the input constraints, unavailability of quality chemicals like plant growth regulator, water soluble fertilizer and plant protection chemicals at government sale centre got first rank with 77.27 per cent respondent, followed by unavailability of quality sapling of guava at Government nursery (73.64 per cent). Among the technological constraints, lack of knowledge about organic farming of guava got first rank with 91.82 per cent respondents followed by lack of knowledge about drip irrigation schedules (89.09 per cent). Among the socio- psychological constraints, lack of coordination among the beneficiary and state/district horticulture department got the first rank with 92.73 per cent respondents followed by inadequate extension activities conducted by state/district horticulture department (88.18 per cent). Among the marketing constraints, exploitation of guava growers by middlemen got first rank with 92.73 per cent respondents followed by lack of quality storage facility (87.27 per cent). Among the financial constraints, lack of government funding of loan and granting of subsidies got first rank with 94.55 per cent followed by high labour charges (92.73 per cent). Lack of knowledge about organic farming of guava was identified as major constraints in qualitative guava production.

Singh *et. al.* (2017) reported that the most of the orchardists lease out their orchards for two fruiting year and then after the management of orchard was done by contractors only. Once the orchardists gave the orchard to the contractor, they did not have any further say in the decision marking regarding orchard management. They showed that Unavailability of improved quality varieties material got second rank with 90.00 per cent responses in the whole study area 88.75 per cent

respondents were Testing laboratory are not available and Old traditional way of packaging materials 87.50 per cent, got rank third and fourth respectively. Another major problem lack of knowledge about application of chemical & fertilizers reported by more than 86.25 per cent orchardists and got fifth rank order followed by less number of trainers training centre about technical know-how awareness 85.00 per cent and Lack of confidence to adopt the new technological practices 83.75 per cent and got rank sixth and seventh respectively. Lack of quality storage facilities 73.75 per cent of the orchardists and got eighth rank. Involvement of middleman in marketing channels by 67.50 per cent and short self-life of ripen guava fruits was also reported to constraint by 63.75 per cent of the orchardists and got ninth and tenth rank order.

Thakur and Shirke (2016) revealed that regarding knowledge of the plant protection measures, major constraints faced by the mango growers were ‘lack of technical and scientific guidance regarding plant protection measures’ (90.48%), ‘lack of knowledge regarding quantity and concentrations of chemicals to be used’ (84.76%), whereas ‘lack of knowledge regarding identification of pests, their nature of damage, diseases and their symptoms’ was also important constraint faced by 78.10 per cent of the respondents. In case of constraints regarding plant protection chemicals and equipment’s, ‘unavailability of required insecticides and fungicides at village level’ was the most frequent constraint faced by 82.86 per cent of the respondents followed by ‘high cost of plant protection chemicals and equipment’s’ (69.52%), ‘unavailability of plant protection equipment’s on hire basis’ (65.71%) and ‘lack of facilities for repairing plant protection equipment’s at village level’ (61.90%). Other important constraints faced by the mango growers were ‘lack of finance’ (49.52%) and ‘sudden rainfall after spraying causes washing off plant protection chemicals’ (12.38%).

Bhat *et. al.* (2015) observed that many types of obstacles are arising in citrus cultivation. Such as financial constraints and lack of credit facilities, inadequate irrigation facilities, non-availability of good quality seedlings, farmyard manure, educated member of their family moved out and lack of latest technical knowledge. It was expressed by most of the farmers that the lack of processing unit and various committee was the major constraints in the marketing process as expressed by almost

all the respondents. Further, not getting remunerative price for the produce and un-organized marketing, paying farmers at low prices, low demand for fruits, lack of market knowledge and marketing frauds by middle man have come to the fore.

Manjula *et. al.* (2009) revealed that the majority of the farmers expressed that bacterial blight has affected the area (88.33%), that the insecticide, fungicide (81.66%) and liquid fertilizers (76.66%) are costly and timely supply of electricity (65.00%) were the problems coming in the way of production to greater extent. In case of marketing of fruits high transportation cost (78.33%), no guaranteed marketing (65.00%) and high rate of commission (48.33%) were the greater extent problems faced by the pomegranate farmers.

## **2.8 Suggestions**

Singh *et. al.* (2017) suggested better knowledge about guava as well as create awareness among farmers through training, meetings and demonstrations and through media to inform guava growers on various aspects of guava production technology.

Sivananth *et. al.* (2016) suggested that the supply of sufficient labour and machinery to regulate the harvesting of the guava crop and the supply of growth and maturity index chart. Mostly, promoting the use of growth regulators in pre and post-harvest weather treatments, regulate the timing and use of hygiene sprays and promote the use of chemicals and pre-cooling. Post-harvest commercialization, storage and delivery of the product to the consumer using a controlled environmental transport system. Giving the farmers the right to fix the price for the marketing of the produce, establishment of whole sale market for the crop, establishment of retail shop and local markets and by the government establishment of fruit and vegetable outlets and setting up of cold storage structures in crop specific areas.

Manjula *et. al.* (2009) suggested that continuous monitoring by scientists, supply of blight resistant pomegranate varieties, developing short duration farming, supplying quality antibiotics to farmers by the state, Horticulture Department and their guidance for adopting organic farming of pomegranate, to ensure good export and local market.

## CHAPTER III

# RESEARCH METHODOLOGY

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This chapter deals with descriptive study of research area, research design, the sampling techniques adopted and the sample size. In addition, it describes the method of data collection and its analysis as well as the statistical tool used to analyses the data collected. It also includes the challenges encountered in the course of data collection and analysis. In short research methodology is a detailed action plan of investigation and is presented under the following heads:

- 3.1 Location of the study area
- 3.2 Sampling techniques
  - 3.2.1 Selection of the blocks
  - 3.2.2 Selection of the villages
  - 3.2.3 Selection of the respondents
- 3.3 Collection of data
- 3.4 Selection of variables
- 3.5 Operationalization and measurement of independent variables
- 3.6 Operationalization and measurement of dependent variables
- 3.7 Problem faced by the litchi cultivators during the adoption of recommended litchi production technology.
- 3.8 Suggestions given by the litchi cultivators for overcome to the constraints.
- 3.9 Data processing and statistical framework used for analysis.

### **3.1 Location of the study area**

The present study was carried out during the year 2020-2021. The study was carried out At Jashpur district off Chhattisgarh. Jashpur district is located in the northern hill zone of the state, Its land-lock from Jharkhand and Odisha on the east. This Jashpur district comes under Surguja division of Chhattisgarh. It is located

between 22°17' and 23°15' north latitude and 83°30' and 84°24' east longitude. The district covers a total size of 6,205 square kilometers (620500 ha.).

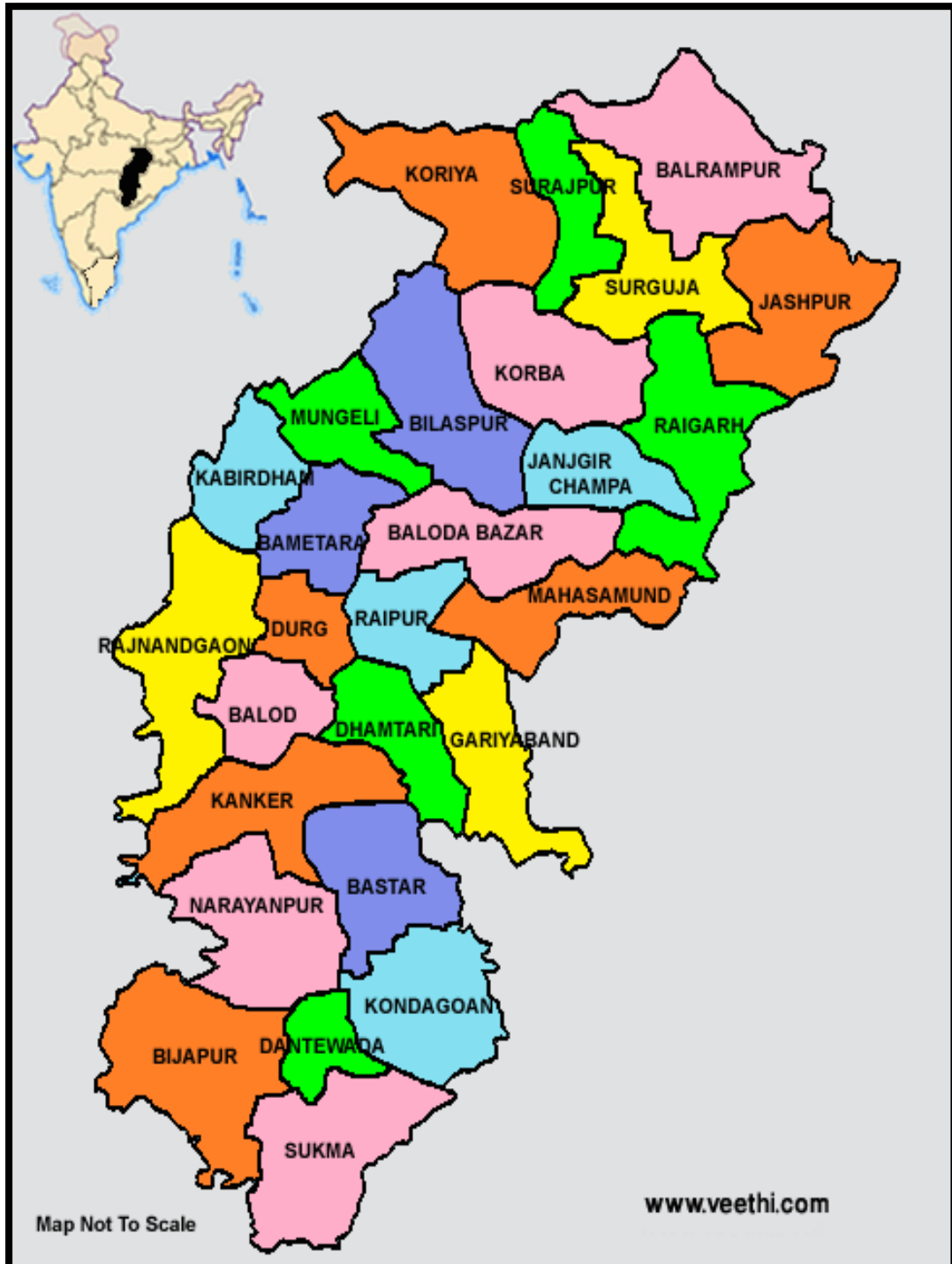


Fig. 3.1: Map of Chhattisgarh

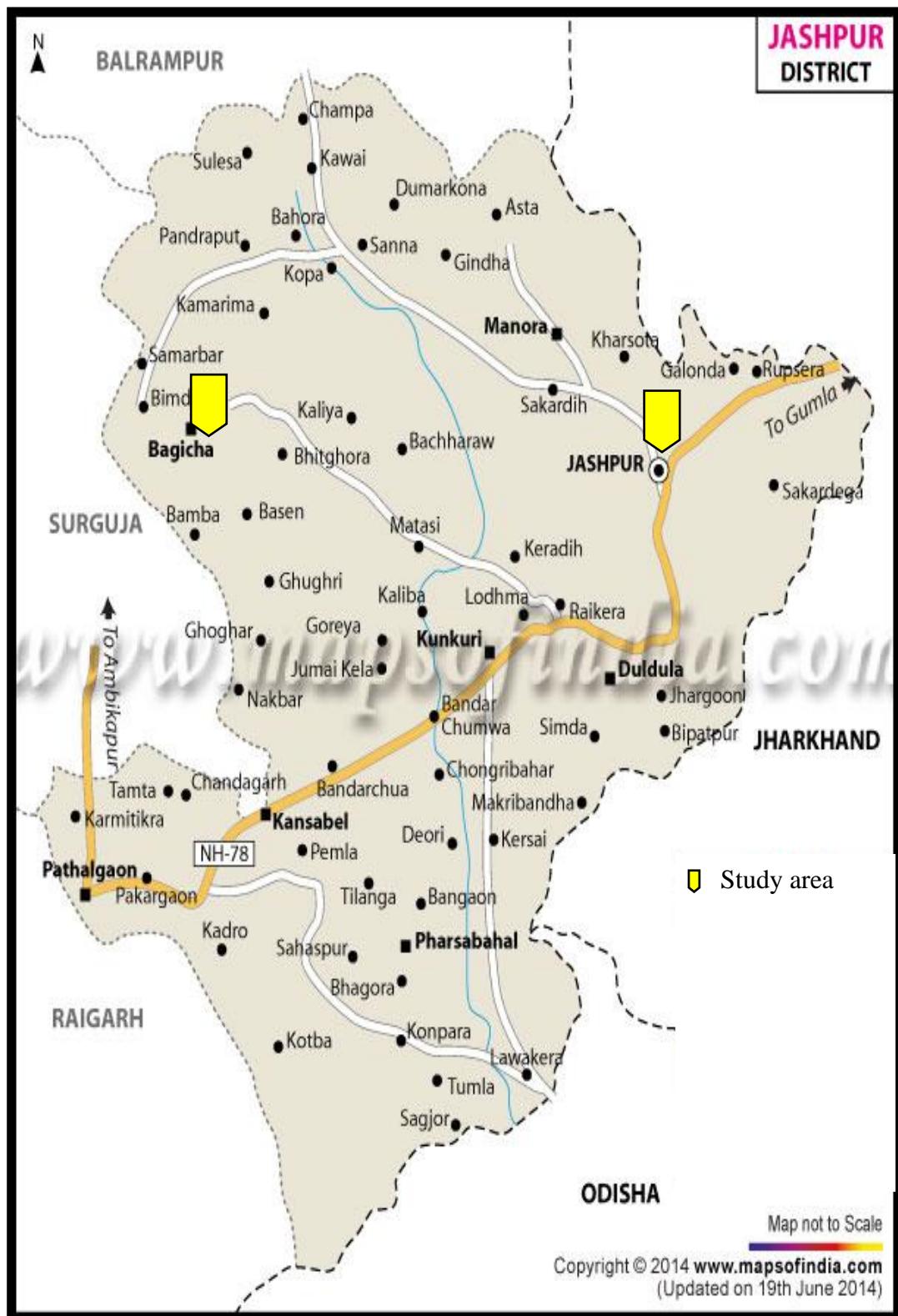


Fig. 3.2: Location map of the study area

## 3.2 Sampling techniques

### 3.2.1 Selection of the blocks

Jashpur district is mainly subdivided into eight blocks *i.e.*, Jashpur, Bagicha, Manora, Duldula, Kunkuri, Farsabahr, Kansabel and Pathalgaon. On the basis of maximum area of production only two blocks were selected for study *i.e.*, Jashpur and Bagicha.

### 3.2.2 Selection of the villages

Five village from each study block are randomly selected where maximum farmers were litchi growers.

### 3.2.3 Selection of the respondents

From each selected villages eighty litchi growers were selected randomly. In this way total of 80 (8 \* 10) litchi growers were selected for the investigation.

Table 3.1 Selection of blocks, villages and respondents

S. No.	Blocks	Villages	No. of respondent
1	Jashpur	Paiku	8
		Pidi	8
		Ameratoli	8
		Portenga	8
		Lokhandi	8
		Jhiki	8
2	Bagicha	Badupara	8
		Tatkela	8
		Bhitghara	8
		Raikera	8
Total	02	10	80

## 3.3 Collection of data

To get the necessary information from the litchi cultivators, it was necessary to interaction with the litchi cultivators and assess their experiences. The litchi cultivators were contacted at their homes and collected data by conducting personal interviews with them. Hesitation in sharing information by the litchi cultivators was

a major problem while interacting with them. Coordination was developed with the litchi growers to solve their problem and to get authentic information. The help from Sarpanch, Gram Panchayat member, Kisan Mitra and Rural Horticulture Extension Officer was taken.



Fig. 3.3: Interviewing with litchi farmers

### 3.4 Selection of variables

The variables were selected for the present study after extensive reviewing of literature available on the subject, consideration of the relevant previous researches undertaken, consultation with experts on the subject and discussions with the members of the advisory committee. Due care was taken to select only those variables with relevance to the research problem and found to play an important role on knowledge and adoption of recommended litchi production technology. The list of independent and dependent variables is given below:

Table 3.2: The list of independent and dependent variables:

S. No.	Variables	Measurement
A.	Independent Variables	
I.	Socio-personal characteristics	
1.	Age	Chronological age of the litchi cultivators.
2.	Education	Procedure mentioned by Bhairamkar <i>et.al.</i> (2011).
3.	Family size	Procedure followed by Saxena (2003).
4.	Litchi cultivation experiences	No. of years of experience.
5.	Social participation	Procedure followed by Dhruw (2008).
II.	Socio-economic characteristics	
1.	Occupation	Structured schedule was used.
2.	Land holding	Procedure mentioned by Bhairamkar <i>et.al.</i> (2011).
3.	Annual income of litchi growers	Actual net income in Rupees per year from litchi.
4.	Marketing process	Structured schedule was used.
III.	Communicational characteristics	
1.	Media utilization	Procedure mentioned by Bhairamkar <i>et. al.</i> (2011).
IV.	Socio-psychological characteristics	

1.	Cosmopolitaness	Procedure followed by Ravishankar (1979) was used with slight modification.
V. Other characteristics		
1.	Area under litchi cultivation	Structured schedule was used.
2.	Number of trees	Structured schedule was used.
3.	Size of orchard	Structured schedule was used.
4.	Age (Year) of orchard	Structured schedule was used.
B. Dependent Variable		
The knowledge and extent of adoption of recommended litchi production technology.		

### 3.5 Operationalization and measurement of independent variables

#### 3.5.1 Socio-personal characteristics of the litchi cultivators

##### 3.5.1.1 Age

The age of the litchi cultivators was recorded as per the information provided by them during the personal interview. The chronological order of the age of the litchi cultivators was applied for the analysis. The data was classified as follows:

Categories	Score
Young (up to 35 years)	1
Middle (36 to 55 years)	2
Old (above 55 years)	3

##### 3.5.1.2 Education

The ability to write and read acquired by the litchi cultivators was considered as their education status and was measured with the help of the education scale outlined by Bhairamkar *et.al.* (2011).

S. No.	Categories	Score
1.	Illiterate	0
2.	Can read only	1
3.	Can read and write	2
4.	Primary	3
5.	Middle	4
6.	High school	5
7.	Graduate	6

### 3.5.1.3 Family size

It refers to the total number of members of an individual family (both male and female) who live together under the same roof and have a common way of cooking and eating. Family size was classified as follows and the procedure adopted by Saxena (2003) was used in the analysis.

S. No.	Categories	Score
1.	Small (up to 4 members)	1
2.	Medium (5 to 8 members)	2
3.	Big (above 8 members)	3

### 3.5.1.4 Litchi cultivation experiences

Experience in litchi cultivation was measured in terms of litchi growing experience of individual farmer in years. The respondent's experience was categorized as follow and score was assigned as given below:

S. No.	Categories	Score
1.	Up to 7 years	1
2.	8 to 15 years	2
3.	Above 15 years	3

### 3.5.1.5 Social participation

Litchi producer's social activity may have an impact on their adoption decisions. Litchi producers may be able to learn more about new ideas and be driven to adopt them if they participate in social activities. In this study, the word "social participation" refers to the litchi grower's level of involvement in formal/informal groups as members, executive/office bearers, or both. On the basis of their membership (s) and position in various formal/informal groups, a social involvement score was calculated for each litchi grower. The social participation was characterised as follows, and the analysis followed Dhruw approach (2008).

S. No.	Categories	Score
1.	No member in any organization	0
2.	Member of one organization	1
3.	Member of more than one organization	2
4.	Office bearer in any organization	3

### 3.5.2 Socio-economic characteristics of the litchi cultivators

#### 3.5.2.1 Occupation

The occupations of litchi growers like agriculture, animal husbandry, service and other occupations etc. were included in this study. The types of occupations followed by litchi growers were classified for analysis in the following ways:

S. No.	Categories	Score
1.	Agriculture	1
2.	Agriculture + Animal Husbandry	2
3.	Agriculture + Labour	3
4.	Agriculture + Business	4
5.	Agriculture + service	5

#### 3.5.2.2 Land holding

It was operationally defined as the actual land holdings of the litchi cultivators at the time of investigation. It was measured with the help of land holding scale mentioned by Bhairamkar *et.al.* (2011).

S. No.	Land holding (ha)	Score
1.	Marginal (Up to 1.00 ha)	1
2.	Small (1.01 to 2.00 ha)	2
3.	Semi medium (2.01 to 4.00 ha)	3
4.	Medium (4.01 to 10.00 ha)	4
5.	Large (10.00 ha and above)	5

### 3.5.2.3 Annual income of litchi growers

Under this study, the litchi cultivators were given the following marks by categorizing the total annual income from litchi fruit crops into the following heads, which are mentioned below:

S. No.	Categories	Score
1.	Low (Less than 50,000 Rs.)	1
2.	Medium (50,001-1,00,000 Rs.)	2
3.	High (Above 1,00,000 Rs.)	3

### 3.5.2.4 Marketing process

The question was asked, how do they sell their produce in market and on the basis of those questions, their marketing process has been divided into the following categories.

S. No.	Categories	Score
1.	One level of marketing channel (Producer – Retailer – Consumer)	1
2.	Three level of marketing channel (Producer – Agent broker – Wholesaler – Retailer – Consumer)	2

## 3.5.3 Communicational characteristics of the litchi cultivators

### 3.5.3.1 Media utilization

This refers to the frequency of participation in agricultural fairs (Kisan mela) as well as the use of mobiles and agricultural magazines and other literature, leaflets, pamphlets, folders, etc.

Scale was mentioned by Bhairamkar *et.al.* (2011). Score is allotted to the litchi cultivators for receiving knowledge about agriculture and allied enterprises from each of the selected mass media. The score of the two for ‘regular’ receiving while one and zero for sometimes and never receiving information, respectively. Thus, cumulative score is obtained by summing up the scores by the respondent for all the mass media listed in the schedule.

S. No.	Media	Media utilization pattern		
		Regular	Sometimes	Never
1.	Mobile			
3.	Farm magazine			
4.	Kisan mela			

The mass media uses for all the litchi cultivators is worked out and they are classified into different categories namely, ‘low’, ‘medium’ and ‘high’ by using mean and standard deviation. For collecting details of mass media utilization following table were used.

Categories	Score
Low	( $<\bar{X} - S. D.$ )
Medium	(in between $\bar{X} \pm S. D.$ )
High	( $>\bar{X} + S. D.$ )

### 3.5.4 Psychological characteristics of the litchi cultivators

#### 3.5.4.1 Cosmopolitaness

Cosmopolitaness is the inclination and regularity with which an individual interacts with people from other communities, based on the assumption that all of an individual’s wants cannot be met inside their own group.

Litchi cultivators were asked to identify how much interaction they have with people outside their social structure through their own efforts in order to determine their cosmopolitaness. With minor modifications, the approach proposed by Ravishankar (1979) was applied to quantify this variable. The following was written down as the response:

Categories	Score
Nil (No contact)	0
Low (Once a month)	1
Medium (Twice a week)	2
High (Daily)	3

### 3.5.5 Other characteristics of the litchi cultivators

#### 3.5.5.1 Area under litchi cultivation

It referred to the extent of land holding put to litchi cultivation by a respondent.

S. No.	Categories	Score
1.	( $<\bar{X} - S. D.$ )	1
2.	(in between $\bar{X} \pm S. D.$ )	2
3.	( $>\bar{X} + S. D.$ )	3

#### 3.5.5.2 Number of trees

The number of trees growing by the litchi cultivators was categories and score was assigned the following manner.

S. No.	Categories	Score
1.	Less than 20 trees	1
2.	Between 20-40 trees	2
3.	Above 40 trees	3

#### 3.5.5.3 Size of orchard

It was operationally defined as the actual size of orchard at the time of investigation. The categorization of the litchi cultivators was done under the following heads:

S. No.	Categories	Score
1.	Less than 0.20 ha.	1
2.	Between 0.20-0.40 ha.	2
3.	More than 0.40 ha.	3

#### 3.5.5.4 Age (Year) of orchard

Farmers were asked about the age of their orchard which was actively defined as the year of the orchard. Litchi cultivators were classified under the following heads on the basis of the age of their orchard:

S. No.	Categories	Score
1.	Up to 8 years	1
2.	8-20 years	2
3.	Above 20 years	3

### 3.6 Operationalization and measurement of dependent variables

#### 3.6.1 Extent of knowledge

According to Rogers (1983), there are three forms of knowledge: awareness knowledge, how to knowledge, and principal knowledge. The current study focused on awareness knowledge, as well as the technical information that litchi cultivators had on recommended litchi production technology. A teacher-made knowledge scale was used to assess the same.

The knowledge test included packages of all practices related to litchi production. A set of questions was developed from the respective package of practices to be asked to the litchi growers which were then finalized after discussions with the major guide and advisory committee, and finalising total eleven question to be asked from the respondents.

A tool was developed to measure the knowledge level of farmers about selected recommended techniques for litchi crop. Knowledge index was used along with the use of a scale made by the teacher with some modifications. Respondent's responses regarding knowledge were obtained in a two-point continuum as follows:

S. No.	Categories	Score
1.	No knowledge	0
2.	Complete knowledge	1

The knowledge index was worked out as follows:

$$KI = \frac{\text{Sum of knowledge score actually obtained by the litchi cultivators}}{\text{Maximum possible knowledge score by the litchi cultivators}} \times 100$$

Further, the litchi cultivators were classified into three categories using the following formula:

$$K.I. = \text{Mean } (\bar{X}) \pm \text{S.D. (Standard Deviation)}$$

S. No.	Categories	Score
1.	Low	(< $\bar{X}$ - S. D.)
2.	Medium	(in between $\bar{X} \pm$ S. D.)
3.	High	(> $\bar{X}$ + S. D.)

### 3.6.2 Extent of adoption of recommended litchi production technology

It is mental process through which an individual passes from hearing about an innovation to final adoption. (Rogers, 1995)

It is circulated as the degree of use of recommended practices. Adoption refers to the extent to which litchi growers use the recommended agricultural practices of litchi cultivation. The recommended package of practices for higher production of litchi in litchi cultivation was measured keeping in mind the extent of adoption by the litchi cultivators.

To measure the extent of adoption, the list of recommended important practices was prepared and responses for each practice was obtained into two-point continuum as under:

S. No.	Categories	Score
1.	Not adopted	0
2.	Complete adopted	1

The extent of adoption in terms of selected litchi production technology employed was determined by the researcher. The following formula was used to divide the litchi cultivators into three groups:

$$AI = \frac{\text{Sum of adoption score actually obtained by the litchi cultivators}}{\text{Maximum possible obtained adoption score by the litchi cultivators}} \times 100$$

The litchi cultivators were also classified into three categories on the basis of mean and S. D. as given below:

A.I. = Mean ( $\bar{x}$ )  $\pm$  S.D. (Standard Deviation)

S. No.	Categories	Score
1.	Low	( $<\bar{X} - S. D.$ )
2.	Medium	(in between $\bar{X} \pm S. D.$ )
3.	High	( $>\bar{X} + S. D.$ )

### **3.7 Problem faced by the litchi cultivators in adoption of recommended litchi production technology**

A simple ranking technique was used to measure the problems faced by litchi farmers in adopting recommended litchi production technology. Each farmer was requested to list his problems in adopting recommended litchi production technology in order of degree of difficulty.

### **3.8 Suggestions given by the litchi cultivators for overcome to the constraints**

In response to the challenges faced by litchi cultivators in adopting litchi production technology and how to overcome those problems in successfully adopting litchi production technology, farmers were invited to provide important advice. The proposals were ranked by the number and percentage of farmers who expressed interest in them.

### **3.9 Data processing and statistical framework used for analysis**

The information gathered from the eighty litchi cultivators was tabulated in coding sheets, and the data was then processed and analyzed in accordance with the study's objectives. The statistics applied were percentage, mean, standard deviation and coefficient of correlation for measurement of "The extent of knowledge and adoption of recommended litchi production technology among the farmers".

#### **3.9.1 Frequency and percentage**

Simple comparisons were made using frequency and percentage. To calculate the percentage, the frequency of each category was multiplied by a hundred and divided by the total number of litchi growers in that category.

### 3.9.2 Mean and standard deviation

#### 1. Mean

The sample mean was determined by adding up all individual scores and dividing by the number of cases. The formula is as follows:

$$\bar{X} = \frac{\sum X}{N}$$

Where,

$\bar{X}$  = Mean of the litchi cultivators

$\sum X$  = Sum of total number of litchi cultivators

$N$  = Total number of litchi cultivators

#### 2. Standard deviation

Standard deviation was calculated by using following formula:

$$SD = \sqrt{\frac{\sum(X - \bar{X})^2}{N}}$$

Where,

S.D. = Standard deviation

$X$  = Deviation obtained from mean

$N$  = Number of observations

### 3.9.3 Pearson's Coefficient of correlation

It is a method of determining a link between two variables, using the following formula:

$$r = \frac{n \sum xy - \sum x \sum y}{\sqrt{n \sum x^2 - (\sum x)^2 \cdot n \sum y^2 - (\sum y)^2}}$$

Where,

r = Correlation coefficient

x = Score of independent variables

y = Score of dependent variables

n = Number of observations

### 3.9.4 Multiple regression

This method was used to determine the partial and total impact of independent variables. For the present study linear model of regression equation was used which is as follows:

$$Y_1 = a + b_1x_1 + b_2x_2 + \dots + b_nx_n$$

Where,

$Y_1$  = Dependent variable

$x_1 \dots x_n$  = Independent variables

a = Constant value

$b_1 \dots b_n$  = The regression coefficient for respective independent variables

# RESULTS AND DISCUSSION

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This chapter focuses on the data analysis and interpretation, including samples obtained from 80 litchi farmers using a structured interview schedule to assess their understanding and implementation of recommended litchi production technology. The data was analysed and presented with statistical analysis, reasoning, and conclusions. The findings were discussed in light of the study's aims and presented under the following headings:

- 4.1 Independent variables
  - 4.1.1 Socio-personal characteristics of the litchi cultivators
  - 4.1.2 Socio-economic characteristics of the litchi cultivators
  - 4.1.3 Communicational characteristics of the litchi cultivators
  - 4.1.4 Psychological characteristics of the litchi cultivators
  - 4.1.5 Other characteristics of the litchi cultivators
- 4.2 Dependent variable
  - 4.2.1 Extent of knowledge
  - 4.2.2 Extent of adoption of recommended litchi production technology.
- 4.3 Correlation analysis of independent variables with the extent of knowledge about recommended litchi production technology.
- 4.4 Multiple regression analysis of independent variables with knowledge of recommended litchi production technology.
- 4.5 Correlation analysis of independent variables with adoption of recommended litchi production technology.
- 4.6 Multiple regression analysis of independent variables with adoption of recommended litchi production technology.
- 4.7 Problem faced by the litchi cultivators during the adoption of recommended litchi production technology.
- 4.8 Suggestions as given by the litchi cultivators regarding adoption of litchi production technology.

## 4.1 Independent variables

### 4.1.1 Socio-personal characteristics of the litchi cultivators

#### 4.1.1.1 Age

Table 4.1: Distribution of the litchi cultivators according to their age (n=80)

Categories	Frequency	Percentage
Young (up to 35 years)	22	27.50
Middle (36 to 55 years)	31	38.75
Old (above 55 years)	27	33.75

According to the Table 4.1, the majority of litchi cultivators (38.75%) were in the medium age group (36 to 55 years), followed by 33.75 per cent in the old age group (above 55 years) and 27.50 per cent in the young age group (up to 35 years). As a result, the majority of litchi growers were in middle age group (35 to 55 years). Similar findings were also reported by Pargi (2012) and Singh (2000) that the middle age group of mango growers adopted improved mango and peach production technology.

#### 4.1.1.2 Education

Table 4.2: Distribution of the litchi cultivators according to their education (n=80)

Categories	Frequency	Percentage
Illiterate	7	8.75
Can read only	3	3.75
Can read and write	7	8.75
Primary	13	16.25
Middle	18	22.50
High school	24	30.00
Graduate	8	10.00

It could be observed from Table 4.2, out of 80 litchi cultivators, about 3.75 per cent farmers belonged to can read only category and 8.75 per cent farmers can read and write and same per cent of the litchi cultivators also belonged to Illiterate

category whereas 16.25, 22.50, 30.00 and 10.00 per cent farmers were educated up to primary school, middle school, high school and graduate level, respectively. Singh (2000) found almost identical results.

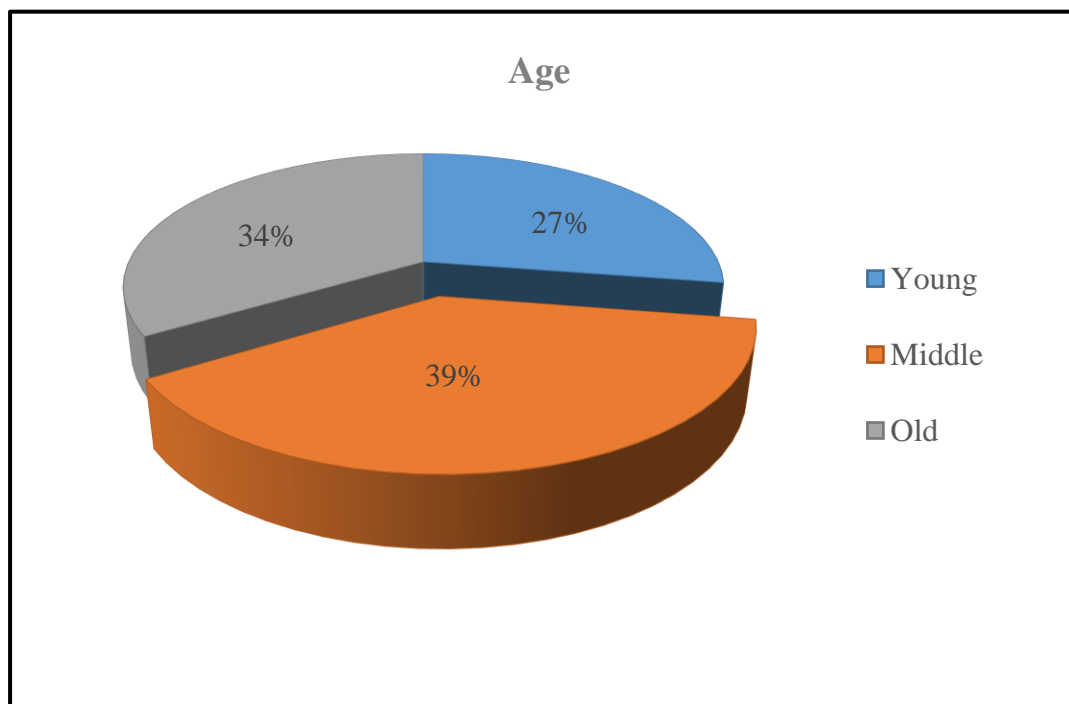


Fig. 4.1: Distribution of the litchi cultivators according to their age

#### 4.1.1.3 Family size

Table 4.3: Distribution of the litchi cultivators according to their family size  
(n=80)

Categories	Frequency	Percentage
Small (up to 4 members)	11	13.75
Medium (5 to 8 members)	46	57.50
Big (above 8 members)	23	28.75

The results also indicated that majority of the litchi cultivators (5 to 8 members) had a medium sized family 57.50 per cent whereas 28.75 and 13.75 per cent belonged to big size family (above 8 members) and small size family (up to 4 members) respectively. The findings as reported by Pargi (2012) and Katkar (2001) were found also in the similar way.

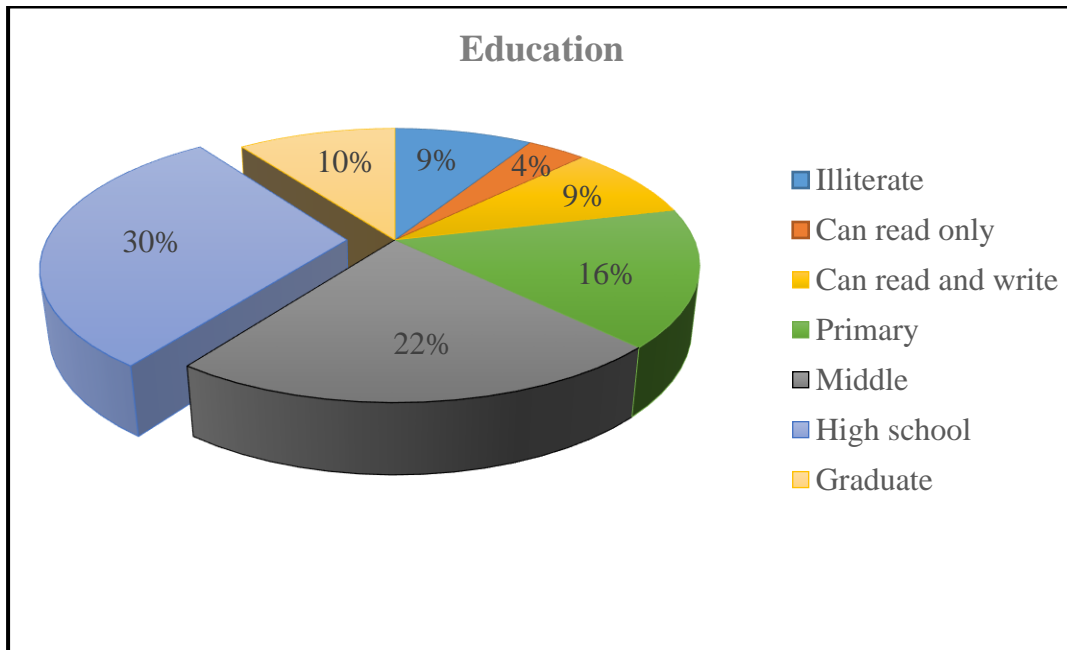


Fig. 4.2: Distribution of the litchi cultivators according to their education

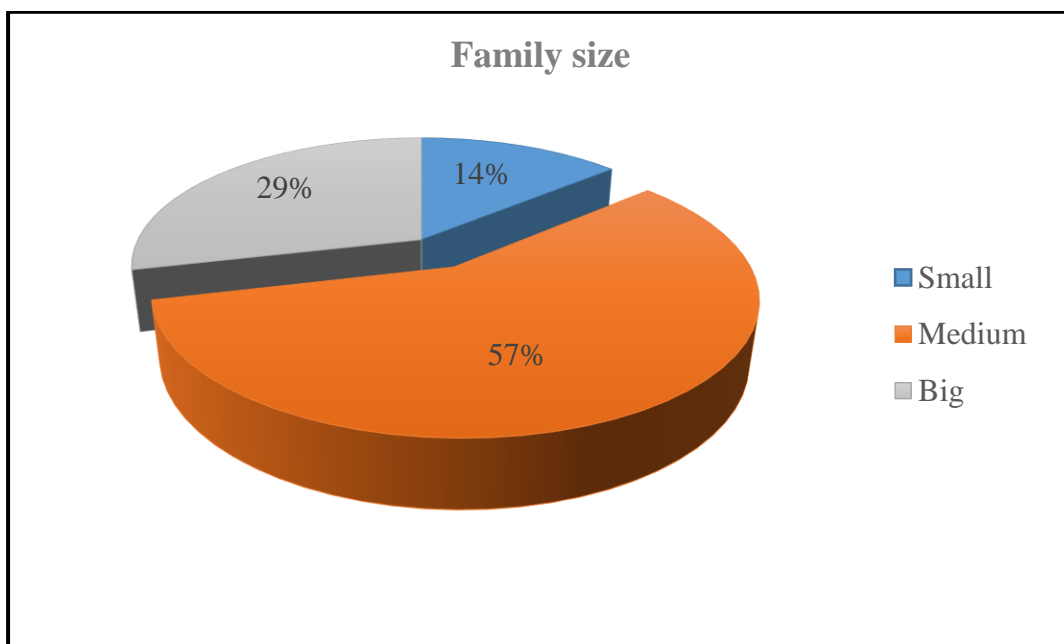


Fig. 4.3: Distribution of the litchi cultivators according to their family size

#### 4.1.1.4 Litchi cultivation experience

Table 4.4: Distribution of the litchi cultivators according to their litchi cultivation experience (n=80)

Categories	Frequency	Percentage
Up to 7 years	17	21.25
8 to 16 years	42	52.50
Above 16 years	21	26.25

Mean = 11.85, S.D. = 4.74

It revealed from Table 4.4, that 52.50 per cent of the litchi cultivators had experience of 8 to 16 years litchi cultivation experience, while 26.25 per cent litchi cultivators had above 16 years and 21.25 per cent had experience of up to 7 years.

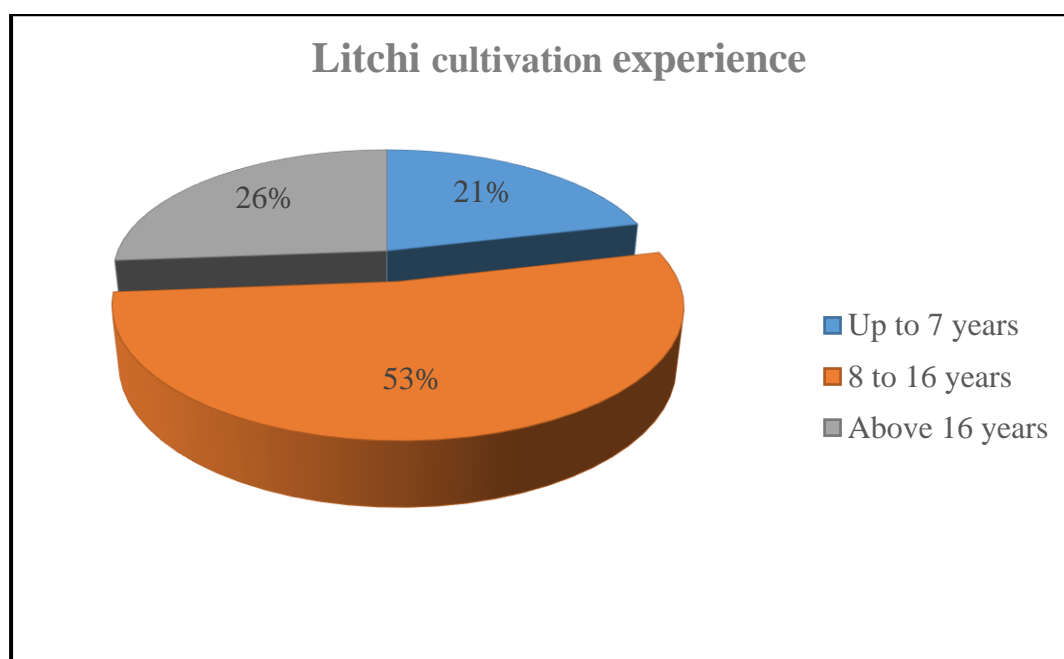


Fig. 4.4: Distribution of the litchi cultivators according to their litchi cultivation experience

#### 4.1.1.5 Social participation

Table 4.5: Distribution of the litchi cultivators according to their social participation (n=80)

Categories	Frequency	Percentage
No member in any organization	21	26.25
Member of one organization	39	48.75
Member of more than one organization	18	22.50
Office bearer in any organization	2	2.50

The social involvement indicator indicated how involved the respondent in social activities. In terms of social participation, the majority of litchi cultivators (48.75%) belong to just one organisation, while 22.50 per cent belong to many organisations. Only 2.50 per cent of litchi cultivators were in the executive / office bearer group, with 26.25 per cent of litchi cultivators having no membership in any organisation.

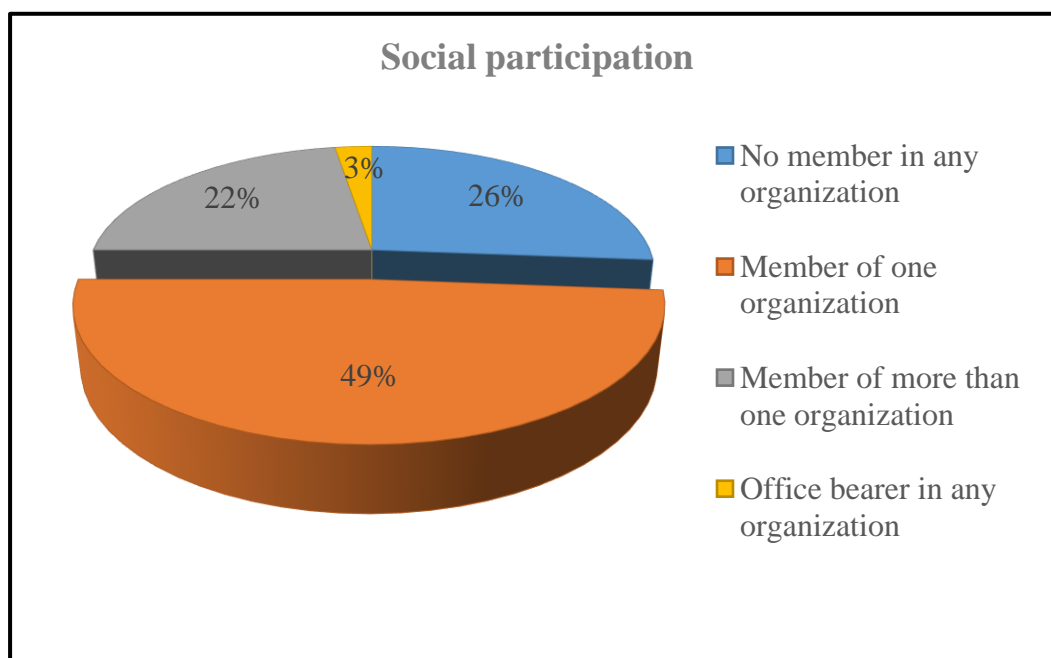


Fig. 4.5: Distribution of the litchi cultivators according to their social participation

#### 4.1.2 Socio-economic characteristics of the litchi cultivators

##### 4.1.2.1 Occupation:

The Table 4.6 depicted that 46.25 per cent of the litchi cultivator's dependent on agriculture followed by agriculture + business (20.00%), agriculture + Labour (13.75%), agriculture + service (11.25%), and agriculture + animal husbandry (8.75%), respectively. Similar finding were given by Raja (2015) who reported that the main occupation of agriculture.

Table 4.6: Distribution of the litchi cultivators according to their occupation (n=80)

Categories	Frequency	Percentage
Agriculture	37	46.25
Agriculture + Animal Husbandry	7	8.75
Agriculture + Labour	11	13.75
Agriculture + Business	16	20.00
Agriculture + service	9	11.25

##### 4.1.2.2 Land holding:

The data presented in Table 4.7, revealed that majority of the litchi cultivators (52.50 %) belonged to semi medium category, whereas 26.25 per cent, 15.00 per cent and 6.25 per cent litchi cultivators belonged to medium, small and marginal category of land holding, respectively.

Table 4.7: Distribution of the litchi cultivators according to their land holding (n=80)

Categories	Frequency	Percentage
Marginal (Up to 1.00 ha)	5	6.25
Small (1.01 to 2.00 ha)	12	15.00
Semi medium (2.01 to 4.00 ha)	42	52.50
Medium (4.01 to 10.00 ha)	21	26.25
Large (Above 10.00 ha)	0	0.00

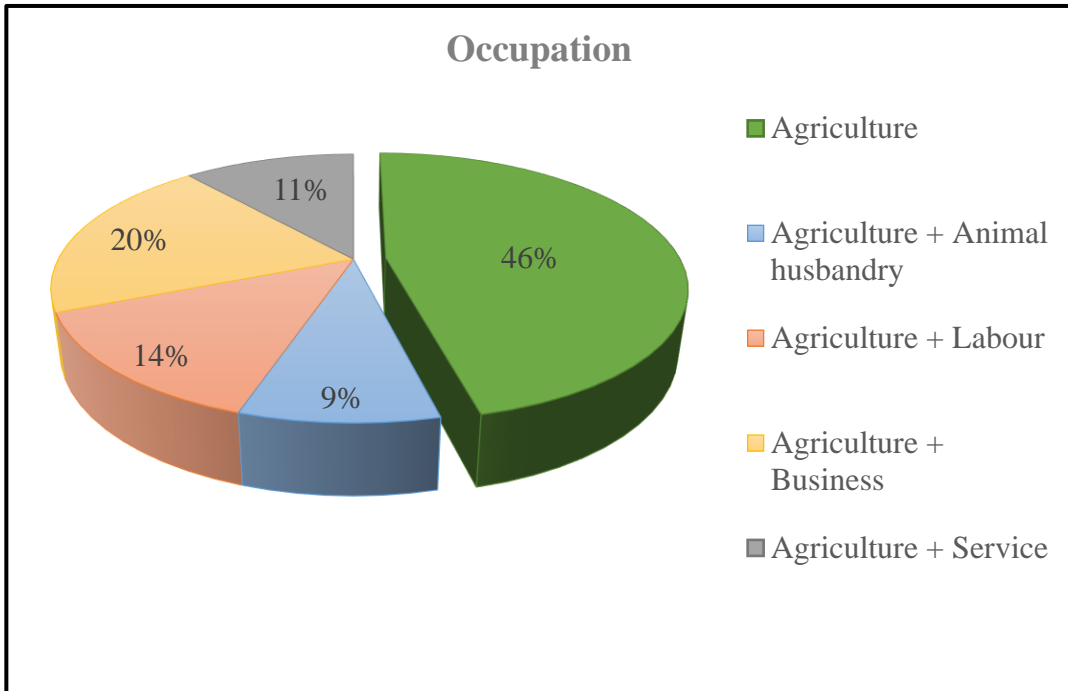


Fig. 4.6: Distribution of the litchi cultivators according to their occupation

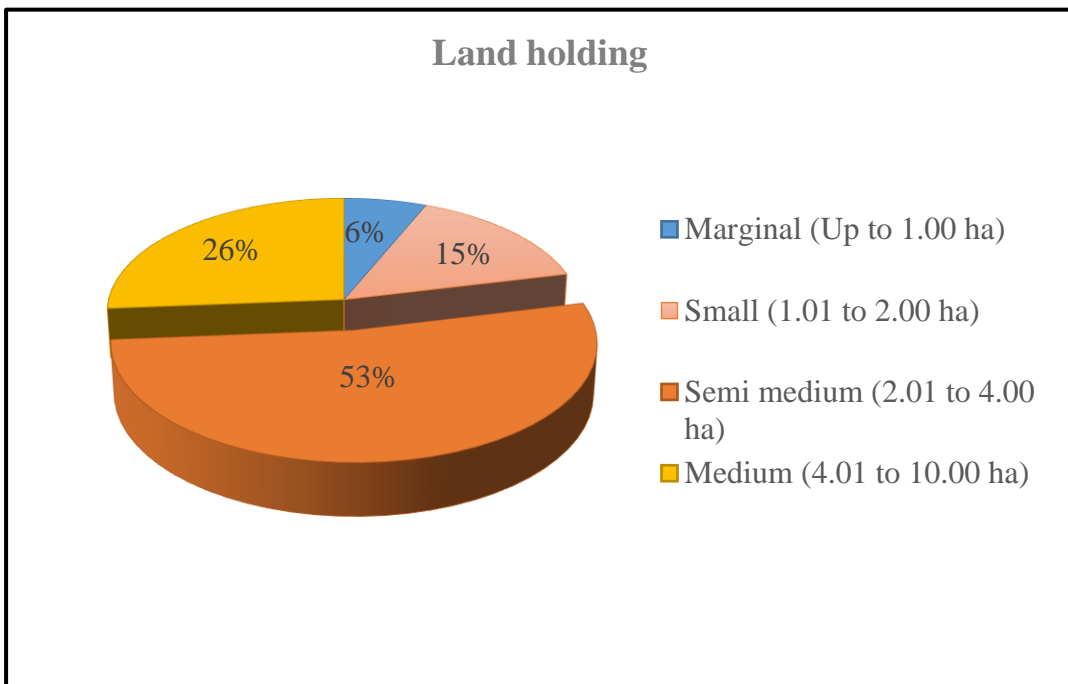


Fig. 4.7: Distribution of the litchi cultivators according to their land holding

#### 4.1.2.3 Annual income of litchi growers:

Table 4.8: Distribution of the litchi cultivators according to their annual income of litchi growers (n=80)

Categories	Frequency	Percentage
Low (Up to 50,000 Rs.)	29	36.25
Medium (50,001-1,00,000 Rs.)	32	40.00
High (More than 1,00,000 Rs.)	19	23.75

According to Table 4.8, 40.00 per cent of litchi cultivators claimed an annual revenue of Rs. 50,001-1,00,000 from their litchi fruit production, while 36.25 per cent reported an annual income of up to Rs. 50,000. The annual income of 23.75 per cent of litchi cultivators was more than Rs. 1,00,000. The data also showed that the majority of litchi cultivators get a moderate amount of money from their crop.

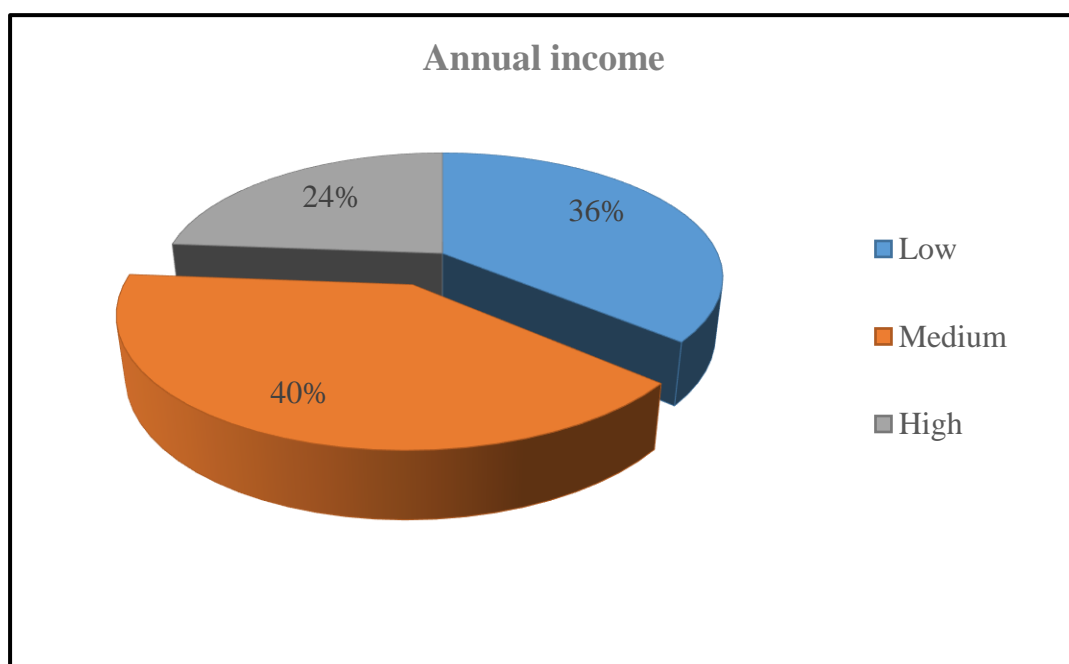


Fig. 4.8: Distribution of the litchi cultivators according to their annual income of litchi growers

#### 4.1.2.4 Marketing process:

Table 4.9, showed that majority (67.50%) of litchi cultivators sell litchi through three level of marketing channel (Producer – Agent broker – Wholesaler – Retails – Consumer), while 32.50 per cent farmers sell litchi fruit in one level of marketing channel (Producer – Retailer – Consumer). Sharma (2019) confirmed similar findings, stating that channel-B emerged as the most important route and that growers preferred to promote their produce through wholesalers rather than direct selling.

Table 4.9: Distribution of the litchi cultivators according to their marketing process  
(n=80)

Categories	Frequency	Percentage
One level of marketing channel (Producer – Retailer – Consumer)	26	32.50
Three level of marketing channel (Producer – Agent broker – Wholesaler – Retails – Consumer)	54	67.50

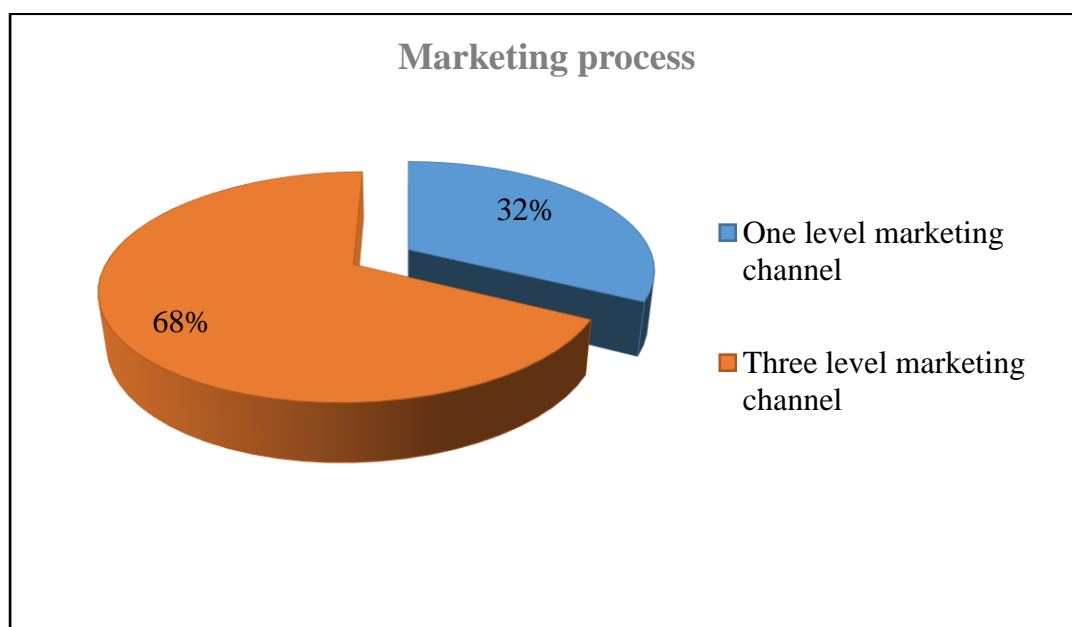


Fig. 4.9: Distribution of the litchi cultivators according to their marketing process

### 4.1.3 Communicational characteristics of the litchi cultivators

#### 4.1.3.1 Media utilization

Table 4.10: Pattern of utilization of the different medias (n=80)

Types of media	Pattern of utilization					
	Regular		Sometime		Never	
	No.	%	No.	%	No.	%
Mobile	22	27.50	18	22.50	40	50.00
Agricultural magazines	11	13.75	27	33.75	42	52.50
Kisan mela	30	37.50	28	35.00	22	27.50

To get information related to litchi by mobile, one has to use mobile application, YouTube, and various websites, which is possible through internet. Along with this, the farmer uses agricultural magazines, under which leaflets, pamphlets, etc., for information related to litchi. Apart from these, the respondent participates in Kisan Mela etc. for information.

The data presented in Table 4.10, indicated that the media utilization pattern among litchi farmers is as followed: Most (50.00 %) of the litchi producing farmers never use mobile for information related to litchi, while 27.50 per cent farmers use mobile on regular basis and 22.50 per cent farmers use mobile occasionally. Similarly, most farmers (52.50%) never use agricultural magazines for information related to litchi, while 33.75 per cent farmers occasionally and 13.75 per cent farmers use agricultural magazines on regular basis. Similarly, most (37.50%) farmers always participated in the Kisan Mela for information related to litchi, whereas 35.00 per cent of the farmers sometimes and 27.50 per cent of the farmers never participated in the Kisan Mela.

Table 4.11: Distribution of the litchi cultivators according to their media utilization (n=80)

Categories	Frequency	Percentage
Low (less than 2)	16	20.00
Medium (2-3)	46	57.50
High (Above 3)	18	22.50

Mean=2.49, S.D.=1.20

Table 4.11, revealed that maximum number of the litchi cultivators (57.50 %) had a moderate level of media use, followed by 22.50 and 20.00 per cent with a high and low level of media use, respectively. Singh (2006) also observed similar findings.

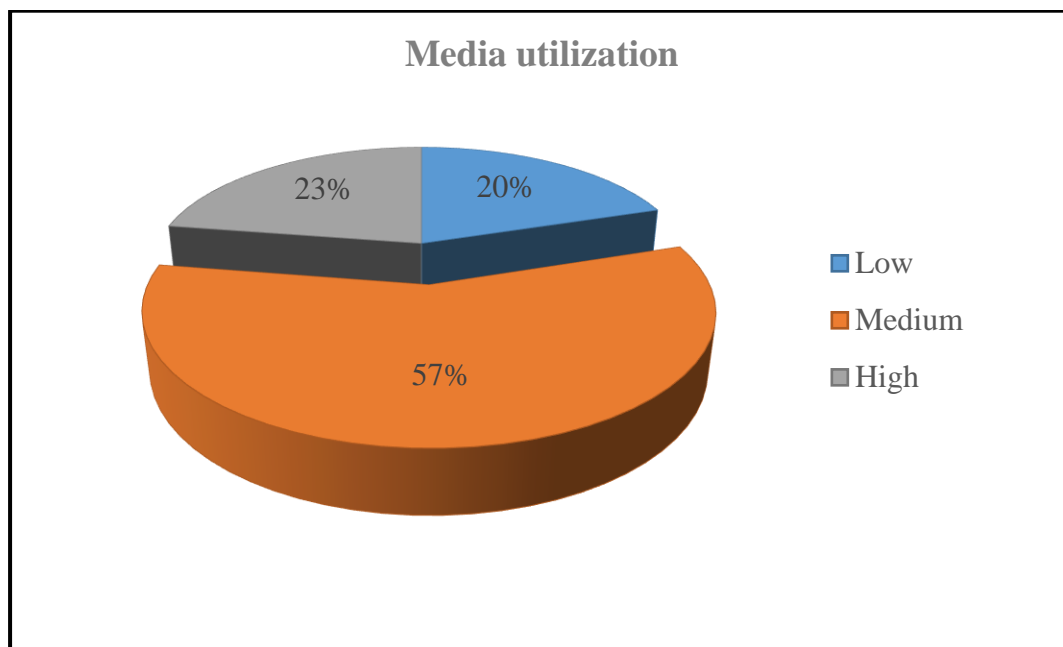


Fig. 4.10: Distribution of the litchi cultivators according to their media utilization

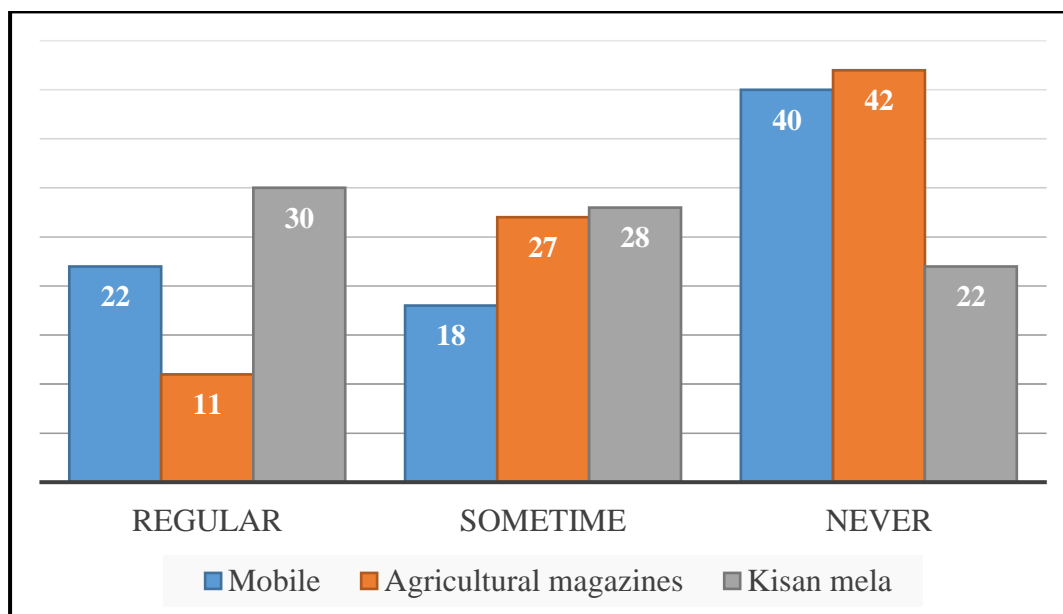


Fig. 4.11: Pattern of utilization of the different medias

#### 4.1.4 Psychological characteristics of the litchi cultivators

##### 4.1.4.1 Cosmopolitanism:

Table 4.12: Distribution of the litchi cultivators according to their cosmopolitanism

(n=80)

Categories	Frequency	Percentage
Nil (No contact)	8	10.00
Low (Once a month)	43	53.75
Medium (Twice a week)	17	21.25
High (Daily)	12	15.00

Table 4.12 depicted the results of the cosmopolitanism test. According to the findings, the majority of the litchi cultivators (53.75%) had low level of cosmopolitanism, while 21.25 per cent had medium cosmopolitanism. Only 10.00 per cent of litchi cultivators had no cosmopolitanism tendencies, whereas 15.00 per cent had a high cosmopolitanism level.

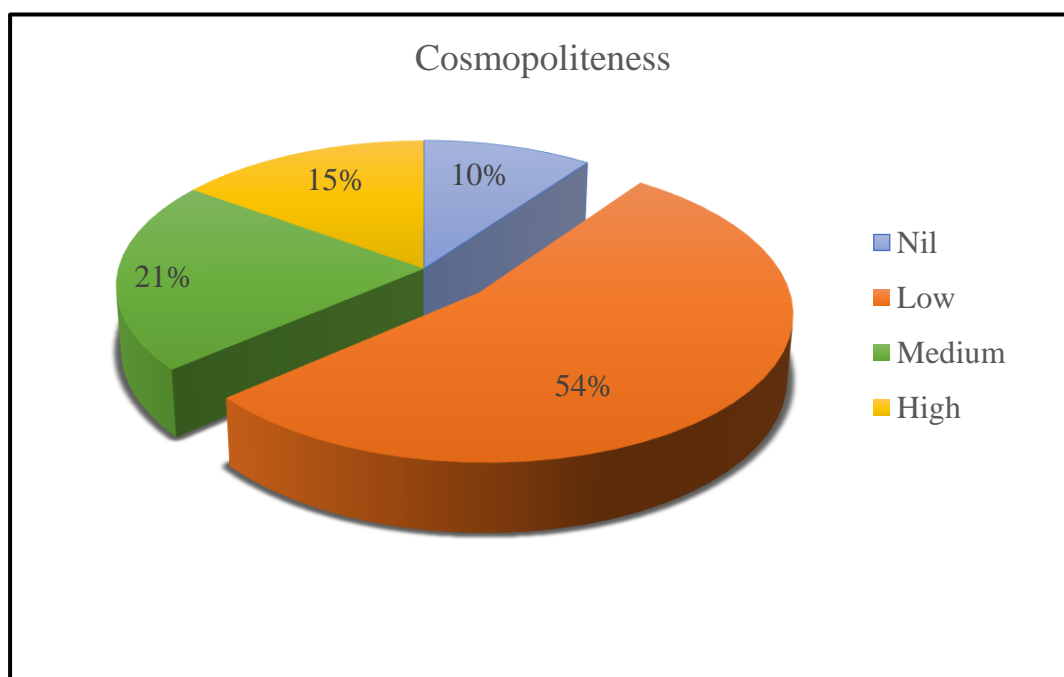


Fig. 4.12: Distribution of the litchi cultivators according to their cosmopolitanism

#### 4.1.5 Other characteristics of the litchi cultivators

##### 4.1.5.1 Area under litchi cultivation:

Table 4.13: Distribution of the litchi cultivators according to their area under litchi cultivation (n=80)

Categories	Frequency	Percentage
Less than 0.11 ha.	15	18.75
Between 0.11 – 0.34 ha.	50	62.50
More than 0.34 ha.	15	18.75

Mean = 0.22, S.D. = 0.11

Table 4.13, revealed that majority of the litchi cultivators (62.50%) were cultivating litchi in an area of 0.11 – 0.34 ha. While same per cent (18.75 %) of the litchi cultivators were cultivating litchi in an area of more than 0.34 ha. And less than 0.11 ha.

##### 4.1.5.2 Size of orchard:

Table 4.14: Distribution of the litchi cultivators according to their size of orchard (n=80)

Categories	Frequency	Percentage
Less than 0.20 ha.	31	38.75
Between 0.20 – 0.40 ha.	37	46.25
More than 0.40 ha.	12	15.00

Table 4.14, showed that 37 litchi cultivators, which is 46.25 per cent had an orchard size of about 0.20 – 0.40 ha. Also 31 litchi cultivators (38.75%) had orchard size up to 0.20 ha. And 12 litchi cultivators (15.00%) had orchard size more than 0.40 ha.

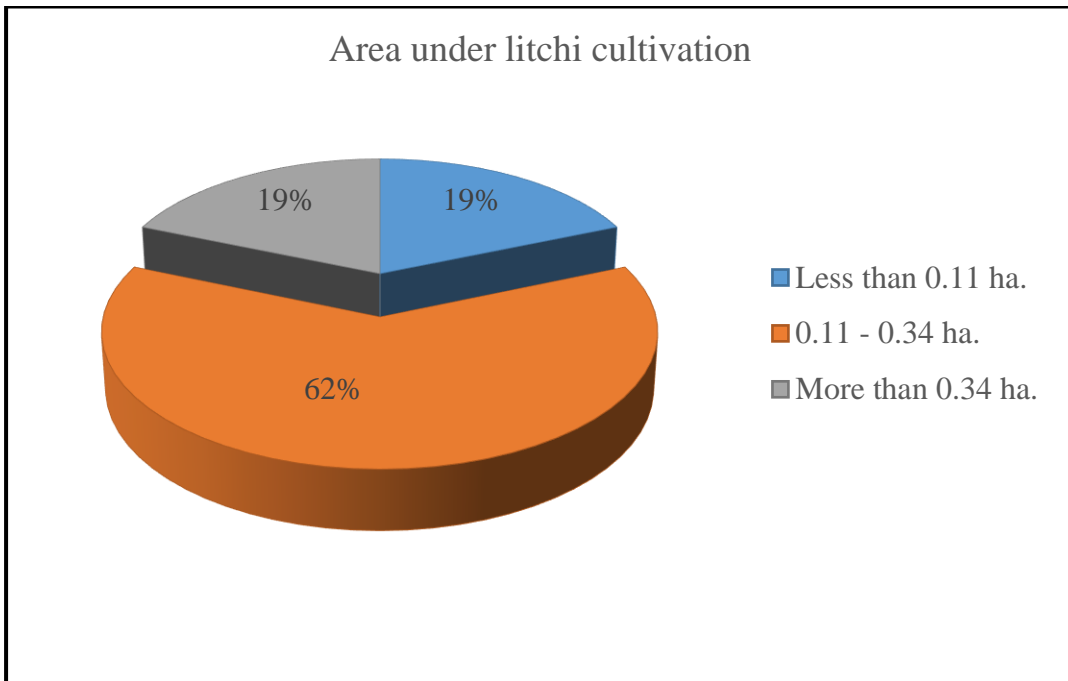


Fig. 4.13: Distribution of the litchi cultivators according to their area under litchi cultivation

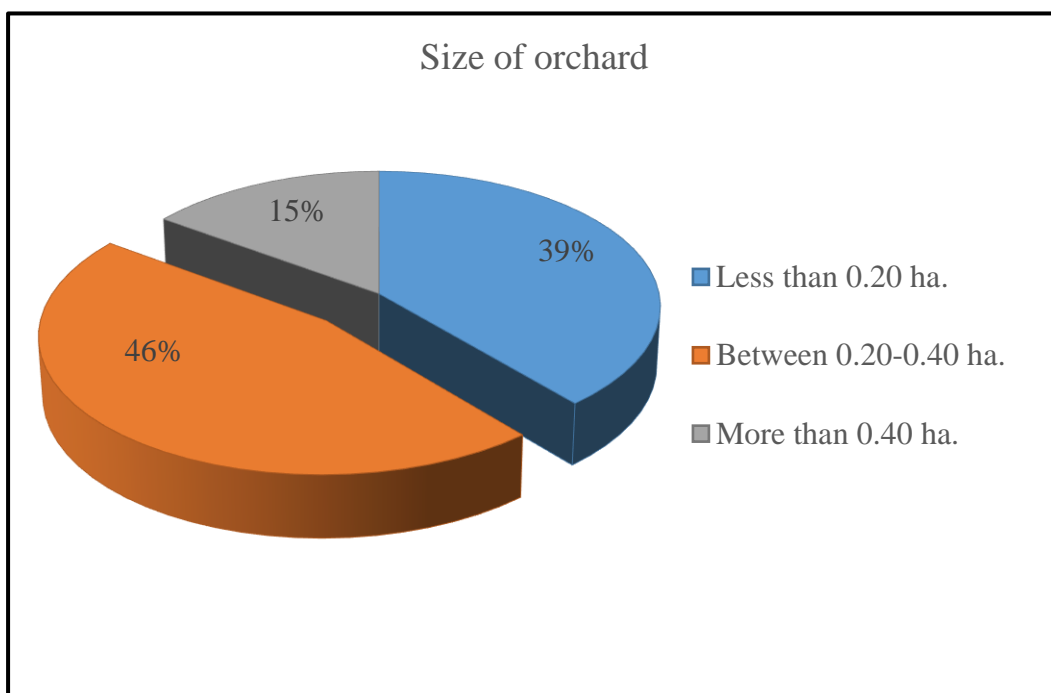


Fig. 4.14: Distribution of the litchi cultivators according to their size of orchard

#### 4.1.5.3 Number of trees:

Table 4.15: Distribution of the litchi cultivators according to their number of trees in given areas (n=80)

Categories	Frequency	Percentage
Less than 20 trees	34	42.50
Between 20-40 trees	36	45.00
Above 40 trees	10	12.50

It is observed from Table 4.15, that most of the litchi cultivators (45.00%) had 20-40 litchi trees while 42.50 per cent litchi cultivators had less than 20 litchi trees and 12.50 per cent litchi cultivators had more than 40 litchi trees.

#### 4.1.5.4 Age (Years) of orchard:

Table 4.16, revealed that majority of the litchi cultivators (61.25%) were had 8–20-year age of litchi orchard followed by more than 20 and approx. 8 years were had 22.50 per cent and 16.25 per cent, respectively.

Table 4.16: Distribution of the litchi cultivators according to their age (years) of orchard (n=80)

Categories	Frequency	Percentage
Up to 8 years	13	16.25
8-20 years	49	61.25
Above 20 years	18	22.50

Mean = 13.59, S.D. = 6.40

## 4.2 Dependent variable

### 4.2.1 knowledge level of recommended litchi production technology among the litchi cultivators.

The data presented in Table 4.17 revealed that most of the litchi growers were aware of certain aspects of litchi production technology *i.e.*, harvesting (100.00%), litchi variety (86.25%), spacing between two plants (78.75%), irrigation method (72.50%), pruning (53.75%), fertilizer application (52.50%), intercropping

and pest-control (48.75%), propagation (47.50%), irrigation time (45.00%) and disease-control (42.50%).

Table 4.17: Distribution of the litchi cultivators according to their practice wise level of knowledge regarding litchi cultivation (n=80)

S. No.	Litchi Cultivation Practices	Knowledge Level			
		YES		NO	
		Frequency	Percentage	Frequency	Percentage
1.	Litchi variety	69	86.25	11	13.75
2.	Spacing between two plants	63	78.75	17	21.25
3.	Propagation	38	47.50	42	52.50
4.	Intercropping	39	48.75	41	51.25
5.	Irrigation time	36	45.00	44	55.00
6.	Irrigation method	58	72.50	22	27.50
7.	Fertilizer application	42	52.50	38	47.50
8.	Pruning practices	43	53.75	37	46.25
9.	Insect-control	39	48.75	41	51.25
10.	Disease-control	34	42.50	46	57.50
11.	Harvesting	80	100.00	00	00.00

Whereas, majority of the respondents were had no knowledge regarding litchi production technology *i.e.*, disease-control (57.50%), irrigation time (55.00%), propagation (52.50%), intercropping and pest-control are same per cent (51.25%), fertilizer application (47.50%), pruning (46.25%), irrigation method (27.50%), spacing between two plants (21.25%) and litchi variety (13.75%).

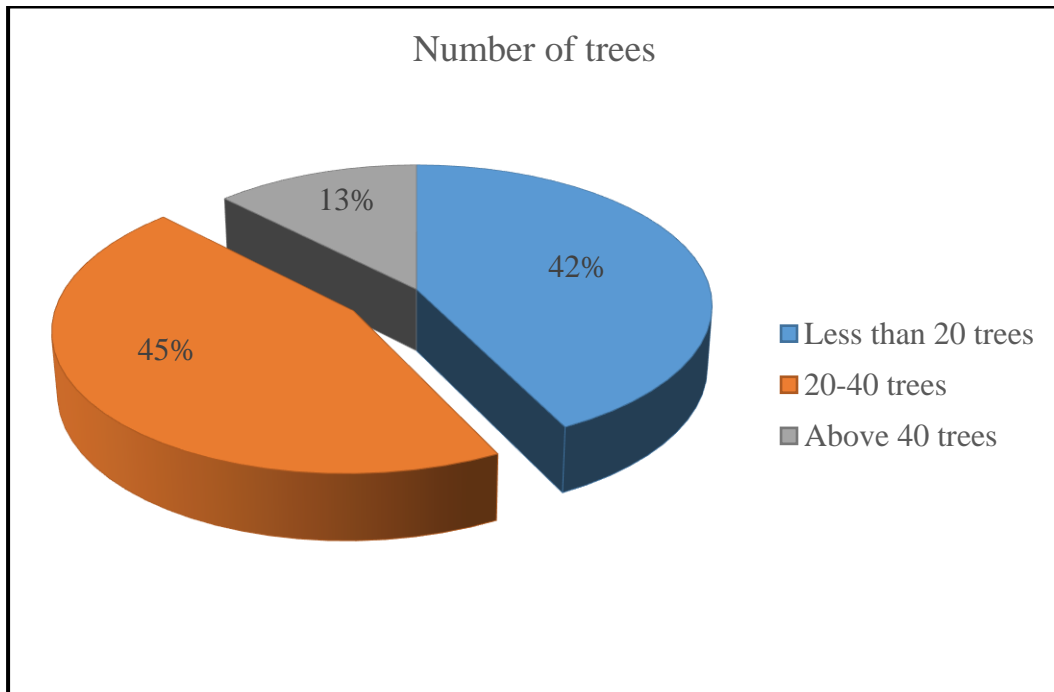


Fig. 4.15: Distribution of the litchi cultivators according to their number of trees in given areas

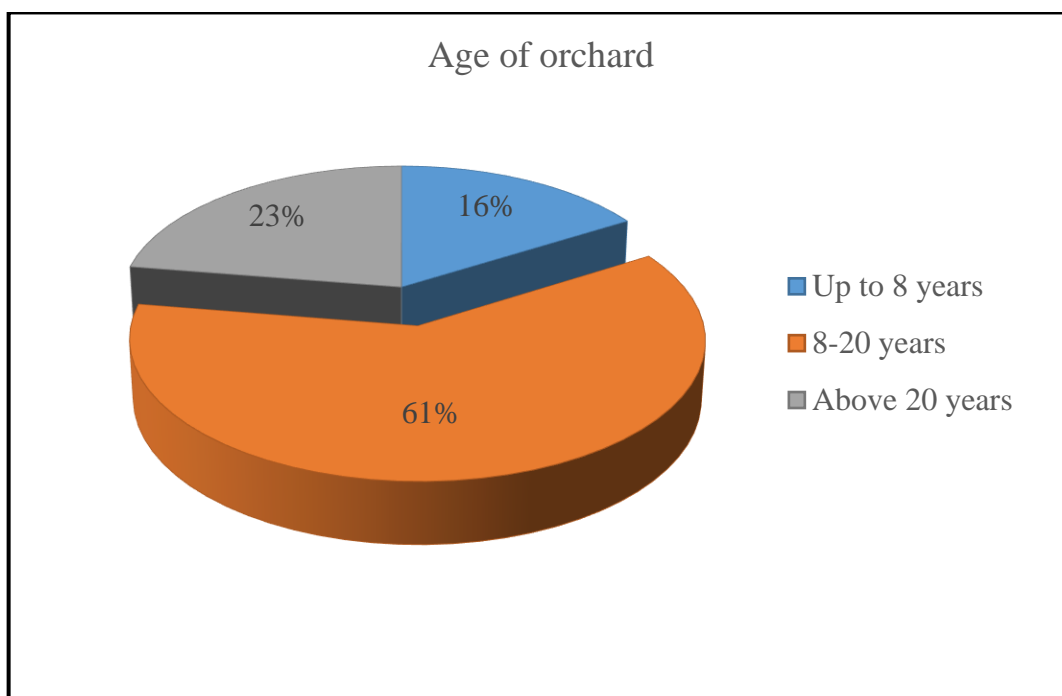


Fig. 4.16: Distribution of the litchi cultivators according to their age (years) of orchard

Table 4.18: Distribution of the litchi cultivators according to their overall knowledge level (n=80)

Categories	Frequency	Percentage
Low (Up to 5 score)	18	22.50
Medium (6 to 9 score)	49	61.25
High (Above 9 score)	13	16.25

Mean = 6.76, S.D. = 2.04

The data presented in Table 4.18 revealed that out of 80 litchi growers (61.25%) had a medium level of knowledge about the recommended litchi production technology. Whereas 22.50 per cent and 16.25 per cent of the litchi growers had low and high level of knowledge, respectively. Singh (2000), Katkar (2001) and Chavhan (2015) all found similar results.

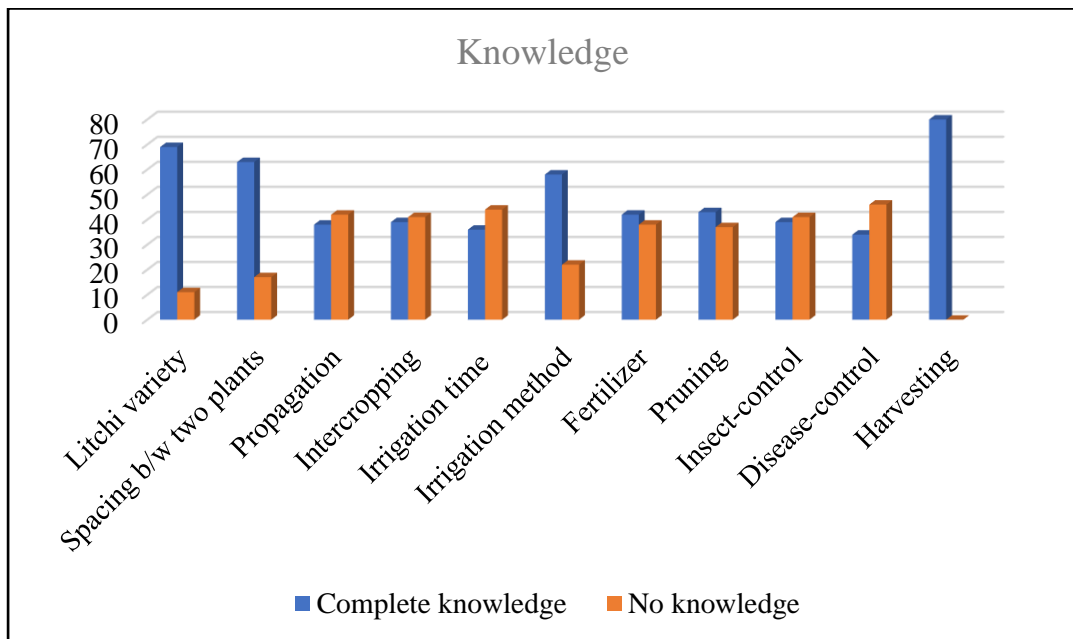


Fig. 4.17: Distribution of the litchi cultivators according to their practice wise level of knowledge regarding litchi cultivation

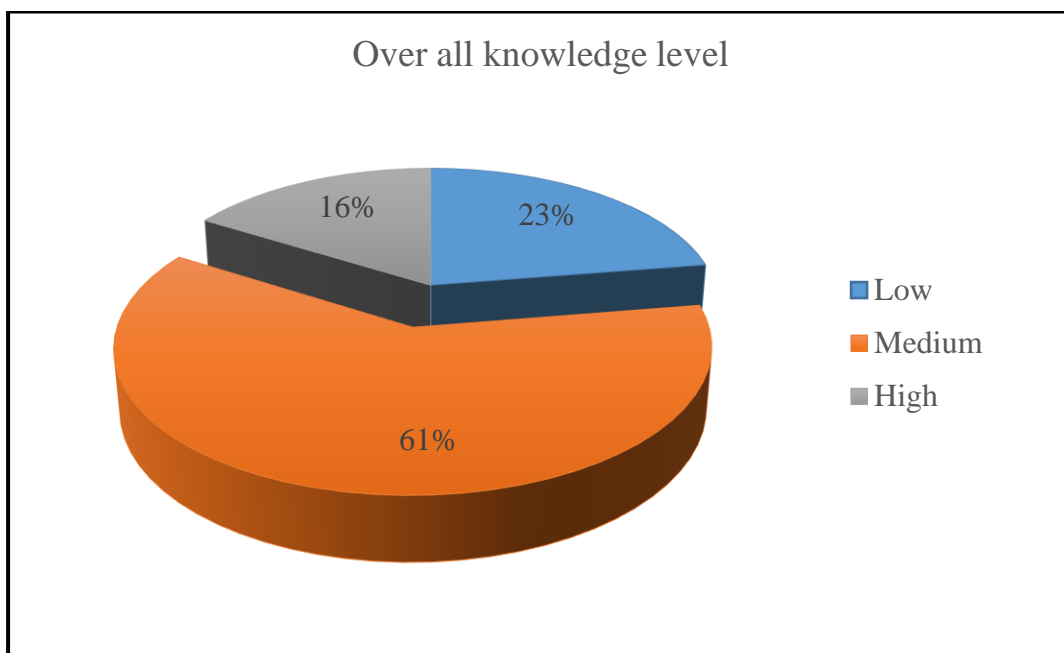


Fig. 4.18: Distribution of the litchi cultivators according to their overall knowledge level

#### 4.2.2 Extent of adoption of recommended litchi production technology.

The data presented in Table 4.19 indicated that most of the litchi growers (68.75%) had adopted the recommended varieties of litchi in their orchards. Only 31.25 per cent of them did not plant any recommended variety in their orchards. The improved practices of planting distance are 10m x 10m, but 36.25 per cent of litchi growers were not following this practice. 63.75 per cent of litchi growers complete adopted the recommended planting distance for litchi cultivation. Nearly 25.00 per cent of litchi growers had adopted improved method of propagation, while 75.00 per cent litchi growers did not adopt at all. Only 41.25 per cent of litchi growers were found to grow intercrops in their litchi orchards, depending upon the interspace available and the age of orchard. The crops grown were generally self-sustaining crop including peas, potato, okra, turmeric and some vegetables crops, out of them 58.75 per cent litchi growers did not adopt any inter-cropping practices.

It is observed from Table 4.19, about 32.50 per cent litchi cultivators had practiced the recommended practice of irrigation time in their orchards, but 67.50 per cent of the litchi cultivators did not adopt the recommended irrigation time due to non-availability of water at right time. Along with this, 43.75 per cent litchi

producing farmers had complete adopt the ring method of irrigation in the litchi plant, but 56.25 per cent of the litchi cultivators haven't adopt the recommended irrigation method. Majority 53.75 per cent of the litchi cultivators did not adopt regular use of fertilizer application whereas, 46.25 per cent of the litchi cultivators had complete used the fertilizer for litchi as per recommendation.

After harvesting, farmers adopt the practice of pruning where majority of the respondents (61.25%) did not adopt pruning techniques in their litchi orchard. Another 38.75 per cent respondents were found to adopt this pruning techniques in litchi orchards. Litchi mite, bark eaten caterpillar and fruit & seed borer are usually seen in this litchi orchards, but 36.25 per cent sample farmers completely adopting plant protection measures, while 63.75 per cent of them were not at all adopted any plant protection measures in their litchi orchards. Anthracnose, fruit rot, powdery mildew and leaf & twig blight were usually seen but only in a few plants in the litchi

Table 4.19: Distribution of the litchi cultivators according to their practice wise adoption level regarding litchi cultivation (n=80)

S. No.	Litchi Cultivation Practices	Adoption Level			
		YES		NO	
		Frequency	Percentage	Frequency	Percentage
1.	Litchi variety	55	68.75	25	31.25
2.	Spacing between two plants	51	63.75	29	36.25
3.	Propagation	20	25.00	60	75.00
4.	Intercropping	33	41.25	47	58.75
5.	Irrigation time	26	32.50	54	67.50
6.	Irrigation method	35	43.75	45	56.25
7.	Fertilizer application	37	46.25	43	53.75
8.	Pruning practices	31	38.75	49	61.25
9.	Insect-control	29	36.25	51	63.75
10.	Disease-control	27	33.75	53	66.25
11.	Harvesting	80	100.00	00	00.00

orchard. Only 33.75 per cent litchi growers were adopted plant protection measures, whereas 66.25 per cent litchi growers haven't adopt any plant protection measures for disease control in their orchards.

Change in fruit colour from green to pink along with smoothness of skin is indication of fruit maturity. While harvesting fruits are harvested in bunch which take little portion of leaves and branches. For local markets, harvesting should be done at ripening stage while for distance markets, harvest when they start to turn pink. Along with this, all the litchi growers (100.00%) had followed the harvesting time as per the accordance to maturity index.

Table 4.20: Distribution of the litchi cultivators according to their overall adoption level (n=80)

Categories	Frequency	Percentage
Low (Up to 4 score)	20	25.00
Medium (5 to 7 score)	51	63.75
High (Above 7 score)	9	11.25

Mean = 5.30, S.D. = 1.79

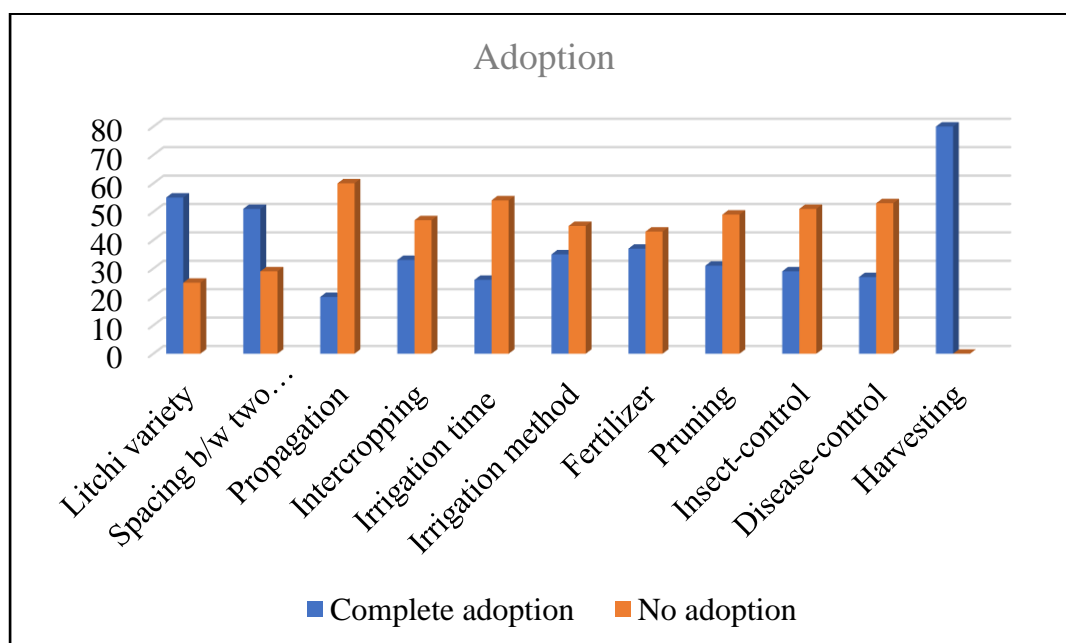


Fig. 4.19: Distribution of the litchi cultivators according to their practice wise adoption level regarding litchi cultivation

Table 4.20 showed that 63.75 per cent litchi growers had medium adoption level of recommended litchi production technology, whereas 25.00 per cent and 11.25 per cent had adopted low and high adoption level of recommended litchi production technology respectively. This observation is consistent with Singh's findings (2006).

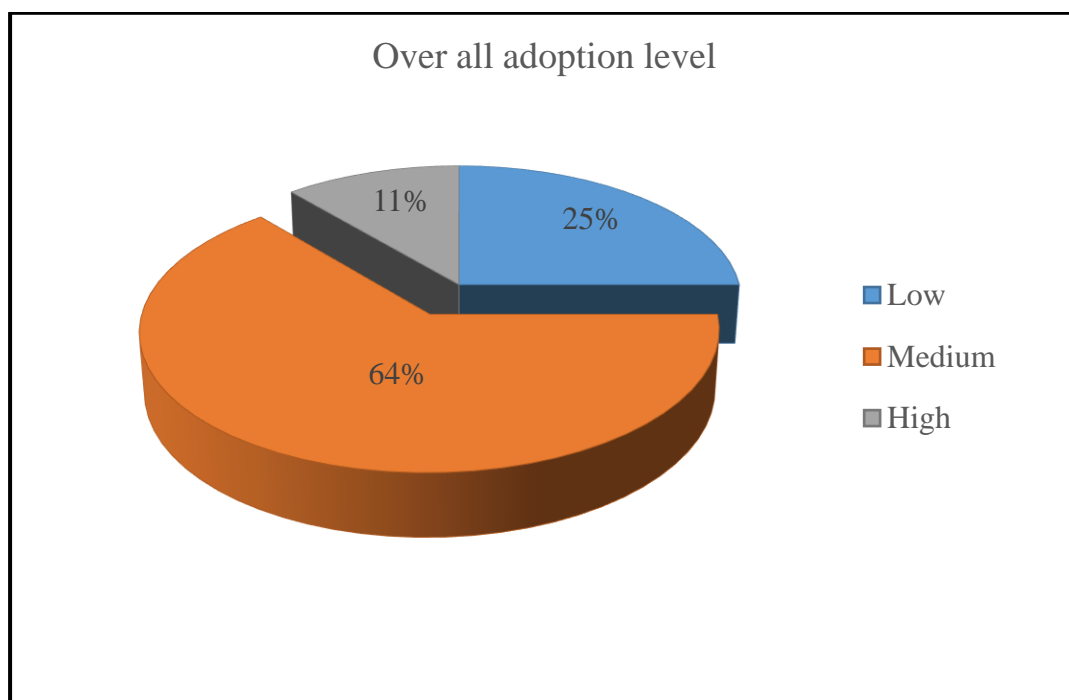


Fig. 4.20: Distribution of the litchi cultivators according to their overall adoption level

### **4.3 Correlation analysis of independent variables with the extent of knowledge about recommended litchi production technology.**

To determine the relationship between dependent and independent variables, correlation analysis was applied and results are presented in Table 4.21. Out of 15 selected independent variables, only five variables i.e., education, land holding, annual income of litchi growers, litchi cultivation experience and area under litchi cultivation were found positively and significantly correlated at 0.01 per cent level of probability with the extent of knowledge about litchi production technology.

Further it is also clear from the same table that number of trees, size of orchard, age (years) of orchard and media utilization was found positively and significantly association with the knowledge level at 0.05 per cent level of probability. On the other hand, the variables like age, family size, occupation, cosmopolitaness, social participation and marketing process had non-significant relationship with the level of knowledge of litchi cultivators.

Table 4.21: Correlation co-efficient between knowledge and independent variables of the litchi cultivators (n=80)

S. NO.	Independent variables	Correlation coefficient (r)
1.	Age	0.219 <sup>NS</sup>
2.	Education	0.300 <sup>**</sup>
3.	Family size	0.169 <sup>NS</sup>
4.	Land holding	0.301 <sup>**</sup>
5.	Occupation	0.193 <sup>NS</sup>
6.	Annual income of litchi growers	0.376 <sup>**</sup>
7.	Cosmopolitaness	0.156 <sup>NS</sup>
8.	Social participation	0.203 <sup>NS</sup>
9.	Litchi cultivation experience	0.361 <sup>**</sup>
10.	Area under litchi cultivation	0.287 <sup>**</sup>
11.	Number of trees	0.257 <sup>*</sup>
12.	Size of orchard	0.256 <sup>*</sup>
13.	Age (Years) of orchard	0.249 <sup>*</sup>
14.	Media utilization	0.286 <sup>*</sup>
15.	Marketing process	0.161 <sup>NS</sup>

\*\* -- Significance at 0.01 probability level

NS – Not significant

\* - Significant 0.05 probability level

#### 4.4 Multiple regression analysis of independent variables with knowledge of recommended litchi production technology.

All the fifteen independent variables fitted in the regression equation to determine the contribution of independent variable in the knowledge of litchi growing farmers about litchi production technology. Out of all independent variables, education, annual income of litchi fruit crops, litchi cultivation experience and media utilization showed the significant effect on the knowledge of litchi production technology.

Table 4.22: Regression co-efficient of selected independent variables and knowledge of the litchi cultivators (n=80)

S. NO.	Independent variables	Litchi cultivators (n=80)		
		Regression coefficient (b)	Std. error	't' value
1.	Age	0.012	0.014	0.856
2.	Education	0.227	0.114	1.996
3.	Family size	0.028	0.078	0.360
4.	Land holding	0.536*	0.244	2.196
5.	Occupation	0.080	0.129	0.618
6.	Annual income of litchi growers	0.432	0.264	1.634
7.	Cosmopoliteness	-0.020	0.229	-0.089
8.	Social participation	-0.009	0.272	-0.035
9.	Litchi cultivation experience	0.062	0.046	1.349
10.	Area under litchi cultivation	2.169	1.945	1.115
11.	Number of trees	0.013	0.019	0.693
12.	Size of orchard	4.212*	1.806	2.332
13.	Age (Years) of orchard	0.028	0.031	0.903
14.	Media utilization	0.270	0.169	1.594
15.	Marketing process	0.852	0.465	1.833

\*\* -- Significant at 0.01 probability level

$R^2 = 0.50$

\*- Significant at 0.05 probability level

NS—Non significant

#### 4.5 Correlation analysis of independent variables with adoption of recommended litchi production technology.

The correlation coefficient between litchi cultivators specified attributes and adoption of recommended litchi production technology among litchi growers was also calculated, and the results are provided in Table 4.23. The Table showed that at the 0.01 level of probability, all of the selected factors, namely education, annual income of litchi fruit growers, litchi cultivation experience, were discovered to have a strong and positive relationship with adoption.

Table 4.23: Correlation co-efficient between adoption and independent variables of the litchi cultivators (n=80)

S. NO.	Independent variables	Correlation coefficient (r)
1.	Age	0.223*
2.	Education	0.292**
3.	Family size	0.140 <sup>NS</sup>
4.	Land holding	0.262*
5.	Occupation	0.216 <sup>NS</sup>
6.	Annual income of litchi growers	0.331**
7.	Cosmopoliteness	0.131 <sup>NS</sup>
8.	Social participation	0.153 <sup>NS</sup>
9.	Litchi cultivation experience	0.379**
10.	Area under litchi cultivation	0.271*
11.	Number of trees	0.275*
12.	Size of orchard	0.261*
13.	Age (Years) of orchard	0.263*
14.	Media utilization	0.226*
15.	Marketing process	0.117 <sup>NS</sup>

\*\* -- Significance at 0.01 probability level

NS – Not significant

\* - Significant 0.05 probability level

Where, the variable like age, land holding, area under litchi cultivation, number of trees, size of orchard, age (years) of orchard, media utilization were found to be positively and significantly related with adoption at the 0.05 significant level.

The other variables *viz.* family size, occupation, cosmopolitaness, social participation and marketing process showed non-significant relation with extent of adoption of recommended production technology of litchi.

It can be concluded that the litchi cultivators had higher education, medium to high land holding, high annual income litchi growers, more experience, high area under litchi cultivation, more no. of trees, large size of orchard, age (years) of orchard, more media utilization, and more knowledge, increases the extent of adoption among the litchi cultivators.

#### **4.6 Multiple regression analysis of independent variables with adoption of recommended litchi production technology.**

Table 4.24 showed that the results of multiple regression analysis. Out of 15 independent variables, whereas education, annual income of litchi growers, litchi cultivation experience and media utilization were shown to be substantially associated with adoption at 0.05 per cent significant level. These variables have a significant 't' value, as evidenced by their significant 't' values. With the adoption of recommended litchi production method, all four variables – education, annual income of litchi growers, litchi cultivation experience and media utilization – showed 0.223, 0.518, 0.074, and 0.516 – unit changes, respectively.

Table 4.24: Regression co-efficient of selected independent variables and adoption of the litchi cultivators (n=80)

S. NO.	Independent variables	Litchi cultivators (n=80)		
		Regression coefficient (b)	Std. error	't' value
1.	Age	0.006	0.012	0.496
2.	Education	0.223*	0.108	2.062
3.	Family size	0.061	0.061	1.004
4.	Land holding	0.302	0.218	1.385
5.	Occupation	0.177	0.111	1.596
6.	Annual income of litchi growers	0.518*	0.218	2.381
7.	Cosmopolitaness	0.300	0.189	1.584
8.	Social participation	0.336	0.211	1.591
9.	Litchi cultivation experience	0.074*	0.036	2.049
10.	Area under litchi cultivation	0.296	1.560	0.190
11.	Number of trees	0.021	0.016	1.346
12.	Size of orchard	1.970	1.450	1.359
13.	Age (Years) of orchard	0.006	0.027	0.218
14.	Media utilization	0.516*	0.140	3.687
15.	Marketing process	0.178	0.348	0.512

\*\* -- Significant at 0.01 probability level

$R^2 = 0.521$

\*- Significant at 0.05 probability level

NS—Non significant

#### 4.7 Problems faced by litchi cultivators during the adoption of recommended litchi production technology.

Table 4.25: Distribution of the litchi cultivators according to their constraints as faced by them during the adoption of litchi production technology.

S. NO.	Problems	Frequency	Percentage	Rank
1.	Lack of cold storage	44	55.00	III
2.	Not getting appropriate price of produce	58	72.50	I
3.	Lack of processing units	19	23.75	VI
4.	High transportation cost	20	25.00	V
5.	Long distance market access	30	37.50	IV
6.	Non availability of information related to litchi production technology	47	58.75	II

The interviewees were asked about the challenges they had in adopted the recommended litchi production technology throughout the interview. According to the comments given by the litchi cultivators in Table 4.25, 72.50 per cent of the eighty litchi growers claimed that they were not getting a fair price for their goods, and 58.75 per cent of litchi cultivators reported that there was a lack of information on litchi production technology. It was also observed from Table 4.25, 55.00 per cent of litchi cultivators reported lack of cold storage.

It is further observed that 37.50 per cent of the litchi cultivators faced the problem that there is long distance market access to sell litchi fruit, while 25.00 per cent litchi cultivators also said that transportation cost is high due to long distance market access and 23.75 per cent litchi cultivators also said that there is a shortage of processing units.

#### 4.8 Suggestions as given by the litchi cultivators regarding adoption of litchi production technology.

Table 4.26: Distribution of the litchi cultivators according to their suggestions as given by the litchi cultivators for improving the adoption of litchi production technology.

S. No.	Suggestions	Frequency	Percentage	Rank
1	Proper marketing facilities should be available.	62	77.50	I
2	Efforts should be made for establishing value addition processing unit at least at the block level by the government.	25	31.25	V
3	The government should provide storage facilities especially to the litchi growers to facilitate marketing as litchi fruit is highly perishable in nature.	30	37.50	IV
4	Latest information know-how be provided to litchi growers through extension activities by the concerned departments.	43	53.75	III
5	All inputs used in cultivation of litchi crop should be available at timely and affordable price for getting maximum yield.	49	61.25	II

It is seen from the data in Table 4.26, that maximum 77.50 per cent litchi cultivators suggested that proper marketing facilities should be provided, followed by (61.25%) all inputs used in cultivation of litchi crop should be available at timely and affordable price for getting maximum yield, 53.75 per cent litchi cultivators suggested that the concerned departments should provide latest information to the litchi growers through extension activities, 37.50 per cent litchi cultivators suggested

that the government should provide storage facilities especially to the litchi growers to facilitate marketing as litchi fruit is highly perishable in nature and 31.25 per cent of the litchi cultivators suggested that the government should try to set up value addition processing units at least at the block level which should be adopted by the litchi cultivators in recommended litchi production technology.

### **SUMMARY AND CONCLUSION**

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The major goal of this chapter is to summarise the findings and draw conclusions based on the previous study, as well as to suggest some action implications.

The Litchi (*Litchi chinensis* Sonn.) belongs to the Sapindaceae family and it is called the “Queen of fruits”. Litchi was originated in near South China and North Vietnam in the year 1500 BC. Litchi fruits are mainly eaten in fresh form, many types of preserves such as jamaes, beverages (juice, nectar, carbonated drinks) and canned fruits are made from its fruits.

India is the second country in the world in terms of production, which produces large quantity of litchi after China. The area of litchi production in India is 95000 ha and 727000 MT as of 2018-19. Agro-climatically litchi can be successfully grown in the hilly area of northern Surguja. Also, it can be grown in Surguja, Jashpur, Surajpur, Balrampur district of Chhattisgarh. In Chhattisgarh Litchi occupies 7965 hectares of area with total production 55907 MT and productivity of 7 MT per hectares in 2019-20. The area of Litchi cultivation in Jashpur district is 1520 hectares and production are 6840 MT, respectively, with an average yield of 4.5 MT per hectare.

Useful studies have been done on various aspects of the techniques related to litchi production in different parts of the country. However, little work has been done to analyze the adoption of recommended litchi production technology in Jashpur district of Chhattisgarh. In view of the above facts, the present study titled **“A STUDY ON KNOWLEDGE & ADOPTION OF RECOMMENDED LITCHI PRODUCTION TECHNOLOGY AMONG THE FARMERS OF JASHPUR DISTRICT OF CHHATTISGARH”** was conducted during 2020-21 with following objectives:

1. To study the socio-economic profile of litchi cultivators
2. To study the information media utilization pattern of the respondents.
3. To find out the knowledge level of recommended litchi production technology among the litchi cultivators.

4. To determine the extent of adoption of recommended litchi production technology among the litchi cultivators.
5. To identify the problems faced by the litchi cultivators and obtain suggestions to overcome these problems.

## **Methodology**

This study was conducted during 2020-21 in two blocks of Jashpur district namely Jashpur and Bagicha of Chhattisgarh Northern Hill Region. Out of each of the selected blocks, five villages from each block were randomly selected for study. And then 8-8 litchi cultivators from each of these selected villages were selected by lottery method. In this way a total of 80 (10 x 8) litchi cultivators were selected. A structured interview schedule was used to acquire primary data from selected farmers. The data was analysed using statistical approaches such as mean, percent, standard deviation, correlation, and multiple regression, among others.

## **Major findings**

Under the following subheadings, the study's principal findings are summarised.

### **A. Independent variables**

#### **Socio-personal characteristics**

- The vast majority (38.75%) of the litchi cultivators were determined to be in the middle age group (36 to 55 years).
- The greatest number of litchi cultivators was discovered to be educated up to high school 30.00 per cent followed by 22.50 per cent of the litchi cultivators who educated up to middle school whereas 16.25 per cent litchi cultivators educated up to primary, 10.00 per cent respondent's graduate. People who are illiterate and who can read and write are 7 per cent. A negligible per cent of the litchi cultivators (3.00 %) were can read only.
- With regard to family size, the maximum number of litchi cultivators (57.50%) had a medium-sized household (5 to 8 members).

- The majority of litchi cultivators (48.75%) were members of only one organisation.
- The maximum (52.50%) number of the litchi cultivators had medium litchi cultivation experience.

#### **Socio-economic characteristics**

- The study revealed that majority (52.50%) of the litchi cultivators had semi-medium (2.01 to 4.00 ha) size of land holding.
- The main occupation of the litchi cultivators indicated that 46.25 per cent of the farmers were agriculture and was the means of livelihood.
- The maximum (40.00%) number of the litchi cultivators were had annual income of litchi fruit crops between Rs. 50,001 to 1,00,000.
- The maximum (67.50%) number of the litchi cultivators had selling litchi fruits through three level of marketing channel (Producer – Agent broker – Wholesaler – Retailer – Consumer).

#### **Communicational characteristics**

- The majority of litchi cultivators (57.50 percent) used media in a moderate way.
- The majority (38.75%) of the litchi cultivators were used in mobile as a media on the regular basis, regarding majority (35.00%) of the litchi cultivators were participated in kisan mela on sometime and majority (52.50%) of the litchi cultivators had no used in agricultural magazines as a media.

#### **Psychological characteristics**

- The majority of litchi cultivators (53.75%) reported a low level of cosmopolitaness.

#### **Other characteristics**

- The majority (62.50%) of the litchi cultivators had litchi cultivation under area 0.11- 0.34 ha.
- The maximum (45.00%) number of the litchi cultivators had 20 to 40 litchi trees.

- The majority (46.25%) of the litchi cultivators had 0.20 to 0.40 ha. Size of litchi orchard.
- The majority (61.25%) of the litchi cultivators had 8 to 20 years old litchi orchard.

#### **B. Dependent variables**

- According to the findings, the majority of litchi cultivators (61.25%) had a medium knowledge level of the recommended litchi production technology.
- On the basis of analysis of practice-wise knowledge, it was found that the litchi cultivators had full knowledge about litchi variety (86.25%), spacing between two plants (78.75%), propagation (47.50%), intercropping (48.75%), irrigation time (45.00%), irrigation method (72.50%), fertilizer application (52.50%), pruning (53.75%), insect-control (48.75%), disease-control (42.50%) and harvesting (100.00%).
- The results showed that maximum (63.75%) number of the litchi cultivators had medium level of adoption of the recommended litchi production technology.
- In case of practice-wise adoption, it is indicated that the number of the litchi cultivators had adopted regarding litchi variety (68.75%), spacing between two plants (63.75%), propagation (25.00%), intercropping (41.25%), irrigation time (32.50%), irrigation method (43.75%), fertilizer application (46.25%), pruning (38.75%), insect-control (36.25%), disease-control (33.75%), and harvesting (100.00%).

#### **Correlation and multiple regression analysis**

- The coefficient of correlation between education, land holding, annual income of litchi growers, litchi cultivation experience and area under litchi cultivation were found to be positive and highly significant whereas number of trees, size of orchard, age (years) of orchard and media utilization were found to be positively significant with extent of knowledge. The remaining variables were found non-significant.

- Out of fifteen independent variables, whereas education, annual income of litchi growers, litchi cultivation experience and media utilization showed the significant effect on the knowledge of litchi production technology.
- The coefficient of correlation between education, annual income of litchi fruit crops and litchi cultivation experience were found to be positive and highly significant whereas age, land holding, area under litchi cultivation, number of trees, size of orchard, age (years) of orchard and media utilization were found to be positively significant with extent of adoption. The remaining variables were found non-significant.
- Out of 15 independent variables, whereas education, annual income of litchi growers, litchi cultivation experience and media utilisation were found to be positively and significant at the 0.05 level of significance. The remaining variables were found to have no relevance on the amount to which the recommended litchi production technology was adopted.

### **Constraints**

The barriers identified by litchi growers in adopting the recommended litchi production technique are significant; the majority of litchi cultivators (72.50%) reported not receiving a fair price for their produce, followed by a lack of understanding about litchi production technology (58.75%), lack of cold storage (55.00%), long distance market access (37.50%), high transportation cost (25.00%) and lack of processing unit (23.75%) are the important constraints faced by the litchi cultivators in adopted recommended litchi production technology.

### **Suggestions**

The litchi farmers' main proposals for resolving the challenges they were having were as follows: Proper marketing facilities should be available (77.50%), followed by all inputs used in cultivation of litchi crop should be available at timely and affordable price for getting maximum yield (61.25%), latest information know-how be provided to litchi growers through extension activities by the concerned departments (53.75%), the government should provide storage facilities (37.50%)

and efforts should be made for establishing value addition processing unit at least at the block level by the government (31.25%).

## **Conclusion**

Any production technology requires knowledge in order to be adopted. In this study, knowledge was measured in terms of an individual's actual knowledge of recommended litchi production technology, which has a direct impact on the farmer's adoption behaviour. According to the results of the study, the majority of the litchi cultivators (61.25%) had a medium level of knowledge about recommended litchi production technology, but only 25.00 per cent of them were able to transfer that knowledge to the field condition completely, and the rest fell into the low-level category of adoption. The variables *viz.* education, annual income of litchi fruit crops and litchi cultivation experience were found highly significant relationship with extent of adoption level of recommended litchi production technology and the variables *viz.* age, land holding, area under litchi cultivation, number of trees, size of orchard, year of orchard and media utilization were found 0.05 significant level associated with extent of adoption level of recommended litchi production technology.

Similarly, some variables *viz.* education, annual income of litchi fruit crops, litchi cultivation experience and media utilization were found 0.05 significant level associated with extent of adoption of recommended litchi production technology.

The major constraints faced by litchi cultivators were, not getting appropriate price of produce, non-availability of information related to litchi production technology, high transportation cost, long distance market access, no storage facilities and fruit spoilage due to seasonal defect of litchi. Among all "not getting appropriate price of produce" is the major constraints faced by the litchi cultivators owing to uncertainty of market price and lack of demand in this area.

The majority of litchi cultivators suggested that proper marketing facilities, storage facilities, the establishment of value-added processing units at the block level, and easy access to agricultural information for improving their knowledge, skills, and level of adoption of recommended litchi production technology should be provided.

### **Suggestions for future works**

1. The present study is confined to only one major fruit crop i.e., litchi. Similar studies can be done on other important fruit crops.
2. Only a few selected features of litchi farmers were considered in this study in order to determine their link with knowledge and adoption status. Other variables that are likely to affect the dependent variables may be investigated as well.
3. The present investigation was conducted in Jashpur district of Chhattisgarh. Similar studies may be under taken in other litchi areas of Chhattisgarh.
4. An analytical study should be conducted on training needs of farmers in establishment of litchi orchards in Jashpur district of Chhattisgarh.

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## कृषि विस्तार विभाग

इंदिरा गाँधी कृषि विश्वविद्यालय रायपुर (छ.ग.)

साक्षात्कार अनुसूची

छत्तीसगढ़ राज्य के जशपुर जिले के किसानों के बीच अनुशंसित लीची उत्पादन के तकनीकी ज्ञान और अंगीकरण पर एक अध्ययन

प्रश्नावली क्रमांक .....

दिनांक .....

परामर्शदाता

डॉ. डी.के.सूर्यवंशी

वरिष्ठ वैज्ञानिक, कृषि विस्तार विभाग

इं.गां.कृ.वि.वि.रायपुर (छ.ग.)

शोधकर्ता का नाम

सविता नंदन साय

एम.एस.सी. (कृषि) अंतिम वर्ष

कृषि विस्तार विभाग

इं.गां.कृ.वि.वि.रायपुर (छ.ग.)

1. कृषक का नाम: .....
2. ग्राम: .....
3. विकासखंड: .....
4. जिला: .....
5. कृषक का उम्र: .....
6. संपर्क / मो.न. ....

7. शिक्षा का स्तर:
- क. अशिक्षित
- ख. केवल पढ़ सकते हैं
- ग. पढ़ और लिख सकते हैं
- घ. प्राथमिक (1 वी से 5 वी)
- ङ. माध्यमिक (6 वी से 8 वी)
- च. उच्च एवं उच्चतर माध्यमिक (9 वी से 12 वी)
- छ. स्नातक एवं अधिक
8. परिवार का आकार:
- क. छोटा परिवार (4 सदस्यों तक)
- ख. मध्यम परिवार (5-8 सदस्यों)
- ग. संयुक्त परिवार (8 से अधिक सदस्यों)
9. आपके पास कृषि योग्य कुल कितनी भूमि है:
- क. सीमांत कृषक (1.00 हे. से कम)
- ख. लघु कृषक (1.01 से 2.00 हे.)
- ग. अर्ध मध्यम (2.01 से 4.00 हे.)
- घ. मध्यम (4.01 से 10.00 हे.)
- ङ. दीर्घ (बड़ा) कृषक (10.00 हे. से अधिक)
10. आपका व्यवसाय क्या है:
- क. कृषि
- ख. कृषि + पशुपालन
- ग. कृषि + मजदूरी
- घ. कृषि + व्यवसाय

ड. कृषि + नौकरी

11. आपकी लीची की खेती से होने वाली कुल वार्षिक आय कितनी है? कृपया जानकारी दें:

.....

12. आप अपने आसपास के शहर अथवा ब्लॉक से कितना संपर्क रखते हैं? कृपया शहर जाने का अन्तराल बताइए?

1. कभी नहीं

2. बहुत कम (माह में एक बार)

3. अक्सर (हफ्ते में 2 बार)

4. प्रतिदिन

13. आप अपने ग्राम में कार्यरत संस्थाओं में अपनी सामाजिक भागीदारी के बारे में जानकारी दें?

क्र.	संस्थाएं	सदस्यता		पदाधिकारी
		हाँ	नहीं	
1.	ग्राम पंचायत			
2.	सहकारी समिति			
3.	स्कूल समिति			
4.	किसान समूह			
5.	सांस्कृतिक मंच			
6.	युवा मंडल			
7.	स्वयं सहायता समूह			
8.	अन्य			

14. आपको लीची की खेती का कितने वर्ष का अनुभव है? कृपया जानकारी दें:

.....

15. आप कितने भूमि के अंतर्गत लीची की खेती करते हैं:

क. कुल भूमि (हे.) .....

ख. लीची की खेती .....

16. आपके बगीचे में पेड़ों की संख्या के बारे में जानकारी दीजिये?

क. लीची के पेड़ों की संख्या .....

ख. अन्य पेड़ों की संख्या .....

17. आपके बगीचे का कुल क्षेत्रफल कितना है? कृपया जानकारी दें:

.....

.....

18. आपके लीची के बगीचे कितने वर्ष पुराने हैं ? कृपया बगीचे की उम्र की जानकारी दें (वर्ष में): .

.....

.....

19. कृपया बताएँ कि आपको लीची उत्पादन तकनीक के बारे में जानकारी किन-किन स्रोतों से प्राप्त होती है अथवा लीची उत्पादन तकनीक के जानकारी के लिए आप किन-किन मीडिया का उपयोग करते हैं?

क्र.	मीडिया के नाम	मीडिया का उपयोग		
		हमेशा	कभी-कभी	कभी नहीं
1.	किसान मेला			
2.	मोबाइल			
3.	कृषि पत्रिकाएं			

20. लीची के फलों के लिए महत्वपूर्ण विपणन चैनलों के बारे में जानकारी दें:

(क) उत्पाद - थोक विक्रेता - उपभोक्ता

(ख) उत्पाद - एजेंट दलाल - थोक विक्रेता - खुदरा विक्रेता - उपभोक्ता

21. क्या आपको लीची उत्पादन के तकनीकी ज्ञान के बारे में जानकारी है? (हाँ/नहीं) यदि हाँ तो निम्न के बारे में जानकारी दें:

क्र.	कथन	ज्ञान का स्तर	
		पूर्ण	नहीं
1.	लीची की किस्म:		
	लीची की किस्म के बारे में जानकारी है : 1. मुजफ्फरपुरी 2. शाही 3. चाइना		
2.	रोपण की दूरी :		
	रोपण दूरी 10 मी. x 10 मी.		
3.	प्रवर्धन:		
	1. लीची को व्यावसायिक रूप से प्रसारित करने के लिए गुटी प्रवर्धन विधि का उपयोग किया जाता है, क्या आपको जानकारी है? 2. लीची को बीज या कटिंग द्वारा भी प्रसारित किया जा सकता है, क्या आपको इसके बारे में जानकारी है? 3. गुटी तैयार करने का कार्य जुलाई से सितम्बर माह तक किया जाता है, क्या आपको इसके बारे में जानकारी है?		
4.	अंतरवर्ती फसलें:		
	क्या आपको लीची के बाग में अंतरवर्ती खेती के बारे में जानकारी है? हाँ तो जानकारी दें: 1. सब्जियों की खेती : आलू , प्याज , गोभी वर्गीय 2. फूलों की खेती : ग्लेडियोलस 3. छायादार फसलें : हल्दी, अदरक 4. अन्य फलदार वृक्ष : पपीता , अमरुद		
5.	सिंचाई का समय :		
	क्या आपको लीची के पौधे में सिंचाई की अवस्थाओं के बारे में जानकारी है? 1. गर्मियों के दौरान, सप्ताह में दो बार युवा पौधों को और 4 वर्ष से अधिक उम्र के पौधों के लिए सप्ताह में एक बार सिंचाई करनी चाहिये आपको जानकारी है		

	2. उर्वरक डालने के बाद सिंचाई करनी चाहिये , आपको जानकारी है																											
	3. लीची फलन के समय नियमित सिंचाई कर मृदा में नमी बनाये रखना आवश्यक होता है, जिससे फल गिरने की समस्या कम होती है क्या आपको जानकारी है ?																											
6.	सिंचाई की विधियाँ :																											
	क्या आपको लीची के पौधे में सिंचाई की विधियों के बारे में जानकारी है: 1. थाला विधि 2. टपक सिंचाई विधि																											
7.	उर्वरक:																											
	क्या आपको लीची के पौधे में अनुशंसित उर्वरकों की मात्रा के बारे में जानकारी है?																											
	<table border="1"> <thead> <tr> <th>फसलों की उम्र (वर्षों में)</th> <th>गाय का गोबर (कि.ग्रा.)</th> <th>यूरिया (ग्रा.)</th> <th>फॉस्फोरस (ग्रा.)</th> <th>डब्लू (ग्रा.)</th> </tr> </thead> <tbody> <tr> <td>पहले तीन वर्ष तक</td> <td>10-20</td> <td>150-500</td> <td>200-600</td> <td>60-150</td> </tr> <tr> <td>चार से छः वर्ष</td> <td>25-40</td> <td>500-1000</td> <td>750-1250</td> <td>200-300</td> </tr> <tr> <td>सात से दस वर्ष</td> <td>40-50</td> <td>1000-1500</td> <td>1500-2000</td> <td>300-500</td> </tr> <tr> <td>दस वर्ष से अधिक</td> <td>60</td> <td>1600</td> <td>2250</td> <td>600</td> </tr> </tbody> </table>	फसलों की उम्र (वर्षों में)	गाय का गोबर (कि.ग्रा.)	यूरिया (ग्रा.)	फॉस्फोरस (ग्रा.)	डब्लू (ग्रा.)	पहले तीन वर्ष तक	10-20	150-500	200-600	60-150	चार से छः वर्ष	25-40	500-1000	750-1250	200-300	सात से दस वर्ष	40-50	1000-1500	1500-2000	300-500	दस वर्ष से अधिक	60	1600	2250	600		
फसलों की उम्र (वर्षों में)	गाय का गोबर (कि.ग्रा.)	यूरिया (ग्रा.)	फॉस्फोरस (ग्रा.)	डब्लू (ग्रा.)																								
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8.	क्या आपको लीची में होने वाले कांट छांट की जानकारी है? लीची के पौधे के लिए छंटाई की ज्यादा आवश्यकता नहीं होती, लेकिन नई टहनियों को बढ़ावा देने के लिए फलों की कटाई के बाद हल्की छंटाई की आवश्यकता होती है , क्या आपको जानकारी है ?																											
9.	लीची के प्रमुख कीट एवं नियंत्रण:																											
	क्या आपको लीची के प्रमुख कीटों के बारे में जानकारी है: 1. फल छेदक																											

	<p>2. माईट (घुन)</p> <p>3. पत्ती सुरंगक (लीफ माइनर)</p>		
	<p>निम्नलिखित कीट लीची को कैसे नुकसान पहुंचाते हैं? क्या आपको इसके बारे में जानकारी है:</p> <p>1. फल छेदक</p> <p>2. माईट (घुन)</p> <p>3. पत्ती सुरंगक (लीफ माइनर)</p>		
	<p>क्या आपको लीची के प्रमुख कीटों को नियंत्रित करने के अनुशंसित उपायों के बारे में जानकारी है:</p> <p>1. फल छेदक</p> <p>2. माईट (घुन)</p> <p>3. पत्ती सुरंगक (लीफ माइनर)</p>		
10.	लीची के प्रमुख रोग एवं नियंत्रण:		
	<p>क्या आपको लीची के प्रमुख बिमारियों के बारे में जानकारी है:</p> <p>1. मृदुरोमिल असिता (डाउनी मिलडिव)</p> <p>2. एन्ट्रिक्नोस</p> <p>3. रेड रस्ट</p> <p>4. फल का फटना</p>		
	<p>क्या आपको लीची के प्रमुख बिमारियों की पहचान की जानकारी है:</p> <p>1. मृदुरोमिल असिता (डाउनी मिलडिव)</p> <p>2. एन्ट्रिक्नोस</p> <p>3. रेड रस्ट</p> <p>4. फल का फटना</p>		
	<p>क्या आपको लीची के बिमारियों को नियंत्रित करने के अनुशंसित उपायों के बारे में जानकारी है:</p> <p>1. मृदुरोमिल असिता (डाउनी मिलडिव)</p> <p>2. एन्ट्रिक्नोस</p> <p>3. रेड रस्ट</p> <p>4. फल का फटना</p>		
11.	फलों की तुड़ाई:		
	<p>क्या आपको लीची के फल की तुड़ाई के बारे में जानकारी है:</p> <p>1. फलों के रंग में परिवर्तन, हरे से गुलाबी रंग के साथ - साथ छिलके समतल होने लगे तब तुड़ाई करनी चाहिये, आपको जानकारी है ?</p>		

2. फलों को गुच्छे में पत्तियों और टहनियों के छोटे हिस्से के साथ तोड़ा जाता है , आपको जानकारी है ?		
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22. कृपया आप लीची उत्पादन की अनुसंधान तकनीकी ज्ञान के अंगीकरण के बारे में जानकारी दें:

क्र.	कथन	अंगीकरण का स्तर	
		पूर्ण	नहीं
1.	लीची की किस्म:		
	आप लीची की कौन –कौन सी किस्म को अपनाते हैं: 1. मुजफ्फरपुरी 2. शाही 3. चाइना		
2.	रोपण की दूरी :		
	रोपण दूरी 10 मी. x 10 मी.		
3.	प्रवर्धन:		
	1. आप लीची को व्यावसायिक रूप से प्रसारित करने के लिए गुटी प्रवर्धन विधि का उपयोग करते हैं? 2. गुटी तैयार करने का कार्य जुलाई से सितम्बर माह तक किया जाता है, क्या आप समय पर गुटी तैयार करने का कार्य करते हैं ?		
4.	अंतरवर्ती फसलें:		
	आप लीची के बाग में अंतरवर्ती खेती करते हैं: 1. सब्जियों की खेती : आलू , प्याज , गोभी वर्गीय 2. फूलों की खेती : ग्लेडियोलस 3. छायादार फसलें : हल्दी, अदरक 4. अन्य फलदार वृक्ष : पपीता , अमरुद		
5.	सिंचाई का समय :		
	क्या आप लीची के पौधे में सिंचाई की विभिन्न अवस्थाओं में सिंचाई करते हैं? 1 गर्मियों के दौरान, सप्ताह में दो बार युवा पौधों को और 4 वर्ष से अधिक उम्र के पौधों के लिए सप्ताह में एक बार सिंचाई करनी चाहिये 2 खाद डालने के बाद सिंचाई करनी चाहिये		

	3 लीची फलन के समय नियमित सिंचाई कर मृदा में नमी बनाये रखना आवश्यक होता है, जिससे फल गिरने की समस्या कम होती है क्या आप समय पर सिंचाई करते है ?																											
6.	सिंचाई की विधियाँ :																											
	आप लीची के पौधे में सिंचाई की कौन सी विधि को अपनाते है: 1. थाला विधि 2. टपक सिंचाई विधि																											
7.	उर्वरक:																											
	क्या आप लीची के पौधे में अनुशासित उर्वरकों की मात्रा के आधार पर उर्वरकों का उपयोग करते हैं? <table border="1" data-bbox="395 786 1059 1599"> <thead> <tr> <th>फसलों की उम्र (वर्षों में)</th> <th>गाय का गोबर (कि.ग्रा.)</th> <th>यूरिया (ग्रा.)</th> <th>ैच (ग्रा.)</th> <th>डव् (ग्रा.)</th> </tr> </thead> <tbody> <tr> <td>पहले तीन वर्ष तक</td> <td>10-20</td> <td>150-500</td> <td>200-600</td> <td>60-150</td> </tr> <tr> <td>चार से छः वर्ष</td> <td>25-40</td> <td>500-1000</td> <td>750-1250</td> <td>200-300</td> </tr> <tr> <td>सात से दस वर्ष</td> <td>40-50</td> <td>1000-1500</td> <td>1500-2000</td> <td>300-500</td> </tr> <tr> <td>दस वर्ष से अधिक</td> <td>60</td> <td>1600</td> <td>2250</td> <td>600</td> </tr> </tbody> </table>	फसलों की उम्र (वर्षों में)	गाय का गोबर (कि.ग्रा.)	यूरिया (ग्रा.)	ैच (ग्रा.)	डव् (ग्रा.)	पहले तीन वर्ष तक	10-20	150-500	200-600	60-150	चार से छः वर्ष	25-40	500-1000	750-1250	200-300	सात से दस वर्ष	40-50	1000-1500	1500-2000	300-500	दस वर्ष से अधिक	60	1600	2250	600		
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सात से दस वर्ष	40-50	1000-1500	1500-2000	300-500																								
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8.	लीची के पौधे के लिए छंटाई की ज्यादा आवश्यकता नहीं होती, लेकिन नई टहनियों को बढ़ावा देने के लिए फलों की कटाई के बाद हल्की छंटाई की आवश्यकता होती है , क्या आप समय पर छंटाई का कार्य करते है ?																											
9.	लीची के प्रमुख कीट एवं नियंत्रण:																											
	क्या आप लीची के प्रमुख कीटों को नियंत्रित करने के अनुशासित उपायों को अपनाते है: 1. फल छेदक																											

	2. माईट (घुन) 3. पत्ती सुरंगक (लीफ माइनर)		
10.	लीची के प्रमुख रोग एवं नियंत्रण:		
	क्या आप लीची के बिमारियों को नियंत्रित करने के अनुशंसित उपायों को अपनाते हैं: 1. मृदुरोमिल असिता (डाउनी मिलडिव) 2. एन्थ्रेक्नोस 3. रेड रस्ट 4. फल का फटना		
11.	फलों की तुड़ाई:		
	1 फलों के रंग में परिवर्तन , हरे से गुलाबी रंग के साथ साथ छिलके समतल होने लगे तब तुड़ाई करनी चाहिये , आप ऐसा करते है ?		
	2 फलों को गुच्छे में पत्तियों और टहनियों के छोटे हिस्से के साथ तोड़ा जाता है , आप ऐसा करते है ?		

23. आपको लीची की पैदावार तकनीकी को अपनाने में किन-किन समस्याओं का सामना करना पड़ा?

1. ....
2. ....
3. ....
4. ....
5. ....

24. आप लीची के उत्पादन में आने वाली समस्याओं को दूर करने के अपने सुझाव दीजिये?

1. ....  
.....
2. ....  
.....
3. ....  
.....
4. ....  
.....
5. ....  
.....

## RESUME

**Name** : **Savita Nandan Sai**  
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### **Academic Qualification: -**

<b>Degree</b>	<b>Year of passing</b>	<b>Board/University</b>
Higher secondary Education	2014	CGBSE, Raipur (C.G.)
B. Sc. (Ag.)	2019	IGKV, Raipur (C.G.)
M. Sc. (Ag.)	Appearing	IGKV, Raipur (C.G.)

**Professional Experience** : Rural Agricultural Work  
Experience

**Membership of Professional Societies** : No

(If any)

**Awards / Recognitions (if any)** : No

**Publications (If any): In numbers only** : No

  
Signature