

**AN ECONOMIC ANALYSIS OF SUPPLY CHAIN  
MANAGEMENT AND MARKETING EFFICENCY OF  
LITCHI IN MUZAFFARPUR DISTRICT OF BIHAR**

**By**

**SHIVLAL KUMAWAT**



**DEPARTMENT OF AGRICULTURAL ECONOMICS**

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**DR. RAJENDRA PRASAD CENTRAL AGRICULTURAL  
UNIVERSITY  
PUSA (SAMASTIPUR), BIHAR – 848 125, INDIA**

**2021**

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**SHIVLAL KUMAWAT**



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***(Agricultural Economics)***

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**Reg. No. M/AE/475/2019-20**

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Dated 19 / 07 / 2021

### Certificate

This is to certify that the work embodied in the thesis entitled “*AN ECONOMIC ANALYSIS OF SUPPLY CHAIN MANAGEMENT AND MARKETING EFFICIENCY OF LITCHI IN MUZAFFARPUR DISTRICT OF BIHAR*” submitted by *MR. SHIVLAL KUMAWAT* bearing Regd. No. M/AE/475/2019-20, in partial fulfilment of the requirements for the award of the degree **MASTER OF SCIENCE IN AGRICULTURE (AGRICULTURAL ECONOMICS)** of the Faculty of Post Graduate Studies, Dr. Rajendra Prasad Central Agricultural University, Pusa Samastipur, Bihar is a record of the *bona fide* research work carried out by him under my supervision and guidance. The results of the investigation reported in this thesis have not so far been submitted for any other degree or diploma.

The assistance and help received during the course of this investigation and sources of literature have been duly acknowledged.

*Janmejay Kumar*  
15-07-2021

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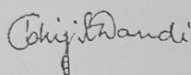
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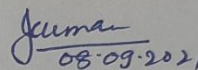
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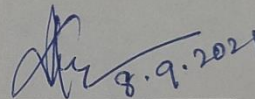


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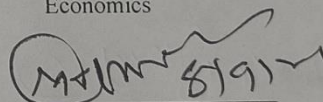


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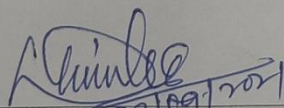
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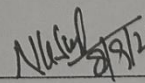
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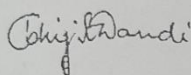
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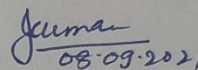
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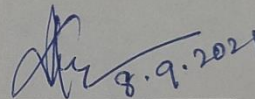


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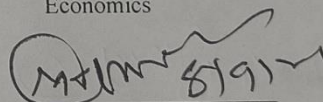


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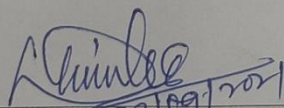
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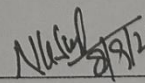
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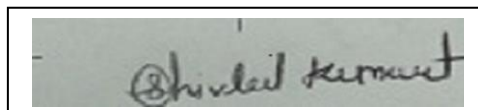
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**ABSTRACT**

The present study planned to analyze “*An economic analysis of Supply Chain Management and Marketing Efficiency of Litchi in Muzaffarpur District of Bihar*”. The district was selected purposely because of the leading litchi producing district in the State. For the purpose of study 140 respondents were interviewed which consisting of 60 litchi growers and 80 market intermediaries under the study. In the district, during the year 2019-20, litchi crop was extensively grown with an area of 33.4 thousand hectares and annual production of 258.3 thousand MT with the productivity of 7.8 MT/hectare. The trends of area, production and productivity of litchi in the district has showed increasing trend with 0.12, 0.014, and -0.12 annual compound growth rate respectively. In the state, the area, production and productivity of annual compound growth rate of litchi was 1.01, 0.5 and -0.4 percent respectively. The overall productivity in the State of Bihar and Muzaffarpur district was found negative whereas national level data showed positive trend. The main reasons behind negative trend were due to uncertainty of rainfall, poor nutrients management, and biennial fruit production in Bihar as well as in Muzaffarpur. The study showed that the marketing of litchi is a very complex procedure in the study area and four major types of marketing channels were identified. Channel I: Producer - Pre-harvest

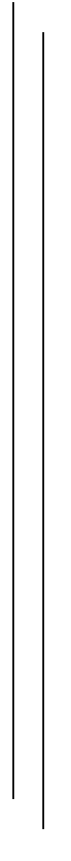
contractor - Commission agent cum Wholesaler – Retailer – Consumer. Channel II: Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer –Consumer. Channel III: Producer - Retailer – Consumer. Channel IV: producer –consumer.

The fourth channel Producer → Consumer, (local market) was found very much efficient for the producers as compared to other three identified marketing channel due to involvement of less number of middlemen. In fourth channel producer received 70.23 % of share in consumer rupee the rest share distributed 29.77 % was in marketing costs and margin. The price spread was found minimum for channel IV that is Rs. 493.38 per quintal due to absence of market middlemen. The marketing efficiency was highest in channel IV (2.02) & lowest in channel II (0.16) due to the reason that channel IV, producers directly sell their produce to consumer. The most important marketing constraints of litchi marketing was perishability of fruits with 98.92 mean score (With 1<sup>st</sup> Rank), followed by others problems i.e. labour shortage during harvesting reason, lack of market information, lack of marketing infrastructure, lack of organized marketing, high transportation cost for distant markets, problem of credit facility, unorganized production and price fluctuation etc. The study observed so many interesting facts about the marketing of litchi and suggested ways and means for improvement of marketing and supply chain for obtaining higher share of consumer to the producer.





# **CHAPTER - I**



# **INTRODUCTION**



# INTRODUCTION

---

Fruit cultivation has been carried out for a long time but not on a broad scale until the start of the planning era. The country was primarily engaged in food grain development activities during the First Five Year Plan period. The need to enrich the diet and make it nutritious by providing the necessary elements was felt in the Second Planning Phase. Systematic cultivation of fruit crops was, however, still neglected in India, possibly because horticultural plantations are capital intensive and their gestation period is very long. The iconic characteristic of horticultural crops is the seasonality of development and perishability. This results in large price fluctuations during the peak harvesting season and creates marketing difficulties.

## 1.1 Origin & distribution of Litchi fruit

Litchi (*Litchi chinensis*) is an evergreen, imperative, temperature-sensitive fruit crop and related to Sapindaceae family. And also known as the 'fruit queen.' It originated three hundred years before, ending of the 17th century. Litchi one of the most famous fruit crops in the eastern part of the country and is mostly cultivated. Litchi is also known regionally as lichi, lichee, laichi, leech, or lychee. Besides it is cultivated extensively in temperate regions of India, Australia, South Africa, Thailand, Mauritius, and Hong Kong, etc. (Rajwanshi *et. al.*, 2017)

## 1.2 Botany of Litchi

Litchi belongs to the family Sapindaceae according to binomial classification and is also considered as the 'Queen of fruits.' And there are 2,000 species and 150 genera in that family. The species Litchi has two more non-commercial subspecies in the region. The red-skinned fruit is made up of a solitary seed surrounded by a juicy sweet fragrant aril or fleshy tissue.

The tree of litchi is dense, slow-growing, round & top, 9-30 m high, and equally long. The leaves are evergreen, fairly fibrous, soft, shiny, and green on upper side of surface & greyish from below. Showy fruits are typically strawberry-red, often rose, pink, or amber in loose, pendent clusters of 2 to 50 and some forms with green colour. The majority of them are flavourful, oval, heart-shaped, or almost spherical, with a diameter of 2.5 cm and a length of 4 cm small, leathery, supple, and easy to peel when young. A tiny amount of clear, delicious juice is contained immediately

under the skin of certain varieties. The shiny, succulent, dense, large, delicious fruit is suggested by the translucent-white to greyish or pinkish fleshy aril, which generally separates easily from the seed. The flavour of the meat is sub-acid and unique. The fruit is a great deal of difference in the seed size and shape.



**Fig -:1.1 (Litchi plant) (Litchi inflorescence) (Litchi fruit)**

### **1.3 Importance of Litchi**

The litchi fruit is known for its exceptional superiority, amusing taste characteristics, & attractive red colour. Litchi is a highly nutritive and delicious, flavoured, and juicy aril.

Litchi fruit contains approximately sixty % squash, eight % tease, nineteen % germ, & thirteen % rind, also depends on cultivar and climate in which it is grown (**Nath et. al., 2016**). Carbohydrates, organic acids, vitamins, pigments, protein, and fat are the principal chemical constituents. Litchi fruit is highly sugar-rich and the sugar content ranges from 5.68 to 19 per cent, protein (0.7-0.8 per cent) fat (0.3 per cent) pectin (0.42 per cent) and mineral deposits are also present in significant quantities, mostly Ca, P, & Fe (0.7 per cent) and vitamin A, B1, and B

## 1.4 Nutritional composition of Litchi

**Table 1.1- Nutritional composition of 100g of litchi**

Calories = 63 To 64	Carbohydrate = 13.30 To 16.41g	Thiamine = 28 Mg
Moisture = 81 To 85%	Calcium = 8 To 10 Mg	TSS (Brix) = 18 To 22
Protein = 0.68 To 1.0 G	Ash = 0.40 To 0.50g	Ascorbic Acid = 20 To 60 Mg
Fat = 0.30 To 0.58g	Phosphorus = 30 To 45mg	Nicotinic Acid = 0.40 Mg
Fibre = 0.23 To 0.40g	Sodium = 3 Mg	Riboflavin, Etc. = 0.05mg

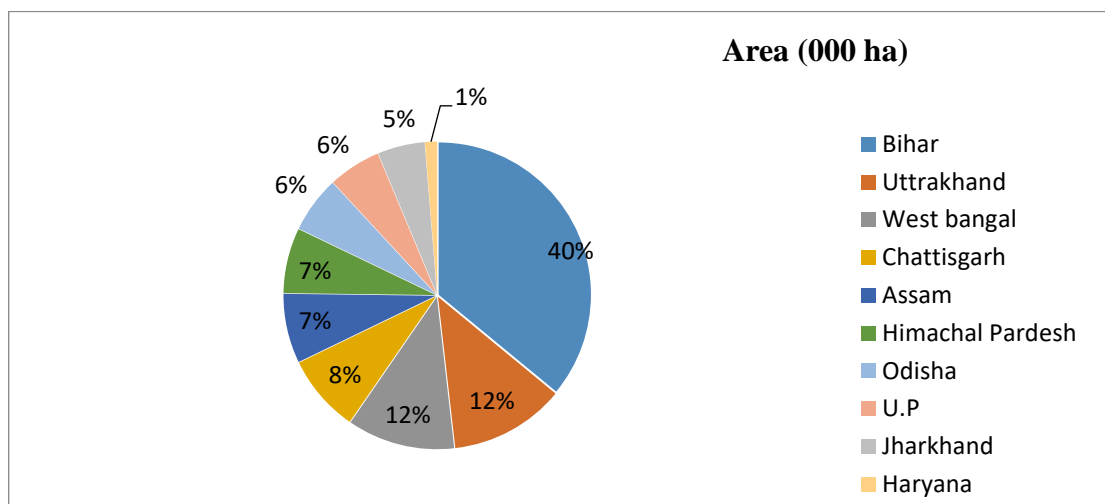
## 1.5 Indian scenario

At the present time in the country the total production is 730.0 MT, 96,000 ha area & 7.6 MT productivity of litchi.(Ag. ministry and welfare of farmers (2019-2020). After china, in the world the country shares 2<sup>nd</sup> rank in litchi cultivation. Mostly country annually, 93,300 hectares, 568,200 metric tons of litchi are produced (**Anonymous, 2018**). The country's average productivity of litchi is 7.5t ha<sup>-1</sup> in 2018-19, which is much lower than the crop's potential productivity. Poor fruit setting/retention in humid, dry springs and biennial bearing due to poor nutrient management are the key reasons for low productivity (**Menzel and Simpson, 1990**).

Around fifty improved litchi cultivars are presently cultivate in India. However, the commercial varieties of north Bihar and eastern Uttar Pradesh are dominated by Shahi, China, and Purbi. Other commercial varieties of importance are rose-scented for Uttarakhand and adjacent areas, Shahi, Ajhauri, China, Swarna, Roopa and purbi for Jharkhand and Bombai, Bedana, and Rose scented in eastern parts of western Bengal. Few varieties have been found promising for high yields with quality fruits, such as Early & Late Bedana etc. and have been well adopted in the region.

The same as Bihar, Uttarakhand, West Bengal, Jharkhand and U.P, Litchi is commercially cultivated in the region. Due to its high profitability and better export prospects, the yield is also acquisition popularity in Himachal Pradesh, Punjab,

Jammu as well as Kashmir, Arunachal Pradesh, Tripura, Karnataka, and Tamil Nadu (Pandey and Sharma, 1989; Cebeco, 2001).

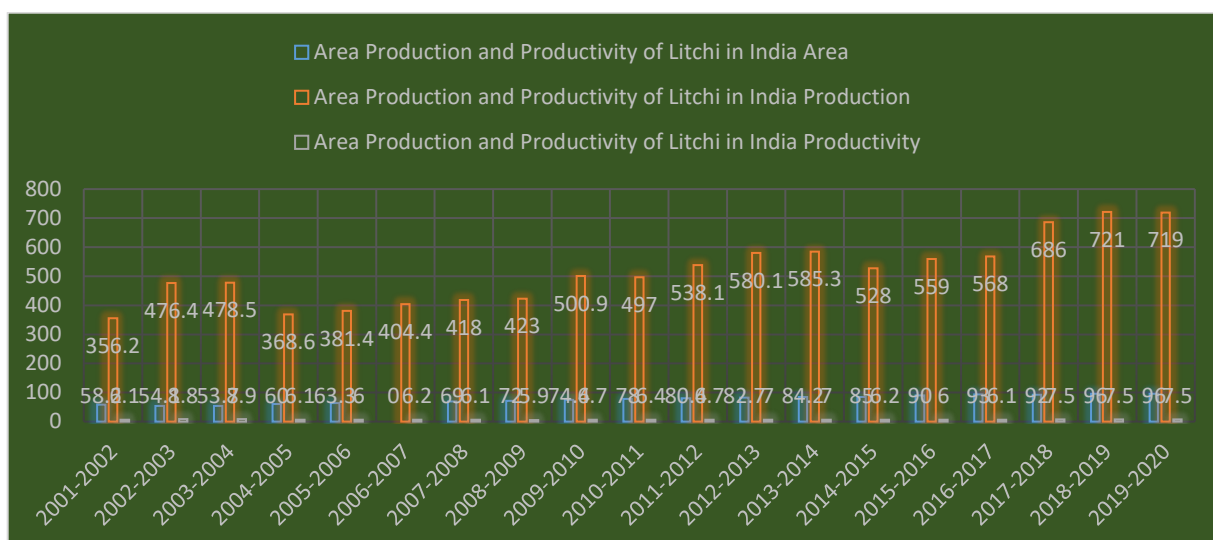


**Fig 1.2 Area, production & productivity of Litchi in Bihar**

Due to its high geographical position and the size its contribution to the region's total production, Litchi cultivation occupies an important position in the horticultural landscape in Bihar. Millions of people are employed in litchi cultivation, both on and off the sector. Litchi farming therefore provides a source of income for a vast population, particularly in the state of Bihar.

Around 40 percent of the area under cultivation, Bihar produces approximately 73.38 percent of the country's total litchi. Litchi is mainly grown in Muzaffarpur (also known as India's litchi bowl and Litchi capital of India), Vaishali, Darbhanga, Samastipur, Sitamarhi, West Champaran, and East Champaran districts in Bihar. Out of the 31,480 hectares area under cultivation, the total production of litchi in Bihar is around 234,200 tonnes, with a productivity of 7.4 t ha<sup>-1</sup>, which is higher than the national productivity.

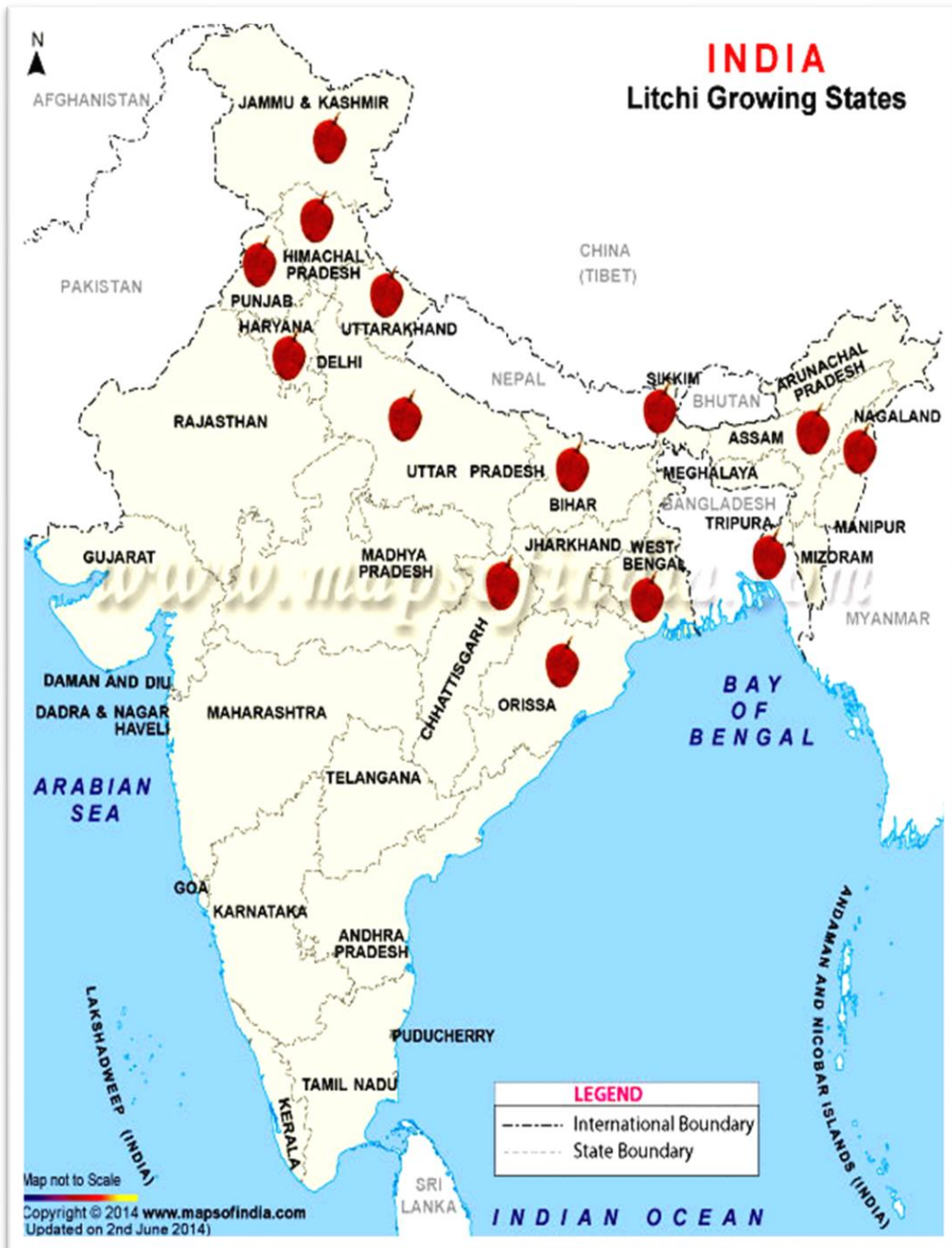
Muzaffarpur (<http://www.hort.in>, 2018) litchi record is created in twenty seven districts of Bihar, according to Directorate of Horticulture. With an output of 56,006 MT, Muzaffarpur is the largest district producing litchi, Vaishali came in second with 26, 498 MT, and Sitamarhi came in third with 15,518 MT. Three additional districts with more over 10,000 MT of output are West Champaran, East Champaran, and Katihar.



**Figure-1.3 Growth trends in area, production, & productivity of Litchi in India**

Selected states	Major Litchi Producing Districts
Bihar	Muzaffarpur, Samastipur, Darbanga , Vaishali , East & west Champaran, Sitamarhi, Sheohar, Madhubani, Purnia, Begusarau, Saharsa, Bhagalpur, Kishanganj Etc.
Assam	Jorhat, Bongoigaon, Goalpara, Kamrup, Barpeta, Naoga, Golaghat, Cachar, Sonitpur.
West Bengal	Nadia, Murshidabad, Hubli, Malda, Uttar Dinajpur, DakshinDinajpur.
Punjab	Hoshiarpur, Gurdaspur .
Uttarakhand	Champawat, Nainital, Udham Sing Nagar, Haridwar, Tehrigarhwal, Deharadun, Paurigarhal Etc.
Odisha	Sambalpur, An gul, Sundergarh, Deogarh
Tripura	West Tripura, South Tripura, Dhalai Tripura, North Tripura

**Table.1.2. Some important litchi growing states in India**



**Fig. 1.4 Litchi growing states in India**

## **1.6 Products of Litchi**

Litchi fruit a better amount of minerals, various vitamins, and a safe antioxidant its helps to protect against harmful free radicals. Litchi is a highly perishable fruit and litchi is made from many value-added ingredients. Litchi squash is a distilled drink prepared from heavily flavoured litchi pulp. Litchi fruit is also made from many other items, such as dehydrated litchi pulp, canned litchi, wine, juice, pickle, jelly, ice-cream, and preserves. The medicinal qualities of litchi fruit are, in natural cancer treatment, litchi fruit prevents cancer cell growth, it has amazing anti-breast cancer properties. The immune system is improved by it.

## **1.7 Marketing of Litchi**

Litchi fruit is temperature-sensitive; due to the unavailability of transport with cool chain installations, its access to the distant market is limited. To maintain the desired flavour and colour at room temperature, the commodity needs to enter distant market locations within 24-36 hours after harvesting. The existing supply chains of litchi frequently take more than 24-36 hours from the manufacturing site to the ultimate trade out of state. To target distant markets, refrigerated van and cold chain are therefore required, while fruit needs processing to increase its shelf life for export markets. Markets for litchi can be divided mainly into three markets:

- (a) Market at domestic level
- (b) Market at national level
- (c) Market at International level.

Litchi marketing in Bihar requires the presence of a variety of market middleman between producers point to consumer so the price paid by the latter is reduced when it reaches the producer. There is a considerable disparity among the price remunerated by the consumers and the value earned through the manufacturers, and a substantial proportion of that price is appropriated by the intermediaries. In Muzaffarpur, the litchi market, PHC plays a crucial role. The traders enter into a contract with the manufacturer to buy litchi at the agreed price in the field itself before harvesting litchi and to sell them at the time of harvest in urban markets through a commission agent. Where the price is higher than the agreed price, the

higher returns are not shared with the suppliers and only the contract price is charged to the producer, while, in the case of the harvest price falling below the pre-harvest price, the contractors pay 10% of the value of the goods sold by them while paying the producers.

In India, the marketing of litchi depends largely on the quantity of the goods available for sale within the state, outside the state, within the country, and outside the country. The quality of the products according to the cultivar codex, road and rail system support for the transportation & information about system of market, as well as administration policies have a vital role. Due to the importance of tropical fruits in the area, efforts should be made to give assistance through capacity building that promote production, post-harvest maintenance, and sales, includes export. Litchi has been identified as a valuable export crop. Due to the growing local market, India's litchi exports are currently very minor. High variations in the market price are noted and simply a undersized share of the buyer income enters the farmer.

The growth of litchi under different climatic conditions in different states has reward in provisions of early harvesting; prolonged harvesting & fruits are only available for 3-4 weeks under season. This season available from May (2<sup>nd</sup> week) to June (2<sup>nd</sup> week). Around 80 percent of litchi developed in the state is sold out of the state. According to the survey report Delhi Mumbai, Bangalore etc. Are major important markets for Litchi.

In order to suggest steps to increase the profitability of litchi marketing, this study focuses on marketing networks, marketing quality, and price spread in the litchi supply chain.

### **Objectives:-**

1. To examine the **Growth and Variability** in area, production and productivity of litchi in supply chain.
2. To identify the **Marketing Channels** involved in litchi supply chain in study area.
3. To Estimate the **Price Spared and Marketing Efficiency** of litchi supply chain.
4. To suggest suitable **Policy Measures** for improving marketing efficiency in litchi supply chain in study area.

**Scope of the study:**

Information on the supply chain and transportation of produce from farmers/producers to the ultimate consumers is provided by the results of the current report. In the respective networks, distinct marketing channels are defined along with profit margins, price spread, and marketing effectiveness. The study provides the litchi growers and intermediaries with useful and meaningful insights into the viability of litchi marketing in marketing under various channels. In order to solve problems involved in the marketing of litchi, the position of intermediaries will be of great importance to policymakers.

**Limitations of the study:**

An individual's research studies are often faced with different bottlenecks and, thus, the current analysis is not an exception to this constraint. This research was limited to a specific market in the country and, thus, the results drawn are applicable to those areas where there is a similar situation. In addition, the requisite data and information obtained by the survey method through the conduct of individual interviews through mock-up farmers, intermediaries, etc., along with the conclusion strained are topic to remember preconception, because no records on cultivation and marketing aspects were kept by farmers and intermediaries. But in the compilation of relevant data, the utmost care was taken. The analysis was passed out over a short phase of point in time and with partial sample size and it is therefore not advisable to generalize the findings.

**Table 1.4 Characteristic of Different Litchi Varieties**

<b>S.NO.</b>	<b>VARIETY</b>	<b>TSS(0 Brix)</b>	<b>WEIGHT(g.)</b>	<b>SPACIFIC CHARASTRICS</b>	<b>SEASON AVAILABLITY</b>
1	Sahi	19-22	20-25	Early maturing ,regular bearing, high yielding	15 April to end of April
2	Chaina	-	20-25	Late maturing, resistant to fruit cracking	3 <sup>rd</sup> week of may
3	Early Bedana	18-20	15-18	Oval shaped	Fri st may to third week of may
4	Late Bedana	17	18-20	Conical in shaped	Third week of may to second week of June
6	Bombai	-	15-20	Fruits are obliquely heart shaped	Same as late bedana
7	Kasaba	16-16.5	22-25	Mid late maturing variety	3 <sup>rd</sup> week of may
8	Rose scented	19.8-20	15-20	Mid early maturing variety	2 <sup>nd</sup> week of June 1 <sup>st</sup> week of April
9	Dehradun	17-20	18-20	Fruit are heart sand conical shape	3 <sup>rd</sup> week of June





## **CHAPTER - II**



## **REVIEW OF LITERATURE**



## REVIEW OF LITERATURE

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In this chapter, the most relevant literature is mentioned using with specific objectives and methodology. The reviews of previous important studies exist below with headings.

2.1 Growth & variability.

2.2.1 Marketing channels, price spread & supply chain efficiency

2.2.2 Constraints in production and marketing.

### 2.1 Growth & Variability

**Shaini *et al.*(2020)** in their study, the status of Litchi cultivation in India observed that for a significant population in litchi-growing states, which offers both on-farm and off-farm work, is a source of living stability. India is the world's second-largest producer of litchi after China, with a total acreage of over 93,300 ha and annual output of over 568,200 t in 2016-17. With a productivity level of just 6.1t/ha, This study examines the cultivation of litchi patterns in country major litchi-growing states, as well as commercially grown cultivars, marketing, and export potential.

**Goyal *et al.*(2020)** in their study on growth and instability in production of major fruits grown in India, analyzed the growth rates in different fruits that has seen a decline in production is the banana (-0.35 per cent). However, due to 1.49 percent area rise, production increased at a 1.15 per cent annual rate. The research also discovered that grapes had the highest level of production instability, while oranges had the highest level of region instability. In case of orange, area and productivity instability were nearly equal. In all other fruit crops, productivity instability was more critical than region instability in causing development instability.

**Gupta *et al.*(2019)** Studies focus on **variability in litchi production in north-eastern India** is very contracted and most plantations are restricted in the homestead or as backyard trees. Litchi is only found in Meghalaya's North and East Garo Hills, as well as the RiBhoi and Khasi Hills bordering Assam and Bangladesh, respectively. Except for 'Nongjri' litchi, which matures late, litchi from this area mature early-medium Sonitpur district in Assam has the most germ plasm, and the

varieties 'Bilaiti', 'Bombai,' and 'Rongiya' were found to be the most promising, with large, high-quality fruits that mature late. Tripura's litchi variability is also very poor. Early maturing varieties include 'Shahi,' 'Muzaffarpur,' and 'SwarnaRoopa,' while mid-maturing varieties include 'Bombai,' and 'Late Bedana.'

**Chattopadhyay et al.(2019)** In their study, found that **the growth performance of fruits production in the era of globalisation in West Bengal** as well as country , crop-group expansion growth rates are found to be significantly positive. Burdwan, on the other hand, saw a large increase in production when all fruits were combined. The growth rate of papaya production in Burdwan, West Bengal, and India is significantly higher. Mango and litchi production growth rates have been found to be significantly positive in both the country and the state.

**K. C. Bairwa et al. (2012)** tried to focus attention on **economics of growth and instability: fruit crops of India**. the fruit productivity has remained nearly constant over the last decade, while area and amount produced have nearly doubled from 1991-92 to 2007-08. In this study the banana, papaya, litchi and apple showed greater production instability, while banana, citrus, mango, and papaya showed greater production transition.. Mango's relative share of total Indian exports is steadily decreasing, while grapes' share is steadily growing.

**Khunt et al.(2008)** conducted study on **export potential and barriers in export of onion from Gujarat**, researchers discovered that site, production, and yield were all rising by compound pace of 3.50 %, 3.35 %, and 0.15 %, in that order, indicating that there would be enough onions for export as well as the state's fast-growing onion dehydration industries. India's fresh onion exports are concentrated in its neighbouring countries and the Middle East. Despite the fact that European and American countries were found to be highly competitive for export, the volume exported to these countries was very small. As a result, there was a need to shift onion exports from less competitive to more competitive countries.

**Mathur and Henry (2005)** conducted study on **trend of guar seed production in arid districts of Rajasthan** Vis-À-Vis Rajasthan and India and export of Guar. They observed that the find out the Rajasthan state, and India, have inclination in region, growth, & yield of cluster bean in favour of the durable time (1977 to 2001). In both arid Rajasthan and Rajasthan state, the CGR 2.1 for output

and -0.2 productivity has been declining. On a pan-India basis, these showed a long-term and recent-year positive pattern.

**Kumar *et al.* (2004)** studied the decade-wise growth trends of vegetables production and observed that in 1980, vegetables production increased at an annual rate of about 4 per cent, which rose to about 5 per cent during the 1990s. Both area expansion and yield increase contributed to this growth, although the contribution of yield slowed down during the 1990s. The growth in the yield of total vegetables decelerated from about 2 per cent in 1980s to 1.50 per cent during the 1990s.

**Nawadkar and Birari (2000)** studied focus on **Issues and Challenges in the Supply Chain of Fruits & Vegetables Sector in the séance of Bihar**. The Bihar state is leading producer of fruits and vegetables in India with addition to Uttar Pradesh and Andhra Pradesh states. Fruit and vegetable exports totalled Rs. 772.48 corers at the end of 1997-98, with fruits accounting for 60% of the total and vegetables accounting for 40%. India has snatched up both neighbouring and gulf markets. However, there is a lot of space to expand exports to new markets.

## **2.2 Study going on marketing channel, price spread & supply chain efficiency.**

**Chand *et al.* (2020)** in their study, find out the marketing efficiency of vegetables in developing economies: Evidences for critical intervention from Rajasthan, India. Market Dynamics and supply chain efficiency of Litchi in Muzaffarpur district of Bihar the marketing efficiency index is 0.33 in carrot and 0.71 in tomato is very poor in prominent channels. The most popular and significant restriction is traders' failure to obey the prescribed auction scheme, which results in lower price realisation for farmers and unnecessary deductions from value realised. Suggestions are made to improve marketing efficiency.

**J kumar & kumar (2018)** In their study, focus attention on economic analysis of production, marketing and export potential of Litchi in Muzaffarpur district of Bihar analyzed the market dynamics and supply chain efficiency of Litchi litchi is cultivated in an area about 74.40 thousand hectares with total production of 483.60 thousand metric tons and productivity of 6.50 metric tons / hectare. Bihar produces nearly cultivated in an area about 31.1 thousand hectares with a total production of 227 thousand metric tons and productivity of 7.3 metric tons / hectare. It is mainly cultivated in the old district of Muzaffarpur, Champarn and Darbhanga. The study reveals that the growth rates in area, production and productivity is positive and found

2.76, 3.82 and 0.98, per cent respectively in India while in Bihar it is recorded 1.19, 3.02 and 1.75 per cent and negative rate -0.19, -2.07 and -2.03 per cent respectively in Muzaffarpur In Muzaffarpur District and finds that the following channels were popular in the study area of Bihar.

Channel 1<sup>st</sup>: Producer → Pre - harvest contractor → Commission agent cum Wholesaler → Retailer → Consumer.

Channel 2<sup>nd</sup>: Producer → Village Trader → Wholesaler (local) → Commission agent (distant) → Wholesaler (distant) → Retailer → Consumer.

Channel 3<sup>rd</sup>: Producer → Retailer → Consumer.

Channel 4<sup>th</sup>: Producer → Consumer.

Since channel IV was very efficient because it is very small channel and have high share of shopper rupee is 68.99 %. Marketing channel I, II, and III, the producers' share of the consumer's rupee is 33.59 percent, 10.89%, & 41.02 %, in that order.

**Kumar et al. (2016)** to find out the **losses in Litchi at various stages of supply chain and changes in fruit quality** parameters crop protection at agricultural, trade, & consumer rates in India. The effectiveness of an enhanced corrugated fibre board (CFB) package against standard wooden box packaging in minimising postharvest losses was also investigated. Producers' plantations in Bihar's Muzaffarpur area provided agricultural samples immediately after harvest. The Muzaffarpur and Delhi markets provided retail samples, while the Delhi market provided wholesale and retail samples.

**Kumar et al. (2015)** conducted a study to assess losses at the farm, wholesale and retail levels in the supply chain of litchi in India. Changes in fruit quality parameters after harvest and the effectiveness of an improved corrugated fibre board (CFB) box versus conventional wooden box packaging to minimize post-harvest losses were also studied. Farm-level samples were collected immediately after harvest from farmers' orchards in the Muzaffarpur district of Bihar state. Wholesale market samples were procured from the Delhi market, and retail samples from the Muzaffarpur and Delhi market. Real time data on losses and quality parameters of fruits were recorded by transporting litchi from Muzaffarpur to Delhi (distance 1000 km) by truck. Studies indicated that the average loss (fruits discarded at sorting) apparent at the farm level during 2012 and 2013 was 30.4 per cent and 25.8 per cent, respectively. The average

loss at the wholesale market level in Delhi was 15.8 per cent and 12.4 per cent during 2012 and 2013, respectively. The highest mean loss (up to 20.5 per cent) was observed at the retail level. The mean fruit weight loss during transport to Delhi was 9.42 per cent and 7.07 per cent during 2012 and 2013, respectively. The mean total loss in the supply chain of litchi ranged from 35.3 per cent to 43.8 per cent.

**Negi and Anand (2015)** examined in their study on “Issues and Challenges in the Supply Chain of Fruits & Vegetables Sector in India” that Poor inventory management, a lack of cold chain facilities, and agro - processing units were discovered in India's fruit and vegetable supply chain, all of which contributed to maximum inefficiencies and vegetables and fruits losses and wastage. F&V's entire supply chain is beset by post-harvest losses and wastages. On the one side, this resulted in low market realisation by farmers and exorbitant prices charged by consumers

**Imtiyaz and Soni (2013)** in their study, revealed that the consumer price for fresh guava was significantly lower in marketing supply chain SC1 (Producer - Consumer) as compared with SC2 (Producer – Retailer - Consumer), SC3 (Producer - Commission agent – Retailer - Consumer) and SC4 (Producer - Commission agent – Wholesaler – Retailer - Consumer). The total marketing cost, total marketing loss and total net marketing margin were significantly higher in marketing supply chain SC4, followed by SC3, SC2 and SC1 for fresh guava. The multiple regression results revealed that commission charges for marketing of guava was the most important factor influencing the total marketing cost. The marketing efficiency and producer's share in consumer price were significantly higher in marketing supply chain SC1, followed by SC2, SC3 and SC4.

**Ahmed and Aara (2012)** in their study, the **marketing management of Kashmir apples**. He found various marketing channels for apples in Kashmir, including marketing middleman from point of producers to consumers .They discovered that each channel had a significant defect. The most serious issue identified was that a large part of the produce was marketed through a well-connected network of intermediaries. Efficient advertising networks have a tendency to pay larger commissions to intermediaries, pre-harvest contractors, and forward brokers.

**Enan (2011)** examined the efficiency of tomato marketing channel in Khartoum state on this market middleman like retailers get more profit than other market middleman, he discovered that wholesalers had higher marketing margins than retailers. At the wholesale and retail levels Omdurman market was ranked first in terms of marketing quality, followed by Bahari and Khartoum.

**Kumar et. al.(2010)** the price spread in mangoes in Lucknow district of Uttar pardesh was investigated, and the following four marketing channels were identified.

Channel-1 Producer (local) – Pre-harvest contractor – Commission Agent (Lucknow) – Wholesaler (New Delhi) – Retailer (New Delhi) – Consumer (New Delhi)

Channel-2 Producer - Pre-harvest contractor – Commission agent -Retailer – Consumer

Channel-3 Producer – Pre harvest contractor – wholesaler – Retailer – Consumer

Channel – 4 Producer – Pre-harvest contractor – Retailer – Consumer

**Murthy et al.(2009)** conducted a study on marketing management and post-harvest losses in fruits. In this supply chain including mango, litchi, grape, banana, and pomegranate indicated that marketing costs, margins, and efficiency are mostly controlled by marketing channels. Mango, grapes, banana, and pomegranate had marketing costs of approximately 16.82, 23.14, 28.33, & 21.03 % respectively. The farmer's net share of the market price in banana and pomegranate was 53 and 50 per cent, respectively. Mango, grapes, banana, and pomegranate had market performance of 0.85, 2.13, 1.12, and 1.01 per cent, respectively.

**Bhardwaj (2007)** conducted study find on conceptual reforms to increase fruit marketing performance, it was discovered that a competitive market-chain would provide producers with long-term growth and profits. It laid the framework for successful mechanisms to:

- Capabilities of market intelligence
- Procurement of services and inputs, production, and marketing
- Infusing agencies for improving business environment.

#### **Study on constraints in production and marketing.**

**Radhika et al.(2020)** in their study, focused on supply chain of Agri. commodities in India and found that agricultural commodity supply chains are a web of market participants that connects producers to end users. The supply chains for two agricultural commodities, jaggery and litchi, were identified, and the costs associated with each channel were determined. Market intermediaries played a critical role in determining the price of agricultural products and, as a result, the returns that farmers received. Farmers and market intermediaries faced different constraints depending on the channel they use, and the length of the channel influence the cost and quality of the channel.

**Chandra et al. (2012)** Studies focus on marketing efficiency of vegetables in developing economies. Litchi fruit can only be stored at room temperature for 1 to 2 days after harvest. Under cold conditions, a steady decrease in fruit weight was observed in the current research. Chemical treatments had a big impact on the TSS (Total soluble solid). Litchi fruit spoilage was minimised by all four packaging materials. The packaging materials had a major impact on total soluble solids. This added value to the supply chain by extending the shelf life and improving the quality of the produce, and the farmer a higher share of the customer rupee.

**Singh and Dwivedi (2012)** in their study, the status of litchi production in India, with the its constraints, and opportunities. The Horticulture Technology Mission Project conducted research in various parts of Uttarakhand, which revealed issues such as the litchi crop's high sensitivity to environmental conditions, restricted varietal wealth, long gestation time, low and erratic bearing, skin cracking, fruit falling, pest incidence during the reproductive process, poor shelf life, and post-harvest disease as major constraints in litchi production.

**Bharadwaj et al.(2012)** in their study on the SWOT Matrix Approach, identified the following challenges and constraints in the production, marketing, and export of litchi: On the one hand, they must deal with hundreds of small-scale farmers (usually through intermediaries) who want a fair price for their produce. Exporters, on the other hand, must produce goods that meet quality criteria as well as, progressively, social and environmental expectations in competitive markets. This necessitates the implementation of expensive quality control programmes as well as farmer preparation. Producing litchi for high-quality markets such as Europe, the United Arab Emirates, and the United States presents both opportunities and constraints

(price margins are usually higher) (higher requirements on quality). To conquer these barriers, producers and exporters need assistance. Globalization and liberalisation are forcing favoured business partners to form exclusive supply chains. Small-scale agriculture is ill-equipped to deal with these changes. They propose that a concentrated effort be made to include poorer households in value chains, organisational growth, technological upgrading, management skills, and financial access.

**Dhaka and Poonia (2010)** studied the constraints in production and marketing of vegetables in Rajasthan. They revealed that the perishability of vegetables, small quantity of produce and price fluctuations as the major impediments in marketing. They used Rank Based Quotient (RBQ) to rank the constraints.

**Sikka *et al.* (2005)** conducted study, on problems and opportunities in value chain export of litchi in Uttarakhand. They found that the cost of marketing was about five times that of domestic because foreign trade necessitates a lot of logistics, but the absolute producer's share is half as high, implying higher returns to farmers. Litchi has a limited shelf life when stored at room temperature. As a result, for successful marketing, the study also recommended cautious post-harvest procedures, such as grading, packaging, and transportation under regulated conditions. They also emphasised the importance of the Horticulture Technology Mission, APEDA, Directorate of Horticulture, NHB, and others playing a larger role in meeting demand for Uttarakhand litchi in Middle Eastern countries and UK.

**Mushtaq *et al.* (2005)** in his study on post-harvest losses in mango in Pakistani Punjab had identified the total post-harvest losses in the marketing channel of mango which were 11.97 per cent at farm level (producer/contractor level), 11.1 per cent at market level (phariawala and retailer level) and 7.9 per cent at consumption level. Experience, area, picking stage, picking technique, number of workers and training of workers had significant effect on post-harvest losses of mango at farm level while education of producer/contractor, picking time, variety combination and average distance of farm to market had no significant effect on losses.



# **CHAPTER - III**



# **MATERIALS AND METHODS**



## **MATERIALS AND METHODS**

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Present investigations on “An economic analysis of supply chain management and marketing efficiency of litchi in Muzaffarpur district of Bihar” under the three sub headings whole technical programme was presented in this chapter. The first part describes the details of sampling procedure that was carried out for the study. Second part contains the study kind and nature of data that was collected and the third part contains the different analytical tools that was utilized for analyzing the data. The details approaches presented here under.

Primary data was obtained using the survey process, including personal interviews, using primary analyzed questionnaires considered for this research study. From the Department of Horticulture, Govt. Websites, The National Litchi Research Centre, and other outlets, secondary data were collected.

The methodology followed is given below with subheads.

3.1 Procedure of sampling plan

3.2 Plan of data collection

3.3 Plan of analysis of tools

### **3.1 SAMPLING PROCEDURE**

This section consists of selection of state, district, block, villages, and ultimate growers/ market intermediaries in the study area, the details are here under.

#### **3.1.1 Selection of district**

On the basis of higher acreage, as well as production across the district in the state, the district of Muzaffarpur was selected for in-depth study. It was selected from the point view of the importance of litchi cultivation in the economy of Muzaffarpur.

#### **3.1.2. Selection of blocks**

Out of sixteen blocks in the selected district, four (4) blocks namely, **Moural, Bochha, Mushahari, & Kanti** were chosen based on larger area and yield of Litchi cultivation.

### 3.1.3. Selection of village

In this stage of sampling, for each block a list of villages was prepared considering the potential under the cultivation of litchi crop. After that 3 villages were chosen randomly for each separate block. The total 12 villages were selected for the study.

<b>Estimated divisions Wise Area, Production, of Litchi in Muzaffarpur District of Bihar</b>		
<b>Blocks</b>	<b>Area (in hectares)</b>	<b>Production(000MT)</b>
MUSHAHRI	1050	6000
MINAPUR	895	5050
BOCHAHAN	520	2003
KATRA	283	1500
GAIGHAT	491	1550
MOURAL	450	2250
SAKARY	350	2000
KURHANI	498	2948
KANTHI	1050	5372
PAROO	456	2776
<b>Overall</b>	<b>6043</b>	<b>42755</b>

### 3.1.4 Selection of Farmers

In this step, the directory of litchi growers was arranged as of each selected village according to their land holding size.

The prepared list was the categorized in to three broad groups according to land holding size i.e. small holding size one to two ha., mid farm size possess two to four ha., & larger farm size ranging greater than four ha, land .

From the categorized list, 60 farmers were selected randomly from 3 existing land size groups. In this way, number of small farmers were 34, medium 18 and large 8 using probability proportional to size method (PPS).

### 3.1.5. Selection of market intermediaries

This step made known about the levels of marketing intermediaries in system of marketing and analysed their marketing efficiency. The list of market middlemen

collected from National Research Centre for Litchi and personal interview method. The marketing system included contractors, commission agents, wholesalers and retailers etc. The total sample of market intermediaries were 80, collected from all four blocks. From each block 20 market middlemen were selected.

#### **Four channels were identified on the basis of preliminary information**

**Channel I:** Producer - Pre-harvest contractor - Commission agent cum Wholesaler – Retailer – Consumer.

**Channel II:** Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer – Consumer.

**Channel III:** Producer - Retailer – Consumer.

**Channel IV:** producer –consumer

### **3.2. Collection of Data**

Primary as well as secondary data were used for the study.

#### **3.2.1 Sources of primary Data**

To calculate the marketing channels, cost of marketing, marketing margins, price spread & constraints faced by litchi grower in study area, the respondents were interviewed and documented through direct personal contact in the study area with pre-tested questionnaires. The reference period of the study was agricultural year 2019 to 2020. The primary data related to marketing aspects were also required to be collected through a well structured and pre tested questionnaires from various litchi growers, and market intermediaries.

#### **3.2.2 Sources of Secondary Data**

In this section the already published data were used to achieve the objectives. The secondary data collected from available sources i.e., Reports, Journals, Books, and websites, Government offices through personal visit or visit of websites to Directorate of Agriculture, Govt. Of Bihar, National Research Centre for Litchi, Ministry of Agriculture ,Govt. of India etc.

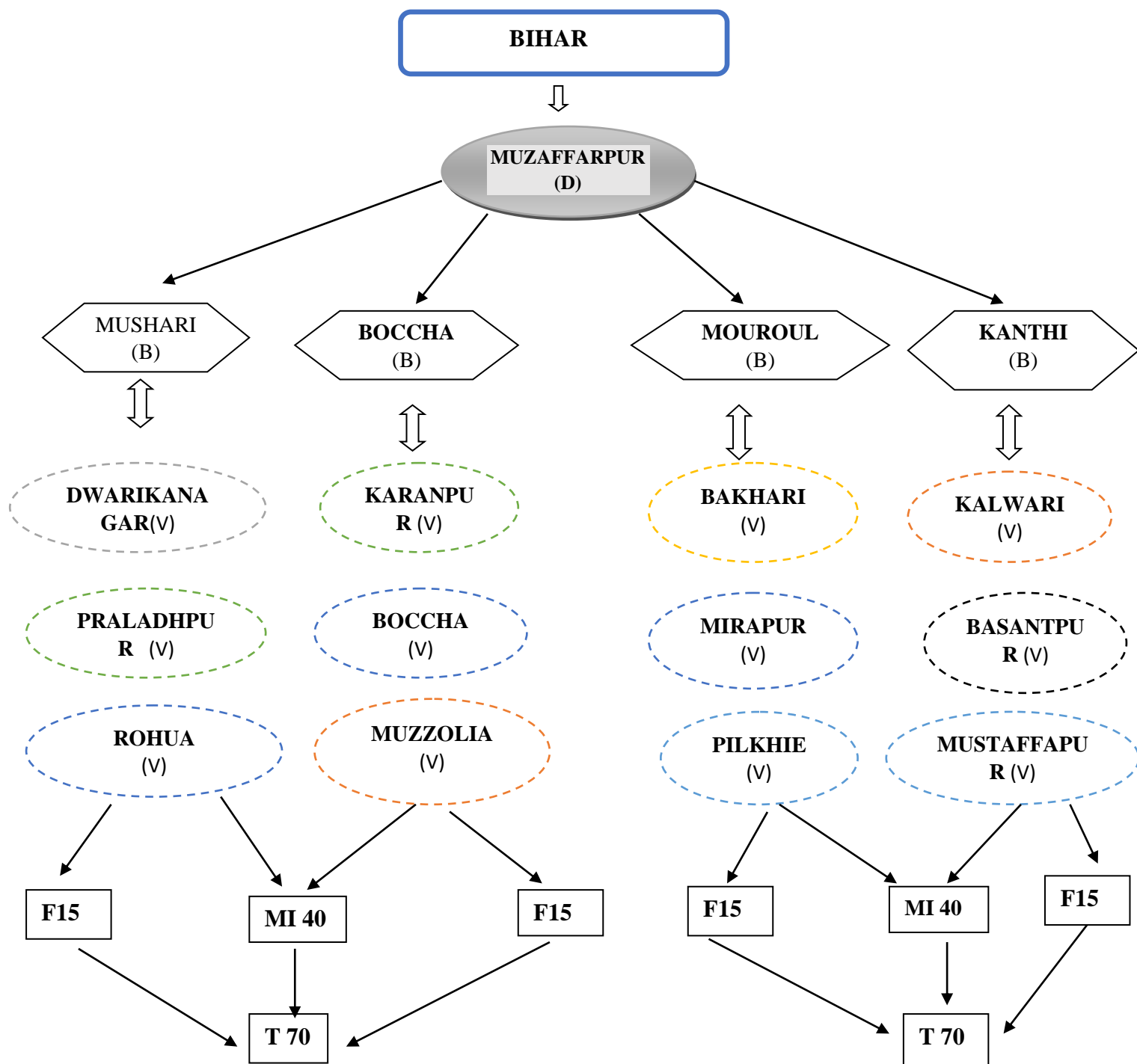


Fig -3.1 Sampling design showing selection of study area and sample size

**F – Farmers (Farmers-15 from each block/Taluk**

**Different size Groups (Small farm size -1.0 - 2.0 hectare, Medium farm size -2.0 - 4.0 hectare, Large farm size – greater than 4 hectare)**

**MI- Market Intermediaries (P.H.Contractore-6, Wholesalers /C. A.-7, Retailers-5, & Consumers-4, Total = 20 samples from each block/taluk).**

### 3.3 Tools analysis

In this study part, the effort was made to focus on statistical analysis, functional analysis such as compound growth rate and marketing effectiveness which were used to analyse and derive appropriate conclusions from the data. To get at the conclusions, price spread, producer's portion in consumer's rupee, and middlemen's margins were used.

#### 3.3.1 Tabular Analysis

The information collected about the data was compiled and evaluated. To get the results, traditional and functional analyses were used. To understand the results, simple percentages and averages were calculated.

#### 3.3.2 Functional Analysis

##### 3.3.2.1 Evaluation of growth rates

In this analysis, the data for Muzaffarpur district as a whole was analysed using a trend analysis. To examine the variations in cultivated area of litchi, output and productivity in Muzaffarpur district, compound growth rates were calculated. The research was conducted over a ten-years period, from 2010-2011 to 2019-2020. The exponential approach was used to determine compound growth rates.

$$y = AB^t \dots \dots \dots (1)$$

$$\text{Log } y = \text{Log } a + t * \text{Log } b \dots \dots \dots (2)$$

Here,

t = Base period in number of years (1, 2, 3.....n)

y = Area/ Production/ Productivity

b = (1+ r) r = Compound growth rate

And a = Constant

In Log b estimated by following formula.

$$\text{Log } b = \frac{t * \log Y - (t * \log Y/n)}{t} \dots \dots \dots (3)$$

$$t^2 - (t)^2 / n$$

Here,

n = Number of years

The per cent of compound growth rate is,

$$[(\text{Anti log of } b) - 1] \times 100 \dots \dots \dots (4)$$

The standard error of growth rate (SEr) expected from with the help of following equation.

$$\text{SEr} = \frac{\log b}{\log e(n-2)} \sqrt{\frac{\sum (\log y)^2 - (\sum \log y)^2 / n - (\log g)^2 \sum T^2}{\sum T^2}} \dots \dots \dots (5)$$

The significance of growth rate estimated by with the help of student t test.

$$T = r / \text{SEr} \dots \dots \dots (6)$$

Here = T = t - t

### 3.3.3 Marketing cost

In this part of study, it included the entire cost of marketing, in cash or in kind, borne by the producer-seller and numerous intermediaries engaged in the sale and purchase of the commodity until it reaches the final consumer.

$$C = C_f + C_{m1} + C_{m2} + C_{m3} + \dots \dots \dots C_m \dots \dots \dots (7)$$

Here,

- C = total marketing cost.
- Cf = cost incurred by producer.
- Cmn = cost paid by market middlemen.

### 3.3.3.1 Producer's Share

It is the proportion of the consumer price that the producer receives.

$$P_s = (P_f/P_c) \times 100$$

### 3.3.4. Marketing Margin

The distinction among both middlemen's accumulated interest (cost + purchase price) & returns (selling price) is known as the spread (ith agency).

a) Absolute margin of the  $i^{\text{th}}$  middlemen

$$\frac{P_{Ri} - (P_{Pi} + C_{mi})}{P_{Ri}} \times 100 \dots\dots\dots (8)$$

b) Percentage margin of the  $i^{\text{th}}$  middlemen

$$(Pmi) = \frac{P_{Ri} - (P_{Pi} + C_{mi})}{P_{Ri}} \times 100$$

Where,

PRi= (sale price)

PPi= (purchase price)

CMi = Cost incurred on marketing per unit

### 3.3.5. Price Spread

It is the ratio between the price the consumer pays and the price the maker receives. With the help of following formula this was analyzed.

$$\text{Price Spread} = P_p - P_f$$

Pp = Price paid by the consumer.

Pf = Price received by the farmer.

### 3.3.6. Marketing Efficiency of separate Channels

A measure of market performance is marketing efficiency. Efficient marketing is defined as the transfer of products from producers to final consumers at the lowest feasible cost while maintaining the level of service required by the customers.



### Using shepherd formula

Shepherd (1965) proposed using the ratio of total value of promoted items to marketing cost as a measure of marketing efficiency. The larger this proportion, the more efficient it is, and vice versa. The following is an example of how this may be expressed:

$$ME = [(V/I)-1]$$

Where,

ME = In marketing efficiency.

V = Value of goods sold.

I = Total marketing cost.

### 3.3.7 (RBQ) Rank based quotient

The grower's and their market middlemen' challenges in marketing litchi were highlighted. The data was quantified by rating the restrictions based on the replies received and then computing the rank based quotient (RBQ).

$$R.B.Q = \frac{\sum f_i (n+1-i)}{N \times n}$$

Here,

$f_i$  = No of respondents coverage a specific problem beneath  $i$ th rank.

N = Overall no of respondents.

n = Overall no of identify problems.

### 3.4 CONCEPTS USED

**Pre-Harvest contractors:** this person can be defined as persons who contract to buy the produce before it is actually harvested, usually on market terms and conditions. They are, in a sense, forward traders.

**Wholesalers:** The seller intermediaries that trade enormous amounts of agricultural commodities. They have the option of purchasing directly from farmers or through other pre-harvest contractors.

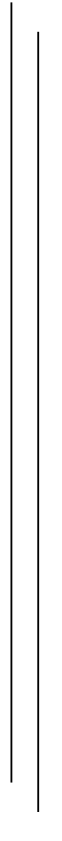
**Distant Wholesaler:** A person who engages in purchasing activities by calling a wholesaler. He is in charge of marketing in far-flung locations such as Nagpur, Gujarat, and Delhi.

**Commission Agent:** Intermediaries facilitate the sale of litchi by acting as an intermediary between farmers, producers, or pre-harvest contractors and wholesalers. Any businessman who registers mostly with market committee can serve as a commission agent in regulated agricultural marketplaces.





## **CHAPTER - IV**



### **AGRO-ECONOMICS BACKGROUND OF THE STUDY AREA**



## **AGRO-ECONOMICS BACKGROUND OF THE STUDY AREA**

This research study having knowledge about the area where the study took place. The study area's general characteristics encourage discussion of similarities and differences in various components such as district physical features, land use pattern, soil type, rainfall, irrigation, crop pattern, government plans, government institutes, and so on, which should contribute to the area's history and study significance.



**Figure No. 4.1 Bihar location map**

#### 4.1 General description of Study area

Muzaffarpur district is situated in the Tirhut Division and is part of the North Bihar plains. In 1875, the old Muzaffarpur district was formed by dividing the previous district of Tirhut for administrative purposes. Muzaffarpur, the city's capital, was created in the 18th century by Muzaffar Khan, an amil (revenue farmer). Muzaffarpur district currently includes two sections, Muzaffarpur East and Muzaffarpur West, as a consequence of reorganisation of counties in the Country in 1972, which resulted in the establishment of Sitamarhi and Vaishali districts (which were previously subdivisions of Muzaffarpur district).



Figure 4.2 District wise distribution of Bihar



**Figure 4.3 Division wise distribution of Bihar**

#### **4.2 Geographic and demographic profile of muzaffarpur district**

On a worldwide map, Muzaffarpur district, often known as "The Land of Litchi," is situated between 25°54' & 26°23' north latitude to 84°53' & 85°45' n latitude. The region is 3,172 square kilometres in size. It takes up 3.4 percent of the state of Bihar's total area. The district ranks 10th in thousand hectares when compared to other districts in Bihar. The muzaffarpur has an average elevation of 170 meter from mean sea level.

The district is bordered on the north by Sitamarhi, Sheohar, and PurbaChamparan, on the south by Vaishali and Saran, on the east by Darbhanga and Samastipur, as well as on the west by Saran as well as Gopalganj.

### 4.3 Important Statistics of District

**Table 4.1 Social characteristics of Muzaffarur District**

Items	Numbers
Number of village	1786
Number of towns	9
Number of households	943,155
Population	2,273,565
a. Rural	4327,625
b. Urban	473,437(9.86)
Decadal Population Growth	28.14%
a .Rural	28.42%
b. Urban	29.14%
Literates	2509,235 (63.43)
Schedule cast	751,975(15.66)
Schedule tribes	5979(0.12)
Total workers (main & marginal)	1547,586 (32.23)
a. main\	910,304 (18.96)
b . marginal	637,282 (13.27)
c. non workers	3253,476 (67.77)
Cultivar	273,436 (17.67)
Agricultural labour	769,001 (49.69)
Workers in households in industry	65,253 (4.22)
Others workers	439,896 (28.42)

**(Source: District census handbook, Muzaffarpur, 2011)**

**Table 4.2 Administrative Unit of the Selected District**

<b>Particulars</b>	<b>Description</b>
Sub-division	2
block	16
Revenue circle	16
Police station	29
Out post	9
Municipal corporation	1
Nagar panchayat	3
Total halka	141
Total number of panchayat	385
Total number of village	1811

#### **4.4 Natural Divisions**

The district of Muzaffarpur comprises the alluvium carried by the Gandak, Baghmata, as well as other rivers that pass through it has created a vast plain. There are no high contours on the land, and there are several chains of small marshes that act as a drainage system for surplus water amount of rainfall and torrent excess. The floodplain plain is a fertile stretch of land. The district's soil is mostly alluvial. The district's unique characteristic is that several of its riverbeds are higher than the surrounding terrain owing to continual silt deposition. During the rainy season, this results in regular flooding, notably in the district's north-east and southeast.

#### **4.5 Climate**

Except during the summertime, when it is quite dry, the district enjoys a humid climate. From November to February, the cold weather begins, and from March to May, the summer season begins. June to September is the heavy rain, with October serving as a transitional month. Cold winters, with temperatures as low as 4-5°C. Early in April, dust storms and westerly winds usher in the warm weather. The warmest month is May, with maximum temperatures reaching 44°C. The monsoon season begins in the second part of June and lasts through September, with the monsoon season bringing the most yearly rainfall.

#### 4.6 Rainfall

According to statistics from the State Department of Statistics and Evaluation, the annual average rainfall in the district has varied between 761.0 and 2,295.5mm during the previous decade. Maximum annual rainfall from June through September, when the region receives about 80% of its annual average total rainfall. As during month of December, the region receives the least amount of rainfall. During the monsoon season, the weather becomes hot and humid. During 2006-09, the average amount of rain in the district ranged from 38.6 to 67.1.

**Table no. 4.2 Annual Rainfall of Muzaffarpur District**

ANNUAL AVERAGE RAINY DAYS AND ACTUAL RAINFALL IN M.M							
2006		2007		2008		2009	
Average Rainy Days	Actual Rainfall	Average Rainy Days	Actual Rainfall	Average Rainy Days	Actual Rainfall	Average Rainy Days	Actual Rainfall
1	2	3	4	5	6	7	8
38.6	1058.5	67.1	2295.5	59.5	1359.7	37.3	761.0

Source- Directorate of Statistics and Evaluation, Bihar

#### 4.7 Land use Pattern

Agriculture is the primary source of income for the residents of the area. The soil of the district of Muzaffarpur is highly calcareous. Among the different kinds of the soil found here are sandy, loamy, light clayey and usar. Paddy is mainly produced on clayey soil known as maltivari in the area. The sandy loam described as balsundari is ideal for growing rabi. The district's major crop is rice. It accounts for the majority of the total sown area. The district's second most significant crop is maize. Wheat is cultivated in various areas of the district as well. Sugar cane, potato, & barley are just a few examples & grain is a couple of examples. These are only a few instances. Figures for land use patterns are as follows:-

**Table 4.3 Land Use Pattern of Muzaffarpur District**

Overall Forest Area (in Hectares)	Overall Irrigated Land Area (in Hectares)	Overall Un irrigated Land Area (in Hectares)	Cultivable Waste Land Area (in Hectares)	Barren and Un cultivable Land Area (in Hectares)	Area under Non Agricultural Uses (in Hectares)
1702.5	1131116.8	114417.7	7240.2	5661.4	35440.3

Source- Directorate of Statistics and Evaluation, Bihar

#### **4.8 Irrigational facilities**

Irrigation in Muzaffarpur involves watering of the fields on one hand and dewatering of the water-logged areas on the other. A number of schemes have been executed or taken up in the district during the recent period for meeting the above problems. Besides, expansion of irrigational facilities in the district has been done through adoption of various Medium different plan periods.

#### **4.9 Agri +culture**

Agriculture is the primary source of income for the residents of the area. The district's soil is quite calcareous. Among the different kinds of the soil found here are sandy, loamy, light clayey and usar. Paddy is mainly produced on clayey soil termed as maltivari in the area. The sandy loam described as balsundari is ideal for rabi agriculture. The district's major crop is rice. It accounts for the majority of the total sown area. The district's second most significant crop is maize. Wheat is cultivated in various areas of the district as well. Mango & litchi are popular in the area, and they are also exported to other parts of the state. About % of the district's total land is cultivable, while the remainder is used for quasi purposes.

#### **4.10 Soil**

Bihar is located on the world's most rich soils plain, the Genetic Valley, which stretches from the Himalayan foothills in the north to a few miles west of the Ganges as it runs from south to north across the state. Due to a relief features of the area, numerous soil types have evolved from variations in relief, precipitation, flora, and parent rocks. Piedmont Swamp Soil, Terai Soil, Genetic Alluvium Soil, Karail-Kewal Soil, Red and Yellow Soil, Red Sandy Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil, Karail-Kewal Soil

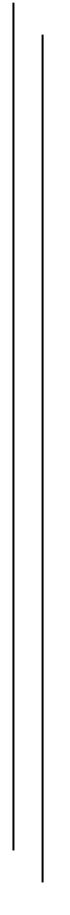
#### **4.11 Dairy**

Muzaffarpur, also called financial capital of Bihar, is the Fourth largest producer of milk in Bihar after Gaya, Patna, East and West Champaran. It offers good opportunity for setting up of new dairies supplying milk to nearby locality. According to economic survey of Bihar (2016-17), there were 19.5 thousand milk cooperative societies in Bihar in 2014-15.





# **CHAPTER - V**



## **FINDING AND DISCUSSION**



## **FINDINGS AND DISCUSSION**

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This chapter focus on results and discussion obtained from primary as well as secondary data. In this chapter an attempt has been made to explain the results through application of analytical tools. This section is presented into different heads for ease of understanding and accessibility.

- 5.1 Socio economic characteristics of sample litchi growers.
- 5.2 Growth rates in area, production, and productivity of litchi.
- 5.3 Procedure of marketing, marketing channels and price spread of litchi.
- 5.4 Problems related with marketing of litchi.

### **5.1 Socio-economic characteristics of sample litchi growers**

In this section educational status, age group, holdings size, and family size were studied to find out the socioeconomic characteristics of the respondents. This analysis was necessary in order to gain a complete understanding of the responders' socio-economic status in order to carry out the study in the most efficient manner and to recommend suitable suggestions.

#### **5.1.1 Sample size**

The present study covers a sample of 60 litchi growers in three size group i.e. small farm size (1 to 2 hectare), medium farm size (2 to 4 hectare), and large farm size (greater than 4 hectare) in selected district is presented in Table 5.1.

**Table 5.1: Categorization of farm size according to land holdings**

<b>S.No.</b>	<b>Farm size</b>	<b>No. of respondent</b>	<b>Per cent</b>
2	Small (1.00-2.00 hectare)	34.00	56.67
3	Medium (2.0-4.00 hectare)	18.00	30.00
4	Large (>4.00 hectare)	8.00	13.33
5	<b>Total</b>	<b>60.00</b>	<b>100</b>

It was observed from the table that highest number of farmers belonged to the category of small size farmers i.e. 34 and from the size of medium group of farmers was 18. The large group was having lowest number of farmers i.e. 8.

It was further observed that Muzaffarpur district had the largest number of small farmers i.e. 56.67 per cent followed by medium and large farmers being 30 (13.33 per cent).

It was clearly defined from above discussion that the small farmers dominated in Muzaffarpur district.

### 5.1.2 Average size of land holding

**Table 5.2: Average size of land holding among different farm size groups**

<b>S.No.</b>	<b>Particulars</b>	<b>Small farm size</b>	<b>Medium farm size</b>	<b>Large farm size</b>	<b>Overall</b>
1	<b>No. of respondent</b>	34	18	8	<b>60</b>
2	<b>Cultivated area overall (ha)</b>	46.23	73.01	145.54	<b>286.55</b>
3	<b>Per cent</b>	16.13	33.07	50.79	<b>100.00</b>
4	<b>Average</b>	1.35	4.00	18.19	<b>4.77</b>

For the agricultural production, land is the basic and important resources. The size of holding affects the selection of marketing channels and economic profit of the respondent. The average size of land holding was for the selected farmers are presented in Table 5.2.

The average land holding size of small farmers was 1.35 hectares, followed by medium and large farmers with 4.05 and 18.19 hectares, respectively.

### 5.1.3 Size of family

**Table 5.3: Size family under different size groups**

<b>S.no.</b>	<b>Types of farmers</b>	<b>Size of family</b>	<b>Respondent</b>	<b>Percent</b>
<b>1</b>	<b>Small</b>	< 4	3.00	8.83
		4 to 6	19.00	55.88
		7 to 9	5.00	14.71
		10 & above	7.00	20.58
		<b>Total</b>	<b>34.00</b>	<b>100.00</b>
<b>2</b>	<b>Medium</b>	< 4	2.00	11.11
		4 to 6	9.00	50.00
		7 to 9	4.00	22.22
		10 & above	3.00	16.67
		<b>Total</b>	<b>18.00</b>	<b>100.00</b>
<b>3</b>	<b>Large</b>	< 4	1.00	12.5
		4 to 6	3.00	37.5
		7 to 9	2.00	25.00
		10 & above	2.00	25.00
		<b>Total</b>	<b>8.00</b>	<b>100.00</b>
<b>4</b>	<b>Overall</b>	< 4	6.00	10.00
		4 to 6	31.00	51.67
		7 to 9	11.00	18.33
		10 & above	12.00	20.00
		<b>Total</b>	<b>60.00</b>	<b>100.00</b>

In particular, the majority of the respondents (51.67%) had a family size of 4 to 6 people, while 18.33% had a family size of 7 to 9 members, as shown in Table 5.3. Only 20.00 % of family had 10 and more than 10 members.

#### 5.1.4. Age

**Table 5.4 Age wise distribution of respondents**

S.No .	Types of farmers	Age group	No. of family members	Per cent
1	Small	Child (<18) year	0.28	12.96
		Middle (18-50) year	1.75	81.01
		Old (>50 year)	0.13	6.01
		Total	2.16	100.00
2	Medium	Child (<18) year	0.40	16.80
		Middle (18-50) year	1.82	76.47
		Old (>50 year)	0.16	6.73
		Total	2.38	100.00
3	Large	Child (<18) year	0.62	24.50
		Middle (18-50) year	1.79	70.75
		Old (>50 year)	0.12	4.74
		Total	2.53	100.00
4	Overall	Child (<18) year	1.3	18.39
		Middle (18-50) year	5.36	75.82
		Old (>50 year)	0.41	5.80
		<b>Total</b>	<b>7.07</b>	<b>100.00</b>

In this selected area (81.01 per cent), the share of age middle age group (18-50 years), as marketing of agriculture experience was the highest among in small size group of farmers. In the middle age group (18-50 years) was recorded to have a share of total family size of 76.47. The average size of family members in large group of community (75.82 per cent) share by middle age group (18-50 years).

The average size of family members in small group of farmers was highest is (81.01 per cent).

### 5.1.5 Educational (literacy) Level

Education is the key of growth, prosperity, social equity, social justice, and equal opportunity.

Education and earnings are linked with each other. The people involved in agriculture as well as other occupations get benefit greatly from education. Several studies revealed that the highly educated individual earns more than the less educated person. Farmers with a higher level of education had a better knowledge of advisories, took fewer risks, and shared information with their peers more frequently than those with a lower level of education. Therefore, it is crucial to study the education level of farmers. The educational level of respondents is presented in Table 5.5.

**Table 5.5 Educational status of respondents**

Types of farmers	Particulars	No. of respondents	Per cent
<b>Small</b>	Illiterate	7.00	20.59
	Primary	5.00	14.70
	Middle	8.00	23.53
	High school	7.00	20.59
	Intermediate	5.00	14.70
	Graduate	2.00	5.89
	PG	0.00	0.00
	<b>Total</b>	<b>34.00</b>	<b>100.00</b>
<b>Medium</b>	Illiterate	2.00	11.11
	Primary	1.00	5.56
	Middle	5.00	27.78
	High school	7.00	38.89
	Intermediate	0.00	0.00
	Graduate	2.00	11.11
	PG	1.00	5.55
	<b>Total</b>	<b>18.00</b>	<b>100</b>
<b>Large</b>	Illiterate	1.00	12.5
	Primary	0.00	0.00
	Middle	0.00	0.00
	High school	2.00	25.00
	Intermediate	1.00	12.5
	Graduate	1.00	12.5
	PG	3.00	37.5
	<b>Total</b>	<b>8.00</b>	<b>100</b>
	Illiterate	10.00	16.67

<b>Overall</b>	Primary	6.00	10.00
	Middle	13.00	21.66
	High school	16.00	26.66
	Intermediate	6.00	10.00
	Graduate	5.00	8.34
	PG	4.00	6.67
	<b>Total</b>	<b>60.00</b>	<b>100.00</b>

It is evident from the table that only 16.67 per cent respondents were illiterate and remaining 83.33 per cent were educated. Among the literate farmers, majority (26.66 %) were having qualification up to high school level. Very less farmers (6.67 %) were having qualification up to post graduate level. The percentage of farmers were having qualification up to primary, middle, intermediate, graduation level are 10.00, 21.66, 10.00, 8.34 per cent respectively.

## **5.2 GROWTH RATES IN AREA, PRODUCTION, AND PRODUCTIVITY OF LITCHI**

In this section, the compound annual growth rate (CGR) and percent change in area, production, and productivity of litchi in India is presented.

### **5.2.1. Year wise growth trends in area, production, & productivity of Litchi in India**

The compound annual growth rate (CGR) and percent change in area, production, and productivity of litchi was calculated from the data collected from secondary sources for ten-year period (2010-11 to 2019-20). The growth trend in area, production, & productivity of litchi in India is given in Table 5.6.

**Table: 5.6 Growth trend in area, production, & productivity, of litchi in India (2010-11 to 2019-20)**

<b>S.No.</b>	<b>Year</b>	<b>Area (in '000' ha)</b>	<b>% change from previous year</b>	<b>Production (in'000'MT)</b>	<b>% change from previous year</b>	<b>Productivity (MT./ha.)</b>	<b>% change from previous year</b>
1	2010-2011	78.2	-	500.48	-	6.4	-
2	2011-2012	80.4	2.81	538.68	8.2	6.7	4.69
3	2012-2013	82.7	2.86	595.44	7.81	7.2	7.46
4	2013-2014	84.2	2.41	597.82	0.9	7.1	-1.39

5	2014-2015	85.1	0.47	527.62	-9.76	6.2	-12.68
6	2015-2016	90.2	5.99	559.24	5.91	6.2	0
7	2016-2017	92.4	2.44	582.12	6.4	6.3	1.61
8	2017-2018	93.1	0.75	688.94	15.27	7.4	17.46
9	2018-2019	95.7	2.79	717.75	5.13	7.5	1.35
10	2019-2020	96.2	0.52	692.64	-2.03	7.2	-4
	Per cent change in 2019-20 over 2010-11		23.01		50.858		12.5
	<b>CGR</b>	<b>2.4620**</b>		<b>3.4779**</b>		<b>0.9915*</b>	

Note \*\* Significant @ 1% level of significance

\* Significant @ 5 % level of significance.

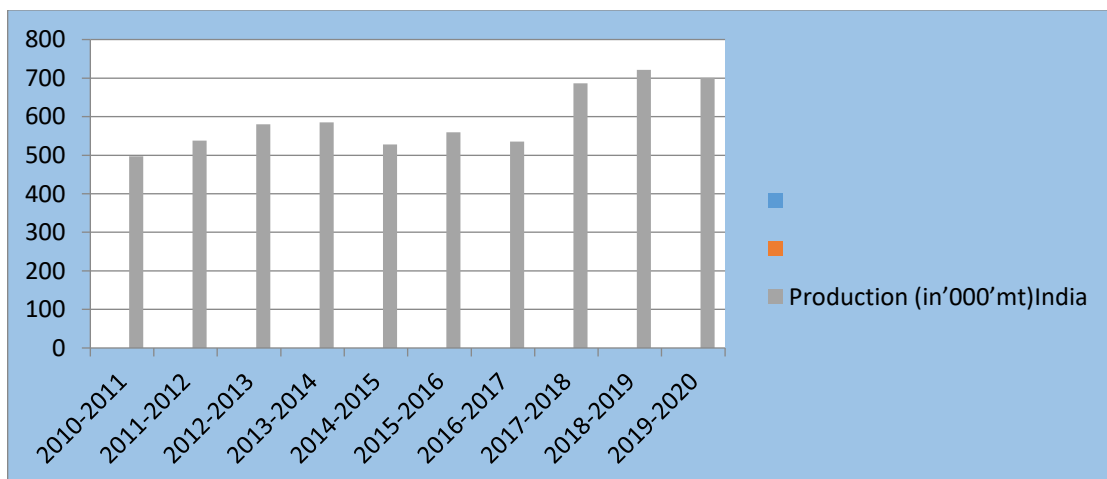
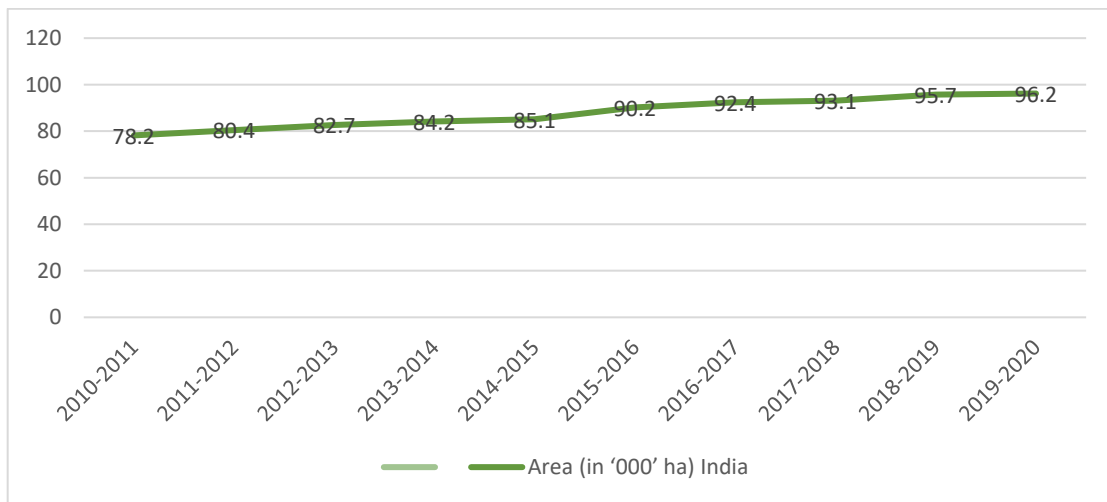
CGR: Compound growth rate.

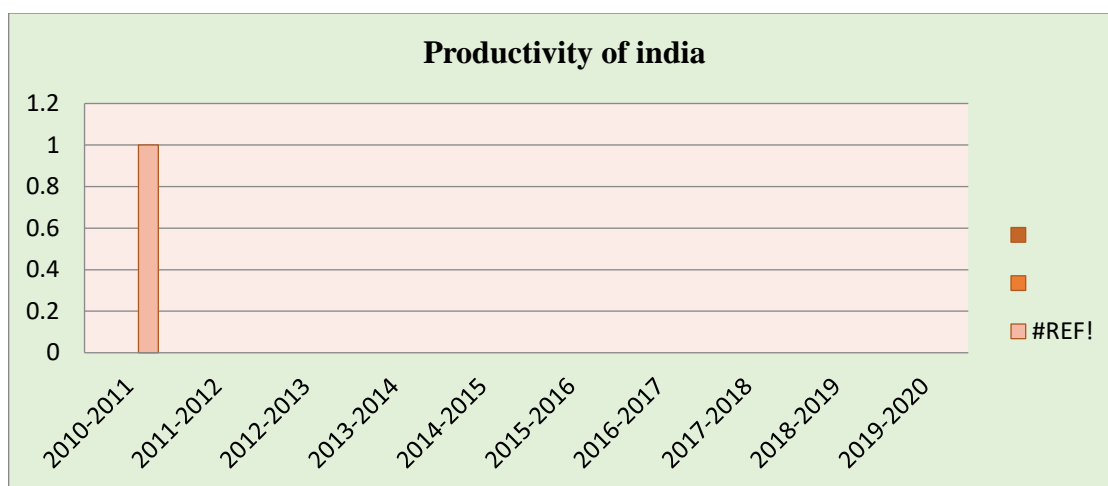
The cultivated area under litchi was 78.20 thousand hectares during 2010-11. The area has increased by 2.81 per cent during 2011-12 to 80.40 thousand hectares. The area extended to 82.70 thousand hectares in 2012-13 i.e., 2.86 per cent from the preceding year. It increased again to 84.20 ha (2.41%) in 2013-14. In the year of 2014-15 it became 85.10 thousand hectare (0.47 %). Similarly in 2015-16 it increased to 90.10 thousand hectares (5.99 %). Further in the year of 2016-17, the area increased by 0.75 per cent and reached 92.40 thousand hectares. In the year of 2016-17, further the area increased to 95.70 thousand hectare i.e., increase by 2.79 % from the preceding year. In the year 2019-20, area again increased to 96.20 thousand hectare i.e. 0.52 per cent from previous year. The cultivated area under litchi has increased from 2010-11 to 2019-20 due to increase in price of Litchi.

The production of litchi in the country during 2010-11 was 497.3 MT. In 2011-12 it increased to 538.10 MT (8.20 %) and further increased 580.10 thousand metric ton (7.81%) in the next year. Similarly in 2012-13 it increased to 580.10 metric ton (0.91%) from preceding year. It increase again 585.20 thousand (0.90%) in 2013-14 year. In the year 2014-15 it decline 528.20 thousand (-9.76 %) from the previous year. Similarly in 2015-16 it increased 559.40 thousand MT & (5.91 per cent). In the year 2017-18, production again increased to 721.30 MT and 750.20. Finally in the year 2019-20 the production level decreased to 700.20 thousand MT i.e. 2.93 % from the previous year.

The productivity of litchi during the year 2011-12 was 6.4 MT/ha. During the year 2011-12 it was constant at 6.7 MT/ha and it was further increased to 6.7 MT/ha (7.46 %) during 2012-13. Further it was decreased to 7.1 MT/ha (-1.39 per cent) in 2013-14. Similarly in 2014-15 it decreased to 7.1268. In the year 2017-18, productivity again increased to 7.4 MT/ha (17.46) from previous year. In the year 2018-2019 it was constant to 7.35 MT/ha from the preceding year. Finally during the year 2019-20 productivity decreased to 7.2 MT/ha (-4.00) from the preceding year.

From the above table, it is clear that the compound annual growth rate for area, production, and productivity was 2.4620 %, 3.4779 %, and 0.9915 %, respectively. The growth rate of area and production was significant at 1% significance level, and productivity was significant at 5% level of significance.





**Fig. 5.1 Year wise growth trends in area, production, & productivity of Litchi in India**

### 5.2.2 Year wise growth trends in Area, Production, and Productivity, of Litchi in Bihar.

The compound annual growth rate (CGR) and percent change in area, production, and productivity of litchi was calculated from the data collected from secondary sources for ten-year period (2010-11 to 2019-20). The growth trend in area, production, & productivity of litchi in Bihar is given in Table 5.7.

**Table: 5.7 Growth trend in area, production, and productivity, of Litchi in Bihar (2010-11 to 2019-20)**

S.No.	Year	Area (in '000' ha)	% change from previous year	Production (in'000'mt)	% change from previous year	Productivity (mt/ha.)	% change from previous year
1	2010-2011	31.1	-	227.03	-	7.3	-
2	2011-2012	31.1	0	236.36	9.43	7.6	4.15
3	2012-2013	30.3	-2.48	257.55	20	8.5	11.32
4	2013-2014	31.4	3.79	235.5	-22.23	7.5	-11.87
5	2014-2015	32	1.65	198.4	-36.2	6.2	-17.33
6	2015-2016	32.4	1.25	210.6	6.16	6.5	4.83
7	2016-2017	32.7	0.92	222.36	5.42	6.8	4.61
8	2017-2018	33	0.91	231	4.74	7	2.94
9	2018-2019	33.2	0.66	245.68	6.16	7.4	5.71
10	2019-2020	33.4	0.6	260.52	4.83	7.8	5.4
	Per cent change in 2019-20 over		7.4		13.78		6.84

2010-11						
<b>CAGR</b>	<b>1.0114**</b>		<b>0.5180**</b>		<b>-0.4884*</b>	

Note \*\* significant @ 1% level of significant, \* Significant @ 5 % level of significance.

CGR: Compound growth rate.

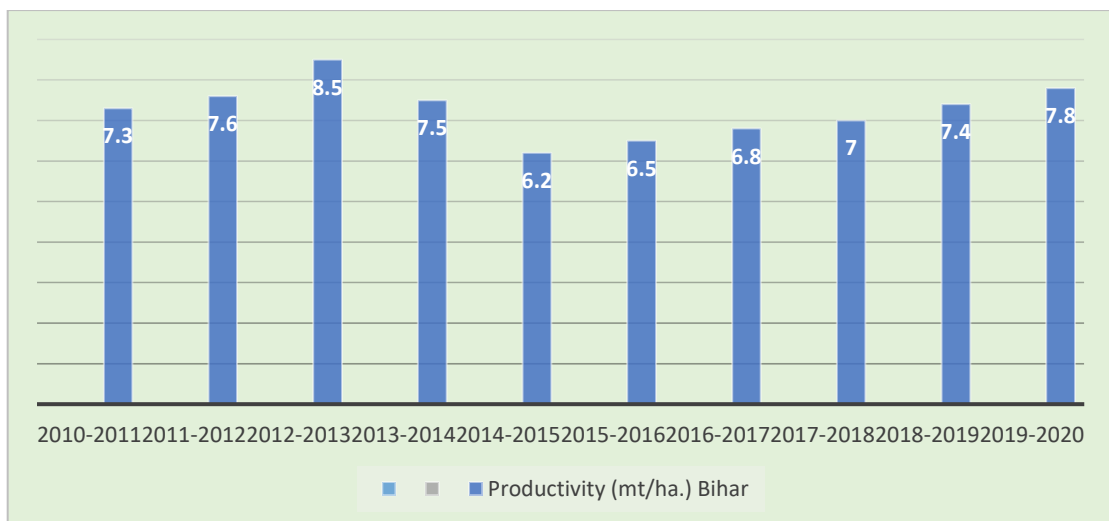
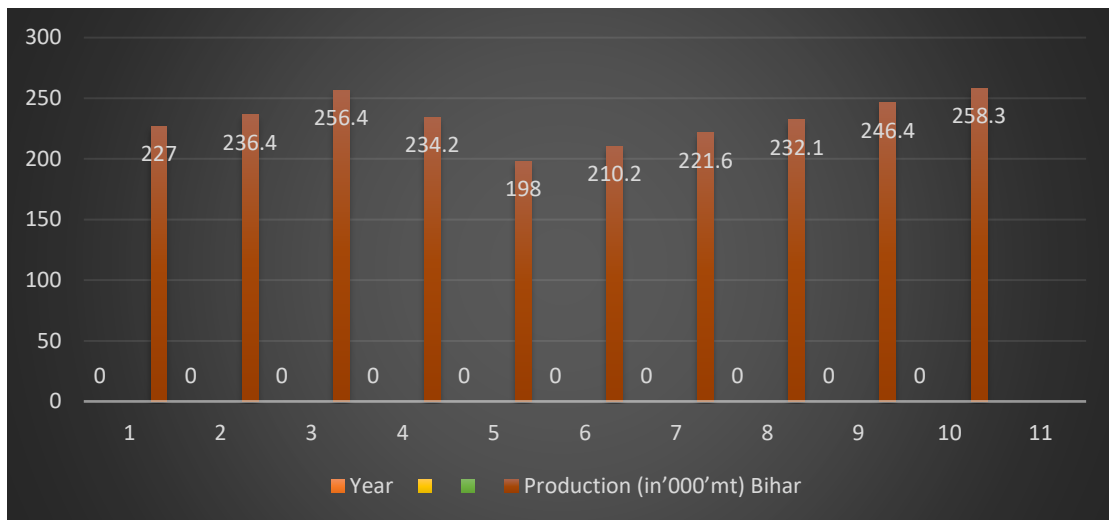
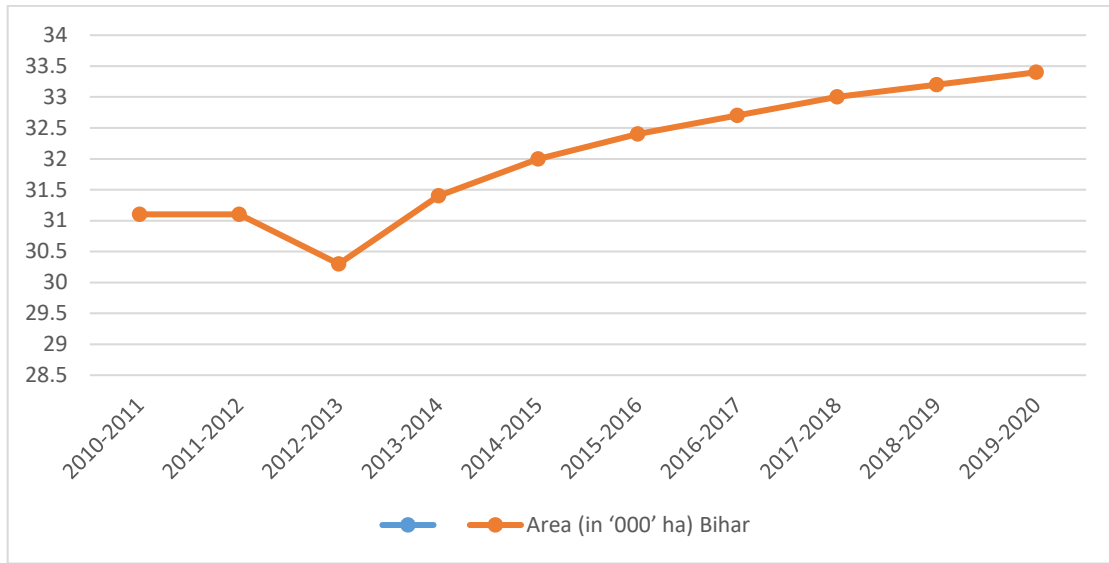
The cultivated area under litchi was 31.1 thousand hectare during 2010-11. The area has increased by 31.1 thousand hectares i.e. during 2011-12. The area extended to -2.48 % an increased from the previous year. It increased again to 31.4 thousand hectares (3.79 %) in 2013-14. Similarly in 2014-15 it again increased to 32.0 thousand hectares,(1.65%) from the preceding year. Further during the year 2015-16 it increased to 32.4 thousand hectares (1.25 per cent). In the year 2016-17, further the area increased to 32.7 thousand hectares (0.32 per cent),i.e increase by 33.0 (0.91%) thousand hectares from the previous years . During the year 2019-20 area was increased to 33.4 thousand hectares i.e.0.66 per cent from the previous year.

The production of litchi in Bihar during 2010-11 was 227.0 thousand MT. In 2011-12 it increased to 236.4 thousand MT, and further increased 9.43 % from the previous year. Similarly it increased to 256.4 thousand MT (20.00 %) from the previous year. In the year 2013-14, it declined to 234.2 thousand MT, it declined - 22.23 percent from the previous year. It again declined to 198.0 thousand MT (-36020 percent) from the previous year. From the previous year, production increased by 6.16 % to 210.2 thousand MT in 2015-16. Finally, production increased to 258.3 thousand MT in the year 2019-20, (4.83 %) from preceding year.

The productivity of litchi in Bihar during the year was 7.3 MT/ha. During the year 2010-11,it was increased to 7.6 MT/ha (4.15%), and further it was increased to 8.5 MT/ha (11.32%) from the previous year. In the year 2015-16, productivity declined to 6.5 MT/ha ( 4.83%) from the previous year. Similarly it was increased to 6.8 MT/ha from the preceding year. During the year 2017-18, it was increased to7.0 MT/ha. And it was further increased by 7.4 (5.71%) from the previous year. Finally, during the 2019-20 productivity increased by 5.40 % from the previous year it was increased to 7.8 MT/ha.

From the above table, it is clear that the compound annual growth rate for area, production, and productivity was 1.0114 per cent, 0.5180 per cent, and -0.4884

%, respectively. The growth rate of area production and productivity is positively significantly.



**Fig. 5.2 Year wise trends in area, production, & productivity of Litchi in Bihar**

**5.2.3 Year wise growth trends in area, production, and productivity, of Litchi in Muzaffarpur district of Bihar.**

**Table: 5.8 Growth rates in area, production, and productivity, of litchi in Muzaffarpur (2010-11 to 2019-20)**

S.No.	Year	Area ( '000' ha)	% change from previous year	Production (in00'MT)	% change from previous year	Productivity (MT/ha.)	% change from previous year
1	2010-2011	7281	-	53879.4	-	7.4	-
2	2011-2012	7289	0.11	53938.6	0.01	7.4	0
3	2012-2013	7300	0.15	59130	9.45	8.1	9.5
4	2013-2014	7300	0	59130	0	8.1	0
5	2014-2015	7298	-0.03	55464.8	-5.48	7.6	-6.2
6	2015-2016	7303	0.07	54772.5	-1.08	7.5	-1.32
7	2016-2017	7305	0.03	54787.5	0.01	7.5	0
8	2017-2018	7301	-0.05	54757.5	0.05	7.5	0
9	2018-2019	7353	0.71	55882.8	1.67	7.6	1.33
10	2019-2020	7395	0.57	56202	0.2	7.6	0
	Per cent change in 2019-20 over 2010-11	1.56		4.33		2.7	
	<b>CAGR</b>	<b>0.1239**</b>		<b>0.0014**</b>		<b>-0.1225*</b>	

Note \*\* Significant @ 1 % level of significance, \* Significant @ 5% level of significance.

The compound annual growth rate (CGR) and percent change in area, production, and productivity of litchi was calculated from the data collected from secondary sources for ten-year period (2010-11 to 2019-20). The growth trend in area, production, & productivity of litchi in Muzaffarpur district of Bihar is given in Table 5.8.

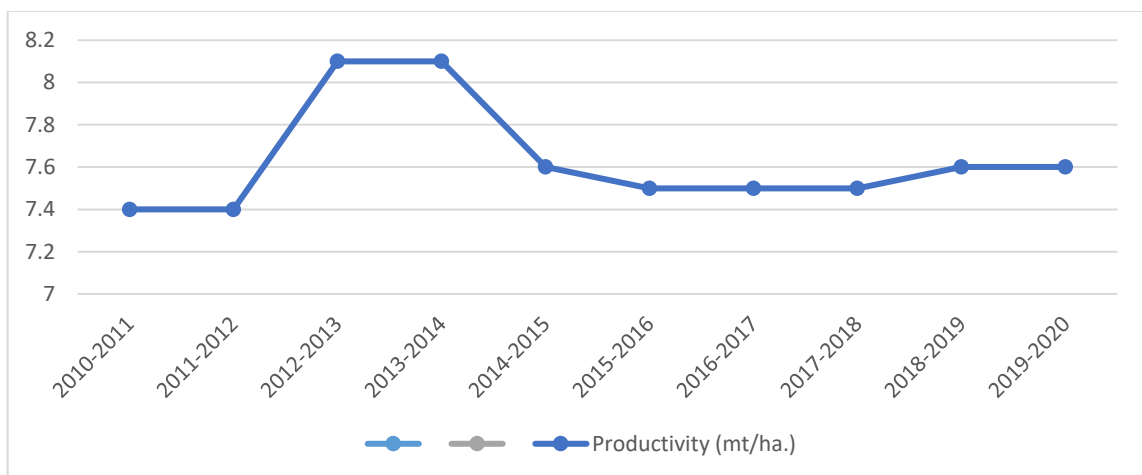
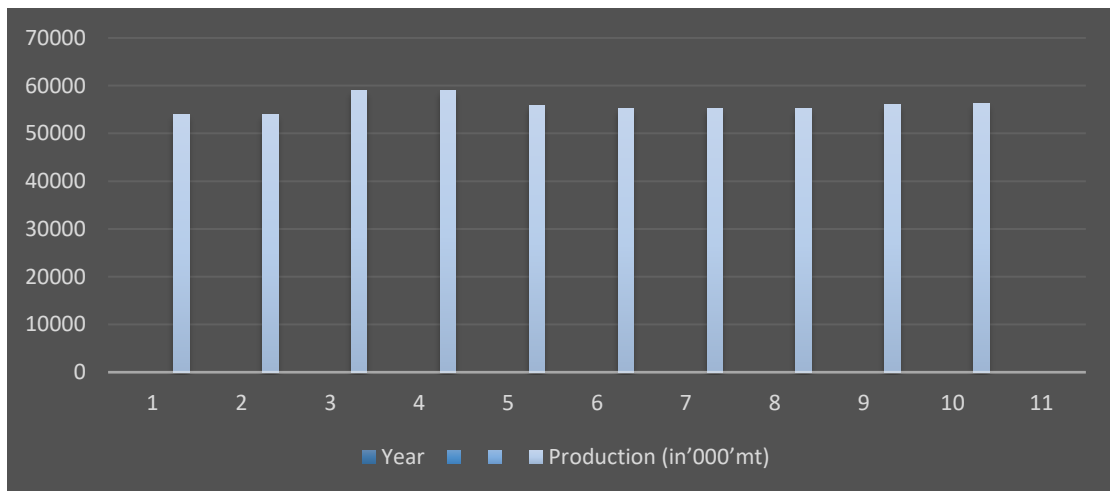
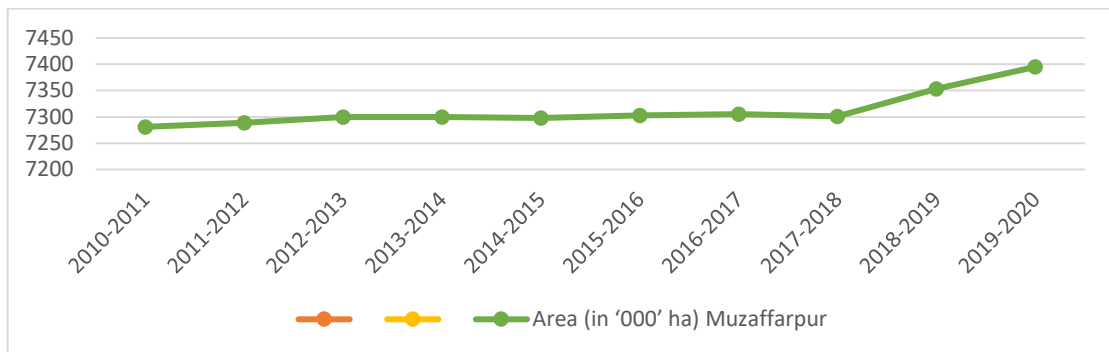
In the year 2010-11, the cultivated area under litchi was 7281 hectares. The area has increased during the year 2011-12, to 7289 ha .It was further increased to 7300 from the previous year. During the year 2012-13 & 2013-14, it (7300 ha) was constant. In the year 2014-15 the area decreased by -0.03 % from the previous year, and it was further increased by 0.07 per cent. During the year 2016-17 area was increased to 7305 ha, (0.03 %) increased from previous year and further decreased to 7301 hectare, i.e. -0.05 per cent. In the year 2018-19 it was increased by 0.71 per cent, from the previous year. During the year 2019-20, it was increased near 0.57 %.

The litchi production in the Muzaffarpur District during 2010-2011 was 53879 metric ton. In the year 2011-12, it increase to 53886 MT (0.01 per cent) and further increased to 58980 MT (9.45%) from the previous year. In the year 2012-13, it was constant at 58980 MT. In the year 2014-15, it decreased to 55746 MT (-5.48 %) from the previous year. It further decreased to 55146 metric ton (-1.08 %) from the preceding year due to unfavourable climatic condition. In the year 2016-17, it slightly increased to 55153 MT and further increased to 55180 MT in the year 2017-18. Similarly in 2018-19, it increased to 56102 MT and remains constant from the previous year. Finally it increased by 0.20 % in the year 2019-20 from the previous year.

The productivity of litchi in Muzaffarpur district of Bihar during the year 2010-11 was 7.4 MT/ha. In the year 2011-12 it was constant to 7.4mt/ha and it, further increased to 8.1 metric ton/ha (9.5 %) from the previous year. In the year 2013-14 , it was constant to 8.1 MT/ha. During the year 2014-15, it decreased to 7.6 metric ton/ha (-6.2 per cent) and it, further decreased to 7.5mt/ha (-1.32 per cent). In the year 2015-16 and 2016-17, it remain unchanged from the previous year. In the year 2017-18, it was constant from the previous year. Further, it was increased by 1.33% in

the previous year. Finally during the year 2018-19& 2019-20, it was constant to 7.6 MT/ha i.e. (0.00 %) from the previous year.

From the above table, it is clear that the compound annual growth rate for area, production, and productivity was 0.1239 %, 0.0014 %, and -0.1225 %, respectively. All three variables showed a significantly rate of positive. The growth rate of area production and productivity is positively significantly.



**Fig. 5.3 Year wise growth trends in Area, Production, and Productivity of Litchi in Muzaffarpur**

### **5.3 PROCEDURE OF MARKETING, CHANNELS OF MARKETING, EFFICIENCY & PRICE SPREAD OF LITCHI SUPPLY CHAIN**

The method and techniques of litchi marketing, marketing channels, marketing efficiency are described under the following sub heading:

5.3.1. Post harvest management of litchi

5.3.2. Process of litchi marketing

5.3.3. Channels of marketing

5.3.4 Efficiency of marketing channels.

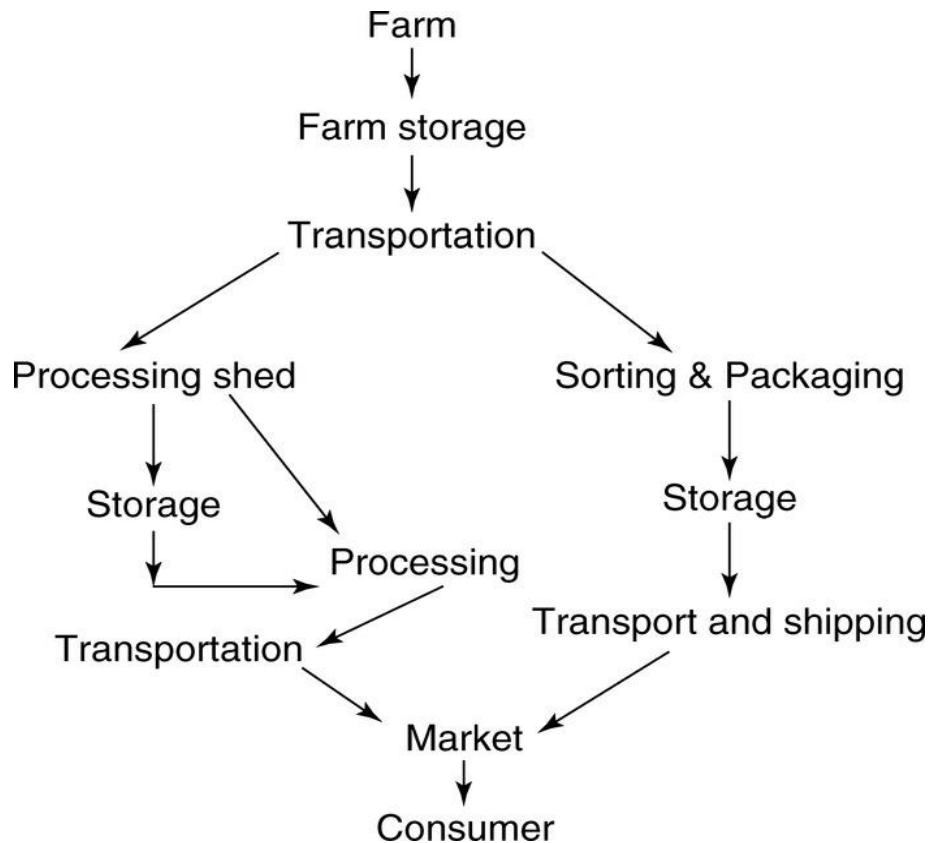
#### **5.3.1. LITCHI MANAGEMENT AFTER HARVESTING**

In the chosen location, the following actions are commonly used in post-harvest management.

##### **5.3.1.1 Harvesting of Litchi fruit**

The harvesting of litchi can be done only after the ripening of fruit as the litchi is non-climacteric fruit. At the full maturity level the fruit become attractive with good colour. For distant market, the fruits should be harvested when they started turning pinkish or reddish.

**Fig.5.4 Flow chart of Litchi marketing**



### **5.3.1.2 Litchi Produce Handling and packing House Operation**

After harvesting of fruits, it should be placed in a cool room and then start sorting, grading and pre cooling. We have to remove damaged, insect Pest infected and spoiled fruits.

#### **Pre cooling–**

For removal of field heat we have to passed the chilled air from harvest litchi produce .best method of pre Cooling is forced air cooling .if we want best life of fruits after harvest then we have to do carefully harvesting and pre Cooling and transport through cool truck and stored 2 to 3c this is essential for best life.

### **Packaging –**

If we do packaging in CFB boxes then kept 2% area for holes on the sides for release of heat.

### **Commodity movement –**

Most of the litchi (92%) produced in the Muzzfarpur and these litchi harvested by pre contractor .These pre contractor are having commission agents in Delhi, Mumbai etc. pre contractor supply the commodity to the local processing units and expert in the district after purchase the orchard from farmers and gave advance payment to the farmers .The agent and wholesaler merchant is a major role in the distribution .They send produce to different part of cities in country .At also make arrangements for the sell of produce.

### **5.3.2. PROCESS OF LITCHI MARKETING -**

In Muzzfarpur, litchi grower sell their produce through pre harvest contractor for one year or more. Crop contractor settle the price and terms and condition with the growers and these contractor gave price on time basis. If tree is 10 to 30 years with 100 kg yield they gave 500 Rs per tree per year. If tree is 5 to 10 years then gave RS 300 per tree per year. Farmers receive 50% price before the harvest when they settle price and rest at the time of harvest. Harvesting, packaging, sorting, transportation are done by the contractor.

This pre harvest contractor affect the health of litchi orchard .litchi arrive at flowering stage that is valid for that year .contractor spray for fruit flies but owner do cultural practices .so the final cost is deducted because litchi orchard is harm due to spray of insecticide.

If contractor for 2 to 3 years so the contractor do all operation .He is doing all operations for only about own profit he don't care about orchard maintenance. Contractor also not invests in orchard because they are not sure about next year contract. So landlord suffer in long run if the orchard owner is not present at the time of harvesting so the contractor may be damage branches when harvesting so this damage affect at long run to landlord.

### 5.3.3 CHANNELS OF MARKETING & PRICE SPREAD IN LITCHI

During the field survey four major marketing channels were identified and presented hereunder:

**Channel I:** Producer - Pre-harvest contractor - Commission agent cum Wholesaler – Retailer – Consumer.

**Channel II:** Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer – Consumer.

**Channel III:** Producer - Retailer – Consumer.

**Channel IV:** Producer –consumer.

#### 5.3.3.1 Price Spread of Marketing Channel -I

The marketing cost, margin & price spread of litchi in channel -I is presented in Table 5.9.

**Table: 5.9 marketing cost, marketing margin & price spread of Litchi in Muzaffarpur District of Bihar.**

Producer→PreharvestContractor→CommissionAgent/Wholesaler→Retailer→Consumer.

Sl. no.	Particulars		(Rupee./qt.)	Percent share of producer/consumer
1	Producer receive price		1600	39.35
	Paid cost of pre harvest contractor		314.00	7.72
	A	Watch and ward	15	00.37
	B	Picking grading billing etc.	55.00	1.35
	C	Container cost	10.00	0.25
	D	Transportation cost	32	00.79
	E	Loading / unloading cost	12.00	00.30
	F	Commission of middleman @ 6 percent price of producer	94.00	2.31
	G	charges of miscellaneous	96	2.36
	Contractor margin		300	7.38
	Selling price of contractor or purchase price of wholesaler		2064.00	50.76
	A.	Cost incurred by wholesaler	382.88	8.57
	B.	Market fee @2%	47.28	1.16

2.	C	Transportation cost	58.00	1.43
	D	Cost of bag	28.00	0.69
	E	Spoilage/Wastage	54.33	1.33
	F	Commission @ 6%	121.84	2.99
	G	Miscellaneous Charges	73.43	1.80
	Wholesaler margin		506.27	12.45
3.	Wholesaler sale price/ Retailer purchase price		2553.17	62.79
	A	Cost incurred by the Retailer	517.79	12.73
	B	Market fee @ 2%	61.06	1.50
	C	Transportation cost	86.12	2.11
	D	Cost of bag	40.32	0.99
	E	Spoilage/Wastage	69.38	1.70
	F	Commission @ 6%	173.18	4.26
	G	Miscellaneous charges	87.73	22.01
	Retailer margin		895.00	2.16
	Sale price of retailer or purchase price of consumer		4066.27	100
<b>Price Spread</b>			<b>2466.27</b>	

Channel 1 is comprised of producer →contractor (PHC) →Commission agent →Retailer →Consumer. The contractor (PHC) takes growers orchard on rent and get 1600 rupee /q which is only (39.35%) of the consumer's rupee. The cost incurred by contractor which includes watch and ward cost (Rs.15), picking, grading filling etc. (Rs.55) container (gunny bag) cost (Rs.10), transportation cost (Rs. 32), loading charges (Rs. 12) & charges of miscellaneous 96 rupees per quintal. All these costs together accounted to 314 rupees / quintal which is 7.72 per cent of the consumer's rupee. The price at which the Pre-harvest contractors sell to wholesalers is rupee 2064/ q which results in margin of rupee 300/q. The cost incurred by wholesaler is Rs. 382.88 per quintal which includes 2 per cent market fee, 6 per cent commission, transportation cost, spoilage losses, cost of the bag, miscellaneous etc. The producers sell to the retailer at Rs.2553.17 /q, with a profit of Rs 506.27 which is (12.45%) of the customer's rupee. The price spread for this channel is 2466.27Rs.

### 5.3.3.2 Price Spread of Marketing Channel -: II

The marketing cost, margin & price spread of litchi in channel -II is presented in Table 5.10.

**Table 5.10** Marketing cost, margins of marketing, & price spread of Litchi in channel – II in Bihar district of Muzaffarpur.

Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer – Consumer.

Sl. no.	Particulars	(Rs./qt.)	Percent share of producer
1	Producer receive price or purchase price of contactor	1600	14.47
	<b>Cost paid by contractor/ local trader</b>	364.85	3.10
	A Watch and ward	20.00	00.18
	B Picking grading filling etc.	60.00	0.54
	C Container cost	22.00	0.19
	D Commission to the mediator@ 10%	80	1.63
	E charges of miscellaneous	82.85	00.75
	contractor margin	585.64	5.30
2.	Wholesaler(local) purchase price	2150.49	19.44
	<b>Cost incurred by wholesaler</b>	753.97	6.81
	A Market fee @2%	63.00	0.57
	B Transportation cost	182.34	1.65
	C Packaging materials /container cost	65.50	0.53
	D Spoilage/Wastage	172.59	1.56
	E Loading /Unloading charge	74.79	0.68
	F Commission @ 6%	149.00	1.35
	G. Charges of miscellaneous	46.75	0.42
wholesaler Margin	664.53	6.00	
	Wholesaler purchase price(distant)	3368.99	30.55
	<b>Incurred cost by the distant wholesaler</b>	1899.27	17.17
	A Transportation cost	410.78	3.71

3.	B	Cost of bag	86.26	0.78
	C	Spoilage/Wastage	765.15	6.92
	D	Commission @ 10 %	356.89	3.22
	E	Loading /Unloading charge	84.53	0.76
	F	Miscellaneous Charges	195.64	1.77
			Margin of wholesaler (distant)	1700.37
4.	Wholesaler sale price /Retailer Purchase Price		6768.63	61.20
	<b>Cost incurred by the Retailer</b>		2389.01	21.60
	A.	Market fee @ 2 %	155.37	1.40
	B.	transport cost	154.35	1.39
	C.	Bagging cost	116.71	1.05
	D.	Spoilage/Wastage	1100.26	9.95
	E.	Commission @ 8 %	551.49	4.99
	F.	Miscellaneous Charges	310.77	2.81
		Retailer Margin	1800.64	16.28
5	Retailer trade price or Consumer buy price		11058.28	100
<b>Price Spread</b>			<b>9458.28</b>	

The marketing cost of channel -II showed that cost paid by contractor or local trader towards watch & ward was Rupees 20 /q, accounting to consumer's price that is 0.18 per cent. Similarly, the cost of picking, grading, and filling was Rs 60 /q i.e. 0.54 per cent of the consumer's price.

The commission agent to middleman who arrange for the contract @ 10 per cent of the price paid to the producer accounted to Rs 82.35/q . Thus, the total cost incurred by local trader/contractor was Rs 364.85 per quintal, which attributes 3.10 per cent of the consumer's rupee. Producers sold to the local wholesaler at a price of Rs 2150.49/q. The contractor received Rs 585.64 (5.30 % of the consumer's rupees).

The cost incurred by wholesaler was 753.97 /q which accounted 6.81% of consumer's rupee. The wholesaler expenditure includes transportation cost (Rupees.182.34), wastage losses (172.59 Rs.) & commission charges (149.00 Rs.), margin of wholesaler in Kolkata at 3568.99 /q. The cost paid by wholesaler accounted to 1899.27 Rs /q which include container cost, packing material (Rs. 86.26), transportation cost (410.78), loading and unloading cost (Rs. 84.55), commission

(Rs.765.15). The distant wholesaler gets the margin at Rs. 1700.37 per quintal (15.37 per cent of consumer rupee).

The purchase price of retailers was Rupees 6768.63 /q. The cost incurred by retailer was Rs. 2389.01 which included packing/ container costs, transportation cost, spoilage losses, commission etc. The retailer earns profit of Rs. 1800.64 per quintal, which is (16.28%) of the consumer rupee. The price spread which shows the difference between price paid by the consumer and price received by producers is Rs.9458.28 per quintal.

### 5.3.3.3 Price spread under marketing channel -III

The marketing cost, margin & price spread of litchi in channel -II is presented in Table 5.11.

**Table:-5.11** Marketing cost, marketing margins & Price spread of Litchi under marketing channel- III.

Producer - Retailer - Consumer.

S. No.	Particulars	(Rs./qt.)	Percent share of producer
1.	Producer get price or contactors buy price	1600	46.72
	<b>Incurred cost by Producers or pre harvest contractor</b>	363.75	10.62
	A Watch, ward	20	00.58
	B Packaging cost.	64.00	1.86
	C Container cost	25.00	1.31
	D Transportation cost	45.33	1.32
	E Loading /Unloading charge	22.15	0.64
	F Miscellaneous charges	187.27	5.46
	Margin of contractor	357.16	1043
2.	Producer's sale price/Retailer Purchase price	2020.91	59.02
	<b>Cost incurred by Retailer</b>	632.48	18.47
	A Market fee @2%	60.41	1.76
	B Transportation cost	94.75	2.76
	C Packaging materials /container cost	45.00	1.31

D	Spoilage/Wastage	108.73	3.17
E	Commission @ 6%	143.25	4.18
F	Miscellaneous Charges	180.34	5.26
Retailer Margin		670.69	19.76
Consumer buy Price or retailers sold price		3424.08	100
<b>Price spread</b>		<b>1824.08</b>	

The table indicates that the net shares of producer's in consumers rupee was 46.72 per cent. The cost incurred by producers on watch and ward picking grading filling cost of bag/container etc. was 63.7Rs /quintal which is (10.43 %) of consumer's rupee. The margin retained by producer accounted to Rs 357.16 per quintal, which is (10.43 %) of the consumer's rupee.

The retailer sold directly to the consumer at Rs. 3428.08 per quintal. The cost incurred by retailer on market fee at the rate of 2 per cent of transportation cost, bagging wastage, and commission at 6 per cent. Miscellaneous costs and fees amounted to Rupees 632.48/q, which was (18.47 %) of the consumer's rupee. The retailer's profit was Rs 670.69 / quintal, which was 19.76 per cent of the consumer's rupee. Thus the margin retained by the retailer amounted to Rs 670.69 per quintal which was 19.76 per cent of consumers rupee. Among total cost, spoilage losses was high with 3.17 per cent followed by the commission charge, transportation cost and miscellaneous cost i.e., 4.18 per cent, 2.76 per cent and (5.26 %) of the consumer rupees . The price spread, between the price paid by consumers and the price received by producers was Rupees 1824 / quintal.

#### **5.3.3.4 Price Spread of Marketing Channel - IV**

The marketing cost, margin & price spread of litchi in channel -IV is presented in Table 5.12.

**Table:-5.12 Price Spread of Litchi under marketing Channel- IV Producer to Consumer.**

S. No.	Particulars	(RS./qt.)	% share of producer
1.	Net price received by producer c	1600	76.43
	<b>Cost incurred by Producer's</b>	287.88	13.75
	A. Watch & ward	20	.95
	B. Picking & grading, filling etc.	75.43	3.60
	C. Container cost	32.00	1.53
	D. Transportation cost	40.00	1.91
	E. Miscellaneous charges	120.00	5.73
	Margin of the producer	505.50	24.25
	Producers sale Price	2093.38	100
<b>Price spread</b>		<b>493.38</b>	

The above table indicates that the net share of the producer's in the consumer's rupee was 76.43 per cent. The cost incurred by the producers on watch and ward, bag containers, transportation costs, incidental charges, and other costs were 287.88 per quintal. Which was 13.75 per cent of consumers' rupee. The margin retained by the producer's was Rs. 505.50 per quintal which was 24.25 per cent of the consumer rupee. The price spread for this channel was Rs 493.38 per quintal.

#### **5.3.4. Marketing Efficiency**

Marketing efficiency of separate marketing channel consider under following table

**Table: 5.13 Marketing Efficiency of Litchi in Different Channel**

Particulars	Channel I	Channel II:	Channel III:	Channel IV:
Value of Marketing Output (Rs./q)	4066.27	11058.28	3424.08	2093.38
Total Marketing Cost (Rs./q)	1214.67	5407.10	996.23	287.88
Total marketing margins (Rs./q)	1701.27	4750.81	1027.85	505.50

Marketing Efficiency	0.55	0.16	0.79	2.02
Price spread	2466.27	9458.28	1824.08	493.38

The marketing efficiency of each channel i.e., for channel 1, 2, 3 and 4<sup>th</sup> were 0.55, 0.16, 0.79, and 2.02 respectively. Among these marketing channels, channel fourth was found highly efficient due to presence of less number of market middlemen, high marketing margin receive due to less wastage of fruits.

#### **5.4 PROBLEMS RELATED WITH MARKETING OF LITCHI.**

The problem faced by litchi market intermediaries as well as producers were identified and presented in the Table 5.14. The identified problems were perishability of fruits, Lack of freezing services; Lab our scarcity during harvest, Labour scarcity during harvest, lack of organized marketing, elevated transportation cost for distant markets, and lack of credit facility, unorganized marketing with their Rank Based Quotient (RBQ) and responses of responded were ranked and presented in the table.

**Table:-5.14 Marketing problems conclude by market intermediaries.**

<b>S.No.</b>	<b>Marketing problems</b>	<b>Garret Mean Score</b>	<b>category</b>
1	Perish ability of fruits	93.56	I.
2	Lack of cold storage facilities	83.46	II.
3	Lab our shortage during harvest	66.86	III.
4	Lack of market information	63.57	IV.
5	Lack of marketing infrastructure	58.71	V.
6	Lack of organized marketing	58.64	VI.
7	High transportation cost for distant markets	48.71	VII.
8	Lack of credit facility	38.36	VIII.
9	Unorganized production	26.21	IX.
10	Price fluctuation	18.50	X.

From the above table it is concluded that the most important marketing constraints of litchi market intermediaries of Muzaffarpur district was perish ability of fruits; it was a major constraint among all the distributed constraints with 98.92 mean score followed by lack of cold storage facilities with 83.46 average scores. Another marketing constraints were Labour shortage during harvest, Lack of market

information, Lack of marketing infrastructure, lack of organized marketing, high transportation cost for distant markets, lack of credit facility, Unorganized manufacturing, fluctuation in price with average scores of 66.86, 63.57, 58.71, 58.64, 48.71, 38.36, 26.21, and 18.50 respectively.





# **CHAPTER - VI**



## **SUMMARY AND CONCLUSION**



## SUMMARY AND CONCLUSION

---

The purpose of this study is to analyze the level of production, marketing of litchi such as marketing cost, marketing margins, efficiency of marketing channel, and price spread in selected district.

Litchi (*Litchi ch.Sonnerat*) is an evergreen, imperative, temperature-sensitive fruit crop and related to Sapindaceae family and also known as the 'fruit queen.' The litchi fruit is known for its exceptional superiority, amusing taste characteristics, & attractive red colour. Litchi is a highly nutritive and delicious, flavoured, and juicy aril. At the present time in the country the total production is 730.0 MT, 96,000 ha area & 7.6 MT productivity of litchi. Out of the 31,480 hectares area under cultivation, the total production of litchi in Bihar is around 234,200 tonnes, with a productivity of 7.4 t per hectare, which is higher than the national productivity. With an output of 56,006 MT, Muzaffarpur is the largest district producing litchi, Vaishali came in second with 26, 498 MT, and Sitamarhi came in third with 15,518 MT. The district was selected purposely because of the leading litchi producing district in the state. In the district, 140 sample consisting of 60 litchi growers and 80 market intermediaries under the study

The study showed that the marketing of litchi is a very complex procedure in the study area and where four major type of marketing channel are identified. Channel I: Producer - Pre-harvest contractor - Commission agent cum Wholesaler – Retailer – Consumer. Channel II: Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer –Consumer. Channel III: Producer - Retailer – Consumer. Channel IV: producer –consumer.

The fourth channel Producer → Consumer, (local market) was found very much efficient for the producers as compared to other three identified marketing channels.

The distribution of the sample litchi growers indicates that 56.67 per cent of litchi sampler respondents were small (1.0-2.0 ha), 30.00 per cent were medium (2.0-4.0 ha) and 13.33 per cent had large households (more than 4 hectares) among the litchi sample growers.

It was observed that out of total land holdings, the small farmers use 46.23 hectares (16.13 per cent), medium farmers use 73.01 hectares (33.07 per cent) and large farmers use 145.54 hectares (50.79 per cent).

The study related to age of sample litchi growers revealed that in middle age group of farmers (18-50 years) was 75.82 per cent followed by child age family members ( less than 18 years ) with 18.39 per cent & just 5.80 per cent old age members (above 50 years).

Majority of the sampled farmers (51.67 per cent) had family size of 4 to 6 members .only 20.00% of the sample respondents had 10 and above10 family members.

The analysis of literacy level of sample litchi respondents indicated that only 16.67 per cent were illiterate, 10.0 per cent literate farmers. 21.66 per cent earned primary education level, 26.66 per cent got middle to high school education level, and 10.0 per cent had high school to higher secondary level, 8.34 per cent graduate level education, and 6.67 per cent were found to have post graduate level of education.

The trends of litchi crop in the country, in Bihar and in Muzaffarpur district showed positive trend during 2010-11 to 2019-20.

In the country, the trend in area of litchi was observed to be increasing at the rate 2.4620 % / year @ 1 % probability level and on the other hand, production increased with 3.4779 per cent at the same probability level. The productivity increased with lower rate than the area and production.

In Bihar, the trend of area and production of litchi crop indicated increasing trend, showing the area increasing at the rate of 1.0114 % per annum at 1% probability level and production enhanced with 0.5180 per cent at the same

probability level. The productivity revealed negative growth with lower rate than the area and production.

The same trend was observed in the selected district Muzaffarpur. The growth in area was observed to increase at the rate of 0.1239 %/ year @ the 1% of probability level and production increased with 0.0014 per cent at the same probability level of significance and further, the productivity registered negative growth with -0.1225 per cent per annum at the 5 percent probability level.

On the basis of information collected, four channels were identified.

**Channel I:** Producer - Pre-harvest contractor - Commission agent cum Wholesaler – Retailer – Consumer.

**Channel II:** Producer- Village Trader- Wholesaler (local) – Commission agent (distant) – Wholesaler (distant) – Retailer – Consumer.

**Channel III:** Producer - Retailer – Consumer.

**Channel IV:** producer –consumer

In Muzaffarpur market, the analysis of price spread exhibited that producer's share was 39.35%. Rs 54.33 per quintal) & cost of packing material Rs 28.00 per quintal and the miscellaneous charges Rs. 73.43/q for maintenance, electricity etc.

The retailer's purchase price was Rs 2553.17 /q. The total marketing cost was Rs 1214.67 / q). The total cost of marketing paid by wholesaler's /retailers worked out to be (21.3 %) of end user rupee. The producer's share in consumer's rupee was very less because growers sold their produces directly to contractor/wholesaler, the producers' portion of end user rupee was relatively small. As a result, highest profit was made by intermediaries. The portion of the consumer's profit increase if farmers sell their produce by themselves bringing it to market.

The price spread for the distant market (Delhi) explains why the commission agent's marketing expenditures were the lowest in marketing **Channel II**. Because the pre-harvest contractor covers all expenses except market fee, postage and telephone charges, and other minor charges, the commission agent's expenses were minimal.

The marketing cost incurred by retailers was very high, that is Rs 2389.01 quintal (21.60 per cent) which included transporting charges, labour charges, spoilages charges, & miscellaneous charges.

In the whole process of marketing, the total cost paid by pre harvest contractor, wholesaler & retailers in distant market (for Delhi market) were accounted for Rs 364.85, Rs 1899.27 & 2389.01 Rs. /quintal of whole price Rs11058.28/q incurred through consumer. Marketing margin per harvest contractors, wholesaler & retailers were Rs 585.64, Rs1700.37, & Rs1800.64 /quintal, respectively.

In the marketing **Channel III**, the price spread analysis explained that the contractor's purchase price was Rs1600 per quintal that contributed 46.72% of consumer's rupee. Producers & contractors incurred cost was estimated to be Rs 363.75 .per quintal which included watch and ward, transportation cost, loading & unloading cost, gunny bag cost, picking, grading, and filling cost and miscellaneous charges etc. which shared 10.62 per cent of consumer's rupee. Margin of contractor was found to be Rs 357.16 Rs. / quintal which shared (10.43%).The expenses litchi picking, grading, filling charges which shared(1.86%) of that cost incurred with producers.

The retail sale price or consumer purchase price was Rs 3424.08 per quintal. The retailer incurred cost as transportation cost; market fee at the rate of 2 %, bagging cost, spoilage, commission charge @ of 6% & miscellaneous charges etc was Rs 632.48 / quintal to shared 18.47 % of consumer's rupee. The retailer margin was Rs 670.69 /quintal which shared 19.76 % of consumer's rupee. Among all, the spoilage cost was high that shared 3.17 % of buyer's rupee. Price spread was Rs 1824.08/ quintal for this marketing channel.

The price spread under marketing **Channel IV** showed the percentage contribution which of producer's share in of consumer rupee which was 76.43%. Producer incurred charge on picking, grading, filling, watch ward, container cost, transportation cost, miscellaneous charges etc. was 287.88 Rs./quintal which 13.75 % share in consumer's rupee.

Litchi is a highly perishable commodity which is very difficult to store duration in normal conditions. Perish ability of fruit was a major constraint among all the constraints with 98.92 mean score followed by lack of cold storage facilities with 83.46 average scores. The other marketing constraints were Labour shortage during harvest, lack of market information, lack of marketing infrastructure, lack of organized marketing, high transportation cost for distant markets, lack of credit facility, lack of organized marketing, fluctuation in price with average scores of 66.86, 63.57, 58.71, 58.64, 48.71, 38.36, 26.21, and 18.50 respectively.

The marketing structure indicated that litchi producers receive a very low price from customers or consumers, and there is a need to minimise the number of intermediaries. All of the four litchi marketing channels, the fourth marketing channel, Producer → Consumer, (local market) was the most efficient from the view point of producer and consumer where producer received 70.23 per cent of consumer rupee while the 29.77 per cent was incurred as cost of marketing. The marketing margin of the market intermediaries from producer to consumer was found as Rs 1147.38/quintal in distant market. The price spread maximum in the case of marketing channel and that was 9458.28 Rs./quintal & minimum price spread was found in fourth channel or local market. The marketing efficiency was found highest in channel 4<sup>th</sup> (2.02) & lowest in channel 2<sup>nd</sup> (0.16).

The most important marketing constraints of litchi marketing was perish ability of fruits with score of 98.92 (1<sup>st</sup> Rank) followed by others problems i.e. Labour shortage during harvest, Lack of market information, lack of marketing infrastructure, Lack of ordered marketing, High transportation cost for distant markets, problem of credit facility, Unorganized production and Price fluctuation with II Rank, III Rank & IV Rank respectively.

#### **Suggested Suitable Policy Implication Measures:-**

1. The trends in litchi area, production, and productivity throughout the India, as well as in the state of Bihar and selected Muzaffarpur district showed a substantial degree of positive growth except negative trends - 0.12 in productivity in the sampled district. For increasing the productivity of litchi farmers awareness regarding new techniques and methods are required. This may be increased through imparting trainings

cum demonstrations to the farmer's field. The state horticulture department may be entrusted for the work.

2. The need for maintenance of litchi orchard was felt as most of the orchards are very old and they need high level of maintenance and nutrients. The district level horticultural officers may take care in this regard.
3. It was observed that due to non-availability of cold storage and refrigerated van, long distance transportation was very difficult. For preventing wastage state government may be requested for establishment of cold chain and introduction of mobile refrigerated van.
4. Urgency for establishment of Litchi processing plant was found in the study area. It was suggested that through special programme processing units may be established in the grower's locality. This will help in value addition, decreasing spoilage, and it will increase income and employment opportunities for young farmers.
5. For improvement in litchi supply in distant market supply chain needs to be strengthened through formation of farmers' producers' organisations. The state cooperative department may take initiative in this regards.
6. It was also suggested that for export of litchi from the study area, international standard on size, shape, colour, and weight must be emphasised during the production season so that international demand may be met up. Attention may be given by APEDA.
7. Despite the fact that the government has started certain programmes to rehabilitate old orchards, the proper implementations and monitoring of programmes are required for its success.





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# APPENDIX



# APPENDIX

## DEPARTMENT OF AGRICULTURAL ECONOMICS DR. RAJENDRA PRASAD CENTRAL AGRICULTURAL UNIVERSITY PUSA

### QUESTIONNAIRE

**Research Topic:- An Economic Analysis of Supply chain management and Marketing efficiency of Litchi in Muzaffarpur District of Bihar**

### GENERAL INFORMATION

#### **1. A. Socio-Economic Characteristics of the Respondents/Litchi growers**

1. Name of the Farmers /Cultivator : .....

2.Village : .....

3.Block : .....

4.District : .....

#### **B. Household Characteristics**

B1. Sex .....(1=Male, 2 = Female )

B2. Marital Status .....( 1= Married, 2 =Single, 3 = Widow, 4 = Divorced )

B3. Social and Economic condition (Family composition) :-

S. No.	Name of the member	Sex	Age	Caste	Education	Relation with owner	Occupation
1							
2							
3							
4							
5							
6							
7							

B4. Age, Farming Experience and Occupation (Tick)

Age	Response	Farming Experience	Response	Occupation	Response
Below 18 yrs		1-10 years		primary	
18-60 years		11-20 years		Secondary	
>60 years		>20years		Tertiary	

B5. Source of Information with respect to price (Tick)

S.No.	Source of Information	Tick
1	Friends/Relatives/Neighbors	
2	Extension Agent	
3	Radio	
4	Television	
5	Newspaper	
6	Others	

B6. LandHolding.....(Hectare/Acre) Under Litchi Cultivation

S.No.	Particulars	Irrigated (ha.)	Non-Irrigated (ha.)	Total Land Holding (ha.)
1	Owned			
2	Leased In			
3	Leased Out			
4	Fallow			
	<b>Total</b>			

B7. Variety cultivated.

S.No.	Name of variety	Area	Production
1	Shahi		
2	chiana		
3	Bedana		
4	Kasba		
5	Etc.		

B8. Problem faced by Litchi Grower (Tick)

		Adequate	Inadequate
1	Lab our Availability		
2	Storage Availability		
3	Transport Availability		
		<b>Favorable</b>	
4	Weather		
		Yes	No
5	Extension Visit		
6	Members of Cooperative societies		

## B9. marketing channel

S.No.	To Whom Sale Your Produce	Quantity (in Qt.)	Rate of litchi (Rs/Qt.)
1	pre-harvest contractor		
2	wholesaler		
3	Retailer		
4	consumer		

## INTERMEDIATES SCHEDULE

### Marketing cost, margins and price spread of Litchi in channel -1 in muzaffarpur district of Bihar.

Name of the firm:.....

Address: .....

Name of business : (Village trader/Commission agent /Wholesaler cum commission agent /Wholesaler/Retailer).....

No.of years in the trending business.....

Quantity of Litchi purchased

Purchased from local area				Purchased from outside the state			
Month of purchase	Purchased from	Quantity of Purchase	Buying price (per qtl)	Month of purchase	Purchased from	Quantity of purchase	Buying price (per/ctl)

Marketing Function Performed : a. Sorting b. Grading c. Packaging d. Pre cooling

If grading is done then : Number of grades.....

The basis of grading : .....

Grading done at the marketing /field :.....

Method of packing : .....

Pre cooling temperature :.....

No. of days/Hours: .....

**A. Marketing of output by intermediary**

SL. No.	Time /month of sale	Sold To	Quantity sold (qtl.)	Selling price(Rs./qtl.)
1				
2				
3				
4				
5				

**B. marketing cost incurred**

Sl.No.	Items	Total cost ((Rs./qtl.)
1	Purchase price	
I.	Sorting /grading	
II.	Packing	
III.	Lab our charges (harvesting )	
IV.	Transportation charges	
V.	Commission charges	
VI.	Others if any	
	a)Loading cost b)Un loading cost	
2	Total marketing cost	
3	Selling price	
4	Marketing margin	

**C. Price spread of litchi in different marketing channels**

Sl. No.	Particulars	Channel 1	Channel -2	Channel 1-3	Channel-4
1	Producer price				
2	Cost incurred by producer				
3	Producer net price				
4	Purchase price of contractor				
5	Cost incurred by contractor				
6	Sale price of contractor				
7	Profit margin of contractor				
8	Purchase price of commission agent				
9	Cost incurred by commission agent				
10	Sale price of commission agent				
11	Profit margin of commission agent				
12	Purchase price of wholesaler				
13	Cost incurred by wholesaler				
14	Sale price of wholesaler				
15	Profit margin by wholesaler				
16	Purchase price of Retailer				
17	Cost incurred by retailer				
18	Sale price of retailer(consumer price)				
19	Profit margin by retailer				
20	Price spread				
21	Producer share in consumer rupee				

**A. (1) Producer → pre harvest contractor → commission agent/Wholesaler → retailer → consumer**

Sl. No.	Particulars	(Rs./qtl.)	Percent share of producer /consumer
1	Net price received by producer contractor purchase price		
	A	Watch and ward	
	B	Picking grading billing etc.	
	C	Container cost ( gunny bag)	
	D	Transportation cost	
	E	Loading / unloading cost	
	F	Commission to the mediator@ 6% of the producer price	
	G	Margin of the contractor	
	H	Miscellaneous charges	
2.	Pre-harvest contractor sell price/wholesaler purchase price		
	A.	Cost incurred by wholesaler	
	B.	Market fee @2%	
	C	Transportation cost	
	D	Cost of bag	
	E	Spoilage/Wastage	
	F	Commission @ 6%	
	G	Retailer margin	
	H	Miscellaneous Charges	
3.	Wholesaler sale price/ Retailer purchase price		
	A	Cost incurred by the retailer	
	B	Market fee @ 2%	
	C	Transportation cost	
	D	Cost of bag	

	E	Spoilage/Wastage		
	F	Commission @ 6%		
	G	Retailer margin		
	H	Retailer sale price/ consumer		
	I	Purchase price		
	J	Price spread		

**(ii) Marketing channel- II :** Village- Trader-Wholesaler (local)- Commission agent(distant)- Wholesaler(distant)- Retailer- Consumer

**(iii) Marketing channel- III:** Producer-Retailer- Consumer

**(iv) Marketing channel: IV-** Consumer

**4.A. Constraints in production of Litchi .**

**4.B. marketing constraints of Litchi in muzaffarpur District of Bihar**

<b>SI. No.</b>	<b>Constraints</b>	<b>Rank Based Quotient (RBQ)</b>	<b>Rank</b>
1	High transport cost for distant market		
2	Perish ability of fruits		
3	Lack of market information		
4	Lack of organized marketing		
5	Lack of marketing infrastructure		
6	Lack of credit facility		