UNIVERSITY GRANTS COMMISSION
South Western Regional Office
P.K.Block, Palace Road, Gandhi Nagar,
Bangalore - 560009

Minor Research Project entitled

A STUDY ON PRODUCTION AND MARKETING OF HORTICULTURAL CROPS IN KARNATAKA

Ref. No : 1515-MRP/14-15/KATU008/UGC-SWRO
Tenure of the Project : 14.02.2015 to 13.02.2017

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CERTIFICATE

I **H.P.VEERABHADRASWAMY** declare that the work presented in this report is original and carried out independently by me during the complete tenure of Minor Research Project of UGC, South Western Regional Office, Bangalore.

- H.P.Veerabhadraswamy

ACKNOWLEDGEMENTS

I offer my sincere pranams to His Holiness Dr. Sri Sri Shivakumara Swamiji, President, Siddaganga Mutt, Tumkur for his blessings to undertake this research work. I am also grateful to Revered Sri Sri Siddalinga Swamiji who has encouraged me in all respects.

I take this opportunity to acknowledge here the contributions and help rendered by many scholars in the completion of this research work. At the outset, I am highly grateful and indebted to Dr. K.Sivachithappa, Member, State Planning Board, Government of Karnataka, for his creative suggestions.

The moral and intellectual support given by Sri. T.K.Najundappa, Honarary Secretary of Siddaganga Education Society and Sri. K.S.Shankaraiah, Special Officer would be remembered for ever. I am highly indebted to them. I also thank management committee members for their kind support.

I extend my heartful thanks to Dr.D.N.Yogeswarappa, Principal, Sree Siddaganga College for Women, Tumakuru and Dr.R.Anandakumari, Principal, Sree Siddaganga College of Arts, Science and Commerce, Tumakuru for their encouragement and support.

I express my deep sense of gratitude to University Grants Commission for giving me an opportunity to undertake this work by granting a Minor Research Project. I also extend my gratitude to the Director, College Development Council of Tumakuru University.

I would like to thank Sri. D.R.Mohankumar, Dr.Sannaswamy and all my department and college colleagues who have rendered help in the completion of the work. I thank my wife Smt.R.Sudha and elder son H.V.Karthik and younger son H.V.Pratheek and all my friends and relatives, for their support and encouragement.

I acknowledge the help of the officers and staff members of District Statistical Office, Horticultural Office, Lalbagh, Bangalore. They helped me in collecting data and necessary information for this project report. I am also thankful to the librarian and staff members of University Library, Mansagangotri, Mysore who have extended their co-operation during the course of my data collection.

- H.P.Veerabahdraswamy

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INTRODUCTION

1.1 Background

It is known factor that India has been predominantly agrarian economy ever since the time immemorial. Agriculture sector occupies the elementary position in the life of rural population. Although, agriculture sector continues to be livelihood of our people. At present, the contribution of agriculture towards National Income is about 14 per cent and about 62 per cent of population depends on it. Therefore, it is precisely said that agriculture is the backbone of Indian Economy. Horticulture is an essential industry among the land based agricultural systems. Horticultural industry is fast emerging and the most remunerative sector in our country. The horticultural crops are characterized by high productivity, higher returns, and higher potential for employment generation and exports, comparatively lower requirement of water and easy compliance to adverse soil and waste land situations. The input-output ratio in most horticultural crops is much higher than that of field crops. Their role in improving environment is an added benefit.

In India the horticulture sector encompasses a wide range of crops e.g., fruit crops, vegetables crops, potato and tuber crops, ornamental crops, medicinal and aromatic crops, spices and plantation crops. While the first few Five Year Plans assigned priority to achieving self sufficiency in food grain production, over the years, horticulture has emerged as an indispensable part of agriculture, offering a wide range of choices to the farmers for crop diversification. It also provides wide opportunities for sustaining large number of agro based industries which generate substantial employment opportunities. The horticulture sector contributes

about 24.5% of the agricultural GDP from about 8% of the cultivable area in our country.

Horticulture crops cover large varieties of fruits and vegetables, flowers, plantation, spice crops, medicinal and aromatic plants, roots and tuber crops. Fruits are man's oldest food. Fruit cultivation is as old as human civilization itself. Cultivation of fruit is a very important factor contributing to the prosperity of Nation. Fruits and vegetables are the prime source of vitamins and minerals without which human body cannot maintain proper health to resist the diseases. Indian Council of Medical Research (ICMR) had recommended the consumption of at least 92 grams of fruits per day, but per capita consumption of fruits in India is only 46 grams per day. This indicates that there is wide gap between use and requirement of fruits in our country. The major fruit crops grown in India are mango, banana, citrus, grapes, guava, papaya, sapota, pomegranate, jack, anole etc.

India is endowed with different agro-climatic condition which offers immense scope for cultivation of various kinds of fruit crops. This provides an excellent platform for the country to emerge as a leading producer of fruit crops. The fruit crops have established their credibility by improving the economic condition of farmers and entrepreneurs, enhancing exports and above all, providing nutritional security to people. This has assumed special significance in the context of liberalized global economy and establishment of World Trade Organization (WTO). In India, the total area under fruit crop was 1.12 million hectares, in 1951-52 and increased to 3.79 million ha in 2001. The production of fruits has also been increased from 11.7 million tonnes in 1950 to 45.50 million tonnes in 2001. India ranks second in the world next only

to China with respect to fruit production having a global share of 12 per cent.

Trends in Horticultural Crops in India

The major horticulture crops producing states of India with their percentage share in total production increases west Bengal (12.6%), Andhra Pradesh (9.7%), Uttar Pradesh (9.7%) Tamilnadu (9.4%), Bihar (7.7%), Karnataka (7.4%), Gujarat (7.3%), Maharashtra (7.3%), Orissa (4.3%), Kerala (4.2%), Madhya Pradesh (3.2%), Chhattisgarh (2.5%), Haryana (3.1%), Punjab (2.1%) Assam (2.1%) Jharkhand (2.0%), Jammu and Kashmir (1.6%), Himachal Pradesh(1.05%) and Rajasthan (1.0%). Other states /UTs namely Uttarkhand, Tripura, Meghalaya, Manipur, Delhi, Mizoram etc. share less than one percent (each) in production in the country.

The states having largest area under horticulture crops with their percent share include Maharashtra (11.39%) followed by Andhrapradesh (8.86%), Karnataka (8.55%), west Bengal (7.61%), Gujarat (6.33%), Uttar Pradesh (6.21%), Tamilnadu (6.06%), Orissa (5.53%) and Bihar (5.29%). Other states and Union Territories namely Rajasthan, Madhya Pradesh, Chhattisgarh, Assam etc., share less than 5 percent area under horticulture crops in the Country.

The states which have highest productivity in horticultural crops in the country are Punjab (18.8%), West Bengal (17.4%), Uttar Pradesh (17.18%), Tamilnadu (17.13%), Bihar (16.07%), Lakshadweep (15.80%), Jharkhand (14.75%). Delhi (14.22), Chandigarh(14.00%) and Tripura (13.05%).

Karnataka State is one of the progressive states of India with greater potential for development of fruit crops. The state is blessed

with ten agro-climatic regions suitable for growing variety of fruits all around the year. In Karnataka, the total area under fruit crops has increased from 1.41 lakh hectares in 1978-79 to 2.60 lakh hectares in 2001, registering the growth rate of 184 per cent. The production of fruit crops has also gone up from 23.41 lakh tonnes during 1978- 79 to 41.65 lakh tonnes in 2001 showing the growth rate of 178 per cent. The major districts growing fruit crops in the state are Kolar, Belgaum, Bidar, Bangalore, Bijapur, Gulbarga, Dharwad, Mysore, Tumkur, Bagalkot and Chitradurga respectively.

Karnataka occupies a prominent place in the Horticulture map of the Country. Horticultural crops occupy an area of 18.00lakh ha., with an production 136.38 lakh tones. Although the area comprises only 14.44 per cent of the net cultivated area in the state, the total income generated from the horticulture sector accounts to over 40 per cent of the total income derived from the combined agriculture sector. This accounts for 17 per cent of the Gross Domestic Product (GDP) of the state. Horticulture provides excellent opportunities in raising the income of the farmers even in the dry tracts. A significant shift towards horticulture is evident in the state with an increase in area and production. For instance, about 58,000 ha., area has been brought under horticultural crops through the watershed programmes. Horticulture provides higher unit productivity and offers great scope for value addition and this sector is taking inroads throughout the length and breadth of the state. Karnataka having the highest acreage under dry farming in the country next only to Rajasthan has a great potential to grow high value but less water demanding horticultural crops.

Growth of Horticulture is being diversified on scientific base since early decades of the present century. The Mysore State Government gave enough momentum by establishing the

Department of Government gardens in 1856, later in 1961 it was upgraded as the full fledged Department of Horticulture. Mysore Horticulture Society located at Lalbagh in Bangalore was founded by G H Krumbiegal, the Director of Horticulture. But practically it was a rebirth of a society called Mysore Agri-Horticulture Society, Bangalore, which was founded in 1836 by William Munro. The Government of Mysore had taken over the responsibility of conducting the horticultural shows after the society became defunct probably from 1874. After retirement of John Cameron in 1907, G.H. Krumbiegal was appointed as superintendent of Government gardens in the year 1908. It was Krumbiegal who thought of forming an association of horticulturists. Hence Krumbiegal named the society as the "Mysore Horticultural Society" and got it registered with the Registrar of Societies under Societies Registration Act of India-1904.

The Development of Horticulture in Mysore state was started with the establishment of first Horticulture farm was started at Maddur in 1942, to demonstrate the cultivation of Horticulture crops and production of vegetable seeds and planting material for the farmers. Marketing of highly perishable commodities like fruits and vegetables. Farmers often have little bargaining power, middlemen collect commissions from producers, and there was a frequent delay in payments, and produce sold on the basis of volume, with prices being determined to the advantage of retailers and not the farmers. In order to tackle these issues the Horticulture Producers' Co-operative Marketing and Processing Society Ltd. (HOPCOMS) was founded in 1959 under a name of Grape Growers Marketing and Processing Society, under the guidance of Dr. M.H. Mari Gowda, the then Director of the Department of Horticulture under the Indian Co-Operative Society Act. The members comprise farmers, state financial organizations

and the Karnataka State Government. It is managed by official's appointment by the state, drawn from the Department of Horticulture and the Department of Co-operation. As of 2010 there are 22 HOPCOMS in the State, each working independently with in demarcated districts of operation. It had jurisdiction over Bangalore, Kolar, Mysore, Tumkur, Mandya and Mangalore districts. Since grape was a seasonal fruit, the society started handling all types of fruits and vegetables from 1965. Due to this change in operations, the name of the society was changed into Horticulture Producers Co-operative Marketing and Processing Society Ltd. From 10th Sep 1959 its registered office is located at Lalbagh, Bangalore. Later, Government has declared the HOPCOMS as the unit of Horticulture department in January 2009.

The present study covers the economics of production and marketing of horticultural products in Karnataka, specially Papaya, Pomegranate, Mango, Sapota and Banana to identify the problems faced by the cultivators in their cultivation and marketing. It envisages suggesting possible corrective measures to bring about the desired improvement in production and marketing of horticultural products.

1.2 Statement of the Problem

Horticulture has now become as lifeline of a large population in the world. Even in India, we talk largely about horticulture. Horticulture consists of several branches but fruit cultivation (Pomology), vegetable cultivation (Olericulture) and flower cultivation (Floriculture) are the major branches of horticulture. We need fruits, vegetables and flowers in our daily life. It is a known fact that we are the 2nd largest producers of fruits and vegetables in the world. However, our productivity is dismally low than several

other countries of the world primarily because horticulture sectors is encountered with several problems, and to tackle these problems, several technologies have been standardized by the scientists.

Over the years, horticulture has emerged as one of the potential agricultural enterprise in accelerating the growth of economy. Its role in the country's nutritional security, poverty alleviation and employment generation programmes is becoming increasingly important. It offers not only a wide range of options to the farmers for crop diversification, but also provides ample scope for sustaining large number of agro-industries which generate huge employment opportunity. At present, horticulture is contributing 24.5% of agricultural GDP from 8% cropped area.

During the previous two Plan periods, focused attention was given to horticultural research and development. The result has been encouraging. On account of significant increase in the production of horticultural crops across the country, India has emerged as a leading player in the global scenario. We have now emerged as the world's largest producer of coconut and tea and the second largest producer and exporter of tea, coffee, cashew, spices exports of fresh the processed fruits, vegetables, cut flowers dried flowers have also been picking up.

Organized food retailing, which still recently accounted for only around 2 per cent of the total food retail sales, is expected to reach around 20 per cent by the year 2013. Food retail sector is reported to employ about 21 million people. Despite many programmes and policies to provide remunerative price to the producers of fruits and vegetables, the farmer's share in the consumer price continues to be very low. Indian farming is

characterized by small and fragmented holding and dependent on rainfall. In the absence of assured irrigation, the farmer faces risk of getting good crop, besides market risks.

Though Agricultural Producing Marketing Committees (APMC's) have created market infrastructure, middlemen play a prominent role in marketing of fresh fruits and vegetables. Recently, many private players entered the marketing of fresh fruits and vegetables, since several State Governments have amended their APMC Act. These private companies have their own retail chains and malls in metro cities and created infrastructure for cold storages and refrigerated transport. Some of them have contract farming wherein the companies provided backward and forward linkages for the farmers.

As a result of a number of thoughtful research, technological and policy initiatives and inputs, horticulture in India, today, has become a sustainable and viable venture for the small and marginal farmers. it is a matter of satisfaction that their food consumptions levels and household income have increased. Besides, this sector has also started attracting entrepreneurs for taking up horticulture as a commercial venture. Therefore, there is a great scope for the horticulture industry to grow and flourish.

In view of this the central research problem of the study is therefore, to examine the production and marketing of Horticultural crops in India in general, in Karnataka in particular. The study is focused on the growth in area, yield and production of horticultural crops in Karnataka and the economic conditions of horticultural crops farmers in the study area, the role of HOPCOMS in expanding horticultural crops in the study area and to identify the channels of horticultural crops marketing.

1.3 Objectives of the Study

The study is undertaken with the following specific objectives:

1. To estimate the growth in area and production of horticultural crops in Karnataka.
2. To study the economic feasibility in horticultural crops in the study area.
3. To examine the role of HOPCOMS in expansion of horticultural crops in the study area.
4. To identify the channels of marketing for horticultural crops marketing and to work out marketing cost, margin and price spread.
5. To identify the constraints in production and marketing of horticultural crops and to suggest appropriate measures.

1.4 Hypotheses of the Study

The following hypotheses have been framed for the study.

1. There is a positive impact of National Horticultural Mission on the expansion of horticultural crops in the study area
2. Economic conditions of farmers have been improved due to horticultural crops in the study area
3. Horticultural Farmers in the study area have benefited from the HOPCOMS in terms of fair price, sale of products and remunerative price.

1.5 Research Methodology

The present study is mainly based on primary and secondary data. Primary data have been collected from 300 respondents from horticulture crops in Karnataka state through simple random sampling method. The study is confined to five fruit crops viz., Papaya, Pomegranate, Mango, Sapota and Banana. And the

primary data is collected mainly from Mysuru, Bijapur, Bagalkot, Shimoga, Chitradurga and Tumakuru Districts in the state of Karnataka. The study period is restricted to 10 Years period from 2003-04 to 2014-15. The simple statistical tools are employed.

1.6 Sample Design

The primary data are collected from Mysuru, Bijapur, Bagalkot, Shimoga, Chitradurga and Tumakuru districts 300 sample respondents have been selected on simple random sampling method. In Karnataka State 06 Districts have been covered for the study. A main thrust was given to Papaya, Pomegranate, Mango, Sapota and Banana.

Distribution of Sample Farmers by Location and Crops in the Study Area

Taluks	Study of Crops					
	Papaya	**Pomegranate**	**Mango**	**Sapota**	**Banana**	**Total**
Mysuru	10	10	10	10	10	50
Bijapur	10	10	10	10	10	50
Bagalkot	10	10	10	10	10	50
Shimoga	10	10	10	10	10	50
Chitradurga	10	10	10	10	10	50
Tumakuru	10	10	10	10	10	50
Grand Total	**60**	**60**	**60**	**60**	**60**	**300**

1.7 Sources of Data

The secondary source of data relating to Papaya, Pomegranate, Mango, Sapota and Banana crops in India and Karnataka state are collected from

- Economic Survey of India and Karnataka,

- Department of Horticulture Reports
- National Horticulture Mission Reports
- Other learned journals regarding horticulture,
- Annual reports of various years published by District Horticulture Departments.
- District Statistical Office Reports
- Office document, news paper etc.

1.8 Chapter Scheme

The study is presented in five chapters Following is the chapter scheme of the study.

Chapter-I : Introduction

The first chapter deals with the nature and importance of the present study and also the specific Objectives of the study, hypotheses of the study, research methodology and sample size.

Chapter II : Review of literature

The second chapter deals with the review of the previous studies concerned to subject matter. In this chapter a brief review of research studies conducted by individual researchers and research institutions on horticulture crops production and marketing in India and also in Karnataka State is presented.

Chapter III : **Production and Marketing of horticultural crops in India and Karnataka- An Empirical Analysis**

This chapter outlines the features of production and marketing of horticultural crops in India. Detailed information about production and marketing of horticultural crops in India and Karnataka are presented.

Chapter IV : Case Study Analysis

This chapter deals with the impact of horticultural crops on socio-economic status of the horticultural farmers in the study area. A detailed field study analysis is presented in this chapter. Hence this chapter is considered as the core chapter of present study.

Chapter V: Summary of Major Findings of the Study and Suggestions

The last chapter sets out a summary and presents the findings. It also attempts to suggest the suitable measures for the further improvement of the horticultural crops.

Chapter – II

REVIEW OF LITERATURE

The second chapter deals with the review of the previous studies concerned to subject matter. In this chapter a brief review of research studies conducted by individual researchers and research institutions on horticulture crops production and marketing in India and also in Karnataka State is presented.

2.1 Review of Empirical Studies

A brief review of empirical studies on the horticulture crops in India and in the state of Karnataka is presented here below;

Venkataram (1964) made a detailed study on economics of grape production in Bangalore south taluk of Bangalore district. He measured all the costs incurred during first year as establishment cost and the costs required to operate the grape orchard as upholding costs. The apportioned establishment cost along with 10 percent interest on the value of land was taken as fixed capital and included in the total cost.

Singh and Kahlon (1977) in a study on marketing of grapes in Punjab observed that commission agents and retailers were important channels for endorsement of grapes. The sale of grapes in the state of Punjab throughout retailer was uppermost (41.05%) followed by sales through commission agents (40.60 percent) respectively.

Subrahmanyam and Mruthyunjaya (1978) have rightly observed that the marketing of fruits and vegetables is associated with a unique set of conditions which makes the task difficult and highly risky. Firstly, the nature of the produce handled itself,

because of high perishability it is difficult to create time and space utilities. The second factor in marketing of fruits and vegetables is the prevailing imperfect competition i.e. there are only few traders in the business. These two factors have a lot of influence on the current marketing system of other agriculture commodities.

Raikar (1995) has studied the production and marketing of cashew in Karnataka state. The study clearly indicates that the per hectare annual preservation cost of cashew plantation was higher on small size (Rs 1,674,17) plantations compared to large size plantation (Rs 1,303.65) respectively.

Subrahmanyam (1997) observed that despite increase in both number and capacity, the cooperative sector has not been able to help fruit and vegetable producers to the extent desired as it accounted for hardly 8 per cent of total capacity and about 90 per cent of total available capacity is still utilised for storing potato alone with less than 1 per cent capacity utilised for storing fruits and vegetables. A cost-effective transport is an important facility required in proper marketing of fruits and vegetables.

Upton (1999) has applied in his study that the discounted cash flow technique to compare the returns from investment on tree crops with returns from annual crops in western Nigeria. He discounted the expected future returns from new varieties of cocoa, oil palm and rubber over 32, 35 and 35 years respectively to arrive at net present worth. This was compared with returns per acre from annual crops like cotton, rice, maize, Sorghum and Tobacco.

Gummagolmath (2000) has identified the problems in production and marketing of mango in Dharwad district of Karnataka. The survey revealed that the problem of alternative

earning was expressed by 100 percent orchardists in all categories of farmers. Problem of non-availability of labour was expressed by most of the medium orchardists (66.67%) followed by small orchardists (40%) and large orchardists (33.37%). Out of the marketing problems, the problem of price fluctuation was expressed by 44.44 per cent of small, 36.80 percent of medium and 50 per cent of large orchardists and other problems were high commission and existence of under dealing between wholesaler and commission agents.

Ali (2000) has reported in the study that the augment in production of vegetables does not match the augment in demand. In India, among 1980 and 1993, there was a 4.92% per annum increase in total vegetable demand. The supply, on the other hand, increased by 4% per annum. There was hence a demand-supply gap of 0.92%. However, as seen in the above graphs, vegetable production rose dramatically following 1998. There is no data on vegetable demand post 1993; it is therefore not possible to know whether this enlarge in production satisfied the demand, or was further surpassed by demand.

Jakhar (2001) has reported that the current installed capacity can process only 3 to 4 per cent of total production of fruits and vegetables in the country. In the year 1993, there were 4100 to 4200 licensed processing units with an installed capacity of 12 lakh MT, against this the actual production of processed material was only 5.6 lakh MT implying a capacity utilization of less than 50 per cent. Being seasonal in nature, the units operate for less than 150 days a year.

Subrahmanyam (2002) has studied the farmers' share in consumer rupee for fruits in Punjab. They reported that most of the

small and marginal farmers lease out their orchards to pre-harvest contractors. Producers' share in the consumer rupee varied from 25 per cent to about 40 per cent in most of the fruit growers. The pre-harvest contractors who did not make any fixed investment on the orchards also got more than the producer's share. There is no doubt they had to incur some expenses on the watch and ward of their orchards, picking, packing, transportation of the produce, etc. They also reported that in "Apni Mandi" scheme also the domination of the traditional fruit and vegetable retailers outnumber the farmers.

Patil and Pramod Kumar (2002) have studied the economic viability of investments in mango plantations in Ratnagiri district of Maharashtra. The study has clearly revealed that the capital investment in Mango plantations was an economically viable proposition. The B.C ratio was 1.38, NVP was (21.78) the internal rate of return was higher than interest rate of Bank (18%) and payback period was about 10 years.

Gandhi & Namboodiri (2002) have reported that small holders though make a sizeable contribution to high value food production (fruits and vegetables), their access to market is constrained by scale. Their marketable surplus is small while local markets for high value commodities are thin and sale in distant urban markets rises transportation and marketing costs. Existing supply chains are long and are dominated by a number of intermediaries like assemblers, wholesalers, sub-wholesalers, commission agents and retailers. In case of fruits and vegetables, farmers receive one third to one half of the final price. The authors also observed that the share of farmers' in the consumer rupee in Ahmadabad was 41.1 to 69.3 per cent for vegetables and 25.5 to 53.2 per cent for fruits. In case of Chennai the farmers' share was

40.4 to 61.4 per cent for vegetables and 40.7 to 67.6 per cent for fruits. In the small AUS market Chennai where farmers sell directly to the consumers, the share of farmers was as high as 85 to 95.4 per cent for vegetables. This indicates that if there are no middlemen, the farmers' share could be much high. In the Kolkata market the share of farmers ranged from 45.9 to 60.94 per cent for vegetables and 55.8 to 82.3 per cent for fruits. The high percentage of margin to farmer – consumer price difference is indicative of large inefficiencies and relatively poor marketing effectiveness.

Balappa. S. R and Hugas L B (2003) study highlights that the market intermediaries are accruing higher margin by incurring less cost. Therefore in order to regulate the expenditure on commission, transportation and packing, efforts should be made to develop the necessary infrastructure for the marketing in the state. Alternatively it is suggested to develop the farmers market for vegetables and fruits.

Jairath (2005) reported that the share of specialized markets like fruits and vegetables in total regulated market is low. Only few states have separate fruits and vegetable wholesale regulated markets. There availability is not even one per thousand sq. km area. Even the horticultural states which account for nearly 20 per cent of fruits and vegetable production does not have regulated market per hundred sq.km. area. Various State Governments recently initiated a process of direct marketing by producers to consumers in the country by initiating the concept of Apni Mandi (Punjab, Haryana, and Rajasthan), Rythu Bazaar (Andhra Pradesh), Uzahaver Shandies (Tamil Nadu), Shetkari Bazaars (Maharashtra), Krishik Bazaars (Odisha). But these markets have been promoted so far only at state headquarter and some district headquarters

adjoining the State. These markets are dealing only in fruits and vegetables and other perishables.

Surabhi Mittal (2007) has observed that the increasing share of high value commodities in the consumption basket of households, higher incomes and urbanization, changing lifestyles, market integration and trade liberalization at global level have led to an increase in the demand for horticulture products in India.

Singh (2007) has observed in his study that one of the imperative measures of marketing efficiency is the share of producer in the price paid by the ultimate consumer-buyer. The study revealed that the farmer-producer of tomato, cabbage, cauliflower and cucumber received less than 50 per cent price paid by the consumer-buyer, the range being 37.26 per cent (tomato) to 49.16 per cent (cauliflower). The share of producer includes the marketing cost which is very high. The decomposition of retail price into share of producer and market functionaries revealed that i) grower's share generally rises from low priced to high priced vegetables ii) with increased perishability of vegetables the grower's share declines iii) the share of retailer is very high, in few cases even higher than that of producer iv) the marketing cost of vegetables is very high in hill regions.

Rajagopal (2008) in his study on marketing of apple, Guava and mango fruits reported that the producers share in the final price was highest in apple crop followed by mango and guava. The cost of marketing was higher in guava followed by mango and apple. It revealed that apple cultivation was economically viable even to small growers. He recommended that direct sales and sales through cooperatives should be promoted to provide more share to the producers in the final price of fruit crop.

Singh H.P. (2009) study mainly concentrated on the marketing of Agriculture crops is a major constraint in the production and disposal system and has a major role to play in making the industry viable. Fruits and vegetables are mostly marketed through commission agents. A very small portion is handled by Co-operative Marketing Societies. Storage due to over ripening and under ripening, Processing and packing due to inefficiency and contamination and Marketing due to loss of weight and quality with mutli-level handling. Not complete? Are these problems? The Horticulture marketing practices lack systems approach. The trading and marketing structure is very traditional and consists of a long chain of intermediaries. The farm gate price available to farmers is only 25% of the retail price under Indian conditions, whereas the same is 70 percent in the case of Dutch and US farmers, where more efficient marketing system is in place. Trade and market distortions are many and some of these are: high and unjust trading and marketing charges levied on producer sellers, delayed payment, pooling by traders and lack of open bid systems. Malpractices are rampant and the national market operates in a highly segmented manner.

Thomas and Gupta (2010) have studied the economics of banana cultivation in Kottayam district of Kerala. The study revealed that the expenditure on manures and fertilizers followed by labour cost were the major item of cost of cultivation of banana. He found that an amount of more than Rs. 6000 per ha can be gained as profit by undertaking banana cultivation.

Prem Kumar .M. (2012) has conducted a study on Problems of Marketing Vegetables in Farmers Market, the respondents rate high level problems of marketing vegetables and fruits in farmers' market with reference to damage cost, intermediatories exploitative

practices, perish ability of product, transportation cost and high storage cost. The respondents rate moderate level problems of marketing vegetables and fruits in farmers' market with reference to freight charges, lack of proper grading, high carriage and other handling charges, exploitation of growers by market force, lack of proper quality control, long distance of market access, personalization of production, long marketing channel, delay payment, lack of cold storage place, advance sales agreement, inadequate post harvest care, monopoly of middleman, bulkiness of products and low exports.

Piyush Kumar Sinha and Sujo Thomas (2012) in the study of "Organized Retailing of Horticultural Commodities" have observed that wing to rapid urbanization and changing consumption patterns, more and more retailers are trying to put their best efforts to discover new avenues of success when it comes to the sales of horticultural commodities. There are several Indian companies as well as foreign companies who have been focusing all their energies to succeed in the organized retail sector of Indian horticulture commodities. The Indian retail industry is worth $470 million and organized retail stands at $26 million which is around 6% of the market. The overall organized retail market in India is projected to grow at a CAGR of 40%, touching US$ 107 billion by 2013. Especially horticulture retail, which is mostly referred as the selling of fresh fruits and vegetables, is witnessing a slow but steady change.

Patil Jai Kumar (2012) has studied trends and growth rates in area, production and productivity and the factors responsible for change in acreage under banana crop in Jalgoan districts from 1950-51 to 1979-80 the area under banana augmented extremely from 66 hundred hectares to 334 hundred hectares and the

production of banana has increased 689 percent in the same period. Net irrigated area and one year lagged price of banana have together explained nearly 97 percent of the variation in the acreage under banana.

Hoq M. S., S. K. Raha and N. Sultana (2012) have conducted a joint study on "Value Addition In Vegetables Production, Processing And Export From Bangladesh," and observed that Bangladesh seemed to have high projection for export of vegetables for its high demand to the foreign national market. The export of fresh vegetables is more profitable due to high value addition. Bangladeshi vegetables were still not well known to the foreign consumers. To familiarize Bangladeshi vegetables to the foreigners and foreign super markets, quality of those vegetables has to be improved by different value addition activities like upgrading the packaging, Processing, handling, grading and transportation system. These kind of activities added value among to the vegetable producers, suppliers and exporters. Export expansion and demand from super market is constrained by poor quality of produces and imposition of different sanitary and phyto-sanitary criteria by the importing countries. So vegetables export should be promoted by implementing the following proposal cover the above drawbacks.

Vadivelu and B.R. Kiran (2013) in the joint study of "Problems and Prospects of Agricultural Marketing in India: An Overview" there is no doubt that in any marketing there is a motive towards profit involved and at the same time the marketing is to be based on certain values, principles and philosophies such as offering just and fair prices to the farmers who toil hard to till. Bringing necessary reforms coupled with proper price discovery mechanism through regulated market system will help streamline

and strengthen agricultural marketing. In order to avoid isolation of small-scale farmers from the benefits of agricultural produce they need to be integrated and informed with the market knowledge like fluctuations, demand and supply concepts which are the core of economy. Marketing of agriculture can be made effective if it is looked from the collective and integrative efforts from various quarters by addressing to farmers, middlemen, researchers and administrators. It is high time we brought out significant strategies in agricultural marketing with innovative and creative approaches to bring fruits of labor to the farmers.

Sundaravardarayan and Ramanathan (2013) have estimated that the establishment cost of cashew plantation for the first year was Rs. 7,690 , Rs. 8664 and Rs.9,491 for marginal ,small and large farmers respectively. The maintenance cost of cashew plantations were in the case of marginal forms were Rs. 4,059, Rs.4,410, Rs.4,910, Rs. 5,385, Rs.841 Rs.6,332 Rs.6,771 and RS 6,990 for second, third, fourth, fifth, sixth, seventh, eighth, ninth year respectively and incase of large forms the maintenance cost were Rs.5,040, Rs.5,250, Rs.5,764, Rs.6,145, Rs 6,558, Rs.7,021 Rs.7,438, and Rs. 774 for second, third, fourth , fifth, sixth, seventh, eighth and ninth year respectively. The output ratio per ha were 1.43,1.55 and 1.83 for respective farms.

Krishna.K M (2013) in his study on "Performance and Prospects of HOPCOMS in Karnataka – A Direct Link between Farmers and Consumers" has observed that the Horticulture provides excellent opportunities in raising the income of the farmers even in the dry tracts. A significant shift towards horticulture is evident in the state with an increase in area and production. Horticulture provides higher unit productivity and offers great scope for value addition and this sector is taking in

roads throughout the length and breadth of the state. Horticulture products have good potential for generating employment in cultivation and in processing, marketing and distributing. They are regularly produced on small farmers therefore providing an imperative source of additional income for poor farmers in developing countries. Horticulture has been documented and notorious as one of the growth engines by the government of India and numerous states in India. It contributes to economic security of the farmer and the country, creates employment for rural masses and conserves natural resources.

Kh. Dhiren Meetei (2013) in the study of "Overcoming Marketing Problems of Horticultural Produces in Manipur" observed that most of the growers or horticulturists are illiterate and unaware of the best practices and solutions. And latest technology cannot be imposed on them immediately. So the authorities should come forward for their enlightenment and should not simply leave them out as their problem. Also the farmers of small smaller holdings should make a collective effort to pull together their produces and market them to achieve economies of scale to some extent. Even if the technology is growing and brings change, capacity to bridge the gap between scientific knowhow and field level is inadequate in relation to the challenges faced by the farmers. So a pragmatic solution needs to be devised. Government should try to development of infrastructure as it is the backbone for developing the marketing procedure. The production of horticultural produce in the state is increasing by the passage of time. With the increase in production it is the right time for the farmers to have more and more knowledge of marketing and management of the products. The Government of the state should plan and organize various activities which will lead to the growth of

the economic condition of the growers which ultimately bring the economic growth in the state.

Hiremath (2013) in his study on economics of production and marketing of lime in Bijapur district, Karnataka has rightly observed that the per ha., cost of establishment for the four year growth period was Rs. 56,424.58 in small, Rs. 49,179.62 in medium and Rs.47.143.09 in large orchards. The intercrops reduced the establishment cost by 58.82,53.90 and 46.68 per cent in three size group of orchards, respectively. The per hectare cost of cultivation (8th to 30th year) was high in medium (Rs. 12,454.34) followed by large (Rs. 1,203.76) and (Rs.11,399.60) small orchards. The average yield of lime was 340.59, 366.98 bags in small.

Dastagiri M. B., Ramesh Chand (2013) in the study of "Indian vegetables: production trends, marketing efficiency and export competitiveness" have observed that in most of the commodity cases marketing cost, marketing margin, transport cost, labour charges are adversely affecting marketing efficiency and open market price, volume of the produce handled and net price received are increasing marketing efficiency. The study clearly showed that majority of the vegetables commodity markets are operating efficiently. The highest marketing efficiency channel was found to be Producer to Consumer. Hence, government policies should promote direct marketing models for horticultural marketing. The trends of fresh vegetables show that its export quantity increased 18.3% and 22.2% during two periods respectively.

Hemambara, H. S. and Mr. Yogesh, M. S (2014) have observed in the study on "Production and Marketing Problems of Papaya growers in North Karnataka" Papaya is considered one of

the most important fruits because it is a rich source of antioxidant nutrients (e.g., carotenes, vitamin C, and flavonoids), the B vitamins (e.g., folate and pantothenic acid), minerals (e.g., potassium and magnesium), and fiber. In addition, papaya is a source of the digestive enzyme papain, which is used as an industrial ingredient in brewing, meat tenderizing, pharmaceuticals, beauty products, and cosmetics. Production in India has increased significantly within the last few years, and is chiefly responsible for the noticeable growth in global papaya production. The second major problem faced by the global papaya industry is significant post-harvest losses along the marketing chain. Factors such as fungal diseases, physiological disorders, mechanical damage, or a combination of these are the leading causes of post-harvest losses. While papaya has suffered post-harvest losses ranging from 30 to 60 percent in the Southeast Asia region (FAO 2006), simple technology and practices have helped to reduce losses and to extend storage life.

Gupta and George (2014) have estimated the profitability of Santra (orange) cultivation in Nagpur district of Maharashtra by using the conventional measures of project appraisal for the data from 60 orange growers. The study using a discount rate of 12 percent indicated that orange orchards had payback periods of seven years, a net present value of Rs. 6,438.00 per acre, an internal rate of return of 39 percent and a benefit cost ratio of 2.5.

Saurav Negi and Neeraj Anand (2015) in the joint study of "Issues and Challenges in the Supply Chain of Fruits & Vegetables Sector in India: A Review " observed that there is an improper supply chain management, lack of cold chain infrastructure and Food Processing units which are leading to maximum inefficiencies and resulting to losses and wastage of Fruits and Vegetables. The

entire supply chain of F&V is laden with the issue of post-harvest losses and wastages due to long and fragmented chain, dependency on intermediaries, poor road infrastructure, inefficient Mandi system, inadequate cold chain infrastructure facilities, high cost of packaging, poor quality of distribution, weak link in supply chain etc. which resulting to poor price realization of growers on one hand and exorbitant prices paid by consumers on the other end. Highly inefficient supply chain and cold chain infrastructure is the major impediment in the path of speedy growth of agriculture sector in India.

Debajit Misra and Sudip Ghosh (2016) in the study of "Growth and export status of Indian floriculture: A review" observed that the production and trade of Indian floricultural products have been constantly increasing over the last decade. Though India dominates in terms of area under cultivation compared with some leading countries which are quite prosperous in floriculture like the Netherlands, Colombia, Ecuador and Belgium, India's yield per hectare is low. As a result, India's contribution to the global floricultural export market is very least amount. However, in order to become sustainable, new strategies should be followed, which can give fruitful results on long-term basis.

Rais M and Sheoran A (2015) have conducted a joint study on "Scope of Supply Chain Management in Fruits and Vegetables in India" and rightly observed that there is a colossal waste during the post-harvest storage and handling due to improper bagging without crating, lack of temperature controlled vehicles, no cold chain facilities for preserving the produce, coupled with significant processing of the agricultural produce resulting in enormous losses to the nation. Given the characteristics of fruits and vegetables such as perish ability, seasonality, bulkiness and delicate nature of

the products coupled with inadequate storage and transport facilities, the supply chain can be made efficient by reducing the length of the chain improving cold chain facilities. The supply chain management in vegetables has to be improved in all the stages of the supply by adopting global best practices in storage, packaging, handling, transportation, value added service etc. And also by disintermediation and participation of organized players i.e., modern supply chain with a view to benefit both farmers as well as ultimate consumers.

Krishna.K.M and Mokshapathy.S (2013) in the joint study of "Performance and Prospects of HOPCOMS in Karnataka – A Direct Link between Farmers and Consumers" have opined that the Horticulture gives an excellent opportunity in raising the income of the farmers even in the dry tracts. A significant shift towards horticulture is evident in the state with an increase in area and production. Horticulture provides higher unit productivity and offers enormous scope for value count and this sector is taking inroads all through the duration and width of the state. Horticulture products have good possible for creating employment in farming and in processing, marketing and distributing. They are frequently produced on small farmers thus providing an important source of additional income for poor farmers in developing countries. Horticulture has been acknowledged and identified as one of the growth engines by the government of India and many states in India. It contributes to economic security of the farmer and the country, generates employment for rural masses and conserves normal resources.

Kazim Kemal-ur-Rahim (2003) in the study entitled **"**A Review of the Horticultural Marketing and Post-Harvest Conditions in Afghanistan" has rightly observed that in Kabul and the

neighboring regions the focal point should be on improving overall quality of the produce traded as well as upgrading the wholesale market. In the Western Regions around Herat, pistachio, almonds and walnuts hold the most potential. This is the same in the Northern region although melon could also be added to this list. In the Southern regions around Kandahar, dried fruits are the most appropriate crops to concentrate on and in the Eastern regions around Jalalabad; the focus should be on citrus and vegetable production. Currently other bilateral agencies are establishment to formulate programmes to address aspects of the marketing environment. Coordination between donor institutions would be beneficial in delivering an effective mechanism by which the horticultural markets in Afghanistan may be altered to meet the needs of the consumers and develop valuable export markets for prospect production.

Chandrashekar.H.M (2011) has conducted the study on "Role of HOPCOMS in socio-economic change of farmer members in Mysore City" and rightly observed that Sachin Bhardwaj, Rahul Singh (2015) have conducted a study on "From Farmer to Agri-preneurs: A Case Study of Tumkur District" have opined that the Agripreneurs of Tumkur district are very literate, they use their smallholdings in very productive way, and trying to avoid intermediaries in their activities of agriculture. Agripreneurs of Tumkur take they help of agri clinics and NGOs for cultivating their commercial crops, reducing usage of chemicals to avoid soil erosion. They are depending, but not fully depending on government for financial, seed capital, marketing assistance. And further he opined that they have created their own agripreneurs associations to solve their problems.

Baliyan S.P, D.L. Kgathi (2009) in the joint study of "Production And Marketing Problems In Small Scale Horticultural Farming In Botswana" have rightly observed that the production and marketing problems faced by survival horticulture farmers in Botswana hamper the prospective production which forces the country to import 80% of the fruit and vegetable demand. The local farmers not succeed to struggle with the high quality and low priced imported vegetables. The trouble in disposing off the horticultural produce slowdown the farmers and this negatively affects local horticultural production and farm income. Commercialization of the small horticultural sector requires the development of market-oriented production, as opposed to the irregular sale of subsistence surplus. Triumph in commercializing this sector depends on the orientation of production to meet market demand and on the removal, or reduction, of a broad range of production and marketing constraints. A survey based study was conducted in Botswana in the year 2007-08 focusing on the identification of the problems associated with small scale horticultural production and marketing, their causes and possible suggestions thereof. Pareto analysis was used to prioritize (ranking) the problems and their causes.

2.2 Research Gaps

On the basis of the review of above studies pertaining to the horticulture of various categories reveal that they either focused on macro perspective of horticulture development or on some issues related to the specific category of the papaya crops at the micro level. But only a few studies have taken an integrated view of the concept horticultural crops and its impact on the farming community in Karnataka. Hence, in order to fill this research gap, the present study is carried out.

Chapter – III

PRODUCTION AND MARKETING OF HORTICULTURAL CROPS IN INDIA AND KARNATAKA - AN EMPIRICAL ANALYSIS

3.1 Introduction

An attempt is made in this chapter is to analyze the production and marketing of horticultural crops in India in general and in the state of Karnataka in particular. It is estimated that the Indian economy, with its extensive unpredictability of climate and soil, is highly favourable for growing a large range of horticultural crops such as fruits; vegetables, potato, tropical tuber crops and mushroom; ornamental crops; medicinal and aromatic plants, spices and plantation crops like coconut, green nut, cashew, cocoa, tea, coffee and rubber correspondingly.

Government of India has laid the main emphasis in achieving the self-sufficiency in food production especially cereals immediately after attaining independence in 1947. The efforts have successfully brought in Green Revolution in the late Sixties and early Seventies. It also showed that horticulture crops for which the Indian topography and agro-climate is well suited could be an ideal choice in achieving sustainability by small farmers. However, only in mid Eighties, the Government of India identified horticulture crops as a means of diversification for making agriculture more profitable through efficient land use, optimum utilization of natural resources (soil, water and environment) and creating skilled employment for rural masses especially women folk. The past

efforts have been rewarding in terms of increased production and productivity and availability of horticultural produce. India has thus emerged as the largest producer of coconut, arecanut, cashew, ginger, turmeric, black pepper and tea, and the second largest producer of fruits and vegetables. Among the new crops, kiwi, olive crops and oil palm have been successfully introduced for commercial cultivation in the nation.

The varying circumstances encourages private investment, to go for hi-tech horticulture with micro-propagation, protected cultivation, drip irrigation, fustigation, and integrated nutrient and pest management, besides making use of latest post harvest measures particularly in the case of perishable commodities. As a result, horticulture crop production has attracted youth since it has employment potential and highly remunerative and profitability

3.2 Major Fruit Producing Countries in the World

The Table – 3.1 analyses the major fruit producing countries details in the world during 2014-15. Among the countries of the world China stands first by producing 137067 '000 MT followed by India 81,285 '000 MT and Brazil (38,369) and USA (26,549) respectively. Italy is producing 13,889 '000 MT, which is the lowest producing country compared to other countries of the World. The details are presented in table-3.1.

Table -3.1

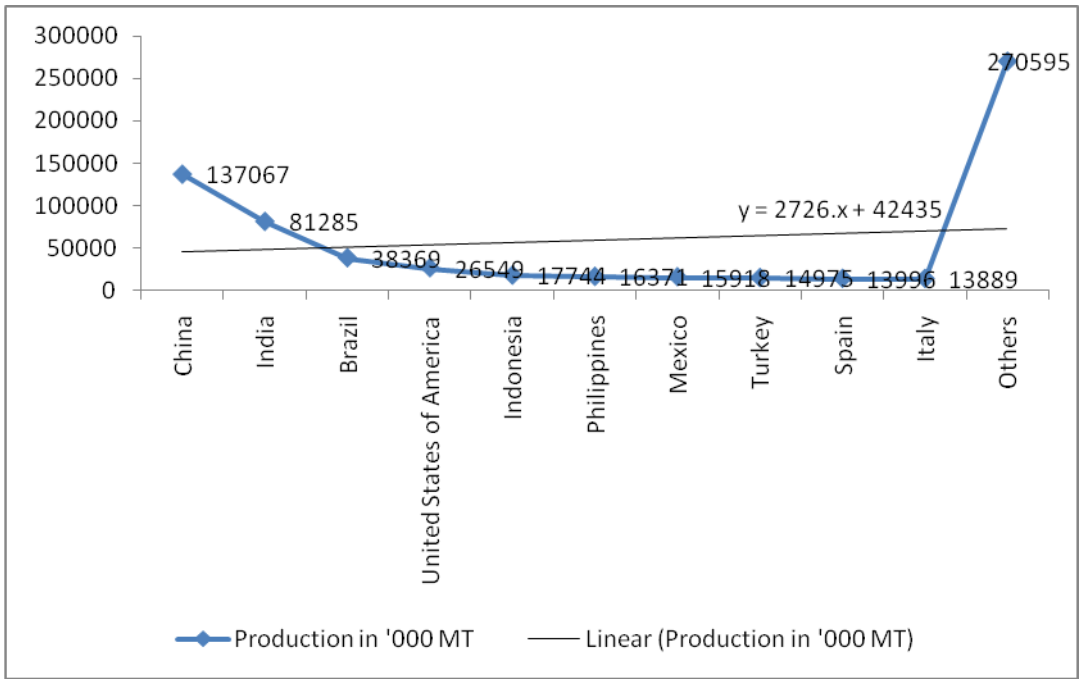
Major Fruit Producing Countries in the World (2014-15)

Country	Area in '000 Ha	Production in '000 MT	Productivity in per/Ha
China	11834	137067	11.6
India	6982	81285	11.6
Brazil	2325	38369	16.5
United States of America	1138	26549	23.3
Indonesia	797	17744	22.3
Philippines	1240	16371	13.2
Mexico	1257	15918	12.7
Turkey	1103	14975	13.6
Spain	1539	13996	9.1
Italy	1126	13889	12.3
Others	27925	270595	9.7
World	**57265**	**646758**	**11.3**

Source : FAO Website and for India : Horticulture Division, D/o Agriculture & Cooperation.

Graph – 3.1

Major Fruit Producing Countries in the World (2014-15)



The development of horticulture was very slow till the third Five-Year Plan and received meager attention even thereafter. However, the plan investment in horticulture development has been increased significantly since the VIII Five Year Plan which resulted in considerable strengthening of the horticultural development programmes in India. The Plan allocation for research on horticulture crops by the Indian Council of Agricultural Research (ICAR) was first made in IV Plan with a modest allotment of Rs.34.8 million. This was enhanced to Rs. 319.6 million, 1,102 million, 2,130 million during the VII, VIII and IX Plan respectively.

A meager financial allocation of Rs. 20.5 million for development in IV Plan, it rose to Rs.76.2 million in V, Rs. 146.4 million in VI, Rs. 250 million in VII, Rs. 10,000 million in VIII (utilization Rs.7890 million) and Rs.14530.6 million in IX Plan. While the increase in budgetary allocation from IV to IX Plan was 61 times for research, it was 584 times in respect of development programmes.

It is also found that the Ministry of Commerce has been promoting research, development and exports of cardamom, tea, coffee, and rubber through the Commodity Boards set up for the purpose namely Spices Board, Tea Board, Coffee Board and Rubber Board respectively. Also, an Agriculture Produce Export Development Authority (APEDA) has been set up under the aegis of the Commerce Ministry for promoting export of horticultural commodities both fresh as well as value added products. Indirect organizational support for horticulture development is also being provided by two agencies in Ministry of Agriculture namely National Cooperative Development Corporation (NCDC) and National Agricultural Cooperative Marketing Federation in the country.

On the basis of above efforts, the noteworthy progress has been made in area expansion resulting in higher production. Besides, use of modern technologies has also brought about improvement in productivity. More than 50 per cent increase in production is seen in many of the horticulture crops between 2005-06 and 2014-15. The details of area and production of important horticultural crops in India are depicted in table – 3.2.

Table - 3.2

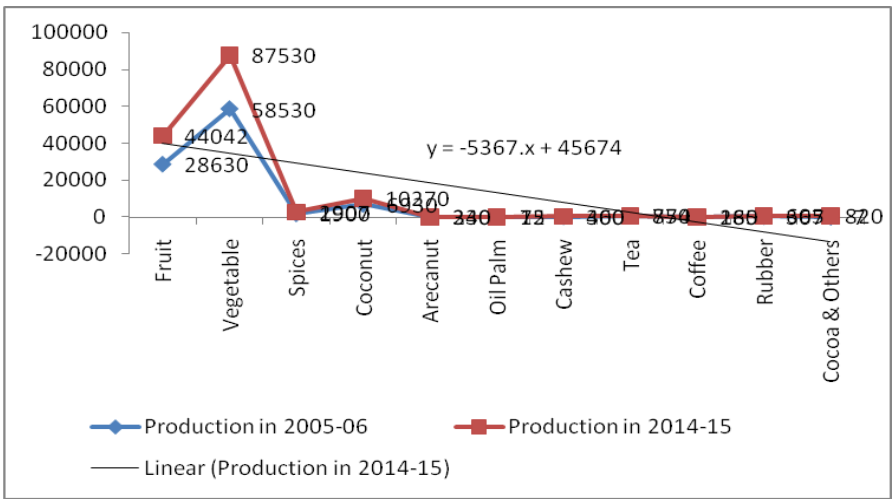
Area and Production of Important Horticultural Crops in India

(Area '000 ha., Production '000 tonnes)

Crops	2005-06		2014-15		increase over 2014-15	
	Area	Production	Area	Production	Area (%)	Production (%)
Fruit	2870	28630	3729	44042	29.93	53.83
Vegetable	5140	58530	5870	87530	14.20	49.55
Spices	2005	1900	2500	2907	24.69	53.00
Coconut	1530	6930	1910	10270	24.84	48.20
Arecanut	212	240	277	330	30.66	37.50
Oil Palm	8	12	50	75	525.00	525.00
Cashew	530	300	730	460	37.74	53.33
Tea	420	754	436	870	3.81	15.38
Coffee	279	180	329	265	17.92	47.22
Rubber	325	367	387	605	19.08	64.85
Cocoa & Others	14	7	12	820	-	-
Total	**13333**	**97850**	**16304**	**148673**	**21.28**	**51.94**

Graph - 3.2

Area and Production of Important Horticultural Crops in India



It can be found from the above table is that between 2005-06 to 2014-15, there has been a significant increase in area and production of various horticultural crops. The total area during 2014-15 was 16.30 million ha with a production of 148.67 million tonnes. While the area under horticultural crops increased by 21.28 per cent between 2005-06 and 2014-15, the production increased by 51.94 percent thus indicating a boost in production due to increased productivity besides area expansion. The maximum increase in area took place under oil palm followed by fruits cashew, areca nut and fruits. The increase in production was also highest in oil palm followed by rubber, spices, fruits, cashew and vegetables.

Table- 3.3 represents the production of horticulture versus food grains in India.

Table – 3.3

Production of Horticulture vis-à-vis Food grains

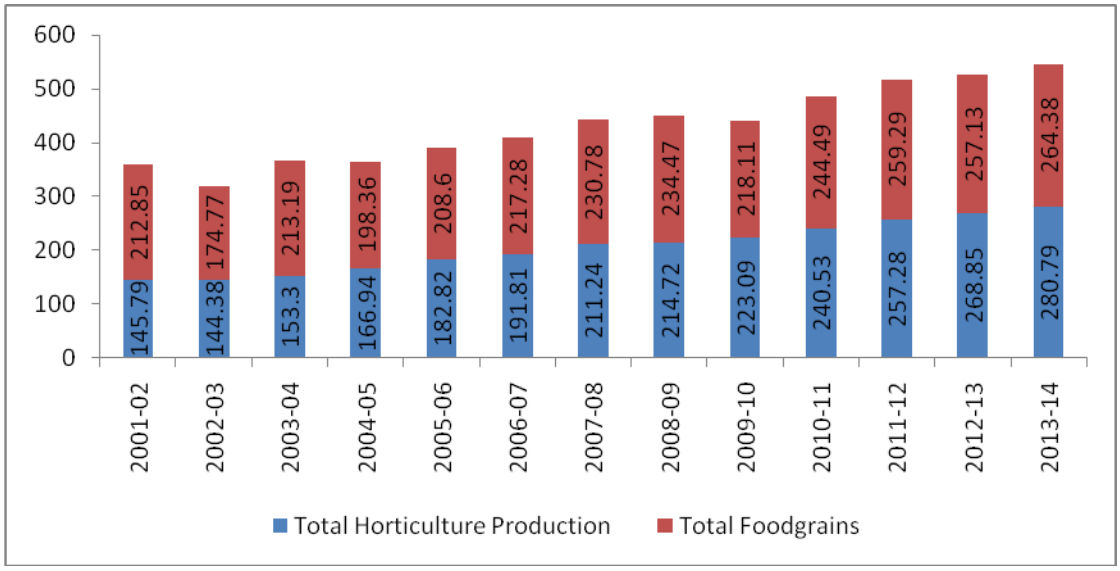
Year	Production (In Million Tonnes)	
	Total Horticulture Production	Total Foodgrains
2001-02	145.79	212.85
2002-03	144.38	174.77
2003-04	153.30	213.19
2004-05	166.94	198.36
2005-06	182.82	208.60
2006-07	191.81	217.28
2007-08	211.24	230.78
2008-09	214.72	234.47
2009-10	223.09	218.11
2010-11	240.53	244.49
2011-12	257.28	259.29
2012-13	268.85	257.13
2013-14	280.79	264.38

Source: Indian Horticulture Database, NHB and Horticulture Division, DAC.

Food grains: Directorate of Economics and Statistics

Graph – 3.3

Production of Horticulture vis-à-vis Food grains



3.3 Major Fruit Crops in India

The large variety of fruits is grown in India. Of these mango, banana, citrus, pineapple, papaya, guava, sapota, jackfruit, litchi and grape, among the tropical and sub-tropical fruits; apple, pear, peach, plum, apricot, almond and walnut among the temperate fruits and aonla, ber, pomegranate, annona, phalsa among the arid zone fruits are important. A comparison of area, production and productivity of different fruits during 2005-06 and 2014-15 are presented in Table -3.4.

Table - 3.4

Area and production of major fruit crops in India

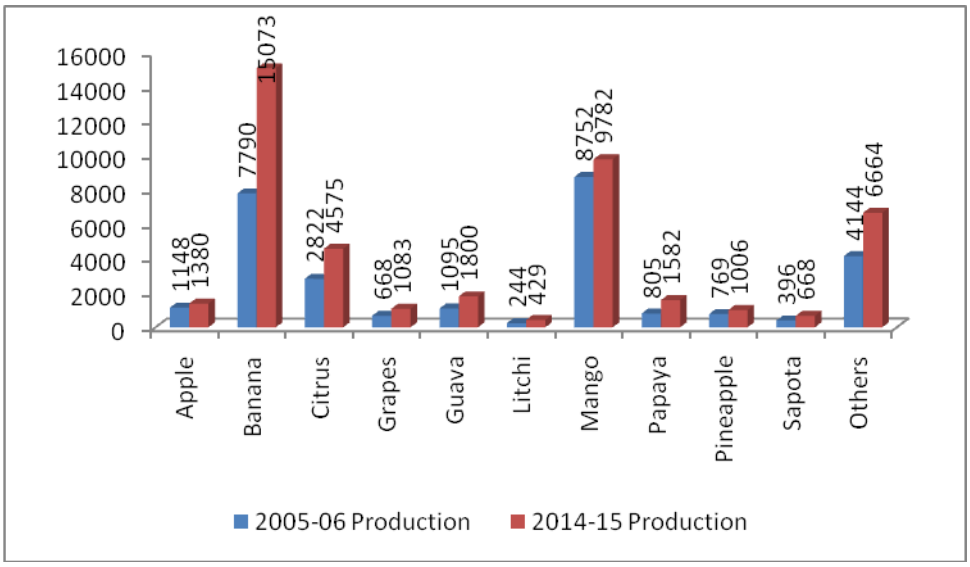
(Area '000 ha., Production '000 tonnes)

Crops	2005-06		2014-15		Productivity (t/ha)	
	Area	Production	Area	Production	1991-92	1998-99
Apple	195	1148	231	1380	5.88	6.00
Banana	384	7790	464	15073	20.27	32.50
Citrus	387	2822	488	4575	7.21	9.40
Grapes	32	668	43	1083	20.87	25.40
Guava	94	1095	151	1800	11.64	11.90
Litchi	49	244	56	429	4.97	7.60
Mango	1078	8752	1401	9782	8.11	7.00
Papaya	45	805	68	1582	17.88	23.40
Pineapple	57	769	74	1006	13.49	13.60
Sapota	27	396	50	668	14.66	13.20
Others	526	4144	699	6664	787	-
Total	**2874**	**28633**	**3725**	**44042**	**9.96**	**11.80**

Source: Indian Horticulture Database, NHB and Horticulture Division, DAC

Graph – 3.4

Area and Production of Major Fruit crops in India



It can be found from the above table that India accounts for 10 per cent of the total world production of fruits. It leads the world in the production of mango, banana, sapota and acid lime and has recorded highest productivity in grape. India accounts for an area of 3.73 million ha under fruit crops with a production of 44.04

million tonnes. During the period 2005-06 to 2014-15 the area, production and productivity of fruits augmented by 29.9, 53.8 and 18.4 per cent respectively. The fruit production has been increased by five times i.e., from 5.5 million tonnes in 1952- 53 to 28.63 million tonnes in 2005-06 and further eight times to 44.04 million tonnes by 2014-15 respectively.

The five principal fruit producing states are Maharashtra (17.08 per cent) Karnataka (12.37 per cent), Andhra Pradesh (10.42 per cent), Bihar (8.62 per cent) and U.P. (8.21 per cent). The highest average productivity is in Karnataka and Maharashtra states (17.3 and 17.2 tonnes/ha), the least being 10.2 tonnes/ha in Uttar Pradesh. Comparative analysis of area and production of fruits in different states are presented in Table - 3.5.

Table - 3.5

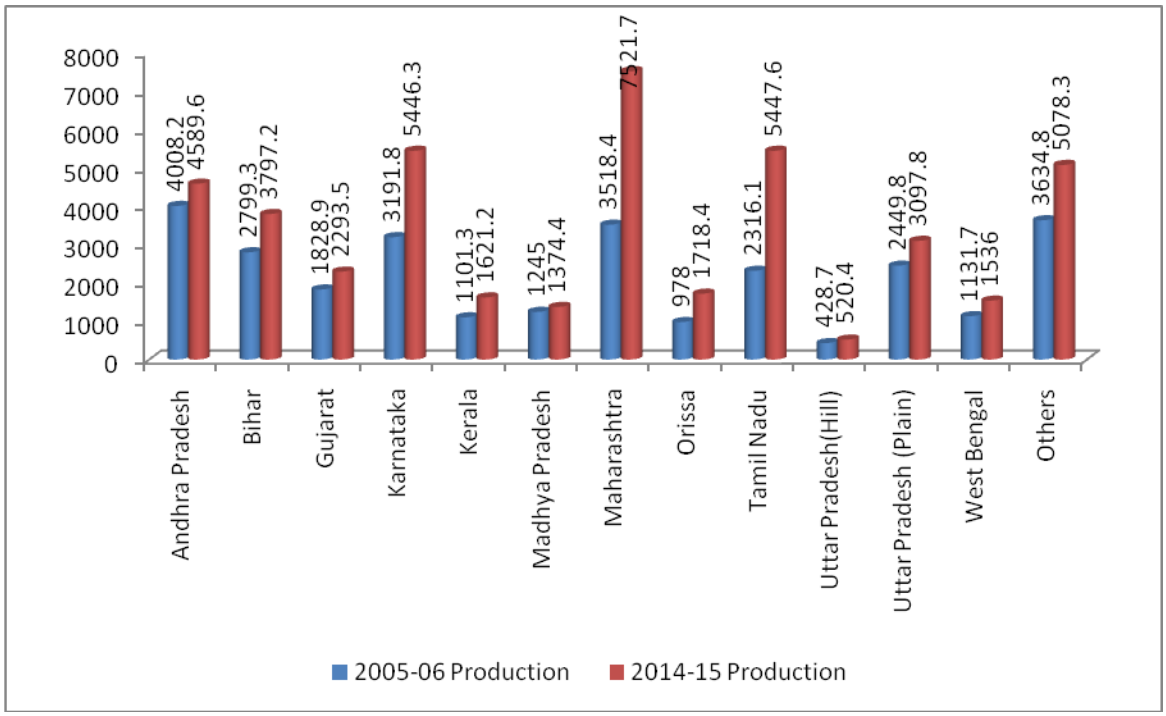
Area, Production and Productivity of Fruits in Major Fruit Growing States (2014-15) (Area '000 ha., Production '000 tonnes)

State	2005-06		2014-15		Productivity (t/ha)	
	Area	Production	Area	Production	2005-06	2014-15
Andhra Pradesh	313.1	4008.2	378.6	4589.6	12.80	12.12
Bihar	266.9	2799.3	303.6	3797.2	10.49	12.51
Gujarat	84.5	1828.9	163	2293.5	21.64	14.07
Karnataka	209.3	3191.8	314.6	5446.3	15.25	17.31
Kerala	236.3	1101.3	233.1	1621.2	4.66	6.95
Madhya Pradesh	64.7	1245.0	63.1	1374.4	19.24	21.78
Maharashtra	256.1	3518.4	436.1	7521.7	13.74	17.25
Orissa	136.3	978.0	249.4	1718.4	7.18	6.89
Tamil Nadu	136.2	2316.1	213.5	5447.6	17.01	25.52
Uttar Pradesh(Hill)	150.5	428.7	187.9	520.4	2.85	2.77
Uttar Pradesh (Plain)	303.2	2449.8	305.2	3097.8	8.08	10.15
West Bengal	111.3	1131.7	128	1536	10.17	12.00
Others	606.0	3634.8	750.7	5078.3	6.00	6.76
Total	2874.4	28632.0	3726.8	44042.4	9.96	11.82

Source: Indian Horticulture Database, NHB and Horticulture Division, DAC

Graph – 3.5

Area, Production and Productivity of Fruits in Major Fruit Growing States (2014-15)



3.4 Production of Horticultural Crops in India

***Mango Crop*:** The mango crop is the most important fruit covering 37.60 per cent of area and accounting for 22.21 per cent of total fruit production in the country. India's share in the world production of mango is 54.2 per cent. The area and production of mango (1998-99) was 1.401 million ha with a production of 9.782 million tonnes. Major mango producing states are Andhra Pradesh, Bihar, Karnataka, Maharashtra and U.P. Andhra Pradesh ranks first in mango production with a share of 20 percent and highest in productivity. There has been an increase of 29.62 and 11.77 per cent in area and production respectively in mango between 2005-06 to 2014-15. Comparatively lesser increase in production seems to be due to larger areas under new plantations.

Citrus crop: In India the citrus crop ranks second in total area with 0.488 million ha and 13.09 percent area under fruits with production of 4.575 million tonnes (10.39 per cent of total production under fruits). Limes, lemons, sweet orange and mandarin cover bulk of the area under this group of fruits. Cultivation of grapefruit and pummelo introduced decades back did not catch up commercially. Citrus fruits are grown mainly in the states of Maharashtra, Andhra Pradesh, Punjab, Karnataka and N.E. region. The increase in area and production of citrus in India (2005-06 to 2014-15) has been of the order of 28.20 and 63.12 per cent respectively. Productivity has increased from 7.21 to 9.40 t/ha (2005-06 to 2014-15). Area under Kogazi-lime has augmented considerably in India.

Banana fruit: The Banana fruit ranks third in India in area with 0.464 million ha covering 12.46 per cent of the total area. However, it is first in total production (15.07 million tonnes), being nearly one- third (34.22 per cent) of total fruit production. India occupies first position in banana production globally. Among the states, Tamil Nadu ranks first in area and production while productivity is highest in Maharashtra. Most of the banana is produced on a small scale basis in different production systems. Total increase in area and production of banana has been 21.05 per cent and 93.83 per cent respectively between 2005-06 and 2014-05. The phenomenal increase in production has been due to adoption of high density planting, use of tissue-cultured seedlings and drip irrigation, which is extensively enhanced efficiency.

Apple crop: The Apple crop is the fourth main fruit crop of the country and occupies a total area of 0.231 million ha with production of 1.38 million tonnes. It is grown mainly in the states of Jammu and Kashmir, Himachal Pradesh, Uttaranchal and

Arunachal Pradesh. Share of total area and production of apple in the total fruit production during 2014-15 was 6.2 and 3.13 per cent, respectively. While the total area under apple is highest in Himachal Pradesh, the productivity is highest in Jammu and Kashmir. Increase in area and production between 2005-06 and 2014-15 has been virtually of the same order i.e. 21.05 and 20.0 per cent respectively.

Guava: Guava is the fifth important fruit covering an area of 0.151 million ha with a total production of 1.8 million tonnes. This fruit accounts for 4.06 and 4.09 per cent of the total area and production respectively. The increase in area and production in guava between 2005-06 and 2014-15 has been 66.66 and 63.63 per cent respectively.

Papaya: The Papaya ranks sixth in area and production with 0.068 million ha (1.82 per cent) of the total area under fruits and 1.582 million tonnes (3.59 per cent) of the total production under fruits respectively. The increase in area and production between 2005-06 and 2014-15 has been 40.00 and 97.00 per cent respectively. The phenomenal increase both in area and production has been due to the development of several gynodioecious and high quality varieties in different states of the country.

Grape: Another fruit in which significant increase in area and production has taken place is grapes. Grape occupies 1.14 per cent of the total area with 2.56 per cent of the total production of fruits. The total area and production during 2014-15 were 0.043 million ha and 1.083 million tonnes respectively. Though primarily grown in Maharashtra, Andhra Pradesh, Karnataka and Tamil Nadu, it is also grown on a limited area in the plains of northern states. The

area and production increases (2005-06 to 2014-15) have been 33.33 and 61.19 per cent respectively.

3.5 The Plantation Crops in India

The Plantation crops constitute a large group of crops. These are grown over an area of 3.82 million ha (2 per cent of total cropped area) and contribute about Rs. 75 billion to export earnings. While the major plantation crops include coconut, arecanut, oil palm, cashew, tea, coffee and rubber, the minor plantation crops include cocoa. Their total coverage is comparatively less and they are mostly confined to small holdings.

Though, they play a important role in view of their export potential as well as domestic requirements and in employment generation and poverty alleviation programmes particularly in rural sector.

Coconut: Coconut is an significant crop and about 10 million people depend on coconut cultivation, processing and related activities. In India, coconut is grown mainly along the coastal states of the country and also in the N.E. region. The major coconut growing states are Kerala, Tamil Nadu, Karnataka, Andhra Pradesh, Orissa, West Bengal, Maharashtra, Goa, Assam, Pondicherry, Lakshadweep and Andaman & Nicobar Islands. In other states like Gujarat, Madhya Pradesh, Bihar and North Eastern region coconut cultivation is now gaining significance.

The Coconut is grown over an area of 1.91 million ha with a production of 1,49,248 million tonnes with a productivity of 6,834 tonnes per ha. India ranks first in total production of coconuts among 90 coconut producing countries in the world. The state-wise area, production and productivity of coconut in India during 2005-

06 to 2014-15 show that Kerala state accounts for a large share in production. Through, Tamil Nadu state has the highest productivity of 11,620 tonnes /ha, Karnataka state has the lowest productivity of 5,127 tonnes /ha. The area under this crop has increased by 24.07 per cent while the total production by 48 per cent during the period 2005-06 to 2014-15. As much as 48 per cent of the nuts produced are consumed in the raw form for edible and religious purposes, 30 per cent for production of milling copra for oil extraction, 10 per cent as tender coconuts, 8 per cent for the production of edible copra and the remaining 4 per cent for the production of various other products of commercial importance such as desiccated coconut, cream, milk powder etc.

The coir obtained from processing coconut husk is of high commercial value. Besides coir, shell based products have also gained entry into the national and international markets. The coir pith made into brick like structure is now used for raising horticultural plants especially in greenhouses. The details of the state-wise area, production and productivity of coconut in India area presented in table – 3.6. The details indicate from the year 2005-06 to 2014-15 respectively.

Table – 3.6

State-Wise area, production and productivity of coconut in India (2005-06 and 2014-15)

State	Area (000 ha)		Production (million tonnes)		Productivity (tonnes /ha)	
	2005-06	2014-15	2005-06	2014-15	2005-06	2014-15
Andhra Pradesh	63	98	9592	19221	15129	8588
Karnataka	238	288	12276	14951	5145	5127
Kerala	846	1078	42061	66720	4969	5793
Tamil Nadu	240	266	27558	30967	11468	11620
Others	141	180	9309	17389	6602	9660
Total	**1528**	**1910**	**100796**	**149248**	**6592**	**6834**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Arecanut: Areca nut is a commercial crop cultivated as a source of betel nut or supari. It covers an area of 0.277 million ha with an annual production of 0.33 million tonnes. India is the largest producer and consumer of areca nut in the world. Karnataka is the major areca nut growing state with an area of 91,500 ha and production of 131,000 tonnes accounting for 40 per cent of the country's production. Kerala ranks second with an area of 80,600 ha and production of 92,500 tonnes contributing 28 per cent of the total production. Assam ranks third with a production of 55,500 tonnes from an area of 74,500 ha and contributes 20 per cent of the total production. It is grown on a limited scale in Tamil Nadu, Meghalaya, West Bengal, Maharashtra and Goa. Table – 3.7 depicts the details of the state-wise area, production and productivity of arecanut in India.

Table – 3.7

State-wise Area, Production and Productivity of Arecanut in India (2005-06 and 2014-15)

State	2005-06			2014-15		
	Area (000 ha)	Production (000 tonnes)	Yield (t/ha)	Area (000 ha)	Production (000 tonnes)	Yield (t/ha)
Assam	68	55	0.822	74	55	0.744
Karnataka	65	95	1.465	91	131	1.200
Kerala	63	67	1.071	80	92	1.148
Meghalaya	9	8	0.978	9	11	1.208
Andaman	3	4	1.500	3	5	1.528
Others	4	11	2.750	20	36	1.800
All India	**212**	**240**	**1.132**	**277**	**330**	**1.189**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Oil Palm: Oil palm, though introduced as an ornamental crop during 1848 at National Botanic Gardens, Kolkatta, attained the status of a commercial plantation crop during 1960 in Kerala, and between 1971-1982 in Andaman & Nicobar Islands. However, its

development was stalled in India due to poor performance of the plantations managed by the two corporations. Considering the vast potential in India, a working group constituted by Govt. of India in 1986 and subsequent committees identified a total area of 801 thousand ha in eleven states of India. However, about 81 per cent of this area is located in Andhra Pradesh and Karnataka. Assam, Gujarat, Goa, Kerala, Maharashtra, Orissa, Tamil Nadu, Tripura and West Bengal are the other states having limited areas suitable for oilpalm cultivation. So far, an area of 50,000 ha has been planted under this crop in different states. Under irrigated conditions, oil palm yields as high as 30 tonnes FFB/ha/per year.

Cashew: Cashew is an important horticultural crop and has assumed an important place in the Indian economy. India produces 44.7 per cent of the global production of cashew. Area under cashew nut has increased from 0.533 million ha to 0.730 million ha during 2005-06 to 2014-15. During the same period, production has increased from 0.30 million tonnes to 0.46 million tonnes (Table -3.13). There have been significant increases in productivity/unit area. India is the largest producer, processor, consumer and exporter of cashew in the world.

Cashew cultivation is confined mainly to the peninsular India. The major cashew producing states are Karnataka, Kerala, Maharashtra, Goa along the West Coast and Orissa, Andhra Pradesh, and Tamil Nadu along the East Coast. It is also grown to a limited extent in Andaman and Nicobar Islands, Madhya Pradesh, Manipur, Meghalaya and Tripura. The area, production and productivity of cashew have been increasing as a result of identification of superior clones, standardization of vegetative propagation techniques and near self-sufficiency in quality planting material.

However, the production of raw nuts is not sufficient to meet the requirements of the processing units which have grown from 572 in early 80s to 1098 units in 2014-15, consuming nearly 650 thousand tonnes of raw nuts. The details of area and production of cashew from 2005-06 to 2014-15 are presented in table- 3.8.

Table – 3.8

Area and Production of Cashew (2005-06 and 2014-2015)

State	2005-06		2014-15	
	Area (000 ha)	Production (000 t)	Area (000 ha)	Production (000 t)
Andhra Pradesh	71	33	101	80
Goa	44	32	53	20
Karnataka	74	31	89	40
Kerala	135	131	122	130
Maharashtra	47	23	119	85
Orissa	60	31	114	50
Tamil Nadu	91	16	83	35
West Bengal	5	3	9	8
Others	3	0	40	12
Total	**530**	**300**	**730**	**460**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Cocoa: The cocoa, though introduced in India in the early half of the last century, got into Commercial cultivation only in 1970. The crop is now cultivated over an area of 12,402 ha with an annual production of 5,198 tonnes. Kerala accounts for 71 per cent of the area and 80 per cent of production in India. Karnataka and Andhra Pradesh is the other cocoa growing states. The details of area and production of cocoa in major states during 2014-15 are presented in table – 3.9.

Table - 3.9

Area and Production of Cocoa in Major States (2014-15)

State	Area (ha)	Production (tonnes)
Andhra Pradesh	670	150
Karnataka	2,780	1,325
Kerala	8,909	3,686
Tamil Nadu	43	37
Total	**12,402**	**5,198**

Source: Indian Horticulture Database, NHB and Horticulture Division.

In the Global scenario, India is nowhere in the production of cocoa, with the meager production of 5198 tonnes against the total world production of 2.95 million tonnes. Cocoa is grown as a mixed crop in the irrigated coconut and / or arecanut gardens in Kerala and Karnataka states. It is estimated that about 300 thousand ha of suitable area is available for expansion of cocoa as a mixed crop in the coconut and arecanut gardens. Pure plantations of cocoa are virtually non-existent. The present production of cocoa beans hardly meets 30 per cent of the demand of processing industry in India. The improved varieties of cocoa are PA x NH 32, Jorgan Red Axil, Amel x PA 7, T 86/2 and CCRP 1-7 respectivley.

3.6 Production wise percent Share of States in Horticultural crops

In India Tamilnadu (13.3) leads in fruit production followed by Maharashtra (12.7), Andhra Pradesh (12.6) Gujarat (9.7) Karnataka (8.4) and Uttar Pradesh (7.2) West Bengal (18.2) leads in vegetable production followed by Uttar Pradesh (12.1), Bihar (10), Andhra Pradesh (8.1) Gujarat (6.4) and Tamilnadu (5.6) respectively.

The state of Tamilnadu leads in looses flower production (24) followed by Karnataka (19.8), Andhra Pradesh (13), Maharashtra (8.8) and Punjab (8). West Bengal leads in cut flower production (34.7) followed by Maharashtra (11.5), Andhra Pradesh (9), Orissa (8.6) and Karnataka (8.5) Kerala leads in plantation crops production (34.8) followed by Tamilnadu (31.4) and Karnataka (14.8) Andhra Pradesh leads in spice production (20) followed by Gujarat (14.8), Rajasthan (12.5), Karnataka (8.6), Madhya Pradesh (7.7) and Tamilnadu (6.4).

Compare to other states Maharashtra (24.1) leads in area under fruits followed by Andhra Pradesh(10.1), Karnataka (5.9) Gujarat (5.5), Jammu & Kashmir (5.1) and Uttar Pradesh (5.1). West Bengal (15.9) leads in area under vegetables followed by Bihar (9.9), Uttar Pradesh (9.8) Andhra Pradesh (7.7) Maharashtra (7.2) and Orissa (6.5). Rajasthan (20.4) leads in area under spices and condiments followed by Gujarat (16.3), Andhra Pradesh (9.8) and Madhya Pradesh (9.8) and Karnataka (8.8). Kerala (29.5) leads in area under plantation crops followed by Karnataka (22.1) Tamilnadu (16.6) Andhra Pradesh (9.2), Maharashtra (6.2) and Orissa (6.1) respectively.

3.7 Current Status of Fruits

In the Global Scenario the China leads in total production (%) share')4) of fruits followed by Indian (12.5), Brazil (6.6), USA (4.2), Italy (2.8) and Philippines (2.7) Indonesia (22.4) leads in productivity followed by USA (22.2), Brazil (16.1), Philippines (14), Italy (13.2) Turkey (12.8), Mexico (12.6) India (11.7) and china (10.7) respectively.

In the middle of horticulture crops in India, fruits occupy second position in area, Production and productivity. Fruits share

29.25 percent of area under horticulture crops, 31.13 percent in production in production share with the productivity (MT/ha) of 11.73. The total area under fruits are 6383 thousand ha and the fruit production is 74878 thousand MT (2010-11). Area (million ha) and production (million MT) of fruits has increased from 2.9 and 28.6 in 1991-92 to 6.3 and 74.9 in 2010-11 respectively.

The productivity (MT/ha) of fruits in the country has been increased gradually from 9.96 to 11.73 from the year 1991-92 to 2010-11. Percent increase in area, production and productivity of fruits since the year 1991-92 till 2010-2011 is 122.09, 161.52 and 17.77 percent respectively Productivity of litchi, pomegranate, mango, citrus apple, sapota and guava is less than national productivity of fruits. Tamilnadu (13.3) leads in fruit production followed by Maharashtra (12.7), Andhra Pradesh (12.6) Gujarat (9.7), Karnataka (8.4) and Uttar Pradesh (7.2).

3.8 Current Status of Vegetables

China ranks first in area and Production with 39 percent share in total area and 46.7 percent share in total vegetable production in the world. China ranks 7th in vegetable productivity MT/ha (22.5) among top vegetable producing countries in the world compared to the best Spain (37.2).

Spain ranks first in vegetable productivity MT/ha (37.2), followed by USA (31.4), Iran (26.2) Egypt (25.7), Italy (25.1), Turkey (23.7), China (22.5) Mexico (18.5), Russian Fed (17.4) and India (17.3),

Among horticulture crops vegetables occupy first position in area, production and productivity. Occupying 38.92 percent area under horticulture crops. Production share is 60.93 percent with the productivity (MT/ha) of 17.25. The total area under vegetable

are 8495 thousand ha and the vegetable production is 146554 thousand MT (2010-11).

Area (million ha) and production (million MT) of vegetables has increased from 5.6 and 58.5 in 1991-92 to 8.5 and 146.5 in 2010-11 respectively. Among all the states of India West Bengal (18.2) leads in vegetable production followed by Uttar Pradesh (12.1), Bihar (10), Andhra Pradesh (8.1), Gujarat (6.4) and Tamilnadu (5.6)

Round – The – Year Availability of Vegetables

Some of the vegetables are available fresh throughout the year in one or the other parts of the country. Such vegetables are peas, cabbage, cauliflower, brinjal, okra, tomato and potato. The states where these vegetables are produced round the year are as under.

Crops	State
Peas, cabbage and cauliflower	Karnataka
Brinjal	Andhra Pradesh, Chhattisgarh, Karnataka, Tamilnadu, U.P., and West Bengal.
Okra	Karnataka and West Bengal
Tomato and potato	Tamilnadu

Table - 3.10

Major Vegetable and Spices and Condiments Producing States of India

Status /UTs	Vegetables		Spices	
	% share in production	% share in area	% share in production	% share of total area
West Bengal	18.24 (1st)	15.89	3.61	3.30
Uttar Pradesh	12.06 (2nd)	9.76	3.75	1.92
Bihar	9.98 (3rd)	9.95	0.23	0.44
Andhra Pradesh	8.08 (4th)	7.67	19.98 (1st)	9.84
Gujarat	6.40 (5th)	6.07	14.81 (2nd)	16.3

Karnataka	6.18 (6th)	5.49	8.60 (4th)	8.81
Tamil Nadu	5.66 (7th)	3.26	6.38 (6th)	4.57
Orissa	5.32 (8th)	6.52	3.27	4.22
Maharashtra	5.12 (9th)	7.19	1.88	3.96
Haryana	3.17	4.08	1.46	0.51
Chattishgarh	2.90	4.07	0.16	0.40
Jharkhand	2.81	3.05	-	-
Madhya Pradesh	2.52	3.34	7.73 (5th)	9.78
Punjab	2.45	2.05	1.19	0.63
Kerala	2.31	1.76	2.11	7.99
Assam	2.00	3.06	4.15 (7th)	3.03
Jammu & Kashmir	1.06	0.82	0.02	0.13
Himachal Pradesh	1.01	0.95	0.37	0.22
Uttarkhand	0.70	1.01	0.72	0.23
Rajasthan	0.60	1.65	12.48 (3rd)	20.37

Source : Indian Horticulture Database, NHB, 2011

3.9 Current Status of Plantation Crops

The plantation crops rank 3rd in area and production and 4th productivity among the horticultural crops in India. The total area ('000 ha) under plantation crops are 3.3 with the total production of ('000 MT) 12 in the years 2010-11 Area (million ha) and production (million MT) of plantation crops has increased from 2.3 and 7.5 in 1991-92 to 3.3 and 12.0 in 2010-11 respectively with the percentage increase of 43.86 percent in area and 60.14 percent in production since the year 1991-92 to 2010-11.

The productivity of cashew nut, arecanut and cocoa is less than the average productivity of plantation crops. Among plantation crops coconut leads in production followed by cashewnut, arecanut and cocoa.

3.10 Current Status of Flowers

Flower production ranks 5th in area, 4th in production and 3rd in productivity among horticulture crops in India. The total area

under loose flowers are 191 thousand ha production is 1031 thousand MT (2010-11).

Area ('000 ha) and production ('000 MT) of flowers has increased from 106 and 535 in 2001-02 to 191 and 1031 in 2010-11 respectively. The percent increase in area since 2001-02 to 2010-11 is 80.19 and production increased by 92.71 percent. Tamilnadu leads in production loose flowers with the total production share of 24% followed by Karnataka (19.8%) Andhra Pradesh (13%), Maharashtra (8.8%) and Punjab (8%).

West Bengal leads in production of cut flowers with the total production share of 34.7% followed by Maharashtra (11.5%) Andhra Pradesh (9%), Orissa (8.6%) and Karnataka (8.5%). The details of the major flowers producing states of India area presented in table – 3.11.

Table – 3.11

Major Flowers (loose and cut) Producing States of India

States	% total loose flower production	% total cut flower production
Andhra Pradesh (AP)	13.0 (3rd)	9.0 (3rd)
Maharashtra	8.8 (4th)	11.5 (9nd)
Tamilnadu (TN)	24.0 (1st)	-
Gujarat	4.8	7.3 (5th)
Karnataka	19.8 (2nd)	8.5 (4th)
Uttar Pradesh	1.7	4.3 (6th)
West Bengal (WB)	5.7	34.7 (1st)
Punjab	8.0 (5th)	-
Delhi	-	1.5
Jharkhand	2.1	2.5
Haryana	5.8	1.6
Uttarkhand	-	5.0
Himachal Pradesh (HP)	-	0.9

Source: Indian Horticulture Database, NHB.

3.11 Aromatic and Medical Plants

The total area under aromatic and medicinal plants are 510 (000, Ha) with the total production of 605 (000, MT) in the year 2010-11 and the total productivity of 1.2 MT/ha) Area ('000 ha) and production ('000 MT) of aromatic and medicinal plants has increased from 324 and 178 in 2006-07 to 510 and 605 in 2010-11 respectively.

3.12 Export of Horticultural Commodities

Among horticultural commodities, India is exporting fresh fruits, vegetables, processed products of fruits and vegetables, cut & dried flowers, medicinal and aromatic plants, seeds, spices, cashew kernels and their products, tea and coffee. The total value of export of these commodities increased from Rs.29722.78 million in 2005-06 to Rs.90315.20 million in 2014-15. The details of the export of horticultural products from India are presented in Table-3.12.

Table - 3.12

Export of Horticultural Products from India

Products	2005-06		2014-15	
	Quantity ('000 tonnes)	Value (Rs. in millions)	Quantity ('000 tonnes)	Value (Rs. in millions)
Fruits & Vegetables	493.61	2934.50	387.43	5360.20
Processed fruits & vegetables	79.90	1777.80	238.60	7056.80
Fruits & Vegetable seeds	8.42	160.90	6.06	663.30
Floriculture	NA	148.00	18.72	966.00
Arecanut/ Cocoa	0.21	111.40	20.59	140.30
Coconut	31.00	745.50	56.00	3021.00
Cashew & its Products	47.74	4422.40	75.02	16099.00
Spices	142.10	3809.68	231.39	17580.20
Tea	216.45	12122.60	205.86	21918.40
Coffee	111.45	3490.00	211.62	17510.00
Total	**1130.88**	**29722.78**	**1451.29**	**90315.20**

Source: Indian Horticulture Database, NHB and Horticulture Division.

It is found that the horticulture products account for more than 54.55% (1998-99) of the total value of exports of agricultural commodities from India. Of these, export of tea leads all horticultural commodities followed by spices, coffee, cashew and processed fruits and vegetables.

3.13 Fresh Fruits & Vegetables

There has been significant increase in the export of fresh fruits and vegetables during the past few years. Exports increased from Rs.2934.5 million in 1991-92 to Rs.5360.2 million in 1998-99. Among fruits mango was the main fruit exported. Export of fresh mango had commenced as early as 1925. Among vegetables onion has been the major crop exported from India. The Government of India has established Agricultural and Processed Food Export Development Authority (APEDA) under the Ministry of Commerce to promote fruits and vegetables export. The APEDA in turn has initiated a programme for an integrated training of horticulture producers for some identified fruits such as grape, mango, litchi, Kinnow in the selected regions. Farmers have been provided training in integrated post harvest management practices for better handling of the produce to ensure export of quality products. APEDA is also making efforts to enhance the shelf life of fruits such as mango, grape, litchi through use of controlled/modified atmosphere storage and use of reefer containers so that they could be transported by sea freight and achieve higher competitive advantage. In order to improve quality of fruits and vegetables, pre-harvest manuals on certain fruits and vegetables have been prepared for dissemination to farmers and producers.

Fruits: During 2014-15, about 96,487.57 tonnes of fruits and nuts were exported. The export earnings, which was Rs. 726.5 million

during 2005-06 increased to Rs. 2,384.48 million in 2014-15. Mango occupies a premier position among fruits valued at Rs. 791.37 million. Other fruits, which have attained significant position in export, are grape, walnut, citrus (Kinnow), banana and apple. Small quantities of a number of other fruits e.g. litchi, guava, custard apple, pineapple papaya and tamarind have also demand in the export market.

The mango varieties exported from India are Alphanso, Kesar, Dashahari, Banganapalli. Variety Thompson Seedless variety constitutes the bulk of exports of grape. Besides, Kinnow is other fruit exported, which has attained a sizeable status value-wise, however, the four fruits and nut exported are mango, grape, kin now and walnut respectively. The details of export of major fruits from India during 2014-15 are presented in table- 3.13.

Table - 3.13

Export of major fruits from India (2014-15)

Product	Quantity (tonnes)	Value (Rs in millions)
Apple	7442.12	100.24
Banana	8111.42	168.94
Citrus	12786.30	151.94
Grapes	11382.12	370.91
Guava	496.84	6.92
Mango	45407.59	791.37
Pineapple	244.68	1.68
Pomegranate	4239.15	89.61
Sapota	1049.45	13.69
Walnut (Whole + Kernel)	5327.9	689.18
Total	**96487.57**	**2384.48**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Vegetables: Fresh vegetable exports have been on the rise. During 2014-15, the total vegetable exports amounted to 2,38,279.28

tonnes valued at Rs. 2104.23 million. The major item exported is onion, worth 1760.47 million, with a share of 83.66% in vegetable exports. Other crops with significant exports include tomato (Rs.4.75 million) peas (Rs.1.63 million) and cucumber (Gherkin) (Rs.71.65 million). Mixed vegetable exports amounted to Rs.265.73 million, with the share of exports being 12.63%. Main vegetable exports from India are to South-east Asia and Middle East, except cucumber and gherkin which are exported to Europe and the U.S.A. High-value beans, peas, green chilli etc. have good scope for export. The details of the export of major vegetables from India during 2014-15 are presented in table- 3.14.

Table - 3.14

Export of Major Vegetables from India (2014-15)

Crop	Quantity (Tonnes)	Value (Million Rs.)
Cucumber (Gherkin)	5132.32	71.65
Mixed vegetables	16738.06	265.73
Onion	215693.61	1760.47
Peas	72.58	1.63
Tomato	642.71	4.75
Total	**238279.28**	**2104.23**

Source: Indian Horticulture Database, NHB and Horticulture Division.

3.14 Processed Fruits & Vegetables

Export of processed fruits and vegetables is another thrust area for increasing export of value added products. While processing industry in India has been dependent on small units without modern facilities a large number of multinational companies have entered the processed food industries in recent years with a thrust on exports.

Some of the new products which have been introduced in the market are tomato paste in bulk aseptic packs, freeze dried and Instant Quick Frozen fruits, vegetables and gherkins. The total

export of processed fruits & vegetables from India is Rs. 7056.8 million. This consists 54.24 % of dried & preserved vegetables, 19.70 % of mango pulp, 15.30 % of other processed fruits & vegetables and 10.76 % of pickles & chutney. The APEDA in its quality upgradation programme has covered 26 Mango pulp processing units in Andhra Pradesh and Tamil Nadu for certification under the HACCP Quality Management tool.

Potato: Limited quantities of potato are exported from India as fresh potato, seed potato and frozen potato. Fresh potato exports during 2014-15 amounted to 20,883.80 tonnes valued at 9.037 million. Frozen potato exports amounted to 1590.30 tonnes, valued at Rs. 1.104 million. Seed potato exports amounted to 431.64 tonnes, valued at Rs.0.469 million. The details can be seen in Table – 3.25.

The major potato exports are to the neighboring countries of South Asia and South East Asia. Since most potatoes in India are harvested in spring, when fresh potatoes are not available in Europe, with a large production base and a sound export strategy, India has opportunities to exploit fresh potato as well as seed potato exports. The details of the export of potatoes from India during 2014-15 are presented in table- 3.15.

Table - 3.15

Export of Potatoes from India (2014-15)

Item	Quantity (tonnes)	Value (Rs. in millions)
Potato fresh	20883.80	9.037
Frozen potato	1590.30	1.104
Potato seed	431.64	0.469
Total	**22905.74**	**10.610**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Mushroom: In India the mushroom exports started in 1993-94 with 4,811.478 tonnes. However, there has been a decline in mushroom export during 2014-15 with a total export of 3,548.37 tonnes, mostly in dried/processed form. The details of the mushroom exports from India during 2014-15 are presented in table- 3.16.

Table - 3.16

Mushroom Exports from India (2014-15)

Type of Mushroom	Quantity (tonnes)	Value (in million Rs.)
Dried	90.13	277.27
Processed	3458.24	139.27
Total	**3548.37**	**416.54**

Source: Indian Horticulture Database, NHB and Horticulture Division.

Dried mushrooms were exported to 18 Countries, the major share of which went to France, Germany and Switzerland. The major importer of processed mushroom from India was USA, Israel, Denmark and Canada.

Flowers: Although India's share in the export market of flowers is still insignificant, it has registered a sharp increase from Rs.144.5 million in 1991-92 to Rs. 966.0 million in 1998-99. The cut flower export values have shown a tremendous increase during the period from Rs.4 million to Rs. 253.0 million. This has come about with the establishment of a large number of export oriented cut flower units around Bangalore, Pune, Delhi and Hyderabad during the last five years. The major product has been rose being grown by more than 90 per cent of commercial units followed by tropical orchids (dendrobium). Limited exports are also taking place in carnation, geranium etc. The major destinations have been Europe

(Germany, Holland & U.K.). The other markets importing Indian flowers are Japan, Australia, Russia and Singapore. A unit near Chennai is exporting tropical orchids. Other potential commodities for export are cut flowers, house plants, tissue culture material, dry flowers and hybrid seeds.

Dry flowers contribute a major share of the floriculture trade. Flower crops like dahlia, bell cup, marigold, jute flower, wood roses, wild lilly, helicrysum, lotus pods which can be easily processed and preserved as dry flowers hold enormous potential as these are becoming popular due to their non-perish ability and are being exported from India.

Export of dry flowers and floral products has been going on since 1985. Indian flower trade has crossed 10,000 tonnes with major markets being US, Israel, Hongkong, Japan, Singapore and West European countries. U.K. has been the largest importer of dried flowers from India, ahead of Germany, Italy, the Netherlands and Spain. The dry flower units are concentrated in places like Tuticorn in Tamil Nadu and Kolkata (Calcutta).

Spices: India has a long history of producing and exporting spices. The world trade in spices is estimated around 0.45 million tonnes. In India, spices exports have been consistently moving up during the last one-decade with an increase of 210% in quantity and 622% in value during this period. The country commands 46% in global trade in terms of quantity and 28% in terms of value. Exports during the year 2014-15 have been 2,31,389 tonnes valued at Rs.17,580.2 million. The exports rose during 1999-2000 creating an all time record in terms of value both in rupee and dollars.

Compared to last year, export has registered an increase of 6% in rupee and dollar terms. However the export has shown a decrease of 10% in volume. During 2014-15, in the total spices export earnings, pepper contributed about 36.3 per cent followed by spice oils and oleoresins (24.1%) and chillies (12.3%) in terms of value. The value-added products in the export basket constitute 37% of the total value of exports. Table- 3.17 gives us the details of estimated export of spices from India.

Table - 3. 17

Estimated Export of Spices from India

Item	2005-06			2014-15		
	Quantity (tonnes)	Value (Rs. in millions)	% of total value	Quantity (tonnes)	Value (Rs. in millions)	% of total value
Pepper	20535	743.17	19.51	34864	6381.13	36.30
Cardamom (S)	544	155.74	4.09	475	252.12	1.43
Cardamom (L)	910	50.45	1.32	1424	119.09	0.68
Chillies	32603	894.85	23.49	61253	2166.11	12.32
Ginger	14259	218.81	5.74	8778	406.48	2.31
Turmeric	19661	377.62	9.91	36522	1245.50	7.08
Coriander	9954	132.35	3.47	20685	458.90	2.61
Cumin	1654	63.75	1.67	10723	601.09	3.42
Celery	3489	58.46	1.53	3991	96.91	0.55
Fennel	2136	48.09	1.26	5279	153.81	0.87
Fenugreek	6375	55.73	1.46	10082	191.49	1.09
Other seeds(1)	1282	25.15	0.66	2001	74.91	0.43
Garlic	10282	82.84	2.17	4068	74.10	0.42
Other spices (2)	13512	183.11	4.81	19077	765.95	4.36
Curry powder	3516	110.01	2.89	5210	359.68	2.05
Mint oil			0.00	4207	1225.22	6.97
Spice oleoresins & other oils	1392	609.55	16.00	2750	3007.74	17.11
Total	**142104**	**3810**		**231389**	**17580.23**	

Source: Indian Horticulture Database, NHB and Horticulture Division.

From a comparative analysis of the total value of export of spices from India during the period 2005-06 and 2014-15, it could be seen that in case of pepper, the prime export earner, the total export value rose from Rs.743.2 million to Rs.6381 million. The percentage value, which was 19.50 in 1991-92 has risen to 36.30 by 1998-99. In the case of small cardamom the percentage value which was 4.1 in 1991-92 has come down to 1.43 at 1998-99. All the crops except garlic recorded increase in export quantity and value during this period. Export value of garlic has come down from 82.8 million to 74.10 million with a difference in total value from 2.17 to 0.42 percent.

3.15 Export of Plantation crops

Coconut and its Products

While coconut as such is not exported, of late, the export of coconut products has increased considerably. The overall export of coconut and its products including coir increased from Rs. 731.90 million during 2005-06 to Rs. 3121.53 million in 2014-15. Coconut oil fetched maximum export earnings of Rs. 62.19 million among the products other than coir, followed by coconut shell (raw)(Rs.11.19 million), desiccated coconut (Rs.8.92 million) and shell charcoal (Rs.6.42 million). Coconut oil is exported primarily to Middle East and African countries like Jordan, Kuwait, Oman, UAE and Kenya. The details of export and import of coconut products and the coir products are presented in table – 3.18.

Table - 3.18

Export and Import of Coconut Products and Coir Products (Rs. in millions)

Year	Exports of Coconut products	Coir Products	Import of Coconut Products
2005-06	4.30	627.60	21.92
2014-15	99.83	3021.70	43.28

Source: Indian Horticultural Data Base, NHB.

In India there is still a vast scope to increase export earnings from coconut and its products. Coir and coir products alone earned Rs. 2,921 million during 2014-15.

Arecanut: While it is claimed that arecanut production in the country is sufficient for internal consumption, a review of the available data provides some important trends. India has been a regular importer of arecanut and its exports, which was 658 tonnes valued at Rs.45.70 million in 2005-06 has declined marginally during 2014-15 when only 533 tonnes of arecanut valued at Rs. 46.89 million was exported. During 2014-15, Indian imports were more than 12 times of exports, being 6707 tonnes valued at Rs. 187.56 million. Table -3.19 depicts the export and import of arecanut from India during 2005-06 and 2014-15 respectively.

Table - 3.19

Export and Import of Arecanut from India

Year	Export		Import	
	Qty (tonnes)	Value (million Rs.)	Qty (tonnes)	Value (million Rs.)
2005-06	658	45.70	-	-
2014-15	533	46.89	6707	187.56

Source: Indian Horticulture Database, NHB and Horticulture Division.

To reduce imports we have to lay emphasis in increasing productivity in the existing arecanut plantation rather than increasing the area under the crop. The arecanut imports were primarily from Sri Lanka followed by Indonesia and Myanmar. Small quantities of arecanut were imported once in a while from Hongkong, Bangladesh, Singapore, Bhutan, Nepal and Pakistan.

Oil Palm: The Country is importing huge quantity of vegetable oils, of which palm oil accounted for nearly 1.2 million tonnes. There is huge demand for vegetable oil in general and palm oil in particular, being cheaper oil. The country has just started producing a small quantity of palm oil. There is, however, great scope for producing palm oil in the country, which can be exploited bringing one million ha under oil palm to produce three million tonnes of crude palm oil and 0.3 million tonnes of kernel oil by 2025.

Cashew: India is the leading producer, processor and exporter of cashew kernels in the world. The export earnings from cashew and allied products during 2005-06 was only Rs.6,690.90 million which increased to Rs. 16,300.8 million by 2014-15. During 1999-2000 the export rose to Rs. 24,514 million, which is an all time record. Cashew stood fourth in position amongst horticultural products exported from India, after tea, coffee and spices. The export of cashew and its products has increased from 47,738 tonnes in 2005-06 to 77,026 tonnes in 2014-15. During the same period the value of exports increased from Rs. 6,690.90 million to Rs.16,300.8 million. There is still potential for more exports in future.

Cashew kernels obtained from raw cashewnuts are exported to more than 30 countries. Very small quantities of roasted/salted cashewnuts in consumer packs of 1 kg or less are also exported.

Principal destinations of exports are the USA, the Netherlands, Japan, U.K, Australia, Singapore, France, UAE and Germany. Cashew nut shell liquid (CNSL) is also an exported item, which was 4542 Mt. in 2005-06 dripped to 1912 Mt in 2014-15, which earned RS, 42.1 million. The details of export and import of cashew is given in Table. The growth of cashew processing industry has been substantial over the last two decades, whereby the processing units doubled, doubling the domestic production. There were 572 units in early 80's, consuming nearly 0.35 million tonnes of raw nuts. This increased to 1098 units in 2014-15, consuming nearly 0.65 million tonnes of raw nuts. The processing capacity of these units is about 1 million tonnes, which is not being fully utilized due to short supply of raw nuts. The average demand growth rate for cashew kernels for export and internal consumption is around 13 per cent. However, the production of raw cashewnuts in the country at about 0.35 million tonnes is inadequate to meet the requirements of the installed processing capacity in the country. The cashew processors are, therefore, importing raw cashew nuts to meet their demand. During 2014-15, about 0.24 million tonnes of raw nuts worth Rs. 9580.3 million were imported.

Tea: Until 1987-88 Tea was the most significant export item from India. It accounted for 20.7% of total export and ranked first among the agricultural products. Thereafter, the export has declined considerably third position by contributing only 8.8% of the total exports. The details of export of tea are given in Table 3.30. In 1990 the share of exports decreased to 18.55, whole in 1999 it further came down to 14.31. Whole developing markets stagnate growth is expected in the developing countries. These markets are expected to open up substantially in the wake of the WTO regime. This will however bring about increased global competitiveness in the area of cost, price, quality, supply schedules, packaging and market focus

and customer satisfaction. The details of the export of tea from India are presented in table – 3.20.

Table - 3.20

Export of Tea from India

Year	Export (Qty m Kg)	Value Rs. million	Unit Price Rs. /Kg
1991	200.7	804.2	4.10
2005	202.9	11345.5	55.91
2015	191.7	19658.6	102.5

Source: Indian Horticulture Database, NHB and Horticulture Division.

The overall tea situation in India is quite different from other producing countries. While some of these countries like Sri Lanka export as much as 95 per cent of their produce, in case of India nearly 75 percent of the total production is consumed within the country. However, the per capita consumption of tea in India is still one of the lowest in the world with only 660 gms per head. With improved economic levels, the demand for domestic consumption is expected to increase. As a consequence India has been importing tea from other countries. During 1999 India imported 9.79 million kgs of tea valued at Rs.590.70 million.

The export of tea from India during 1999 was estimated at 191.7 million kg., valued at Rs. 19,658.6 million with a unit price of Rs.102.5 per kg. The increase in value of exports between 1991 and 1999 indicates a decline in export volume. On the other hand the export earnings have gone up in value terms. The Indian share in global tea exports however had declined from considerably during the period. Import of tea touched around 9.79 million in 1999 compared to 1-2 million kg upto 1997-98 (Table 3.24). This

was value at Rs. 590.7 million at a unit CIF value of Rs. 60.39. The unit CIF value of tea imported from a few countries was lower than the prices fetched at Indian auction. As a result Indian tea industry which was earlier competing in the international market will now have to compete in domestic market also protecting the home market is going to be a challenging task. The Indian tea industry will have to evolve same strategy to counter the new competing forces unleashed by globalization. The details of import of tea in to India from 2011 to 2015 are presented in table – 3.21.

Table - 3.21

Import of Tea into India during 2011 to 2015

Year	Quantity (million kg)	Value (Million Rs.)	Unit (Rs./kg)
2011-12	0.45	24.1	53.56
2012-13	1.25	62.1	49.68
2013-14	2.61	177.9	68.16
2014-15	8.93	647.3	72.79

Source: Indian Horticulture Database, NHB and Horticulture Division.

Coffee: India's coffee industry has great potential for exports and 80 per cent of total produce is exported to over 60 countries worldwide. The major importing countries are Italy, Germany and Russian Federation which together accounts for 43.93 per cent of imports from India. The countries like USA, Germany, Spain and Belgium are the major buyers of *arabica* coffee, while Russian Federation imports mainly the other value added products (instant coffee). The emerging new markets for Indian coffee are Japan and Middle East countries. India's share in world exports is around 4.6 per cent. India exports both *arabica*, which is classified under "other mild category" and *robusta* with their percentage share in world exports of 5 and 12 per cent respectively. During 1998-99,

exports amounted to 2,11,623 tonnes earning Rs.17515 million (US $ 431.4 million). The details of export of coffee from India area presented in table- 3.22.

Table - 3.22

Export of Coffee from India

Year	Export Q/Mt	Value (Rs. in millions)	Unit price (RS. /Kg)
2005-06	100110	2788.90	27.58
2014-15	211623	17515.30	82.77

Source: Indian Horticultural Data Base, NHB.

India's share in world export of coffee was only 2.0 and 4.7 per cent during 2005-06 and 2014-15 respectively. During the X Plan an annual coffee growth rate of 5 per cent is envisaged keeping a base level of 2,50,000 tonnes. India has to evolve suitable strategy to increase exports in the current oversupply situation. Even through India produces the best robusta in the world, it will find it difficult to compete with its Asian neighbours, i.e., Vietnam and Indonesia in the cost of production. However, Indian Arabica is more cost competitive than others, and India should exploit this situation through engaging the key market of USA for Indian coffee. Similarly in Germany the focus should be in building washed Arabica.

Rubber: The accelerated growth in demand for natural rubber in India made the country a net importer of Natural rubber in 1947. The situation remained unchanged until 1970. But, during the first three years of 1970s, owing to the industrial recession and slackness in demand, import of natural rubber was banned from April 1973. Apart from this measure, limited quantities of natural

rubber were exported during 1973-74, 1974-75, 1976-77 and 1977-78. To overcome occasional glut in the market and also in accordance with the new economic policy of Government of India, all restriction on export of natural rubber was removed since 1991. But the indigenous production was insufficient to meet internal consumption and natural rubber continued to be deficit in the country. Though export was freely allowed, only nominal quantities were actually exported. However, India has been exporting significant quantities of rubber in the form of value added products. The export earnings from rubber products during 1999-2000 were Rs. 5,730 million.

Table – 3.23

Percent Share in Export of Horticultural Crops

Products	Quality (MTs)	Value (Rs. Lakhs)	Percent share
Floriculture	27776.14	28645.41	4.1 (8th)
Fruit and vegetable seedless	11182.50	17519.52	2.5 (9th)
Fresh onions	1163472.58	174155.41	25.0 (1st)
Other fresh vegetables	490914.05	89293.61	12.8 (3rd)
Walnuts	5244.58	15650.59	2.2
Fresh mangoes	59220.77	16292.13	2.3 (10th)
Fresh grapes	99311.83	41206.32	5.9 (7th)
Other fresh fruits	253850.99	48964.74	7.0 (6th)
Dried and preserved vegetables	110173.91	51697.09	7.4 (5th)
Mango pulp	171929.43	81400.66	11.7 (4th)
Other processed fruit and vegetable	340067.97	131635.53	18.9 (2nd)
Total	**2733144.75**	**696461.01**	**100.00**

Source: Indian Horticulture Database, NHB.

It is observed that among horticultural crops fresh onion is exported in large quantities with the total export share of 25 percent followed by other processed fruits and vegetables (18.9%), other fresh vegetables (12.8), Mango pulp (11.7%) and dried and preserved vegetables (7.4). The details of the export destinations and cultivators of major fruits are presented in table – 3.24.

Table -3.24

Export Destinations and Cultivators of Major Fruits

Fruits	Major destination (% quantity share of total exports)	Cultivars
Apple	Bangladesh (87.6), Nepal (9.21)	Delicious
Banana	UAE (26.7), Saudi Arabia (20.8), Iran (19.3)	Grand Naine Cavendsh
Orange	Bangladesh (94.4), Nepal (4.9)	Nagpur Mandarin
Grapes	Netherlands (31), Bangladesh (13), UK (12), UAE (12)	Thompson Seedless, Sharad Seedless, Flame Seedless
Guava	UAE (35), UK (20), Maldives (8), Oman (7)	Allahabad Safeda L 49
Litchi	Bangladesh (82.4), Nepal (17)	China, Shahi
Mango	UAE (63), Bangladesh (11), UK(9), Saudi Arabia (4)	Alphonso, Kesar
Papaya	UAE (37),Netherlands (15), Saudi Arabia (14), USA (8)	Taiwan 785, Taiwan 786, Solo
Pineapple	UAE (35), Maldives (23), Oman (15), Nepal (9) Quatar (8)	Mauritius
Sapota	UAE (52), Bahran (18), U.K.(6), Canada (6)	Cricket ball, Kalipathi

Source: Indian Horticulture Database, NHB.

The details of the export destinations of major vegetables are presented in table – 3.24. The vegetables include cabbage, cauliflower, onion, peas, tomato and potato respectively. The major destinations are UAE, Maldives, Saudi Arabia, Nepal, Bangladesh, Malaysia, Sri Lanka and Oman respectively.

Table – 3.25

Export Destinations of Major Vegetables

Vegetables	Major destination $ (% quantity share of total exports)
Cabbage	UAE (55), Maldives (42), Nepal (2)
Cauliflower	UAE (60.4), Maldives (23.9), Saudi Arabia (10.6), Nepal (5)
Onion	Bangladesh (33) Malaysia(27), UAE(10), Sri Lanka (10)
Peas	Saudi Arabia (78.3) UAE (12.4) Nepal (8.2)
Tomato	UAE (65), Bangladesh (1.8), Saudi Arabia (5), Oman (5)
Potato	Nepal (32.1), Maldives (15.6), Malaysia (4.1)

Source: Indian Horticulture Database, NHB.

3.16 Exports Destinations of Flowers

In the year 2010-11 the total quality of flowers export from India was 27,776.2 MT with the value of Rs. 28645 lakhs. USA is the major importer of flowers from India and share about 20% of total exports from India followed by Germany (15), Netherlands 15), UK (13) and Japan (4) respectively.

Exports Destinations of Other Horticultural Produce

Fruits and vegetables seeds exported from India in the year 2010-11 were 11,182.5MT and out of the total exports 38% was exported to Pakistan, followed by Bangladesh (8%) and USA (7%).

The largest amount of walnut from India in the year 2010-11 was exported to Egypt with the total share of 13% followed by Netherlands (11%). Germany (12%), France (12%) and Spain (10%). The largest amount of mango pulp from India was exported to Saudi Arabia with the share of 27% of the total export from India, followed by Netherlands (13%) and UAE (8%) respectively.

3.17 Export Parameters for Vegetable Crops

The major destinations of vegetable export are Middle East and Gulf countries. The major crops and their exports parameters are given in the table -3.26.

Table -3.26

Export parameters for vegetables crops

Crop	Parameters for exports
Okra	3-5 inch length, green tender, packing 5 kg
Bottle ground	12 inch length, green tender, straight, packing 5 kg
Peas	5-6 inch length, green tender, straight, packing 5 kg
Guar	4-5 inch length, not over matured, packing 5 kg
Green chillies	3-4 inch length, green, packing 5 kg
Drum sticks	24 inch length, straight, thick, packing 5 kg
Transport	By Air/Sea

Source: Indian Horticulture Database, NHB.

3.18 Innovative Models in Horticulture Marketing in India

India produces around 111.8 MT of vegetables and 57.73 MTs of fruits (2006-07). Horticultural sector contributes 28% of AgGDP and 54% of Agricultural Exports in India (2014-15). Horticulture development is currently constrained by poor marketing arrangements. The gap between prices received by the farmers and those paid by urban consumers is large, reflecting inefficient marketing arrangements. Studies indicate that the share of producers varies from 33 to 75 per cent case of fruit and vegetables.

India opened up post 1990, a number of innovative liberalized markets in the WTO regime to eliminate middlemen and increase distributional efficiency. It is necessary to study and understand their success and operations of these marketing institutions. The main objective of the paper is to study functions,

mandate and trace innovative models, strategies and policy principles practicing by different innovative marketing institutions in horticulture marketing in India. The recent changes in functions of agricultural marketing institutions, public and private retail markets were documented and analyzed their marketing models, strategies and policy principles in improving the marketing efficiency of fruits and vegetables. The features of different systems operating for marketing of fruits and vegetables were studied through a survey conducted with the officials of Department of Marketing, Hyderabad India opened up post-1990, a number of new innovative public liberalized markets in the WTO regime. The main functions of farmers markets are empowering the farmers to participate effectively in the open market to get a remunerative price for their produce, and increase by enhancing the distributional efficiency of the marketing system. The economic reforms lead to the emergence a number of new private retail markets. Organized retailing in Fresh Fruits and Vegetables (FFV) is gaining a lot of momentum in India with huge investment by leading Indian corporations. The features of different systems operating for marketing of fruits and vegetables were shown that the marketing models of private agencies, particularly Reliance fresh and subhiksha were more efficient than that of Rythu bazaar, due to their low cost on marketing, transport, and incidental charges. Therefore, there is an immediate need to replicate such models in a much larger scale to cover not only the cities but also the interior villages in the country. The study suggests that it is necessary to amend outdated laws restricting the establishment of markets to allow cooperatives and private entrepreneurs to set up modern markets. Both public and private retail markets have to adopt the new marketing models to enhance the distributional efficiency of the marketing system.

3.19 Status of Indian Horticulture

Horticulture crops cover an area 21,825 with production of 2,40,531 in India. The percent increase in area, production and productivity of total horticultural crops in 2010-11 over 1991-92 is 70.91% and 46.8% respectively. Vegetables with the share of 61% leads in production followed by fruits (31%), plantation crops (5%), spices (2%), flowers (0.4%), medicinal and aromatic plants (0.3%), honey (0.03%) and mushroom (0.02%).

Table -3.27

Area, Production and Productivity of Horticultural Crops

Horticultural crops	Area ('000ha)	% Share of total area	Production ('000MT)	% Share of total production	Productivity (MT/Ha)
Vegetables	8495	38.92	146554	60.93	17.25
Fruits	6383	29.25	74878	31.13	11.73
Plantation crops	3306	15.15	12007	4.99	3.63
Spices	2940	13.47	5350	2.22	1.82
Flowers	191	0.88	1031	0.43	5.40
Aromatic and Medicinal plants	510	2.34	605	0.25	1.19
Honey	-	-	65	0.03	-
Mushroom	-	-	41	0.02	-
Total	**21825**	**100.00**	**240531**	**100.00**	**11.02**

Source: Indian Horticulture Database, NHB.

Area Expansion

Area under horticultural crops has increased by 70.91 percent since the year 1991-92. Area ('000 ha) has increased from 12770 in 1990-91 to 21825 in 2010-11. Area expansion (%) is maximum, under fruits (122.09) followed by flowers (80.19), medicinal and aromatic plants (57.41), vegetables (51.89), spices (46.63) and plantation crops (43.86) since the year 1991-92.

Production in horticultural crops has increased by 149.09 percent since the year 1991-92. Production ('000MT) has increased from 96562 in 1990-91 to 240531 in 2010-11. Production has increased maximum (5) in medicinal and aromatic plants (239.9) followed by spices (181.6), fruits (161.52), vegetables (150.38) and plantation crops (60.14) since the year 1991-92 and flowers (92.71) since the year 2001-02. Honey production has increased tremendously (550.0%) since the year 2001-02. Mushroom production has increased by 2.5% in 2010-11 since the year 2001-02.

There is also an increase in productivity in horticultural crops by 45.77 percent since the year 2010-11. In the year 1991-92 the productivity was 7.56 MT/ha which increased to 11.02 MT/ha in the year 2014-15. The productivity in fruits, vegetables, plantation crops and spices has increased by 17.77, 64.76, 11.35 and 91.58 percent respectively since the year 2010-11. Increase in productivity is maximum in spices followed by vegetables, fruits and plantation crops. The details of the trends in area and production of total horticultural crops are presented in table- 3.28.

Table - 3.28

Trends in Area and Production of Total Horticultural Crops

Year	Total area under horticultural crops	Total production of horticultural crops	Productivity (MT/HA)
2010-11	12770	96562	7.56
2011-12	16592	145785	8.79
2012-13	19389	191813	9.89
2013-14	20207	211235	10.45
2014-15	21825	240531	11.02
% change over 2010-11	70.91	149.09	45.75

Source: Indian Horticultural Data Base, NHB.

The trends in area and production of total horticultural crops details are presented in table -3.29. The data in the table clearly indicates that during 2007-08 the fruits were grown in 2,874 acres and the production was about 28,632. The vegetables were grown in 5,593 acres and the production was 58,532 respectively. After 2007-08 in both area and production of fruits, vegetables, flowers and nuts have been gradually increased. The percentage change over 2007-08 to 2014-15 in fruits area is 122.09, production is estimated 161.52, the area of vegetables 51.89 and the production was 150.38 percent, the flowers area was estimated about 80.19 and the production was 92.71 and 21.4% of area and 69.3% of nuts production in 2014-15.

Table - 3.29

Trends in Area and Production of Total Horticultural Crops

Year	Fruits		Vegetables		Flowers		Nuts	
	Area	Production	Area	Production	Area	Production	Area	Production
2007-08	2874	28632	5593	58532	0	0	0	0
2008-09	4010	43001	6156	88622	106	535	117	114
2009-10	3788	45203	6092	84815	70	735	117	114
2010-11	5554	59563	7581	114993	144	880	132	150
2011-12	5857	65587	7848	128449	166	868	132	117
2012-13	6101	68466	7981	129077	167	987	136	173
2013-14	6329	71516	7985	133738	183	1021	142	193
2014-15	6383	74878	8495	146554	191	1031	Included in fruits	
% change over 2007-08 (or 2014-15)	122.09	161.52	51.89	150.38	80.19	92.71	21.4	69.3

Source: Indian Horticultural Data Base, NHB.

It has been realized that the marketing channel for fruits and vegetables which are highly perishable should be as short as possible. Perishable horticulture produce should move quickly from farmers to consumers. If farmers directly sell their produce to the consumers, it will not only save losses but also increase farmer's share in the price paid by the consumers. Therefore, direct marketing by the farmers is being encouraged as an alternative channel. India opened up post-1990, a number of new innovative public liberalized markets for fruits and vegetables in the WTO regime and their key functions and objectives were given in the Table. The main functions of farmers markets are empowering the farmers to participate effectively in the open market to get a remunerative price for their produce, to avoid the exploitation of both the farmers and the consumers by the middlemen and increase by enhancing the distributional efficiency of the marketing system. It will eliminate middlemen, links producers and consumers directly, reduce price spread, and enhance producer shares in consumer rupee. Forward and Futures markets have been identified as important tools of price stabilization and risk management. Commodity exchanges for futures trading narrows the marketing, storage and processing margins, there by benefiting both growers and consumers. E-trading based on buying and selling of electronic warehouse receipts and with the latest price information has also become a widespread practice.

3.20 Horticultural classification

There are a number of ways fruits can be classified. However, to the horticulturist, the most useful groups is on the basis of distinction in climatic requirements. On this basis, fruits are **called temperate, sub-tropical, and tropical.**

Table - 3.30

Fruit types

Temperate Fruits	Apple, Pear, Peach, Plum, Almond, Walnut, Apricot, Pecannut, Hazelnut Cherry, etc
Sub-tropical fruits	Fig. Guava, Ber, Citus, pomegranate, Bael, Datepalm, Loquat, Phalsa etc.
Tropical fruits	Mango, Banana, Pineapple, Sapota, Jackfruit, etc.
Temperate (declduous) fruits ❖ Small fruits (cranberry, grape, raspberry, strawberry) ❖ Tree fruits • Pomes (apple, pear, quince) • Stone fruits or drupes (Cherry, Peach, plum apricots) • Nuts (pecan, filbert, walnut)	
Tropical and sub-tropical (evergreen) fruits ❖ Herbaceous perennials (pineapple, banana) ❖ Tree fruits • Citrus fruits (orange, lemon, grapefruit) • Miscellaneous (fig, date, mango, papaya, avocado) • Nuts (cashew, Brazil nut, macadamia)	

Other class of fruits suitable for their culture in water deficit areas, due to their ability to survive under arid / dry low rainfall and less humid, large diumal temperature variations conditions are called arid fruits.

3.21 GLOBAL SCENARIO (2014-15)

China, India, Brazil, USA, Italy, Mexico, Indonesia, Spin, Philippines, Iran, Turkey and Uganda are leading fruit producing counties of the world. China is the largest producer of fruits (18.7%) in the world production of 107837 (000 MT) followed by India's shared of 11.2% with total production of 68465 (000 MT). Brazil (6.7%) and USA (4.9%).

China is leader both in area and production of fruits in the world. USA has maximum fruit productivity (MT/ha) of 24.3 MT/ha followed by Indonesia (22.1), Brazil (15.9) Italy (14.2), Philippines

(13.8), Mexico (13.4) and Turkey (11.7), India (11.2), and China (9.8). China leads in the production of apple 3rd in banana. 2nd mango, and grapes and 5th in pineapple in the world.

Italy with share of 11.5% is the largest producer of grapes whereas Brazil with 13% share produces maximum pineapple. India is the largest producer of mango (42.1%), banana (28%) and papaya (36.1%) in the world. India ranks second in lime and lemon, 3rd in orange, 6th pineapple (7%), 7th in apple (6.6%), 11th in grapes (2.8%) production in the world.

3.22 Productivity (MT/ha) Status

Italy leads in productivity of apple (40.4) followed by Chile (39.1) compared to 7.2 in India. Indonesia has the highest productivity (54.3 MT/ha) followed by Costa Rica (42.5) compared to 37 in India. India leads in grape productivity (23.5) followed by USA (17.8) and China (16.6).

Brazil has the highest productivity of mango 16.8 followed by Indonesia (10.9), Mexico (10.5) as compared to India (6.0). Indonesia leads in papaya productivity (72.7) followed by Guatemala (52.7) compared to India (37) Indonesia leads in pineapple productivity (61.2) followed by Costa Rica (48.5) as compared to India (16).

3.23 Availability of Fruits in India

The availability of fruits is extended over a period ranging from few months to throughout the year. The availability of major fruits is given in Table -3.31.

Table -3.31

Availability of Major Fruits in the Indian Markets

Crop	Period of availability
Apple	August-November
Grapes	December-April
Guava	November-March
Litchi	May-June
Mango	April-July
Orange	November-march
Mosambi Papaya Sapota Banana Lime/Lemon	Throughout year

Production and Marketing of Horticultural Crops in Karnataka

3.24 Horticulture Scenario in Karnataka

Karnataka state is situated between 11031' and 18048' North Latitudes and 74012' and 78040' and 78040 East longitudes, and lies in the West-Central part of the Peninsular India. It's from North to south is 700 Kms. And from East to West is 400Kms. Karnataka State covers an area of 191791 sq Kms., occupying 7.75 per cent of the total geographical area of the Country. As per the 2001 Census, the population of the state is 53 Millions. Karnataka has been the First State in the Country, to set-up a separate department for the horticulture, in the year 1965. Karnataka is the Fourth largest producer of Horticulture Crops in India, the geographical area of Karnataka is 190.50 lakh ha, of which an area of 126.021 lakh ha, comes under the cultivatable area, constituting 66.15 per cent of the geographical area for the year 2009-2010. Out of the total cultivable area, 18.99 lakh ha, are covered under horticulture, as per the "Horticulture Crops Statistics Karnataka State at A Glance 2009/10".

Horticulture in the state, accounts about 15.07 per cent of the total cultivable area. Out of the 18.99 lakh ha., of the total

horticultural cropped area 8.05 lakh ha., (42.39%) come under Plantation croups; 4.37 lakh ha., (23.01%) under Vegetables; 3.60 lakh ha., (18.96%) under Fruits; 2.66 Lakh ha., (14.01%) under Spices and 0.31 lakh ha., (1.64%) under (Commercial flowers, including the area under Medicinal and Aromatic Plants. Accordingly, the total horticultural production in the State during the year (2009-2010) reference figures at 147.80 lakh tones. Going in detail the production figures stand at 59.63 lakh tones (40.34 per cent) with respect to Fruits Crops. 70.63 lakh tones (47.79 per cent) Vegetables Crops; The Area under horticulture crops is 206.62 lakh hectares and production of 2146.14 lakh tones under Horticulture crops in India. Karnataka has occupied 4th place in respect to the total area with 17.13 lakh hectares contributing 8.29 per cent of area to the total area and 7th place in respect of total production with 149.68 lakh tones contributing 6.97 per cent production at all India. Karnataka has occupied 7th place regarding in Fruits Crops with an area of 3.15 lakh ha hectares, and production of 52.70 lakh tones, 6th place regarding Vegetables Crops with 4.48 lakh hectares, of area and 77.25 lakh tones of production.

Karnataka is the eighth largest State in the country and it is located in southern peninsular India, with a geographical area of 190.50 lakh hac., accounting for 5.84% of the total geographical area of the country. The State consists of 27 districts with 175 taluks. Karnataka is a maritime State with a coastline of 287 kms. covering the districts of Uttara Kannada, Dakshina Kannada and Udupi with nine ports excluding new Mangalore port. Except Karwar, the remaining ports are riverine ports which need to be developed for cost efficient movement of goods. The State has a road length of 1.49 lakh kms., and a railway route length of 3041 kms.

The Economy of Karnataka is well diversified and according to the Economic Survey 2003-04 Karnataka contributes 5.0% to National NDP. Agriculture in Karnataka contributes 26.7% of the State GDP and employs 71% of total workforce. The land topography is suited for agriculture and 83% of area (Soil types) is suitable for agriculture. The State has a high geographical diversity with ten agro climatic zones. The net sown area is 54% of the total Geographic area against the national average of 46%. The gross cropped area has exceeded 116 lakh hac with a cropping intensity of 112%. Small and marginal farmers accounts for 73% of total holdings and 34% of net cultivated land. Though Agro climatically suited, water is a main constraint in horticultural development. Irrigation covers 25% of the net cropped area and remaining 75% is rainfed. Horticulture crop covers 14.8% of the net cultivable area in the State with an annual production of 118.2 lakh tones. Horticulture contributes 40% of the agriculture income and 80% of the agricultural exports.

Karnataka is the second most important states next to Maharashtra for the production of horticultural crops. The agro climatic suitability provides a unique position for the state to be a natural home for a large number of horticultural crops that can be grown all round the year. Out of a total of 121.86 lakh ha cultivable area, nearly 17.64 lakh ha is under horticultural crops accounting for 8 % of area contributing to over 136.66 lakh tones (2007-08) (6 % of total production) (Anonymous 2008). Around 2.46 lakh ha is under fruit crops and 2.99 lakh ha is under vegetables. Fruits contribute to 73.62 lakh tones while vegetables 6.23 lakh tones. The state leads in country's area and production of brinjal, tomato, mango and cut flowers. Being the horticultural capital, Bangalore district is the hub of activity for various horticultural crop research and development. Estimates indicate that the state capital with a

total population of over 80 lakhs consumes nearly one third of the states horticultural crop production. It is also a major hub for interstate transactions and movement of horticultural crop products to distant locations within and outside the country. The metropolis is also the home for the recent retail revolution in the country. Spensors, food world, reliance and more, SAFAL and Namdharis retail outlet chains have set up operations in the metros. Thus, besides production, horticultural crop marketing also is of significance both from their highly seasonal and perishable nature as well as employment generation perspective. While the agricultural marketing system in the country is due for an over haul, given the changing global trade order, that specific to horticultural crops are no exception. However, the sheer commercial nature of these set of crops besets their marketing systems with contradictions. On one hand, perennial and seasonal produce like mango show persisting domination of Pre Harvest Contractors (PHC), others like grapes have advanced systems of marketing that are international in operations ensuring quality product supply chains. Individual or group effort in organizing and integrating production with marketing has been the critical factor responsible for their success, institutional support through favorable policy cannot be over looked.

3.25 HOPCOMS in Karnataka: An Overview

Development of Horticulture is being varied out on scientific basis since early decades of the present century. The Mysore State Government gave enough impetus by establishing the Department of Government gardens in 1856, later in 1961 it was upgraded as the full fledged Department of Horticulture. Mysore Horticulture Society located at Lalbagh in Bangalore was founded by G H Krumbiegal, the Director of Horticulture. But virtually it was a rebirth of a society called Mysore Agri-Horticulture Society,

Bangalore, which was the founded in 1836 by William Munro. The Government of Mysore had taken over the responsibility of conducting the horticultural shows after the society become defunct probably from 1874. After retirement of John Cameron in 1907, G H Krumbiegal was appointed as superintendent of Government gardens in the year 1908. It was Krumbiegal who thought of forming an association of horticulturists. Hence Krumbiegal named the society as the "Mysore Horticultural Society" and got it registered with the Registrar of Societies under Societies Registration Act of India -1904.

The word 'Horticulture' could by symbolized with the letter H which has four limbs. Here the concept "people participation, through NGOs" is made use of. The first limb of "H" is designated as the KSDH and the remaining three limbs of "H" are designated for the three NGOs. The Mysore Horticulture Society (MHS). The Bangalore Nurserymen co-operative Society (BNCS) and Horticultural producers co-operative marketing Society (HOPCOMS). The First two limbs –the Department of Horticulture and the MHS already existed. Founded the remaining two limbs the BNCS and the HOPCOMS in 1958. The Horticulture Producers' Co-operative Marketing and Processing Society Ltd. Popularly called as HOPCOMS was established in with the principal objective of establishing a proper system for the marketing of fruits and vegetables, to benefit both the Producers the consumers. Prior to the establishment of HOPCOMS, no proper system of marketing of horticulture produce was in existence. Farmers were in the clutches of the middlemen and the whole system was benefited the middlemen neither the farmers nor the consumers. Horticulture Development in the Mysore state was started by establishing.

The first horticulture farm was started at Maddur in 1942, to demonstrate the cultivation of horticulture crops and production of vegetable seeds and planting material for the farmers. Marketing of highly perishable commodities like fruits and vegetables has always caught with problems. Farmers often have little bargaining power, middlemen collect commissions from producers, and there was a frequent delay in payments, and produce sold on the basis of volume, with prices being determined to the advantage of retailers and not the farmers. In order to tackle these issues the Horticulture Producers' Co-operative Marketing and Processing Society Ltd. (HOPCOMS) was founded in 1959 under a name of Grape Growers Marketing and Processing Society, under the guidance of Dr. M.H. Mari Gowda, the then Director of the Department of Horticulture under the Indian Co-Operative Society Act. The members comprise farmers, state financial organizations and the Karnataka State Government. It is managed by official's appointment by the state, drawn from the Department of Horticulture and the department of Co-operation.

3.26 Composition of HOPCOMS Board

The Board of HOPCOMS consists of 20 members. In which 11 members are elected from among the producers, and the rest are the Govt. nominees. The President and Vice President are elected among producers only. The Managing Director of HOPCOMS is from of the Horticulture Department on a lent service (Deputation). The HOPCOMS has 16,221 growers as members, with a share capital of Rs. 265.01 lakhs (As on 31.03.2010) and at present HOPCOMS have 916 staff members under different work.

3.27 Aims and Objectives of HOPCOMS

The main objective of HOPCOMS is to promote and encourage the development of horticultural produces with following support.

a) By training & providing technical advice literature on horticultural crop. b) By providing inputs implements plants and grafts etc.., c) Providing marketing facilities and organize the proper studies to members of HOPCOMS. d) Supply of Horticultural products to all major Factories, Hostels, Hospitals, Clubs, and Social functions etc.., e) Providing internal commodities exchange facilities to co-operative societies & Branches.

3.28 Turn-Over of HOPCOMS

At present, HOPCOMS is handling about 90-100 M T of fruits and vegetables every day, Nearly 200 farmers are bringing their produces directly to HOPCOMS every day. Soon after produces arrived at HOPCOMS, it is graded, weighed and cash payment up to 5,000/- is made immediately to the procures. Above 5,000/- to 10,000/- payment will be made by Cheques. Out of total procured quantity, about 80 per cent is distributed & disposed of through outlets, 15 per cent to institutions and the rest 5 per cent to Government Hostels. The retail outlets are being managed by the salesman who is the employees of HOPCOMS. As incentives, they are allowed to absorb driage and damage to the extent of 3.7 per cent of the value of the produce besides wages. Every day the salesman will remit the sales proceeds of the previous day and collect the materials required for the day's sales from the Central procurement center. The supplies to retail outlets are being made through the 30 own and through hired vehicles.

3.29 Area of Operation

At present Bangalore HOPCOMS operating in Bangalore urban, Bangalore Rural, Kolar, Chikkabalapura, Channapatana & Ramanagara Districts. The APMC markets play a major role in setting market trends and prices. The prices at which HOPCOMS

buys the produce from the farmers is based on the rates and prices released APMC. The HOPCOMS employee's collects the maximum, minimum and model prices for the various commodities sold at previous day in the APMC markets published in the newspaper. Based on the rates released by APMC, HOPCOMS fixes the procurement and sale price for different Fruits and Vegetables brought for sale by its member. The prices produce are vary from day to day and from hour, to hour in private markets such as 1) Singshandra market for Fruits 2) K R Market for Vegetables 3) Yashavanthpura market for Food grains. Clarity is person the whole mechanism of price fixation for various Fruits and Vegetables at HOPCOMS.

3.30 Infrastructural Facilities Available at HOPCOMS

The HOPCOMS is having the following infrastructural facilities for marketing of Fruits and Vegetables. The details are presented in Table- 3.32.

Table – 3.32

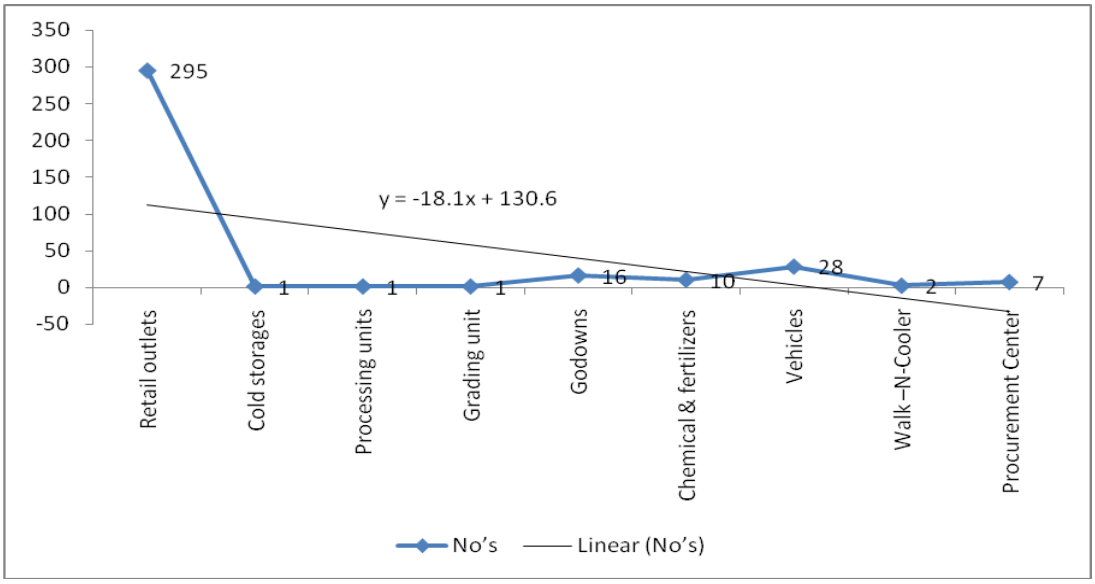
Infrastructural Facilities Available at HOPCOMS

Sl. No	Particulars	No's
01	Retail outlets	295
02	Cold storages	01
03	Processing units	01
04	Grading unit	01
05	Godowns	16
06	Chemical & fertilizers	10
07	Vehicles	28
08	Walk –N-Cooler	02
09	Procurement Center	07

Source: A Brief note on HOPCOMS, Lalbagh, Bangalore.

Graph – 3.6

Infrastructural Facilities Available at HOPCOMS



The HOPCOMS undertake supply of Fruits and Vegetables to directly to marriages and other function on demand. HOPCOMS enroll farmers as its members issues purchase indent to those members specifying the quantity of Vegetables to bring to the procurement center at Bangalore or other districts center. Producer will be verified weighed aid issued a receipt and the same presented to the payment officer who in turn issue a cash voucher which will be encased immediately at the bank located at the centers its of same day.

The society has set up a unit for preparing fresh fruits drinks out of fruits like Bangalore Blue grapes, mango, oranges etc. It is selling the same to the general public at a reasonable price of Rs.5/- per 200 ml bottles through its retail outlets, and through dispensers located at impotent places. The HOPCOMS help its member farmers by supplying Fertilizers, plant protection chemicals, garden implements, seed etc, through its own center located at procurement centers. Fruits and Vegetables being highly

perishable products losses due to driage and wastages is obvious. Driage and wastage at HOPCOMS is around 4-5 per cent of the total procurement of the produce. However, Driage and wastage has been reduced from 4.32 per cent of the total procurement to 1.85 per cent present. The details are presented in table- 3.33.

Table – 3.33

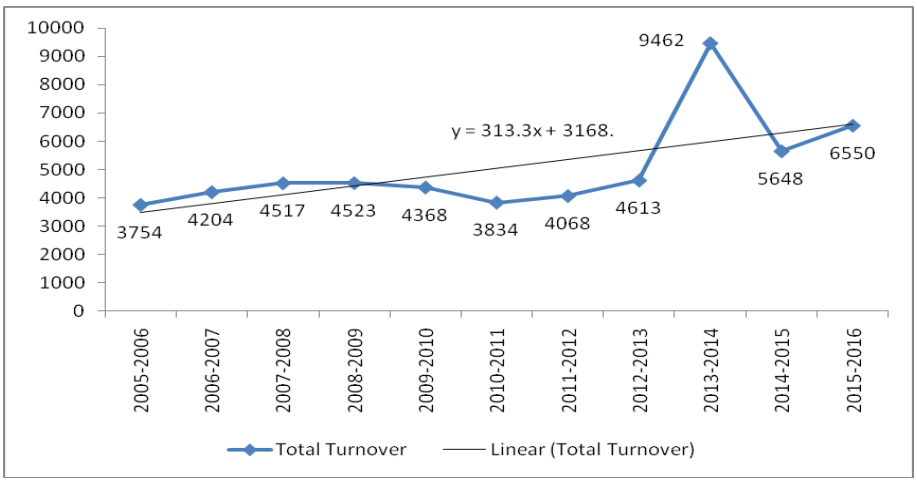
Quantity and Value of Fruits and Vegetables Transacted By HOPCOMS during 2004-2005 to 2015-2016 (Qty: in Metric Tonnes, Value: Rs. in Lakhs)

Years	Fruits		Vegetables		All Products		Total
	Qty	Value	Qty	Value	Qty	Value	Turnover
2005-2006	15921	1795	14444	1011	30365	2806	3754
2006-2007	15732	1962	16872	1122	32605	3083	4204
2007-2008	16384	2041	16659	1244	33043	3284	4517
2008-2009	16099	2131	15964	1179	32063	3311	4523
2009-2010	14648	1959	14198	1242	28845	3200	4368
2010-2011	12565	1681	12903	1103	25468	2484	3834
2011-2012	11095	1572	13137	1343	24232	2915	4068
2012-2013	10910	1719	14802	1468	25713	3187	4613
2013-2014	9869	1757	14274	1659	24144	3416	9462
2014-2015	10100	2099	12906	1592	23012	3691	5648
2015-2016	10243	2523	12547	1768	22790	4291	6550
% of CAGR	-5.78	0.79	-2.22	5.20	-3.90	2.51	5.75

Sources: Department of Horticulture, Bangalore.

Graph – 3.7

Quantity and Value of Fruits and Vegetables Transacted By HOPCOMS during 2004-2005 to 2015-2016 (Qty: in Metric Tonnes, Value: Rs. in Lakhs)



The above table clearly indicates that the quantity & value of Fruits and Vegetables transacted by HOPCOMS during 2005-06 to 2015-16. The table clearly indicates that there was a decline in quantity of Fruits handled (with-5.78 percent) and the value is in positive growth of 0.79 percent in value similarly the vegetables growth was negative with -2.22 percent in quantity but registered the positive growth rate of 5.20 percent in value. However, the total quantity and value handled in the HOPCOMS has been registered the same trend. The total quantity registered the negative growth with-3.90 per cent, where as the value with positive growth rate of 2.51 per cent. The table also revealed that the total turnover of HOPCOMS has been registered the significant positive growth rate with 5.75 percent turnover the period of 11 years.

Through HOPCOMS, the government has invested large amount of resources in marketing of horticultural produce in the city of B cities of Karnataka. While the proportion of total produce that HOPCOMS picks up is small compared to the total amount used in Bangalor a good example, both in terms of the prices that it offers farmers, as well as the quality and prices that if small part of the total horticultural produce in the city of Bangalore, HOPCOMS sets the prices in the market. Both farmers the price set by HOPCOMS as fair.

The area of Karnataka is 190.50 lakh ha., of which an area of 125.63 lakh ha. Come under the cultivable area constituting 65.95% of the geographical area for the year 2010-2011. Out of the total cultivable area, 19.01 lakh ha. Area covered under horticulture, as per the “Horticulture Crop Statistics of Karnataka State At A Glance 2010-2011”. Horticulture area in the state accounts about 15.14% of the total cultivable area. Out of 19.01 lakh ha., of the total horticulture cropped area 8.21 lakh ha.

(43.17%) come under Plantation crops: 4.38 lakh ha. (23.03%) under Vegetable; 3.54 lakh ha. (18.61%) under Fruits; 2.57 lakh ha. (13.51%) under Spices and 0.32 lakh ha. (1.69%) under Commercial Flowers, including the area under the Medicinal plants.

The total horticulture production in the state during the year under reference figures is 152.13lakh tons. The production figures at 61.33 lakh tons (40.31%) with respect to Fruits Crops; 73.80 lakh tons (48.51%) with respect to Vegetables Crops; 9.99 lakh tons (6.57%) with respect to Spice Crops; 8.21 lakh tons (3.17%) with respect to Plantation Crops; and 2.19 lakh tons (1.44% with respect to crops coming under commercial Flowers, including the area under the medicinal and aromatic plants. The total are is 218.24 lakh hectares and production is 2404.26 lakh tons under horticulture crops in India. Karnataka state has occupied 3rd place in respect of total area with 18.66 lakh hectares contributing to 8.60% area to total area and 6thplace in respect of total production with 177.98 lakh tons contributing 7.4% production to total production at all India level. Karnataka state has occupied 3rd place regarding Fruits crops with as area of 3.78 lakh hectares & production of 62.74 lakh tons and 8th place regarding Vegetables crops with 4.66 lakh hectares of area & 90.56 lakh tons of production. With regard to commercial flowers our state has stood in 2nd place with 0.27 lakh hectares of area and 2.04 lakh tons of production and 2nd place regarding plantation crops with 7.32 lakh hectares of area and 17.81 lakh tons of production.

Table – 3.34

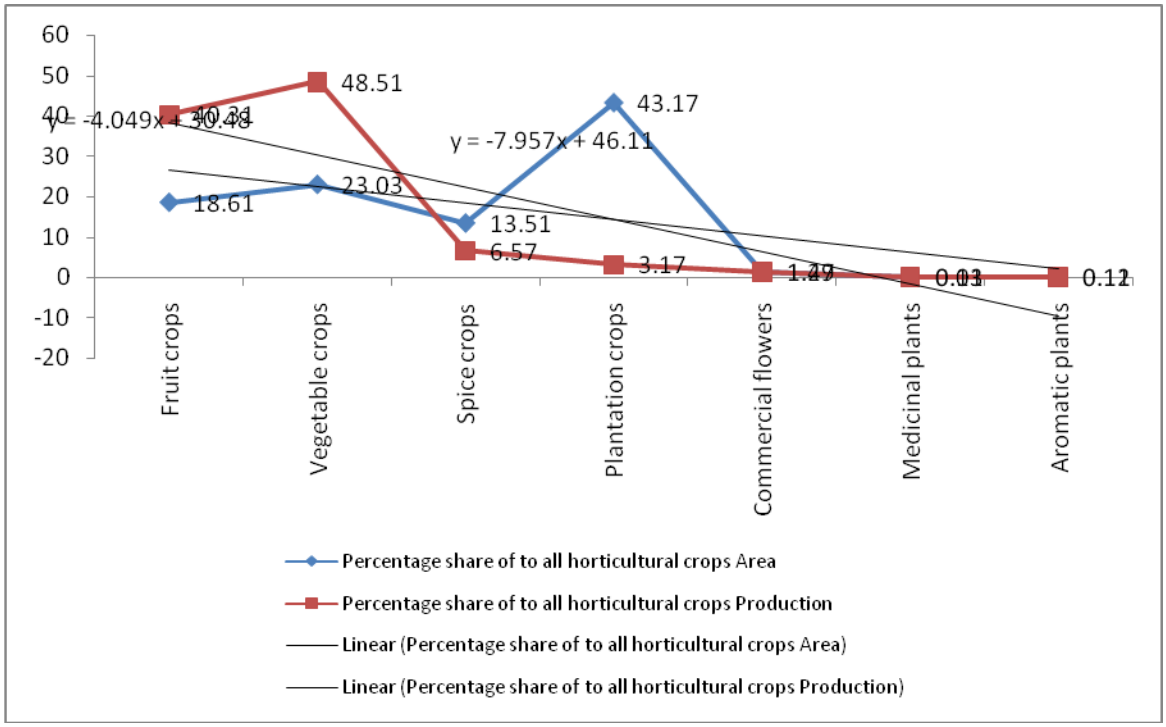
Area and Production of Horticultural Crops in Karnataka (2014-2015)

Sl. No	Name of crops	Area and production of horticultural crops		Percentage share of to all horticultural crops	
		Area	Production	Area	Production
01	Fruit crops	3.54	61.33	18.61	40.31
02	Vegetable crops	4.38	73.80	23.03	48.51
03	Spice crops	2.57	9.99	13.51	6.57
04	Plantation crops	5.21	4.82	43.17	3.17
05	Commercial flowers	0.28	1.96	1.47	1.29
06	Medicinal plants	0.02	0.05	0.11	0.03
07	Aromatic plants	0.02	0.18	0.11	0.12
08	Total state	19.02	152.13	100.00	100.00

Sources: Karnataka state at a glance, 2010-2011; Directorate of economics and statistics.

Graph – 3.8

Area and production of horticultural crops in Karnataka (2014-2015)



3.31 The Horticulture Producers' Co-operative Marketing and Processing Society Ltd in Karnataka

The Horticulture Producers' Co-operative Marketing and Processing Society Ltd. Popularly called as HOPCOMS was established with the principal objective of establishing a proper system for the marketing of fruits and vegetables, to benefit both the Producers the consumers. Prior to the establishment of HOPCOMS, no proper system marketing of horticulture produce was in existence. Farmers were in the clutches of the middlemen and the whole system was benefited the middlemen neither the farmers nor the consumers.

Horticulture Development in the Mysore state in 1932: The first Horticulture farm was started at Maddur in 1942, to demonstrate the cultivation of Horticulture crops and production of vegetable seeds and planting material for the farmers. Marketing of highly perishable commodities like fruits and vegetables has always caught with problems. Farmers often have little bargaining power, middlemen collect commissions from producers, and there was a frequent delay in payments, and produce sold on the basis of volume, with prices being determined to the advantage of retailers and not the farmers. In order to tackle these issues the Horticulture Producers' Co-operative Marketing and Processing Society Ltd. (HOPCOMS) was founded in 1959 Under a name of Grape Growers Marketing and Processing Society, under the guidance of Dr. M.H. Mari Gowda, the then Director of the Department of Horticulture under the Indian Co-Operative Society Act. The member comprises farmers, state financial organizations and the Karnataka State Government.

It is managed by official's appointment by the state, drawn from the Department of Horticulture and the department of Co-

operation. As of 2007 there are 17 HOPCOMS in the state, each working independently with in demarcated districts of operation.

It had jurisdiction over Bangalore, Kolar, Mysore, Tumkur, Mandya and Mangalore districts. Since grape was a seasonal fruit, the society started handling all types of fruits and vegetables from 1965. Due to this change in operations, the name of the society was changed into Horticulture Producers Co-operative Marketing and Processing Society Ltd. From 10th Sep 1959 its registered office is located at Lalbagh, Bangalore. Later, Govt. has declared the HOPCOMS as the unit of Horticulture department in January 2009.

The Board of HOPCOMS consists of 20 members. In which 11 members are elected from among the producers, and the rest are the Govt. nominees. The President and Vice President are elected among producers only. The Managing Director of HOPCOMS is from of the Horticulture Dept. on a lent service (Deputation).

The supply of fresh and quality fruits and vegetables at reasonable price; Ensure correct weigh men; Established Retail outlets in extensions; Providing Mobile sales; Supplying fruits and vegetables to marriages and social functions in spot with Free transportation; Offering Bulk supply of Fruits and Vegetables to institution, Organization, Hostels, Hospitals, & factories etc at competitive price; Offering fresh Grape, Orange, Mango fruits drinks at reasonable prices in 200 ml battles; Conducting seasonal fruits Melas, Fairs and Festivals of Grapes, Mango, fruits – fare at discount rates at cities to promote fruits sales ensuring better returns to farmers and fresh and quality products at reasonable prices to consumers. The details of the total quantity procurement,

marketing and turnover from HOPCOMS are presented in table-3.35.

Table -3.35

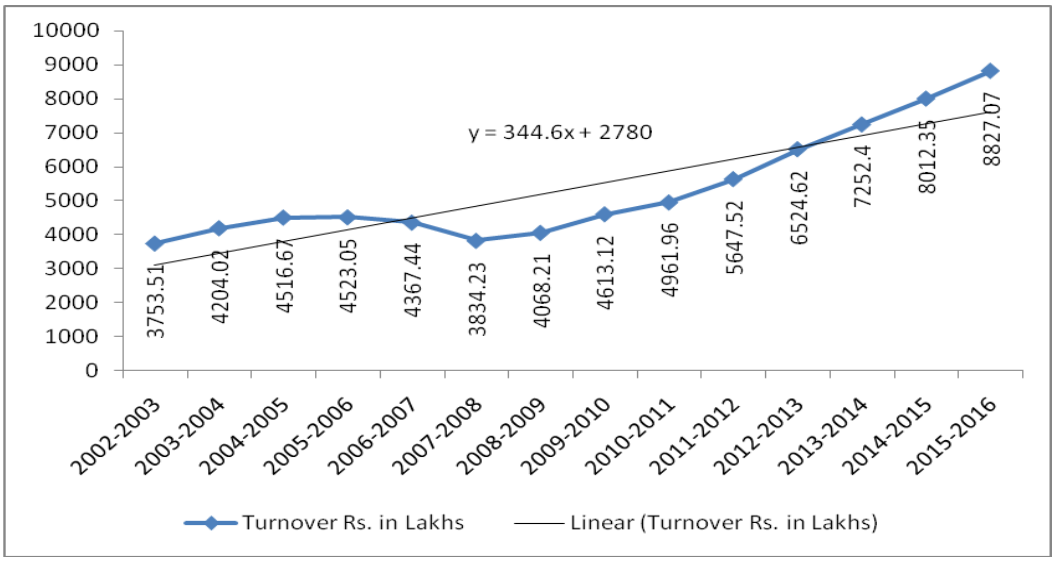
Year wise Total Quantity Procurement, Marketing & Turnover from HOPCOMS of Fruits & Vegetables (2002-2016)

Year	Procurement of fruits & vegetables		Distribution of fruits & vegetables		Turnover
	Tonnes	Values	Tonnes	Values	Rs. in Lakhs
2002-2003	30365.28	2805.75	29941.14	3516.56	3753.51
2003-2004	32604.63	3083.12	31916.73	3925.38	4204.02
2004-2005	33042.95	3284.37	32320.94	4179.27	4516.67
2005-2006	32062.91	3310.54	31467.34	4232.11	4523.05
2006-2007	28844.73	3200.06	28297.73	4084.34	4367.44
2007-2008	25468.04	2784.25	25115.95	3559.51	3834.23
2008-2009	24231.65	2914.51	23543.94	3672.54	4068.21
2009-2010	25712.54	3186.86	25423.81	4157.67	4613.12
2010-2011	24143.77	3415.66	23875.09	4456.21	4961.96
2011-2012	23011.74	3691.12	22548.14	4945.54	5647.52
2012-2013	22790.25	4291.42	22587.75	5660.62	6524.62
2013-2014	21489.42	4832.61	21253.08	6316.11	7252.4
2014-2015	22798.97	5144.52	22577.71	6790.48	8012.35
2015-2016	21426.11	5679.71	21180.99	7459.51	8827.07

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

Graph – 3.9

Year wise total quantity procurement, marketing & Turnover from HOPCOMS of fruits & vegetables (2002-2016)



From the above table it can be seen that during the year 2002-03 procurement of fruits and vegetables in the state of Karnataka approximately about 30365.28 tonnes and its value was 2805.75 and after that it had been gradually increased to 32062.91 tonnes in the year 2005-06. It is interesting to note that after 2006-07 it has been declined gradually inefficiency in procurement of fruits and vegetables in HOPCOMS, but is noted that the value has been increased from 2805.75 to 5679.71 respectively. The distribution of fruits and vegetables from HOPCOMS in the state during 2002-03 was 29941.14 tonnes and the value was 3516.56. After 2003-04 both the tonnnes and values of fruits and vegetables are increased. About turnover of the fruits and vegetables from HOPCOMS during the year 2002-03 was Rs.3753.51 lakhs after that it has been tremendously increased to Rs.8827.07 lakhs till 2015-16. This is a positive trend in the case of fruits and vegetables form HOPCOMS in Karnataka.

Through HOPCOMS, the government has invested huge amount of resources in marketing of horticultural produce in the city of Bangalore and in quite a few other cities of Karnataka state. Though the quantity of total produce that HOPCOMS picks up is tiny compared to the total amount used in Bangalore city, a fine illustration, both in terms of the prices that it offers farmers, as well as the quality and prices that if offers to customers. Although it deals with only a small part of the total horticultural produce in the city of Bangalore, HOPCOMS sets the prices in the market. Both farmers and customers have come to agree to the price set by HOPCOMS as fair.

One of the finest and incredible jobs of HOPCOMS is serving farmers, in case if they have supplementary production HOPCOMS will facilitate them to sell in open market by providing transportation facility without any charges. Though we must be grateful for the price mechanism adopted in HOPCOMS .it acts as middle man between farmers and consumers to collect HOPCOMS are market leader in fitting a precise and accurate price for fruits and vegetables. The details of the area and production of horticulture crops in the state of Karnataka are shown in the table – 3.36.

Table – 3.36

Area & Production of Horticulture Crops in Karnataka

(Area in Lakh ha / Prodn. in Lakh MT)

Crops	2010 -11		2011 -12		2012 -13		2013 -14		2014-15	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
Fruits	3.60	59.63	3.54	61.33	3.69	63.18	3.77	63.47	3.87	66.26
Vegetables	4.37	70.63	4.38	73.80	4.20	75.49	4.03	72.20	4.46	82.50
Plantation	8.05	4.42	8.21	4.82	8.35	5.04	8.51	5.34	8.56	4.85
Spice	2.66	10.97	2.57	9.99	2.29	8.95	1.71	6.17	2.00	6.56
Flowers	0.27	1.96	0.28	1.96	0.29	2.18	0.30	2.19	0.30	2.14
Medicinal Plants	0.02	0.03	0.02	0.05	0.02	0.04	0.02	0.04	0.02	0.11
Aromatic Plants	0.02	0.16	0.02	0.18	0.01	0.13	0.02	0.18	0.01	0.14

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

The above table clearly indicates about the area and production of horticulture crops in the state of Karnataka from 2010-11 to 2014-15 respectively. The area and production of the horticulture crops includes fruits, vegetables, plantation, spice, flowers, medicinal plants and aromatic plants. Among these crops vegetables crops production from 2010-11 to 2014-15 shows an increasing trend. During the year 2010-11 the production of vegetables 70.63 lakh MT, in 2011-12 it was 73.80 lakh MT, in 2012-13 it was about 75.49 lakh MT, in 2013-14 approximately about 72.20 lakh MT and in the year 2014-15 it has reached to 82.50 lakh MT. It is found from the table that after vegetable crops the second place goes to fruits. During 2010-11 the total production of the fruits was about 59.63 lakh MT, in the year 2011-12 it had reached to 61.33 lakh MT, after 2011-12 the production of fruits in Karnataka has been gradually increased. In 2012-13 the production of fruits was 63.18 lakh MT, in 2013-14 it is about 63.47 lakh MT and ultimately it has reached to 66.26 lakh MT in 2014-15. It can be said that among the horticultural crops in the state of Karnataka medicinal plants area and production is not appreciable, it has obtained the least place in area and production in the state of Karnataka.

Table- 3.37

Area & Production of Major Fruits in Karnataka & Processing Opportunities

(Area in thousand ha / Production in thousand MT)

Fruit	Area	Production as on 2014-15	Major Districts	Processing Opportunities
Pomegranate	18.48	198.68	Chitradurga, Bellary, Vijayapura, Tumkur, Koppal Bagalkot	Juice, Jelly, Jam, Syrup, Aril, Wine, Juice Concentrate, Flavours
Grapes	20.35	391.16	Vijayapura, Chikkaballapura, Belagavi, Bengaluru Rural, Bagalkot	Grape Juice, Concentrate, Raisins, Wine
Mango	173.08	1641.16	Kolar, Ramanagar, Tumkur, Chikkaballapura, Mandya, Belagavi, Dharwad	Mango Pulp, Juice, Squash, Jam, Pickles, Dehydrated Fruits, Powder, Jelly, Flavours, IQF

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

The table- 3.37 denotes the area and production of major fruits in the state of Karnataka and processing opportunities. The data provided in the table indicates the area and production of three major fruit crops viz., pomegranate, grapes and mango crops. Pomegranate is produced in 18.48 thousand ha area and production was 198.68 thousand MT as on 2014-15. The pomegranate producing major districts are Chitradurga, Bellary, Vijayapura, Tumkur, Koppal and Bagalkot respectively. The processing opportunities for the pomegranate are juice, jelly, jam, syrup, aril, wine, and juice concentrate flavours.

The grapes are grown in 20.35 ha area and the production of grapes was about 391.16 thousand MT. The major producing districts of grapes are Vijayapura, Chikkaballapura, Belagavi, Bengaluru Rural, and Bagalkot respectively. The mango was grown in 173.08 ha area and the production of mango was approximately about 1641.16 thousand MT. The major mango producing districts

in Karnataka are Kolar, Ramanagar, Tumkur, Chikkaballapura, Mandya, Belagavi,and Dharwad. The details of the area and production of other horticulture crops in the state of Karnataka are presented in the table – 3.38.

Table- 3.38

Area & Production of Other Horticulture Crops in Karnataka

(Area in ha / Production in MT)

Horticulture Crops	Area	Production as on 2014-15	Major Districts	Processing Opportunities
Aromatic & Medicinal Plants	3493	25633	Bellary, Tumkur, Kolar, Vijayapura, Gadag, Chikkaballapura, Uttara Kannada, Koppal, Shivamogga, Kalaburagi	Aromatic plants - Extraction of Essential oil. Medicinal plant: Crude extraction, phytochemicals, dehydration of herbs
Commercial Flowers	30058	214396	Haveri, Bellary, Tumkur, Chikkaballapura, Kolar, Chitradurga, Mandya	Dried flower, extractions of dye, colours & essential oils, Cut flowers & Garlands
Plantation Crops	855525	484630	Tumkur, Hassan, Dakshina Kannada, Chitradurga, Chikkamagalur, Shivamogga, Davanagere, Uttara Kannada	Packed coconut water, Coconut milk, desiccated coconut powder, virgin coconut oil, Dehydrated copra flake, coconut milk powder. Chocolate manufacturing, processing of arecanut, cashew processing
Spices	200191	655706	Dharwad, Kodagu, Hassan, Bellary, Mysuru, Chikmagalur, Haveri, Shivamogga, Bagalkot	Spice powders, Masalas, Pastes, Pickles, Dehydrated flakes
Coffee	230333	211100	Kodagu, Chikmagalur, Hassan	Coffee roasting, Powders, Chocolates

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

3.32 Cropping Intensity and Cropping Pattern

The Net Sown Area in Karnataka is estimated 104.89 lakh ha., accounting for 54% of the geographical area. Thus, the Net Sown Area as a percentage of geographical area in the state remained near static over the 28 year period. However, during the above period, the Net Irrigated Area as a percentage of Net Sown Area increased from 11 to 24 and the cropping intensity increased by 11 percentage points from 106% to 117% resulting in increase in Gross Cropped Area (GCA). This implies the need for more investments in irrigation infrastructure for further increasing the cropping intensity and GCA in the state. Paddy, Ragi, Jowar, Bajra, Maize, Tur, Groundnut, Sugarcane, Cotton, Arecanut and Coconut are some of the major crops grown in the State.

3.33 Potential of Horticulture in Karnataka

The diverse agro-ecological conditions prevailing in the State facilitates growth of large varieties of horticulture crops covering fruits, vegetables, flowers, spices, plantations, roots and tuberous crops, aromatic crops, medicinal crops, oil palm etc. There has been a significant development in horticulture sector since the last two to three decades. There is a clear shift from Agriculture to horticulture sector which is mainly attributed to the fact that Horticulture crops are perennial in nature and are less labour oriented and highly remunerative. Karnataka state at the national level stands first in floriculture, second in spice and plantation crops, third in Coconut and fifth in fruits and vegetables. Of the total cultivated area of 108 lakh ha., in Karnataka, horticulture crops are grown in an area of 15.30 lakh ha., with an annual production of 118 lakh tons annually.

The State of Karnataka is artistic with pleasant agro-climatic environment widespread in six dissimilar agro-climatic zones such as the southern dry zone, hilly zone, coastal zone, central conversion region, northern dry zone and eastern dry zone and this has made it feasible to grow unusual varieties of horticulture crops. Karnataka is the first state to set up a separate Department of Horticulture in India for the overall development of horticulture in the state. The main horticultural crops that are grown-up in the State are presented in the below mentioned table.

3.34 Present Area and Production under Horticulture Crops in Karnataka

The current trends of area and production under horticultural crops in the state of Karnataka are presented in table-4.9. The data in table- 4.9 indicates that the fruits are growing in 2.61 lakh ha. And the production of fruits crops is about 41.65 lakh tones, the vegetables are growing in 3.77 lakh ha., the production of vegetables is about 66.54 lakh tones, the spices are growing in 2.45 lakh ha., area and the production is about 4.97 lakh tones. The plantation crops are growing in 6.26 lakh ha., and the production of plantation crops is at present about 3.34 lakh tones and the flower crops are growing in 0.21 lakh ha., area and the production of flower crops is approximately about 1.57 lakh tones. The details can be seen from the following table – 3.39.

Table- 3.39

Present Area and Production under Horticulture Crops

Sl. No.	Crops	Area in lakh ha.	Production in lakh tonnes
1.	Fruits	2.61	41.65
2.	Vegetables	3.77	66.54
3.	Spices	2.45	4.97
4.	Plantation crops	6.26	3.34
5.	Flower crops	0.21	1.57
6.	Medicinal/Aromatic crops	384/665 (in hac.)	4525/9144 (in tons)
	Total	**15.30**	**118.20**

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

The major production of area of the important fruits in the state of Karnataka is mango, sapota, banana, grapes and pomegranate respectively. The mango availability period is May-June and the major producing areas area, Bangalore, Tumkur, Kolar, Belgaum, Dharwad, Haveri, and Chikmagalur. The Sapota is available during May-June in the state of Karnataka. The major sapota producing areas are, Hassan, Chikmagalur, Kolar, Chitradurga, Dharwad and Belgaum. The Kolar and Chitradurga Sapota is more tasty compare to other districts, because the dry land fruits are always tasty. The banana is available around the year in the state of Karnataka. The major banana producing areas are Hassan, Chikmagalur, Kolar, Chitradurga, Davanagere and Tumkur. The grapes are available between Feb-May months only. The major grapes growing areas are, Koppal, Belgaum, Bijapur, Bagalkot, Bellary and Davanagere. The pomegranate is available during June-Oct months and the major producing areas are - Gulbarga, Raichur, Koppal, Bijapur, Bagalkot, Bellary, Davanagere, Belgaum and Chitradurga respectively. The details of the major production area of important frits in Karnataka are presented in table- 3.40.

Table- 3.40

Major Production area of important fruits in Karnataka

Fruit	Period of Availability	Main Production Areas
Mango	May-June	Bangalore, Tumkur, Kolar, Belgaum, Dharwad, Haveri, Chickmagalur
Sapota	May - June	Hassan, Chickmagalur, Kolar, Chitradurga, Dharwad, Belgaum
Banana	Around the year	Hassan, Chickmagalur, Kolar, Chitradurga, Davangere, Tumkur
Grapes	Feb - May	Koppal, Belgaum, Bijapur, Bagalkot, Bellary, Davangere
Pomegranate	June - Oct	Gulbarga, Raichur, Koppal, Bijapur, Bagalkot, Bellary, Davangere, Belgaum, Chitradurga

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

Karnataka State is one of the largest producers of flowers in the country; the present export of flowers from the State is valued at Rs. 35.0 crore. The focus on Rose, Chrysanthemum, Crossandra and traditional flowers development. The details of the major production area of important vegetables in the state of Karnataka are presented in table- 3.41.

Table- 3.41

Major Production area of important vegetables in Karnataka

Vegetable	Period of Availability	Main Production Areas
Tomato	Around the year	Bangalore, Tumkur, Kolar, Hassan, Haveri, Davangere
Cabbage	Around the year	Kolar, Bangalore U, Bidar, Haveri, Hassan
Cauliflower	Around the year	Bangalore U & R, Kolar, Belgaum, Haveri, Kodagu

Brinjal	Around the year	Gulbarga, Raichur, Hassan, Bangalore, Bijapur, Bagalkot, Belgaum
Ladyfinger	Mar – July	Koppal, Belgaum, Bijapur, Mysore, Udipi, Raichur
Gherkins		Bangalore, Kolar, Tumkur, Hassan, Chitradurg, Dharwad, Bagalkot
Rose Onion	Mar – May	Bangalore and Kolar
Onion	Mar - May	Gadag, Dharwad, Belgaum, Bijapur, Bagalkot, Bellary

Source: Dept. of Horticulture, Various Reports, Government of Karnataka.

3.35 Market Linkages of Horticultural Crops in Karnataka

The horticultural crops being unpreserved in nature, losses in quantity and quality which affects these products between harvest and consumption. Factors like respiration, ethylene production, evaporation, temperature and relative humidity affects the keeping quality of these products. Post harvest facilities from production connecting to the market and consumption points helps in the reduction of losses due to depletion.

The agricultural export zones are promoted with the purpose of promoting exports of agricultural produce from chosen areas of productivity importance, food parks afford an opportunity of growing processing capabilities in the state, and these are two imperative linkage points which helps in absorption of Fruits and Vegetables for further value addition.

3.36 Food Parks in Karnataka State

The Food Parks were established in the State under the Ministry of Food Processing Industries guidelines during 2000-2001. Although there are six Food Parks recognized for establishment in the State, the food Parks are not operational till date. The major commodity of production in the catchment region

of the park is highlighted with a comparison of the percentage of production of the commodity to the state production.

3.37 Markets and Rural Mandis

In Karnataka, Agricultural Produce Marketing Committee Yards and Act (APMC) includes the marketing of horticultural produces. But in practice only few horticultural products which are less perishable like Coconut, Arecanut, Onion and Potatoes are largely marketed through APMC's and horticultural produces other than these are also marketed through APMC's which is around 6% of the total production. Most of the vegetables and fruits in larger cities and towns are traded in the central market area, usually municipal market. The wholesale trade of fruits and vegetables is carried out by the commission agents and the trade is through small auction sales or negotiated sales in terms of baskets/bags etc.,

3.38 Summary

The above analysis clearly indicates that Traditionally Indian farmers depend heavily on middlemen particularly in the marketing of fruits and vegetables. There has been great concern in recent years about the efficiency of fruits and vegetable marketing. It is feared that low efficiency in the marketing channels accompanied with poor marketing infrastructure would not only lead to high and fluctuating consumer prices, but also only a small fraction of the consumer rupee reaching the producer farmer. It may also leads to deterioration in quality, frequent mismatch between demand and supply both spatially and over time resulting to highly fluctuating prices. There is substantial scope for improving the marketing efficiency by improving the market information system by making available latest and extensive market information to all market

participants through the use of internet facilities and other means of communication.

The analysis of production and marketing of horticultural crops in the state of Karnataka clearly indicates that Karnataka is the second most important states next to Maharashtra for the production of horticultural crops. The agro climatic suitability provides a unique position for the state to be a natural home for a large number of horticultural crops that can be grown all round the year. Out of a total of 121.86 lakh ha cultivable area, nearly 17.64 lakh ha is under horticultural crops accounting for 8 % of area contributing to over 136.66 lakh tones (2007-08) (6 % of total production). Around 2.46 lakh ha is under fruit crops and 2.99 lakh ha is under vegetables. Fruits contribute to 73.62 lakh tones while vegetables 6.23 lakh tones. The state leads in country's area and production of brinjal, tomato, mango and cut flowers. Being the horticultural capital, Bangalore district is the hub of activity for various horticultural crop research and development. Estimates indicate that the state capital with a total population of over 80 lakhs consumes nearly one third of the states horticultural crop production. It is also a major hub for interstate transactions and movement of horticultural crop products to distant locations within and outside the country.

Chapter – IV

CASE STUDY ANALYSIS

The case study analysis is presented in this chapter. Hence this chapter considered as the core chapter of the present study.

4.1 Socio-Economic Features of the Respondents in the study area

Here an attempt is made to analyze the socio-economic characteristics of the respondents in Mysuru, Bijapur, Bagalkot, Shimoga, Chitradurga and Tumakuru districts. The analysis starts from the gender-wise distribution of the respondents in the study area and the impact of horticultural crops on the development of the farming community.

4.2 Gender-wise distribution of Respondents

Table-4.1 analyses the gender-wise details among the respondents in the study area. Out of 300 respondents selected for the study 63.33% of the respondents are Male and remaining 36.67% of the respondents are Female farmers, usually the members of the HOPCOMS are male and they bring their produce to HOPCOMS procurement center in the study area. The female members are few in HOPCOMS in the study area. The male farmers play a vital role in HOPCOMS in the study area. The details can be had from the following table – 4.1.

Table- 4.1

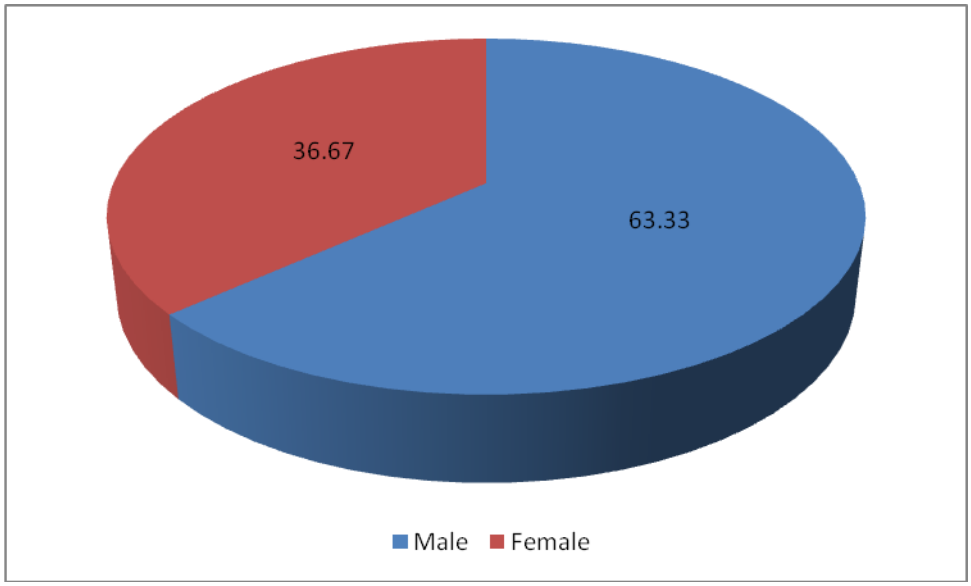
Gender-wise Distribution of Respondents

Sl. No	Gender	Number of Respondents	Percentage
01	Male	190	63.33
03	Female	110	36.67
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.1

Gender-wise distribution of Respondents



4.3 Distribution of Sample Respondents by Location and Crops in the study area

Here an attempt is made to present the sample respondents on the basis of location and crops in the study area. Totally 06 district in Karnataka have been covered for the study. A main thrust was given to Papaya, Pomegranate, Mango, Sapota and Banana in the study area. From each district 50 respondents have been selected. Hence the total 300 sample respondents are interviewed in the study area. The details are furnished in Table – 4.2.

Table – 4.2

Distributions of Sample Farmers by Location and Crops

District	Study of Crops					
	Papaya	**Pomegranate**	**Mango**	**Sapota**	**Banana**	**Total**
Mysuru	10	10	10	10	10	50
Bijapur	10	10	10	10	10	50
Bagalkot	10	10	10	10	10	50
Shimoga	10	10	10	10	10	50
Chitradurga	10	10	10	10	10	50
Tumakuru	10	10	10	10	10	50
Grand Total	**60**	**60**	**60**	**60**	**60**	**300**

Source: Field Survey.

4.4 Age wise distribution of Respondents in the Study area

Age wise distribution of the respondents details are presented in table- 4.3. The table-4.3 analyses the age wise distribution of farmers. Out of 300 respondents 6.67% are in the age below 25 age group, the 11.66% of the respondents are in the age between 25 to 30 years, 15% are in the age between 31 to 39 years, the 33.33% are in the age between 40 to 49 years, 16.67% are in the age of 50 to 59 and above 60 years respectively. The majority of the farmer members are in the age group of 40 to 49 years, followed by 40 to 59 years. This age group of farmer would have knowledge of cultivation of fruits and vegetables and they could understand the consumers need and they could provide good quality products to needy people.

Table – 4.3

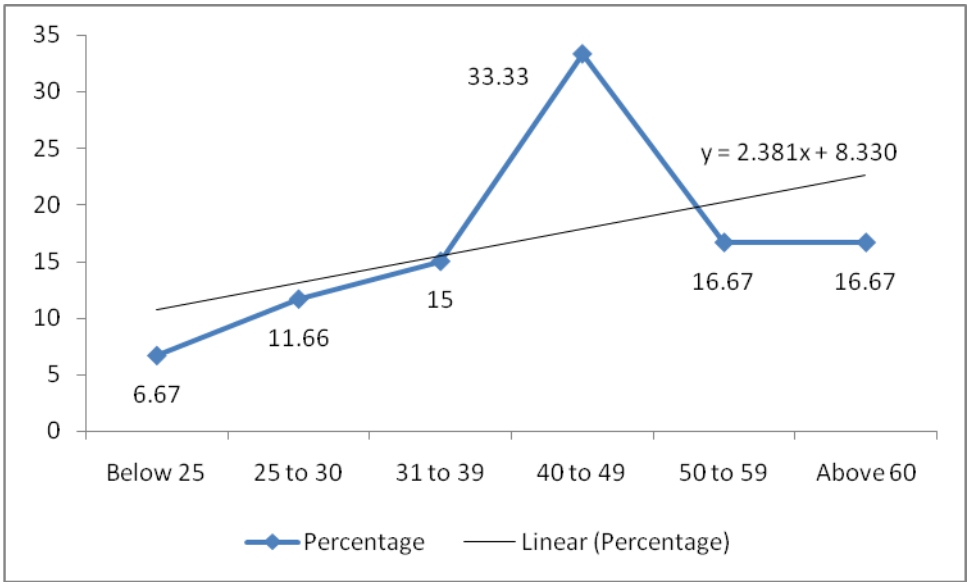
Age wise distribution of Respondents

Sl. No	Age	Number of Respondents	Percentage
01	Below 25	20	6.67
02	25 to 30	35	11.66
03	31 to 39	45	15.00
04	40 to 49	100	33.33
05	50 to 59	50	16.67
06	Above 60	50	16.67
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.2

Age wise distribution of Respondents in Percentage



4.5 Education Status of the Sample Respondents in the Study Area

Education plays a significant role for the overall development of the human being. Here we have made an attempt to present the education status of the sample respondents in the study area. Table – 4.4 shows the education status of HOPCOMS farmer members. It is observed that out of 300 respondents the 41.67% of them are having secondary education followed by intermediate education with 25% and 8.33% of the members are having primary education. It is clear from the study that the farmers in the study area are having at least primary education.

Table – 4.4

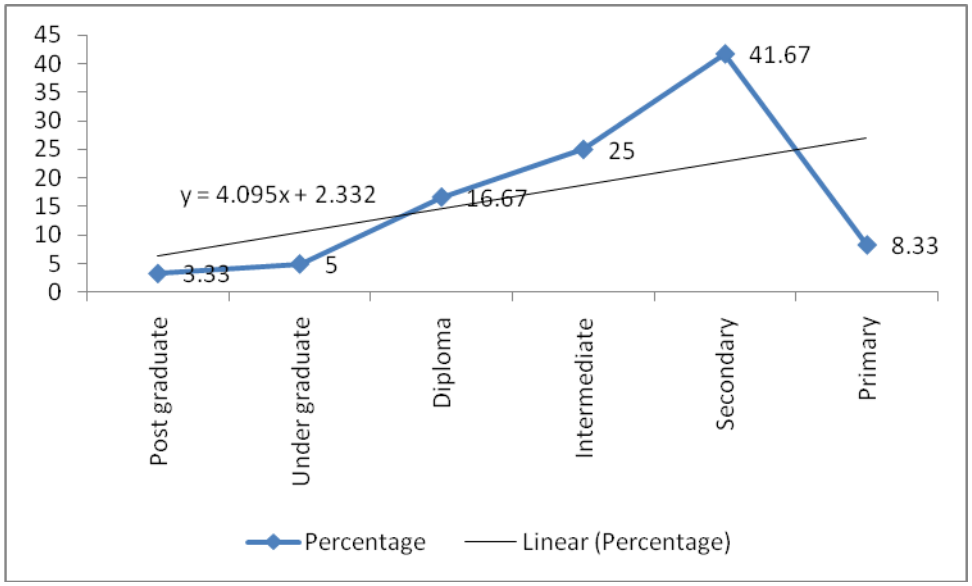
Education Status of the Sample Respondents in the Study Area

Sl. No	Level of Education	Number of Respondents	Percentage
01	Post graduate	10	3.33
02	Under graduate	15	5.00
03	Diploma	50	16.67
04	Intermediate	75	25.00
05	Secondary	125	41.67
06	Primary	25	8.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.3

Education Status of the Sample Respondents in the Study Area in Percentage



4.6 Annual income of the Respondents in the Study Area

Income is an important factor to measure the economic conditions of the farmers. Table- 4.5 reveals the annual income of farmers in the study area. Out of 300 respondents under study about 16.67% are having up to Rs.10,000 annual income , and 11.67% of the respondents has Rs.10,001 to Rs.20,000, and 20% of the respondents Rs.20,001 to Rs.50,000, and 43.33% are of

Rs.50,001 to Rs.1,00,000 and 8.33% of the respondents are having above Rs.100,000 annual income. The annual income of the farmers usually less, when compared to other people the farmers depends on agriculture some time the price of agricultural commodity varies and it declines and formers would not got even his cost of cultivation. The majority of the farmers are under Rs.100,001 to Rs. 20,000 followed by up to Rs. Rs.1,00,000 in the study area. The details can be had from the following table.

Table – 4.5

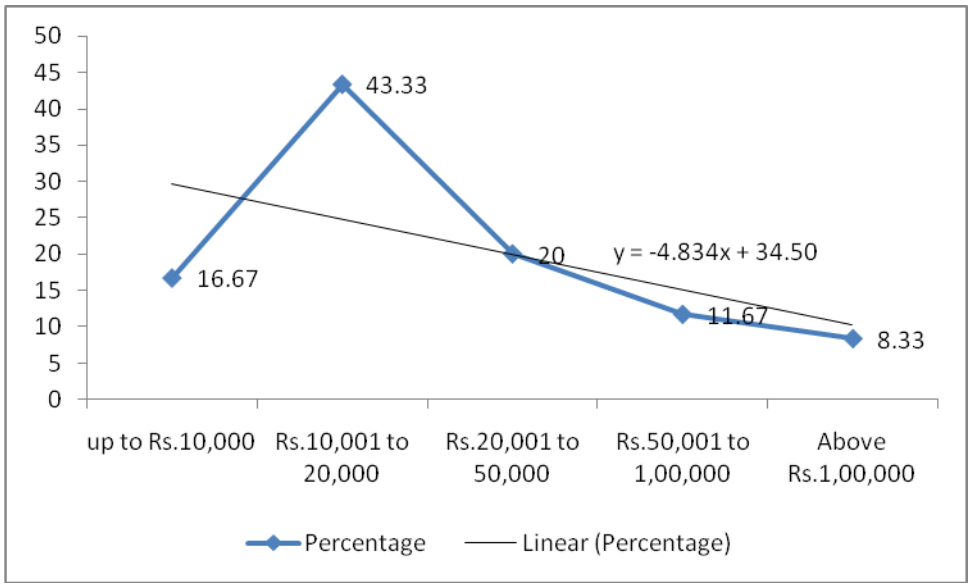
Annual income of the Respondents in the Study Area

Sl. No	Income (in Rs.)	Number of Respondents	Percentage
1	up to Rs.10,000	50	16.67
2	Rs.10,001 to 20,000	35	11.67
3	Rs.20,001 to 50,000	60	20.00
4	Rs.50,001 to 1,00,000	130	43.33
5	Above Rs.1,00,000	25	8.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.4

Annual income of the Respondents in the Study Area in Percentage



4.7 Bank account holders among farmers in the Study Area

To maintain their credit properly and to save their earnings banking habits among the farmers is quite necessary. In this context, we have made an attempt to gather the information about the bank account holders among the farmers in the study area. Table-4.6 depicts the bank account holders among the farmers. Out of 300 respondents 93.33% are using the Bank Accounts and remaining 6.67% of the respondents are not having Bank Account. Hence, there is a need to create awareness among the farmers regarding importance of having bank account. Because of this tendency the farmers could easily avail the crop loan. The details can be had from the following table – 4.6.

Table -4.6

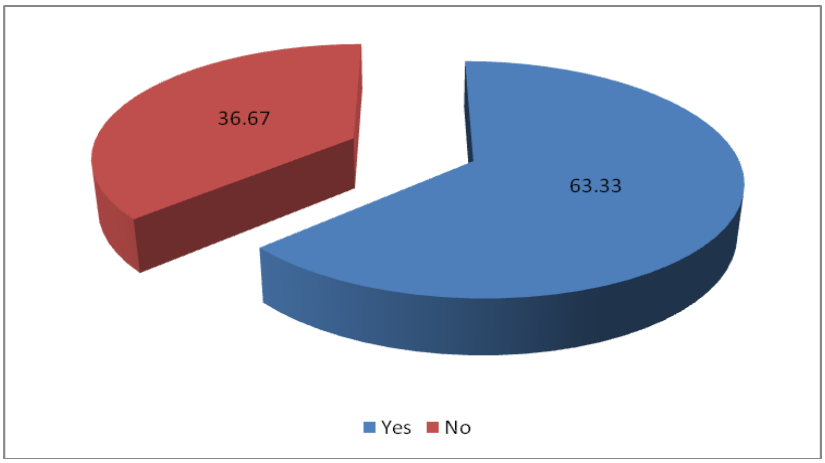
Bank account holders among sample respondents in the study area

Sl. No	Bank account	Number of Respondents	Percentage
01	Yes	280	93.33
02	No	20	6.67
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.5

Bank account holders among sample respondents in the study area in Percentage



4.8 Mode of transport used by the sample respondents in the Study Area

Table-4.7 reveals the mode of transport used by the farmers. It can be observed that in the study area out of 300 sample respondents chosen for the study about 18.33% of the respondents have used their own vehicle as mode of transport, and 53.33% of the respondents have used rented vehicle as mode of transport and remaining 28.34% of the respondents in the study area have used bus as mode of transport. The mode of transport is important as agricultural commodities are concerned and also it is important to prevent loss. The efficient transport could be used to avoid the transportation loss, based on characteristic of the commodities in the study area majority of them use rented vehicle followed by bus and own vehicle. The details can be had from the following table – 4.7.

Table -4.7

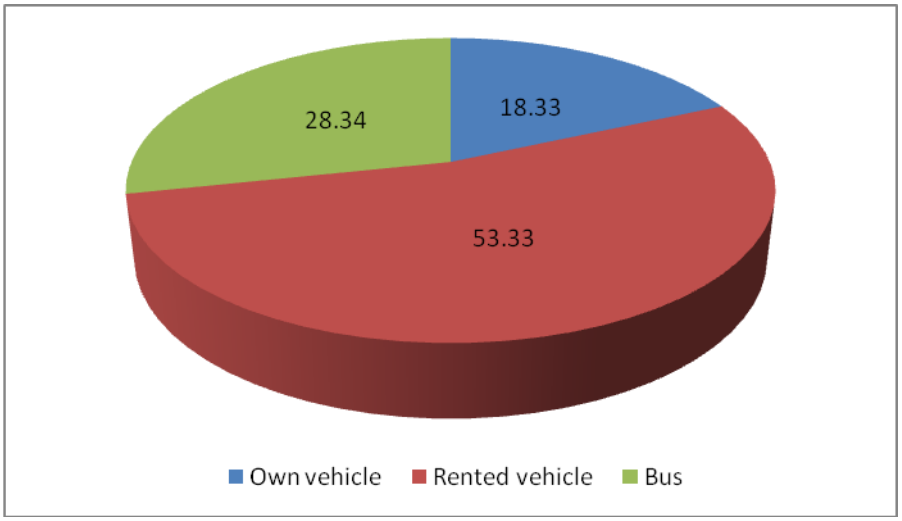
Mode of Transport used by the Sample Respondents in the Study Area

Sl. No	Mode of transport	Number of Respondents	%
01	Own vehicle	55	18.33
02	Rented vehicle	160	53.33
03	Bus	85	28.34
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.6

Mode of transport used by the sample respondents in the study area in Percentage



4.9 Gain from HOPCOMS by farmers in the study area

Table-4.8 clearly analyses that the farmers in the study area have gained from HOPCOMS. Out of 300 respondents selected for the study about 16.67% are opined that neither agreed nor disagreed, 25% of the respondents agreed nor remaining 58.33% of the respondents have strongly agreed. The 83% of the farmers in the study area has gained from HOPCOMS compared to other market who ever may be the producer always try to get profit by growing fruits and vegetables. The details can be had from the table – 4.8.

Table – 4.8

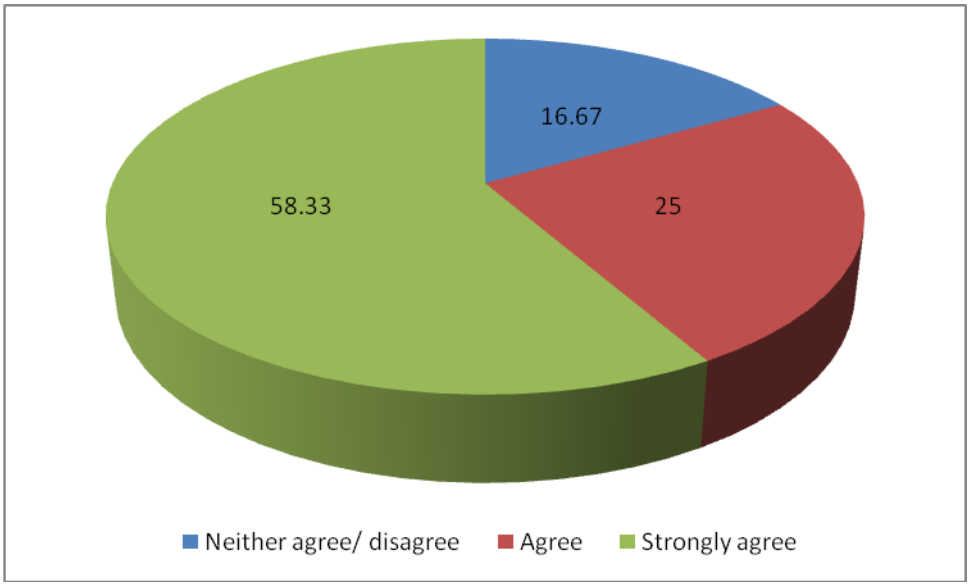
Gain from HOPCOMS by farmers in the study area

Sl. No	Statement	Number of Respondents	%
01	Neither agree/ disagree	50	16.67
02	Agree	75	25.00
03	Strongly agree	175	58.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.7

Gain from HOPCOMS by farmers in the study area (in percent)



4.10 Fair price provided by HOPCOMS in the study area

Table-4.9 reveals the fair price provided by HOPCOMS. Out of 300 respondents under study the 26.67% have agreed 3.33% have not agreed and remaining 70% of the respondents also strongly agreed about the fair price provided by HOPCOMS in the study area. From the study it was cleared that HOPCOMS has been providing fair price to farmers. When compared to other marketing channel, other than co-operative, the lengthy of middlemen's, were involved in marketing of fruits and vegetables. The HOPCOMS provides the direct marketing to farmers and maximizes the profit.

The details about the fair price provided by HOPCOMS in the study area are presented in table- 4.9.

Table -4.9

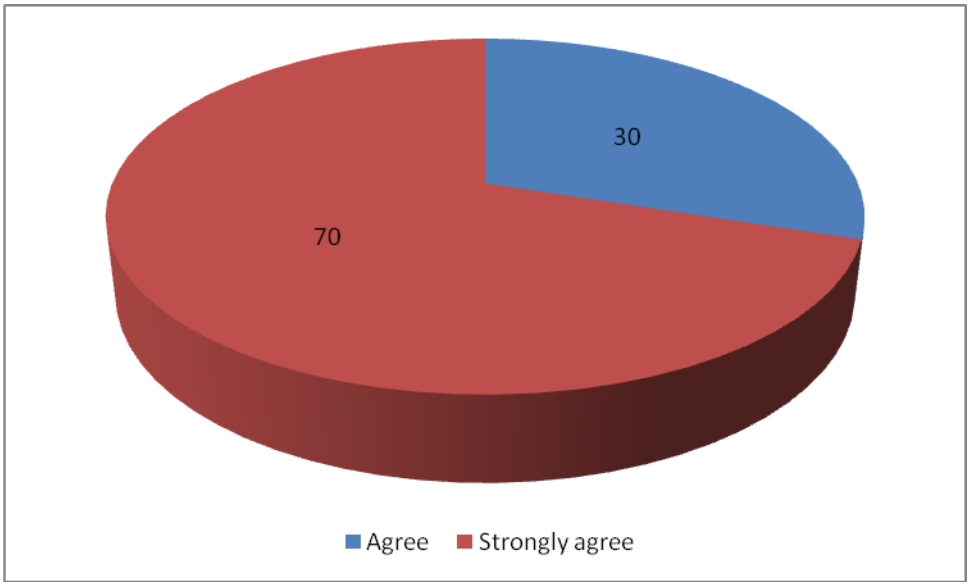
Fair price provided by HOPCOMS in the study area

Sl. No	Statement	Number of Respondents	%
01	Agree	80	26.67
02	Disagree	10	3.33
03	Strongly agree	210	70
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.8

Fair price provided by HOPCOMS in the study area (in percent)



4.11 Sale of Products to HOPCOMS in the study area

It is interesting to note that in the study area out of 300 respondents about 70% of the farmers strongly agreed to sell more fruits and vegetables at HOPCOMS, 6.67% of the respondents have not agreed with the sale of products to HOPCOMS and remaining 23.33% of respondents have agreed to sell their produce at

HOPCOMS, the majority of them sold their products to HOPCOMS because HOPCOMS provides good service to the producers in the study area. The details of the selling more products to HOPCOMS in the study area are presented in table- 4.10.

Table-4.10

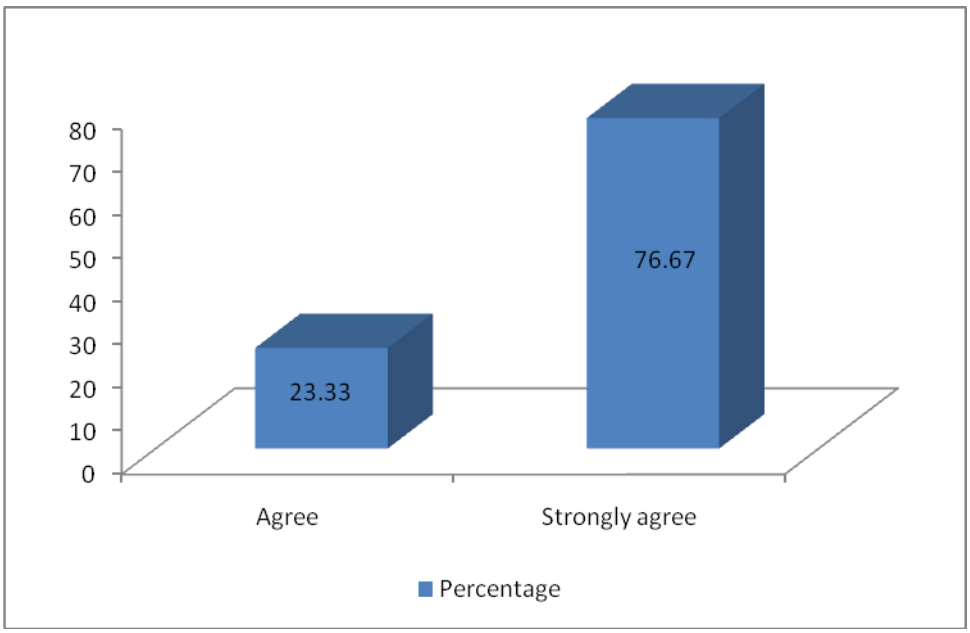
Sale of Products to HOPCOMS the study area

Sl. No	Selling to HOPCOMS	Number of Respondents	%
01	Agree	70	23.33
02	Disagree	20	06.67
03	Strongly agree	210	70.00
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.9

Sale of Products to HOPCOMS the study area (in Percent)



4.12 Remunerative Price paid at HOPCOMS

Table- 4.11 gives us the details of remunerative price paid in the HOPCOMS in the study area. It is pertinent to note that about 70% of the respondents farmers strongly agreed to this statement, 10% of the respondents have not agreed and remaining 20% also agreed with the same statement, normally farmers are cheated by middlemen's, but in HOPCOMS it is not possible. The most of the organized retail outlets are coming up because of direct sale the farmers would get fair price.

Table- 4.11

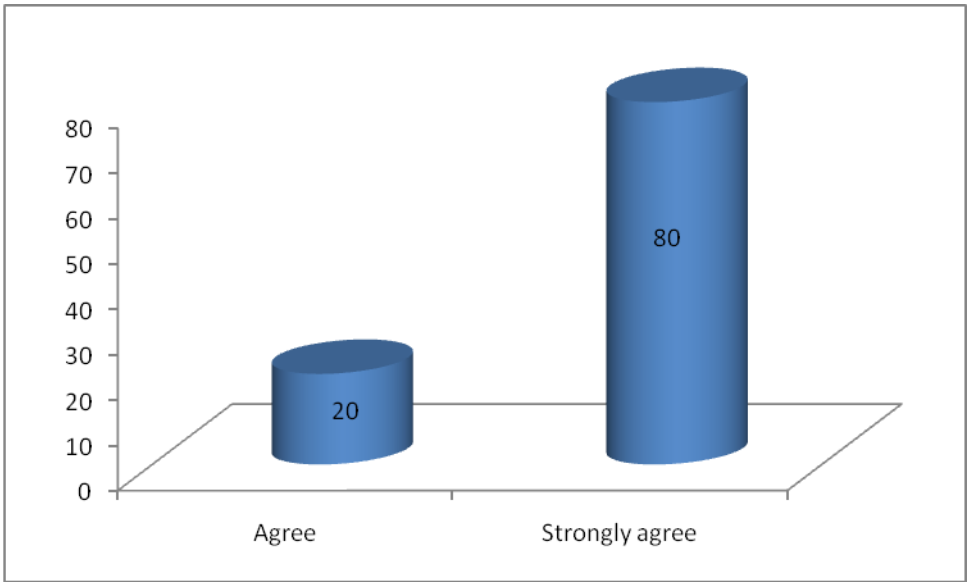
Remunerative price paid at HOPCOMS the study area

Sl. No	Remunerative price	Number of Respondents	%
01	Agree	60	20
02	Disagree	30	10
03	Strongly agree	210	70
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.10

Remunerative price paid at HOPCOMS the study area (in percent)



4.13 Establishment of Hi - tech HOPCOMS outlets in the study area

Table – 4.12 clearly explains the opinion of HOPCOMS farmer members towards starting of new High-tech HOPCOMS in the study area. Out of 300 respondents under study 40% of the respondents have strongly agreed and followed by 26.67% of the respondents in the study area have agreed to start new modernized HOPCOMS outlets, where as 16.67% of the respondents neither agree or with a new strategy with modernized outlets. The main reason for this is to increase in the business turnover.

Table -4.12

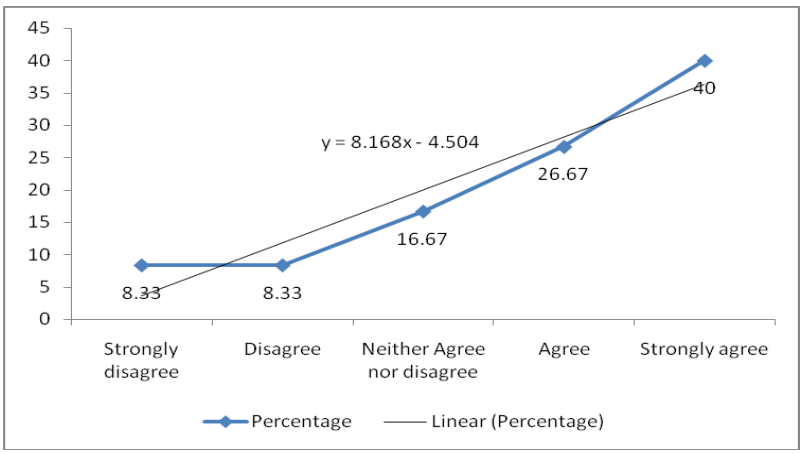
Establishment of Hi - tech HOPCOMS outlets in the study area

Sl. No	Hi-Tech HOPCOMS	Number of Respondents	%
01	Strongly disagree	25	8.33
02	Disagree	25	8.33
03	Neither Agree nor disagree	50	16.67
04	Agree	80	26.67
05	Strongly agree	120	40.00
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.11

Establishment of Hi - tech HOPCOMS outlets in the study area



4.14 Impact of organized retailers on HOPCOMS in the study area

The impact of organized retailers on HOPCOMS in the study area details are presented in the following table. The Table-4.13 reveals the impact of organized retailers on HOPCOMS. Out of 300 respondents 50% of the respondents have strongly disagreed, 16.67% of the respondents have disagree, 25% of the respondents have neither agreed nor disagree. The 5% of respondents agreed and 3.33% of the respondents strongly agreed and opined that there is an impact of organized retail outlets on HOPCOMS retail outlet in the study area. The impact would be gradually affect on HOPCOMS unless the modernization of outlets and provide for the horticultural farmers in the district.

Table -4.13

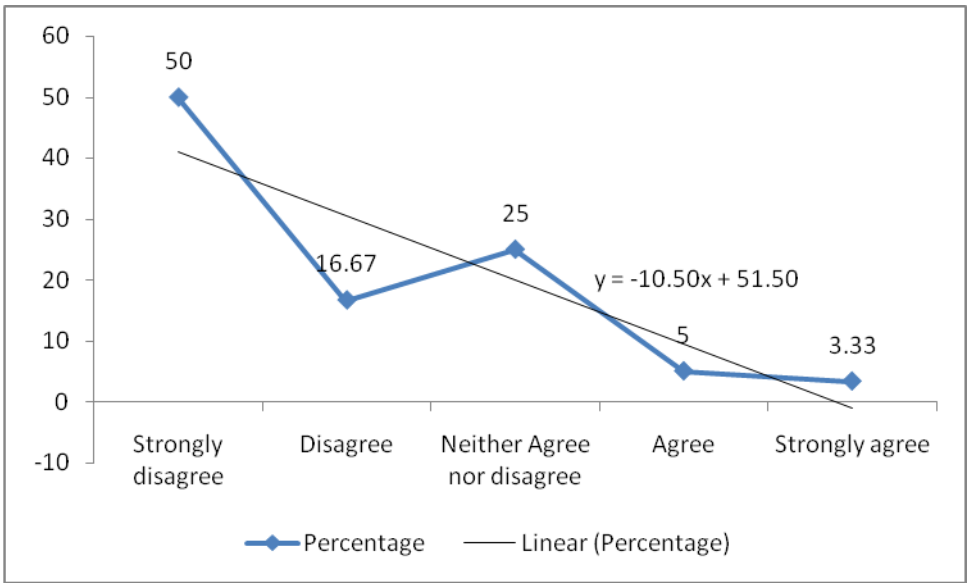
Impact of organized retailers on HOPCOMS in the study area

Sl. No	Impact of organized retailers on HOPCOMS	Number of Respondents	%
01	Strongly disagree	150	50.00
02	Disagree	50	16.67
03	Neither Agree nor disagree	75	25.00
04	Agree	15	5.00
05	Strongly agree	10	3.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.12

Impact of organized retailers on HOPCOMS in Tumakuru District



4.15 Rating of HOPCOMS by farmers in the Study area

Table – 4.14 depicts the details of the rating of HOPCOMS by farmers. It is very interesting to note that out of 300 respondents about 58.33% respondents have opined as good followed by 33.33% of the respondents opined that as very good and remaining 8.343% of the respondents as poor the majority of respondents rated HOPCOMS provide good services to farmers as good. It is clear from the study that they would provide better service in future by updating and modernizing their retail out let to producers as well as to consumers.

Table – 4.14

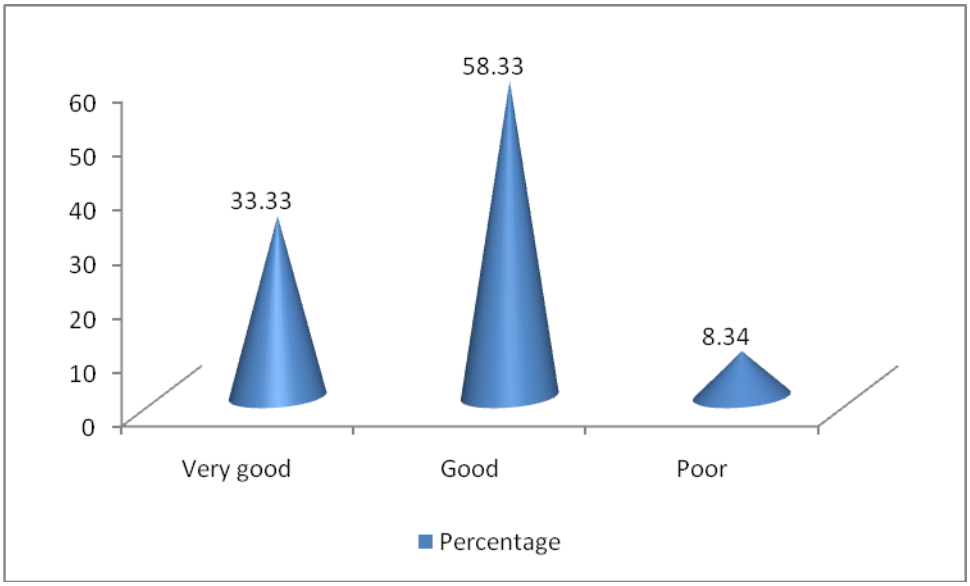
Rating of HOPCOMS by farmers in the study area

Sl. No	Rating of HOPCOMS	Number of Respondents	%
01	Very good	100	33.33
02	Good	175	58.33
03	Poor	25	8.34
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.13

Rating of HOPCOMS by farmers in the study area



4.16 Impact of NHM on the Expansion of Horticultural Crops and Perception of Farmers

In the study area we have also made an attempt to enquire from the sample respondents whether activities of the NHM helped farm households in increasing area under horticultural crops. The activities ranged from planting material to post harvest management. During the field survey, selected farmers were asked questions regarding role of the NHM in area expansion under the horticultural crops. They opined that provision of seedling and material inputs facilitated area expansion under these crops. Response of farmers related to capacity building through training was not encouraging. Moreover, farmers' responses regarding provision of processing facilities, marketing and procurement were found disappointing as none of them expressed positive opinion on implementation of these facilities. The details of the NHM assistance farm households to increase their area under horticultural crops in the study area are presented in table – 4.15.

Table- 4.15

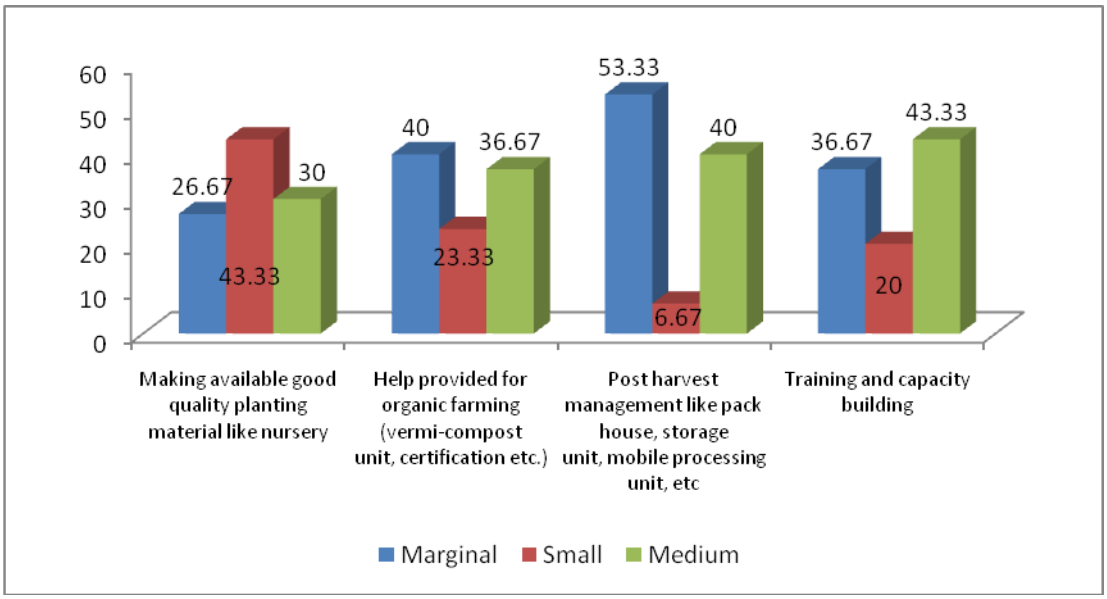
NHM assistant Farm Households to Increase their Area under Horticultural Crops (Percentage of farmers) in the Study Area

Particulars	Marginal	Small	Medium	Total
Making available good quality planting material like nursery	80 (26.67)	130 (43.33)	90 (30.00)	300 (100)
Help provided for organic farming (vermi-compost unit, certification etc.)	120 (40.00)	70 (23.33)	110 (36.67)	300 (100.00)
Post harvest management like pack house, storage unit, mobile processing unit, etc	160 (53.33)	20 (6.67)	120 (40.00)	300 (100)
Training and capacity building	110 (36.67)	60 (20.00)	130 (43.33)	300 (100)

Source: Field survey.

Graph – 4.14

NHM assistant Farm Households to Increase their Area under Horticultural Crops (Percentage of farmers) in the Study Area



The results highlight importance of providing seedling and material inputs in better outcomes of the Mission. Also, these findings indicate towards partial implementation of the Mission since it does not provide crucial facilities such as marketing and procurement to the beneficiaries. In fact, these facilities to the NHM beneficiaries can play a major role in the development of horticultural sector in the study area.

Despite these limitations, outcome in expanding area under horticultural crops has been found encouraging at the state level. But, potential could be realized better with area expansion under these crops in the study area. Further, coverage of the Mission in terms of farmers is low as compared to requirement to diversity cropping pattern and to enhance livelihood security of the farmers through adoption of horticultural crops.

With the increase in area under horticultural crops in the study area, production is continuously increasing. Moreover, horticultural produce is highly perishable and sensitive to temperature. Lack of cold storage facilities deteriorates the quality of the produce. Therefore, the state needs to ramp up the availability of cold storage with a focus on rural areas. Overcoming infrastructure deficit is imperative for the state to achieve a competitive position to attract farmers to grow horticultural crops. Increasing processing centres should be high on horticultural development agenda in order to increase profits of the growers through value addition. Admittedly, many of the above policy initiatives require a huge infusion of funds. The state needs to be pro-active. The magnitude of the requirements calls for active support from the Central government.

4.17 Problems in Production and Marketing of Horticultural Crops in the Study Area

An attempt is made to collect the information about the production and marketing constraints of horticultural crops growers in the study area and the result have been presented in the following Tables. The Problems in horticultural crops production it could be observed from the field survey that out of 300 sample respondents in the study area 18.33% of the horticultural crops growing sample farmers expressed the severity of virus attack along with labour intensiveness(16.67%) and water scarcity (16.67%) during horticultural crops cultivation. The other problems were lack of technical know-how (17.33%), irregular power supply (78%), higher initial investment (22.67%), smaller holdings (3.33%) and duplication of seeds (1.67%) respectively. The details are presented in table - 4.16.

Table – 4.16

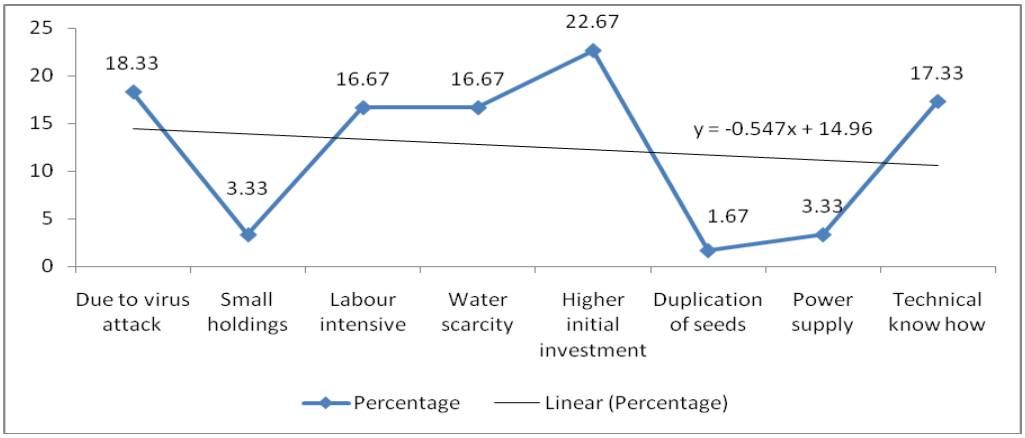
Problems in Horticultural Crops Production

SL. No	Particulars	Number of farmers (300)	Percent
1	Due to virus attack	55	18.33
2	Small holdings	10	3.33
3	Labour intensive	50	16.67
4	Water scarcity	50	16.67
5	Higher initial investment	68	22.67
6	Duplication of seeds	05	1.67
7	Power supply	52	17.33
8	Technical know how	10	3.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.15

Problems in horticultural crops production



4.18 Problems of Marketing of Horticultural Products in the Study Area

From the Table – 4.17 it could be seen that out of 300 respondents in the study area 23.33% of the respondents opined that markets far away from the farm, over 20 per cent of the respondents opined that higher commission charges was another major problem in marketing of horticultural products. The other problems were lack of availability of market information (18.33%), storage problem (76%), price fluctuations (15%) and lack of skilled labour for packing (23.33%). The details can be had from the following table.

Table - 4.17

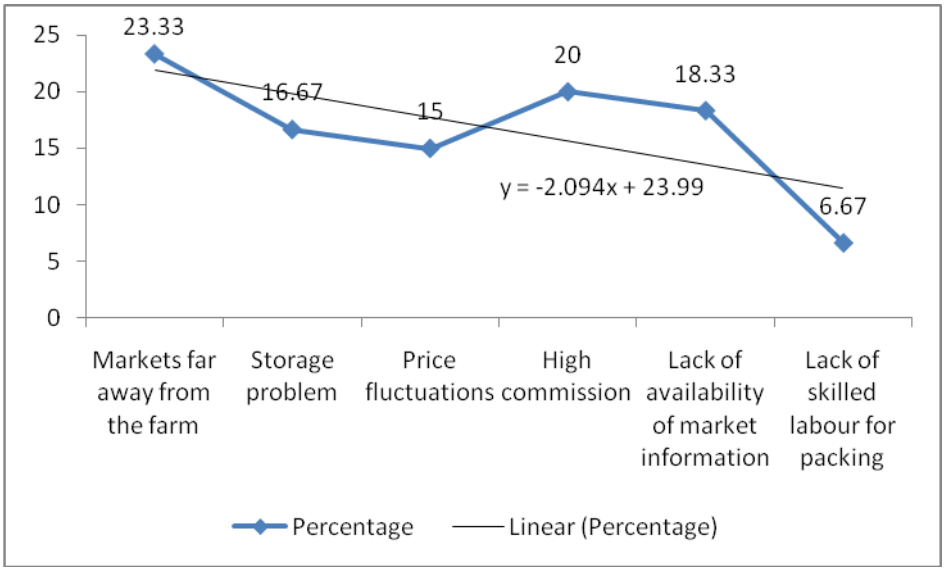
Problems of Marketing of Horticultural Products

SL. No	Particulars	Number of farmers (300)	Percent
1	Markets far away from the farm	70	23.33
2	Storage problem	50	16.67
3	Price fluctuations	45	15.00
4	High commission	10	3.33
5	Lack of availability of market information	55	18.33
6	Lack of skilled labour for packing	70	23.33
	Total	**300**	**100**

Source: Field Survey.

Graph – 4.16

Problems of Marketing of Horticultural Products



All the horticultural crops growers in study area expressed the problems of virus attack, labour intensiveness and water scarcity. As far as virus attack was considered the use of plant protection chemicals was in excess of the requirements as it was seen from the earlier pages. This is due to imperfect knowledge about the viral disease. Next as the horticultural crops is a labour oriented crop there is problem of availability of the labour at the peak time of harvesting or some time of the other operations. As the crop is water intensive crop and there was drought during last year so availability of water was one of the major problems in production of horticultural crops. About 79 per cent of the respondents expressed that the non-availability of the technical aspects know how for the improved horticultural crops cultivation in the study area. And about 68 per cent of the farmers opinioned that the enterprise requires higher initial investment which the small farmer can't provide and they faced problems in getting credit facilities from institutional agencies. Other constraints in horticultural crops production are irregular power supply and smaller holding 37 per cent each and duplication of seeds 20 per cent.

The problems faced by the farmer in marketing of horticultural crops were presented in the table (Table -5.22) have been briefly discussed below. The entire sample farmer's opined problem regarding the transportation viz., poor road conditions, lower frequencies of vehicles for transportation, minimum of 5-6 tonnes is must for the economic transportation. Majority of the horticultural farmers (82%) have expressed high commission charges as the one of the major problem in marketing. The commission agents charged 10 per cent of the commission from the producer, which ultimately reduces the producer's net price. Another major problem was lack of availability of market information as it was opined by 79 per cent of the respondents. The latest market information is not available to the producer and he will not know about daily price fluctuations in the market. Further as indicated by the table it could be seen that storage is also one of the major problem in marketing of papaya as it was expressed by 76 per cent of the farmers. As there is no adequate storage facility for the fruit the farmer has to sell the produce as soon as possible before it get spoiled. Due to this reason the farmer some times are forced to sell the produce at lower price. Other marketing problems were price fluctuations 37 per cent and lack of skilled laborers for packing 19 per cent.

4.19 Conclusion

The analysis in this chapter clearly reveals that response of farmers about area expansion under horticultural crops after adoption of the NHM was positive. Further, perceptions of farmers about employment generation and increase in household income through cultivation of pomegranate, banana, and papaya were positive. Subsidy provision was listed as the most important positive factor by 94.67 per cent farmers. In each farm category, at least 90 per cent farmers gave positive response. Further, response

of the farmers' regarding infrastructure and capacity building was found poor. Growers of selected horticultural crops have received subsidy from the government for seedling, fertilizer, pesticides, drip irrigation and water tank. Although, extension through training plays an important role, frequency of the training provided by the State Horticulture Department to beneficiaries of the NHM was only 1.75 trainings. Overall the analysis indicates that there is a positive impact of HOPCOMS on the production and marketing of horticultural crops in the study area.

Chapter – V

SUMMARY OF MAJOR FINDINGS OF THE STUDY AND SUGGESTIONS

In the concluding chapter, an attempt is made to bring out the major findings and conclusions of the study. This chapter includes the major findings of the study and the suggestions.

The state of Karnataka is one of the progressive states of India with great potential development for fruit crops. The state is blessed with ten agro-climatic regions suitable for growing variety of fruits all around the year in Karnataka. The total area under fruit crops has increased from 2.60 lakh hectares in 2006-07, in 3.69 lakh hectares in 2011-12. The production of fruit crops has also gone up from 41.65 lakh lakh tonnes during 2006-07 to 63.17 lakh tonnes in 2011-12. The major districts growing fruit crops in the state are Kolar, Belgaum, Bidar, Bangalore, Bijapur, Gulbarga, Dharwad, Mysore, Tumkur, Bagalkot and Chitradurga. Papaya belongs to the genus Caricaof the family Caricaceae with 48 species of all the species Carica papaya L. is the most important and best known. It is cultivated all over the world. The original home of papaya is Tropical America. It has been reviewed by Schroeder (1958), where archaeological, historical and biological information have been used to pin point the possible origin of papaya (Singh, 1990). The Dutch Traveller Linschoten in 1598 described fruit brought from the Philippines to Malaya and hence to India.

The Introductory Chapter has provided for an understanding of the problem under analysis, the objectives behind the study and procedures followed in the analysis of data gathered through

personal observation in the field and secondary sources. This chapter serves as the foundation on the basis of which the other chapters of the study are developed.

The second chapter devoted attention on the review of empirical studies pertaining to horticultural crops. In this chapter a brief review of research studies conducted by individual researchers and research institutions on horticultural crops production and marketing in India and also in Karnataka State is presented. Finally research gaps have been identified.

The third chapter outlines the trends in production and marketing of horticultural crops in India and Karnataka. Year-wise details of area and production are also presented.

The fourth chapter deals with the impact of horticultural crops on socio-economic status of the farmers. A detailed field study analysis is presented in this chapter. Hence this chapter is considered as the core chapter of present study.

The last chapter sets out a summary, and presents the conclusions of the study. It also attempts to indicate the possible changes in the procedures of government sponsored programmes in order to empower the tribal women, which called for the fuller realization of the objectives as originally, envisaged.

Major Findings of the Study

Based on the analysis and discussion in the study the following findings have been drawn:

1. Out of 300 respondents selected for the study 63.33% of the respondents are Male and remaining 36.67% of the respondents are Female farmers, usually the members of

the HOPCOMS are male and they bring their produce to HOPCOMS procurement center in Study area. The female members are few in HOPCOMS in the study area. The male farmers play a vital role in HOPCOMS in Study area.

2. Out of 300 respondents relatively larger percentage of farmers i.e., 33.3% are in the age group of 40 to 49 followed by 50 to 59 (16.67%). This age group of farmers would have knowledge of cultivation of fruits and vegetables and they can understand consumer's needs. Therefore, the farmers in the age groups of 40 to 49 and 50 to 59 are playing an important role in the cultivation of Horticultural Crops in the Study Area.
3. It is observed that out of 300 respondents the 41.67% of them are having secondary education followed by intermediate education with 25% and 8.33% of the respondents are having primary education. It is clear from the study that the farmers in the study area are having at least primary education.
4. It has been found from the study that farmers have moved from lower income groups to higher income groups after the introduction of NHM scheme. It is observed that the number of farmers in the income group of Rs. 50,001 to Rs. 1 lakh has increased from 70 to 130 and farmers in the income group of above Rs. 1 lakh has also increased from 10 to 25 after the introduction of NHM scheme. Further farmers in the income group of upto Rs. 10 ,000 has declined from 85 to 50 : farmers in the income group of Rs. 10,001 to Rs. 20,000 declined from 65 to 35 and the farmers in the income group of Rs. 20,001 to Rs. 50,000 has also declined from 70 to 60 after the introduction of NHM scheme.
5. Out of 300 respondents 93.33% are using the Bank

Accounts and remaining 6.67% of the respondents are not having Bank Account. Hence, there is a need to create awareness among the farmers regarding the importance of having bank accounts to avail crop loans.

6. It can be observed that in the study area out of 300 sample respondents chosen for the study about 53.33% of the respondents are using rented vehicles, 28.34% are using buses and remaining 18.33% are using their own vehicles as a mode of Transport to carry their horticultural produce to the marketing centres. Hence efficient transport system to be provided for avoiding transport losses in the study area.
7. It has been found from the study that out of 300 respondents in the study area 25% of the farms have agreed and 58% have strongly agreed that they have gained from HOPCOMS. Therefore totally 83% of farmers have gained from HOPCOMS in terms of getting better profit.
8. Out of 300 respondents, 26.67% of farmers have agreed and 70% have strongly agreed regarding the fair prices provided by HOPCOMS, according 86.67% of farmers have been provided fair prices by HOPCOMS.
9. It is interesting to note that in the study area out of 300 respondents about 70% of the farmers have strongly agreed and 23.33% of the respondents have agreed to sell their produce only to HOPCOMS. Hence, large majority of farmers i.e., 93.3% are selling their produce to HOPCOMS because it provides better service to the farmers.
10. It is also interested to note that 80% of the respondents have strongly agreed and 16% have agreed with the statement that farmers are cheated by middlemen in markets other than HOPCOMS. Hence HOPCOMS are

successful in avoiding exploitation of farmers by middlemen.

11. It is also interesting to note that out of 300 respondents about 58.33% respondents have opined as good and 33.33% of the respondents opined very good regarding the services rendered by HOPCOMS. But 8.3% of the farmers opined as poor regarding the services of HOPCOMS. Hence, HOPCOMS would provide better service in future by updating and modernizing their retail outlets for the benefit of both producers and consumers.
12. It could be observed from the field survey that out of 300 sample respondents 18.33% of farmers expressed virus attack was the severe problem; 16.67% of farmers indicated labour intensiveness as an important problem and another 16.67% expressed water scarcity as an important problem during the cultivation of Horticulture Crops. The other problems are lack of technical know how (17.33%); irregular power supply (78%); higher initial investment (22.67%); small holdings (3.3%) and duplication of seeds (1.67%). So the major problems of farmers cultivating Horticultural crops are irregular power supply, higher initial investment, lack of technical know how and virus attack.
13. Regarding the marketing of Horticultural products in the study area, 23.33% of the respondents opined that markets far away from the farm, over 20% of the respondents opined that higher commission was another problem in the marketing of Horticulture products. The other problems are storage problem (76%), lack of market information (18.33%), price fluctuation (15%) and lack of skilled labour for packing (6.67%).
14. It can be observed from the Field study that Papaya and

pomegranate crops are economically viable in Study area as compared to other crops. The yield of these crops are Rs. 3,90,000 and Rs.3,70,000 per hectare per annum respectively.

15. It is pertinent to note that in Study area the cost of production of Mango and Sapota is relatively less i.e., about Rs.65,000 and Rs. 60,000 per hectare per annum respectively. Hence it is observed that these two crops are economically viable to particular to small farmers.

SUGGESTIONS

On the basis of the study, the following suggestions are recorded to make horticultural crops to be more effective and purposeful in development of the farming community:

1. The growth rate analysis indicated that the augment in production was due to area, rather than productivity, which calls for exhaustive efforts to improve the productivity of horticultural crops in the study area.
2. Since farmers in the study area have expressed virus attack as the main problem, there is a need to develop integrated Pest Management System.
3. In the study area Post Harvest Management Techniques such as grading, packing, storage, transportation, marketing etc., should be encouraged for maximizing the profits of the farmers
4. In the study area, it is observed that probability studies should be conducted for creating marketing infrastructure, setting up of processing units, cold storages, transportation system etc., for raw and processed horticultural products. Based on these studies

viable projects are to be developed and executed on a time bound basis.

5. The promotional activities required to be taken up through mass media for encouraging the consumption of Horticultural products as protective food.
6. There is a need to stimulate private investment in the fields of infrastructure, marketing and research and development and also in production sector to guarantee the availability of produce to well organised processing and export units of Horticultural products.
7. Since horticulture sector is highly technology driven, it will be an essential to upgrade the skills of the farmers, field functionaries as well as entrepreneurs.
8. There is a need to promote elite nurseries at extensive location to ensure the availability of quality planting materials.
9. Since the present credit system is not only costly but inefficient, inadequate and untimely, there is a need for efficient credit support system to encourage more investment in order to increase production.
10. The Govt. should explore markets in Western Europe, Middle East and Japan for the export of fresh vegetables.
11. International standard packing materials should be made available for maintaining quality and freshness of vegetables and fruits.
12. Continuous market research programmes should be conducted for improving the demand for Horticultural Crops in the International Market.

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QUESTIONNAIRE

TOPIC

A STUDY ON PRODUCTION AND MARKETING OF HORTICULTURAL CROPS IN KARNATAKA

Research Scholar
H.P.VEERABHADRASWAMY

I. General information

1. Name of the respondent
2. Age :
3. Education
4. Village :
5. Taluk
6. District :
7. Caste :
8. Marital status :
9. Main occupation :
10. Subsidiary occupation:

1. Gender-wise distribution of Respondents

Sl. No	Gender	Number of Respondents	Percentage
01	Male		
03	Female		
	Total		

2. Age wise distribution of Respondents

Sl. No	Age	Number of Respondents	Percentage
01	Below 25		
02	25 to 30		
03	31 to 39		
04	40 to 49		
05	50 to 59		
06	Above 60		
	Total		

3. Education Status of the Sample Respondents in the Study Area

Sl. No	Level of Education	Number of Respondents	Percentage
01	Post graduate		
02	Under graduate		
03	Diploma		
04	Intermediate		

05	Secondary		
06	Primary		
	Total		

4. Annual income of the Respondents in the Study Area

Sl. No	Income (in Rs.)	Number of Respondents	Percentage
1	up to Rs.10,000		
2	Rs.10,001 to 20,000		
3	Rs.20,001 to 50,000		
4	Rs.50,001 to 1,00,000		
5	Above Rs.1,00,000		
	Total		

5. Bank account holders among sample respondents in the study area

Sl. No	Bank account	Number of Respondents	Percentage
01	Yes		
02	No		
	Total		

6. Mode of transport used by the sample respondents in the study area

Sl. No	Mode of transport	Number of Respondents	%
01	Own vehicle		
02	Rented vehicle		
03	Bus		
	Total		

7. Gain from HOPCOMS by farmers in the study area

Sl. No	Statement	Number of Respondents	%
01	Neither agree/ disagree		
02	Agree		
03	Strongly agree		
	Total		

8. Fair price provided by HOPCOMS in the study area

Sl. No	Statement	Number of Respondents	%
01	Agree		
02	Disagree		
03	Strongly agree		
	Total		

9. Sale of Products to HOPCOMS

Sl. No	Selling to HOPCOMS	Number of Respondents	%
01	Agree		
02	Disagree		
03	Strongly agree		
	Total		

10. Remunerative price paid at HOPCOMS

Sl. No	Remunerative price	Number of Respondents	%
01	Agree		
02	Disagree		
03	Strongly agree		
	Total		

11. Establishment of Hi - tech HOPCOMS outlets the study area

Sl. No	Hi-Tech HOPCOMS	Number of Respondents	%
01	Strongly disagree		
02	Disagree		
03	Neither Agree nor disagree		
04	Agree		
05	Strongly agree		
	Total		

12. Impact of organized retailers on HOPCOMS in the study area

Sl. No	Impact of organized retailers on HOPCOMS	Number of Respondents	%
01	Strongly disagree		
02	Disagree		
03	Neither Agree nor disagree		
04	Agree		
05	Strongly agree		
	Total		

13. Rating of HOCPOMS by farmers in the study area

Sl. No	Rating of HOCPOMS	Number of Respondents	%
01	Very good		
02	Good		
03	Poor		
	Total		

14. NHM assistance to Farm Households for Increasing Area under Horticultural Crops (Percentage of farmers) in the Study Area

Particulars	Marginal	Small	Medium	Total
Making available good quality planting material like nursery				
Help provided for organic farming (vermi-compost unit, certification etc.)				
Post harvest management				

like pack house, storage unit, mobile processing unit, etc				
Training and capacity building				

15. Problems in horticultural crops production

SL. No	Particulars	Number of farmers (300)	Percent
1	Due to virus attack		
2	Small holdings		
3	Labour intensive		
4	Water scarcity		
5	Higher initial investment		
6	Duplication of seeds		
7	Power supply		
8	Technical know how		
	Total		

16. Problems of Marketing of Horticultural Products

SL. No	Particulars	Number of farmers (300)	Percent
1	Markets far away from the farm		
2	Storage problem		
3	Price fluctuations		
4	High commission		
5	Lack of availability of market information		
6	Lack of skilled labour for packing		
	Total		

17. Suggestions

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Signature of the Investigator