ECONOMICS OF PRODUCTION AND MARKETING OF POMEGRANATE IN SOLAPUR DISTRICT

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MAY, 2019

CANDIDATE'S DECLARATION

I hereby declare that the dissertation

Or part thereof has not been

Previously submitted by me

For a degree of any

University or

Institute

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Date : / /2019 **(Reg. No. 2017A/47M)**

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CERTIFICATE – I

This is to certify that the dissertation entitled "**ECONOMICS OF PRODUCTION AND MARKETING OF POMEGRANATE IN SOLAPUR DISTRICT"** submitted by **MR. KHARAT PRATHMESH BALASO** to the Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani in partial fulfillment of the requirements for the degree of **MASTER OF SCIENCE (Agriculture)** in the subject of **AGRICULTURAL ECONOMICS** is record of original and bonafide research work carried out by him under my guidance and supervision. It is of sufficiently high standard to warrant its presentation for the award of the said degree.

I also certify that the dissertation or part thereof has not been previously submitted by him for a degree of any university.

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Date : / /2019 Research Guide

CERTIFICATE-II

This is to certify that the dissertation entitled **" ECONOMICS OF PRODUCTION AND MARKETING OF POMEGRANATE PRODUCTION IN SOLAPUR DISTRICT"** submitted by **Mr. KHARAT PRATHMESH BALASO** to the Vasantrao Naik Marathwada Agricultural University, Parbhani in partial fulfilment of the requirement for the degree of **MASTER OF SCIENCE (Agriculture)** in the subject of **AGRICULTURAL ECONOMICS** has been approved by the student's advisory committee after viva-voce examination in collaboration with the external examiner.

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Place: Parbhani *(Kharat P. B.)*

Date: / / 2019

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LIST OF ABBREVIATIONS

%	-	Per cent
/	-	Per
Agril.	-	Agriculture
Qtls./ha	-	Quintals /hectare
e.g.	-	Exampli gratia (For example)
EA	-	Extent of adoption
Econ.	-	Economics
et al.	-	et alia (and others)
etc.	-	Etcetera
Fig.	-	Figure
Ha	-	Hectare
i.e.	-	That is
J.	-	Journal
kg	-	Kilogram
MH	-	Maharashtra
MT	-	Metric tonnes
Co-op	-	Co-operative
Q	-	Quintals
Qty.	-	Quantity
Res.	-	Research
Univ.	-	University
Viz.,	-	Videlicet (namely)
@	-	at the rate
NI	-	Net Income
MVP	-	Marginal Value Product
Mktg	-	Marketing
FC	-	Fixed Cost
GM	-	Geometric Mean
MP	-	Marginal Product
MC	-	Marginal Cost
Ind	-	Indian
Asso	-	Association
Vol	-	Volume
PP	-	Page Number

INTRODUCTION

CHAPTER-I

INTRODUCTION

Pomegranate (*Punica granatum*) is one of the important fruit of tropical and sub-tropical regions of the country, which belongs to family *Punicaceae,* originated from Iran. It is also cultivated in semi-arid and arid region of the country, but requires irrigation water for better quality fruit production. The sweet-acidic fruit which provides a cool refreshing juice and is valued from its medicinal properties. Its popularity is also due to the ornamental nature of the plant which bears bright red, very attractive flowers.

India having diversity of soils and climate which is advantageous for producing all varieties of tropical and subtropical fruits. India is second largest producer of fruits in world after China it's share in world output of fruits is 12.6 per cent. According to National Horticultural Board of India about 1,655 lakh hectare of land under operational holding of agriculture, out of this 69.82 lakh is under horticultural crops and yield is about 81285 thousand M.T. of fruits during year 2012-13. India rank first in Mango, Banana, Sapota and Acid lime in world. (Handbook on Horticulture Statistics 2014).

Different varieties of pomegranate are commercially grow in the country and state as well viz, Phule Bhagva, Ganesh, Muskat, Arakta, Ruby, Jyoti, Phule Bhagva Super. Phule Bhagva variety have red coloured soft seeds and fruit coat, fruits are small to medium sized. Ganesh variety is prolific bearer,fruit very large, rind yellowish red, pinkish arils with soft seeds. Arakta fruits are smaller than Ganesh variety having dark red colours arils with soft seeds. The fruits of Muskat variety have red rind with pink colour arils. The fruits of Jyoti variety are large with attractive colours having dark red arils. Ruby variety having reddish brown with green streaks containing red bold arils.

In global market, India plays a significant role in export of pomegranate fruits. Recently, exports of pomegranate from India have increased and extended to several countries. The export of pomegranate fruits from India to

Middle East, Germany, Netherland, Holland, U.K. and Behrin. For export purpose Ganesh, Phule Arakta, G-137, Bhagava and Mridula are most suitable varieties.

India is one of the leading country in pomegranate production. The area under pomegranate cultivation during 2015-16 was 1.97 lakh hectares with production of 23.06 lakh MT. while in the year 2016-17,the area under pomegranate cultivation was 2.16 lakh hectare and production was 25.21 lakh MT.(www.indiastat.in).According to National Horticulture Board, Maharashtra contributes two-third area of pomegranate having 1.32 lakh hectares.

At present Maharashtra is the leading state in acreage covering about 68.7% of the area under pomegranate. in t During 2003-2004 to 2013-2014, pomegranate production in India has increased by 102.43%. Maharashtra ranks first (9,45,000 tonnes) accounting 70.2%, followed by Karnataka (1, 34,180 tonnes), Gujarat (99,330 tonnes), Andhra Pradesh (90,010 tonnes), Telangana (25,970 tonnes), Madhya Pradesh (25,290 tonnes), Tamilnadu (13,090tonnes) and other states contributing for the rent of the production.

In Maharashtra, Nashik is major pomegranate growing district with an area of 48,527 ha and production is 6.79 lakh MT followed by Solapur district with an area is 20,033 ha and production is 1.69 lakh M.T. (www.indiastat.in).

In Maharashtra, pomegranate is commercially cultivated in Solapur, Sangli, Satara, Kolhapur, Ahmednagar, Pune, Nashik, Aurangabad, Dhule, Latur and Osmanabad districts. In Solapur district, pomegranate is commercially cultivated in Karmala, Barshi, Madha, Mohol, Mangalweda, Sangola, Malshiras, Pandharpur. The central and western parts of the Solapur district, Sangola, Pandharpur, Malshiras, Mangalwedha, Mohol, Madha excluding Karmala taluka occupy 95 percent (95%) of total area under pomegranate of the region .Out of 11 talukas of Solapur district, Sangola, Pandharpur, Malshiras and Mangalwedha constitute the "Pandharpur Revenue Zone",from these talukas"Sangola" ranks first (31.74%)occupying the highest area under pomegranate in “Pandharpur Revenue Zone” of Solapur district.

Pomegranate is considered as nutritive fruit and rich in vitamin B, vitamin A and potassium. In India it is largely used as “desert fruit” and for fresh juice. Pomegranate fruit is also used for making delicious juice and health drinks. The edible portion of Pomegranate fruit is aril which is nearly 68% of the total fruit containing 78% moisture, 0.7% mineral matter, 1.6% protein, 0.1% fat, 14.5% carbohydrate and 5.1% fibre. The fruits are rich in vitamins such as 0.06mg thiamine, 0.1mg riboflavin, 0.3mg niacin and 16mg vitamin C per 100gm pulp and minerals 10mg, calcium 12mg, phosphorus 70mg and 0.3 mg iron per 100gm pulp.

Three flowering seasons in pomegranate under Maharashtra conditions are June-July (Mrig-bahar) coinciding with break of monsoon, September-October (Hasta-bahar) and February-March (Ambe-bahar). Although, Pomegranate may be induced to bear fruits in any of the season, generally, only one bahar is taken from the tree and the season of fruiting to be adopted is mainly determined by the price and availability of irrigation water. The ambe-bahar fruits are available for harvesting from the end of May till August. The mrig-bahar, where fruits developed during rainy season get affected with diseases and pests, which deals to poor quality. The fruits of October flowering that are hasta-bahar is available from March to May, where there are fewer arrivals of other fruits in market.

Production of pomegranate provides employment to people of drought prone region. There is more requirement of labour at time of harvesting, packaging and marketing of pomegranate fruits. The pomegranate grower remains engaged during whole year and there is also an opportunity for full utilization of waste land in arid and semi-arid regions for getting higher income with minimum inputs. This fruit crop occupies an important place in the international trade. It earns foreign exchange. Pomegranate fruit orchard adds the aesthetic value to the environment, purify air and decreases pollution. With the rapid increase in the area under this crop several problems in production and marketing have emerged. Further it is necessary to know the initial cost in

establishing a pomegranate orchard, average cost of production and returns, cost of marketing, marketing pattern and constraints in production and marketing of pomegranate.

Pomegranate has short shelf life and therefore needs of immediate marketing, besides pomegranate cannot be stored for longer period under ordinary conditions, hence it is marketed locally. This results more supply of fruits in market during peak harvesting period, which leads to low prices to the growers. In order to avoid this all its distributions to places away from producing centres storage become imperative and this way regulation and proper distribution of fruits can be attained by storage and transportation. It is felt necessary to investigate the prevailing market system and channels, marketing cost, margins and price spread and other general problem faced by pomegranate growers in production and marketing.

OBJECTIVES

1. To study socio-economic characteristics of the pomegranate growers
2. To estimate cost and return structure in pomegranate cultivation
3. To estimate resource productivity and resource use efficiency in pomegranate production
4. To identify marketing channels and price spread in different marketing channels of pomegranate
5. To identify constraints faced by pomegranate growers

HYPOTHESIS

Pomegranate crop is profitable enterprises.

SCOPE OF STUDY

1) Study will be helpful to extension and economic researchers to study the socio-economic characteristics of pomegranate grower in Solapur District.

2) The analysis of cost of cultivation of pomegranate would help in finalization of minimum prices.
3) Study will be helpful to the pomegranate growers to study price spread.
4) The study also helpful to research worker for conducting further research work.

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

This chapter is devoted to the review of relevant research work carried out by other investigators. Review of literature related to the research topic is a necessary step in the conduct of any specific research. It helps in formulating the frame work of the study, deciding the objectives and methods of approach to the problem and analysing the data collected it also helps to compare the results of such other studies and the reasons for variation, if any. The knowledge of similar research work previously carried out relating to the problem under study is useful and provides guidance to the researcher in approaching the research problem and carrying out the research problem in proper direction. The attempt of research worker to study the literature related to the problem under the study therefore forms an integral part of any systematic research work. The published literature related to the present problem is reviewed in this chapter.

1. Socio-economic characteristics of pomegranate grower.

Dhakane (2005) studied on the effectiveness of grape production under different vine growing conditions. The result of the study revealed that most of grape grower (81.33%) from Barshi tehasil of Solapur district had received formal education. The proportion of respondents who received primary education was largest (46%). This was followed by those who received secondary level of education i.e. 27.34%, Very few respondent (8%) had received higher education however about 18.66% of respondents could not get an opportunity of attending school education.

Mate (2006) conducted study on economics of production and marketing of papaya in Solapur district. He observed that most of papaya growers were in middle age group (46.66%). He noticed that, about (44.44%) with lower education up to 10^{th} standard and having family size of 1 to 5 members (42.22%).

Raut (2006) studied on socio-economic characteristics of orange grower in Aurangabad district of Maharashtra. He had selected 3 tehsils of 2 villages for the study. Thus total 90 orange growers were selected. From study, he concluded that the majorities (53%) of the orange growers were middle aged followed by old aged (30%) and young (16%) with respect to the education, majority 87.78% of orange growers were literate and remaining 12.22% were illiterate.

Ravikumar (2009) studied on production and marketing of pomegranate in Chitradurga district of Karnataka. The present study conducted in Challakere and Hiriyur tahsils of Chitradurga district. Total sample size of 120 farmers was selected. It could be observed that the age of the farmer was found to be 44 years. More than (50%) of farmers dependent mainly on agriculture. Size of family was found to be 7 members in family in both tahsils. The size of holding of farmer was 2.30 and 2.89 hectares and size of pomegranate orchard was 1.58 and 1.47 hectares in Challakere and Hiriyur tehsils, respectively.

Mahakalkar (2010) studied on the socio economic characteristics of farmers in his research work which was entitled Economics of production and marketing of Orange in Nagpur district. In all 90 farmers were selected from Nagpur district for the study. The selected farmers were classified into three groups on the basis of age Orange orchard which was group I (6-10 year old), group II (11-15 year old) and group III. At overall average size of family members were 5 out of which 20 per cent were male, 20 per cent female and 60 per cent children. At overall level 16.67 per cent of farmers were illiterate and rest of them were educated. Highest illiterate farmers were observed in group II. The cropping intensity was 126.14 per cent at overall level.

Ramchandra (2010) studied on socio economic characteristics of farmers in his research work, Production and marketing of Sapota in Northern Karnataka. He revealed that, 90 growers were selected for the present study from four tehsils viz. Kanpur, Belgaum, Hubli and Kalagthagi. The growers were categorized into small, medium and large size of holding. The average

size of holding of was 2.89 ha. in Belgaum and 2.44 ha, in Dharwad. At overall level 17.00 per cent of farmers were illiterate and rest of them were educated.

Kakade *et al.* (2011) studied on effect of socio-economic characteristics on grape wine productivity. Maharashtra has 58 grape winery units of which 32 grape winery units were selected for knowing the effect of socio- economic characteristics on grape wine productivity. Data pertained for the year 2099-10. Arithmetic means, standard deviation, coefficient of variation, correlation and regression analyses were used to draw the inferences. The results revealed that coefficient of variation with respect to interest rate, visit to foreign countries, recruited technical persons, life of firm showed more stability in grape wine production. Correlation coefficient of education level, per day crushing capacity, crushing days showed positive relationship with grape wine productivity. Regression coefficient of education level, experience, per day crushing capacity, training in wine technology and recruited technical persons showed positive effect on grape wine productivity. Thus, there was 89 per cent of variation in wine productivity due to all socioeconomic characteristics together.

Nanda (2011) studied on Adoption behavior of guava (*Psidium guajava* L.) growers in relation to scientific cultivation of guava. An experiment was conducted to study the adoption behaviour of guava growers in relation to scientific cultivation of guava in Nadia district of West Bengal. Fifty guava growers were randomly selected from Saguna gram panchayat under Chakdaha block in Nadia District of west Bengal. This block was selected purposively. To meet the demand, the data were processed by using some statistical tools and the results showed that The causal variables exhibited a more or less consistent behaviour. The variables as ranked according to their consistency was economic status(l6.29%), family size(30.l 1%)family education status (30.96%), age (30.97%), herd size (33.00%),land holding (41.06%),income from agriculture (45.35%) education (49.48%).income from guava (66.16%),

land under guava (72.07%)guava yield (77.4 7%) social participation (78 .68%) respectively.

Shennewad (2011) studied on economics of production and marketing of papaya in Nanded and Parbhani Districts. The results showed that the total number of family member was 6.95 persons consisting 2.29 males, 2.15 females and 2.51 children. The main occupation was agriculture (28.86%). The investment on farm structure and irrigation structure was Rs. 32672.18 and Rs. 70944.46, respectively. Investment on implements and machinery was Rs. 24567.16.

Thorat (2012) studied on economics of production and marketing of ber in Beed district. The results revealed that age of ber growers was 38.66 years and family size was 5.56 persons. In relation to education most of the ber growers (81.25 percent) had education upto high school. Agriculture was the main business of (79.16 percent) of ber growers. It was observed that land holding and area under ber was 2.64 hectares and 0.68 hectare, respectively.

Haral et al. (2013) studied on socio-economic characteristics and cropping pattern of custard apple grower in Maharashtra. The result of the study revealed that all 60 custard apple growers were randomly selected from twelve villages of two tehsils of Aurangabad district for the year 2010-2011. Cross sectional data were collected from custard apple growers with the help of pretested schedule by personal interview method. Regression coefficients with respect to socio-economic characteristics were obtained through linear regression analysis. The mean values of socio-economic characteristics were also estimated in arithmetic form. The result revealed that educational level showed highly significant effect on custard apple productivity with regression coefficient of 4.54 with mean value of educational level was 2.36 scores. In next order, regression coefficient of land holding was also highly significant (1.59) while mean value of land holding was 3.11 hectares. Regression coefficient of milch animal was 3.66 while mean value of milch animal was 2.65 numbers. Age of custard apple grower, family size and investment on

irrigation structure were found non-significant characteristics. Regarding cropping pattern, gross cropped area was 3.11 hectares. It was observed that proportionate share of cereal crops was the highest as 31.51 per cent followed by cash crops (24.43 %), fruit crop (17.04 %), pulse crops (13.51 %) and oilseed crops (13.51 %). The net sown area was 2.59 hectares and double cropped area was 0.52 hectares. Cropping intensity was found to be 120.08 per cent.

Nagesh et al. (2014) studied on entrepreneurial behaviour of pomegranate growing farmers in Bagalkot district of Karnataka. The result was carried out to analyze the pomegranate growers entrepreneurship behaviour. The study revealed that majority of the farmers had medium entrepreneurial behaviour. Further the variables *viz.*, education, land holding, annual family income, mass media participation, extension participation and scientific orientation showed significant relationship, while remaining variables *viz.*, age, occupation and extension contact showed non-significant relationship with entrepreneurial behaviour of pomegranate farmers.

Shivani Gupta (2014) studied on Impact of Economic Development on Status of Women: An Analysis for India. She tried to study how historical perceptions, prejudices and beliefs regarding women in society have led to perpetuation of deprivation and discrimination against the women and in result deteriorating the overall status of women even in today's world. For any economy, growth relates to an increase in per capita income which reflects only "quantitative aspect" Disregard of distributive justice in that economy. Economic development, on the other hand, is not only to the quantitative aspect but also qualitative aspect of distribution of income and income inequity in respect of its distribution among the population and also other socio-economic factors as well, hence it is also referred as a "multi-dimensional concept" including not only increase in per capita income but also improvement in living standards, educational attainment of people, alleviation of poverty, health conditions and nutritional status, status of women and their empowerment etc.

This paper focused on the status of women and their empowerment along the path of economic development in India and suggests some possible channels as also remedial measures that can lead to or help to uplift the status of women.

Rede *et al*. (2017) studied on the Socio-Economic Characteristics of selected Pomegranate growers in Solapur district of Maharashtra. Investigation was carried out during the agricultural year 2014-15. Five blocks namely Sangole, Pandharpur, Malshiras, Mangalvedha and Mohol had been selected from Pomegranate cultivating eleven blocks contained in Solapur district by Simple Random Sampling Without Replacement (SRSWOR). Primary data were collected from hundred fifty Pomegranate growers. The socio-economic characteristics of sample farmers such as family size, age, educational level, occupational pattern, etc., have inordinate influence on the production as well as on the adoption of improved farm practices. The simple tabular analysis was carried out to accomplish the socio-economic characteristics of selected farmers. Family size and its composition is important to get an idea about labour force available for farm operation from the family. It was assumed that most of the age old persons were less dynamic and innovative, since they are rooted in their traditional practices. Educated farmers are early innovators and adopters, whose activities are copied by those with less schooling. Cropping pattern is another vital factor influencing level of expenses on farm and results from farm business.

Dound *et al*. (2018) studied on the socio economic characteristics of pomegranate grower farmers of Solapur district of Maharashtra state. The study was conducted in Sangola, Pandharpur and Mohol tehsil of Solapur district of the Westen region in Maharashtra were selected randomly, because in these tehsils more number of pomegranate producers are linked for economic activity. The data were collected from 144 respondents were selected for the study. While studying profile i.e. social-economic characteristics of Pomegranate Growing Farmers. It was observed (70.13 per cent) members belonged to medium age category. In case of education (33.33 per cent)

members had completed their secondary education. The caste wise distribution of the respondents shows that majority (65.27 per cent) of the respondents belonged to the general category. It is evident that (60.42 per cent) of the respondents were dependent only on agriculture. A majority (69.45 per cent) were obtained medium level of annual income. It was observed that (43.75 per cent) of the respondents had medium social participation and it was revealed that (65.28 per cent) of the respondents were using medium sources of information.

2. Cost and return structure in pomegranate cultivation

Bansode (2001) studied on economics of production of fig in Aurangabad district. Total establishment cost was Rs. 67000/ha. On an average per ha cost of maintenance was Rs. 89000 in which share of cost-A and cost-B was 25.54% and 96.41% respectively. Amortized establishment cost accounted 7.49%. Input-output ratio was 1.98. It was also revealed from the study that per hectare gross return was Rs. 2.6 lakh and net return was Rs. 1.3 lakh.

Khunt *et al.* (2003) studied on the Economics of production of pomegranate in Bhavnagar district of Gujarat. The study revealed that the establishment cost of Pomegranate orchard consisted of labour cost, material cost, rent of land, interest and depreciation charges incurred up to bearing stage of orchard i.e. for the period of 1 to 3 years. The results showed that total cost of establishment per hectare amounted to Rs. 39,586. Among the various cost components, the share of material cost was found highest to the tune of 41.05 per cent followed by labour cost (27.71%), rent of land (24.04 %) and interest on working capital (6.59 %). The share of interest on fixed capital and depreciation was negligible. The total cost incurred per annum was Rs.43, 930 per hectare, which comprised of Rs. 9,592 as amortized cost and Rs. 34,338 as maintenance cost. The average yield per hectare per year was 6,479 kg. This generated the net return of Rs. 15,558 per year.

Mali *et al.* (2003) studied on the Economics of production of banana in Jalgaon district of Western Maharashtra. They concluded that the per hectare

cost of cultivation worked out to Rs. 1, 33,477.36. The proportion of cost 'A', 'B' and cost 'C' to the total cost was 67.40, 71.34 and 88.11 per cent, respectively. Rental value (16.76 %), human labour (8.58 %), manures (9.54 %), fertilizers (12.49 %) and seed material (12.04 %) were observed to be the major items of cost and these together shared nearly 59.41 per cent of the total cost. Interest on working capital (10.39 %) and irrigation cost (7.93 %) were other important items of expenditure and they together contributed 18.32 per cent to the total cost of cultivation. The yield per hectare worked out to 533.14 quintals. Relatively better yield was observed on the fields who grown 'Shrimanti' variety and adopted a better package of practices. The gross returns obtained by the cultivators were to the extent of Rs. 2, 14,867.24/hectares. Hence, per quintal cost of production came to Rs. 250.36. The gross price realized was Rs. 369.44 per quintal and the net price received by the producer was Rs. 341.89 per quintal. The net profit worked out to Rs. 66,761.8/ hectare.

Rai *et al. (*2006) studied on Production and Marketing of Papaya in Chiraigaon Block of District Varanasi (U.P.). The study revealed that average cost of cultivation of papaya in district Varanasi came to Rs. 38369.91 per hectare. It was the lowest with Rs. 34931.59 per hectare on marginal farm, Rs. 38224.66 per hectare on small and highest of Rs. 41540.44 per hectare on large size group of farms. The average return over cost came to Rs. 99323.60 per hectare which was the lowest with Rs. 71068.40 per hectare on marginal farmers, Rs. 92575.34 per hectare on small farms and the highest Rs. 110859.56 per hectare on large farms. Papaya crop gave an average benefit of more than three times from the investment of Rs 1 from all three size group of farms, but large size group of farm fetch Rs. 3.66 as compared to small Rs. 3.42 and marginal Rs. 3.03 on per rupee investment.

Shinde (2007) studied on economics of production and marketing of fig in Maharashtra. For study she selected 60 samples from Aurangabad district and 60 samples from Pune district. From study she analysed that net establishment cost of orchard at overall level worked out to the tune of Rs.

124955. Overall total cost of production per hectare worked out to Rs. 111958.76 with gross return of Rs. 258750.70 and net return of Rs. 146791.94.

Asmatoddin Mohammad et al. (2008) Studied on the Economics of production of papaya in Maharashtra. Papaya (*Carica papaya* L) is not only a source of food but has many uses in industry and medicine. A survey was conducted in Hingoli district of Maharashtra in the year 2004-05 to study economics of production of papaya in Maharashtra. Data were collected from 60 papaya growers. Most of the papaya growers were in middle age group (45.6 per cent) and their main occupation was agriculture. The highest expensive item of expenditure was rental value of land (31.28 per cent) followed by human labour (14.45 per cent), followed by bullock labour (9.04 per cent), interest on working capital (6.85 per cent),irrigation (5.72 per cent) and family labour (5.79 %) the per ha cost of cultivation of cost 'C' was Rs.147787.63.The net profit was Rs.129754.77.Papaya cultivation was profitable venture in the state. Per quintal cost of production of papaya fruit was found to be Rs.140.16.

Naphade et al. (2008) studied the economics of production and marketing of guava in Buldhana districts of Maharashtra, collected primary data from sixty farmers of five tahsils of Buldhana district. The selected guava growers were classified into three groups based on the age of guava orchard. Simple tabular analysis and standard cost concepts were employed to work out cost of cultivation of guava. The per hectare cost of establishment and cost of cultivation were found to be Rs. 34,333 and Rs. 22,502 respectively. The study revealed that the profit was increasing with the age of orchard.

Chaudhary et al. (2009) studied on the Economics of custard apple production in Akola district of Maharashtra. The study revealed that the total cost of establishment of custard apple orchard was worked out to Rs. 39,615 per hectare. In establishment of orchard, highest share of expenditure was on account of material cost (57.78%), followed by labour cost (29.77 %). The overall cost of cultivation of custard apple was worked out to Rs. 24,745 per

hectare, while it was Rs. 24,743 per hectare and Rs. 25,949 per hectare for group-II and III, respectively. This indicated that per hectare cost of cultivation showed increasing trend with age of orchard. In cost of cultivation, highest share of expenditure was on account of human labour (44.81 %), followed by material cost (21.83 %). The average yield obtained was 64.71 quintals per hectare. The highest gross income, net income and input-output ratio was worked out to Rs. 69,352 per hectare, Rs. 43,673 per hectare and 2.67 in group III, respectively. At overall level input-output ratio was 1.92 per hectare.

Ghulghule *et al.* (2009) studied on economics analysis of fig in Maharashtra with a collected data from 120 farm families. The study revealed that at an overall level per ha total cost of production was Rs. 1.11 lakh with gross return of Rs. 2.58 lakh and net return of Rs. 1.46 lakh. Net profit was comparatively more in Aurangabad district than pune district. Output-input ratio for Aurangabad was 2.35 and for Pune district it was 2.27 and at an overall levels it was 2.31. It indicated that fig cultivation was profitable enterprise. At an overall level per quintal cost of production was Rs. 8.63 qtls.

Ravikumar et al. (2009) studied on the investment pattern in pomegranate orchard and to compute the costs and returns in pomegranate cultivation in Chitradurga district revealed that, the cost of establishment per ha was found to be 1,90,888.41 and 1,89,644.33 of which material cost constituted 56.87 and 58.15 per cent and maintenance cost 43.13 and 41.85 per cent in Challakere and Hiriyur taluks respectively. The average per ha maintenance cost incurred by respondents in Challakere taluka was 82,320.70 during the first three years. The financial feasibility analysis revealed that on an average the investment in pomegranate orchards can be recovered within six years in both the taluks. The net present values were positive and of higher magnitude indicating worth whileness of investment. The returns per rupee of investment in these orchards were capable of generating nearly three rupees which was highly profitable venture. The internal rate of return was found to be in the

range of 57-59 per cent which was much higher compared to the cost of capital (9.5 percent) and hence highly profitable.

Jyoti Kachroo *et al*. (2010) worked out the costs and returns in ber cultivation in Jammu district of Jammu and Kashmir State. The study revealed that the per acre total establishment costs of ber were Rs. 9137, Rs. 7700 and Rs. 8441 in the case of marginal, small and medium orchards with an average of Rs. 9123 per acre. Similarly, the per acre returns per year from ber orchards were Rs. 5854, Rs. 4962 and Rs. 5040 for marginal, small and medium orchards with an average of Rs. 5769 per acre.

Sharma *et al.* (2010) studied financial viability of papaya cultivation in Ahmednagar and Solapur district of Maharashtra state at various level of technology adoption. Since commercial cultivation of papaya is limited to one year only, cost and revenues were calculated for one cycle of cultivation (i.e.1 year). Different cost components for manpower, material and revenue were calculated on per hectare basis. Man power cost for low adopters (Rs.40 thousand) was lower than that of high adopter (Rs. 44 thousand) while average requirement of labour was Rs. 42 thousand. Weeding contribute one quarter of total labour cost. High adopters spend 16% more on materials than lower adopters. Average requirement of material was Rs. Thousand. Fertilizer (including manure) contributed about 34% of total material cost. Cost (C2) of Papaya cultivation was Rs. 1.9 lakh low adopters Rs. 2.1 lakh for high adopters and the average cost was Rs. 2 lakh. Revenues generated were also higher in higher adopters (Rs.6.4 lakh) than lower adopter (Rs.5lakh). While average revenues generated were Rs. 5.7 lakh. Since revenues generated were higher than total cost, papaya farmer registered net profit of Rs. 3.1 for low adopters, Rs.4.2 lakh for high adopter and the average profit was Rs.3.7 lakh. Overall B:C ratio was 2.82 while it was 2.65 for low adopters and 2.96 for high adopters. The additional return for higher adopter was Rs.1.1 lakh against the additional expenditure ofRs.25 thousand.

Dhandhalya et al. (2012) studied on the Economic viability of Sapota orchard and marketing constraints of Sapota (*Achrassapota L.*) in Sourashtra region. The study revealed that, the average yield per hectare per annum was about 18261 kg and the annual gross income flow was about Rs.128681 per hectare. The net annual return was realized to Rs. 58777 per hectare. It was found that among the various cost components, rent of land (28.35%) emerge as a major cost at pre-bearing stage, followed by human labour (25.55%) and material cost (24.78%). The value of benefit cost ratio (BCR) was found near to unity (1.04) indicating that the investment is worthwhile but critical. The value of internal rate of return (IRR) was found 10.89 % the payback period (PBP) was found to be 14 years and 4 months.

Haral et al. (2013) studied on Economics of Custard apple production in Maharashtra. The results revealed that per hectare cost of cultivation of Custard apple was Rs.55930.40. Among individual items of expenditure, the share of rental value of land was 37.72 per cent followed by hired human labour (11.93%), amortized cost (11.35%), family human labour (7.78%), fertilizer (6%), manures (4.59%), irrigation (3.96%), machine labour (3.42%) and bullock labour (2.49%). Per hectare gross return and net profit was Rs.127336.52 and Rs.71406.12, respectively. Output-input ratio was 2.27. Per quintal cost of production was found to be Rs.883.29.

Sahana *et al.* (2017) studied on economic and financial feasibility of pomegranate cultivation in Chittradurga district of Karnataka. The establishment cost of pomegranate orchards was accounted was of Rs. 4,44,034 per hectare. The per year per hectare total cost incurred by farmers was of Rs. 3,05,106. The gross return received was of Rs. 5,97,359 per hectare. The net returns per hectare was of Rs. 2,92,253 per year. The per ha net present values of pomegranate cultivation was of Rs. 12,80,134. The benefit cost ratio in pomegranate cultivation was 1.60, at 8 per cent discount rate. The internal rate of return in pomegranate cultivation was 65 per cent. The internal rate of return was higher than the opportunity cost of capital of 8per cent. The study

indicated that pomegranate cultivation is a very profitable enterprise. Hence, this needs to be popularized among farmers by the agricultural extension agencies.

3. Resource productivity and resource use efficiency in pomegranate:-

Shivanand (2002) studied on the performance of banana plantation in North Karnataka revealed that, the input variables included in the production function contributed substantially in the production of banana as indicated by their higher values of coefficient of multiple determinations (R2). The estimated R2 for the study area as a whole was 0.78 as against 0.86 as in both Bellary and Gulbarga and Belgaum districts.

Naikwadi *et al.* (2004) studied on economics of production and marketing of fig in Pune district. Cobb-Douglas type of production function was used to determine level of resource use efficiency for fig crop of small, medium and large farmers of Pune district. They considered the yield in quintals as dependent variable, while human labour (man days), potassic fertilizers (kg), expenditure on plant protection (Rupee) as an independent variables. The analysis revealed that 64.29 per cent of variation in the output was examined by the selected seven explanatory variables. The regression coefficient of nitrogeneous fertilizer was significant at 10 per cent level in I and II size group which indicates that there is a scope for increasing the use of nitrogenous fertilizer.

Rohile *et al*. (2006) studied on to determine the use efficiency in banana (*Musa paradisiaca*) production in Sindhudurg District, Dapoli, Maharashtra, India. The banana growers (n=90) were classified into two groups based on the type of banana orchards, viz. Mixed cropping and sole cropping. Out of 90 growers, 67 growers practiced mixed cropping and 23 growers employed sole cropping. The variation in yield due to various input used in banana cultivation was 99% in both groups. The study found that in mixed cropping, planting material and fertilizers were significant variables, while in sole cropping, planting material, male labour, fertilizers and irrigation charges were

statistically significant. The ratio of marginal value product to FC [fixed costs] of chemical fertilizers in mixed cropping and planting material, female labour and plant protection in sole cropping was less than one, which indicated excess utilization of these resources.

Wagale *et a.l* (2007)studied on An economic analysis of resource use efficiency in Alphonso mango production in Sindhudurg district. The cross-sectional sample of forty farmers each from small (upto 1.00 ha), medium (1.01 to 2.00 ha)and large (above 2.00 ha) mango orchard categories were selected randomly from Vengurla and Deogad Tahsils. The growth retardant users were negligible (12.5%).The per hectare quantity of manures used was 33.33 quintals. The per hectare quantities of N, P_2O_5 and K_2O used were110.34 kg, 38.39 kg and 48.62 kg, respectively. At overall level, the plant protection chemicals i.e. carbamate (1.04 kg) was used on large scale, followed by copper based fungicide (1.02 lit), cyclodine compound (1.01 lit), sulphur based fungicides (0.91 lit)and organophosphate (0.62 lit). The per hectare cost of cultivation (Cost-C) Rs. 43198.00, Rs. 44310.00 and Rs. 48103.00 in small, medium and large size groups, respectively.

Yeware P.P. *et al.* (2009) Studied on the Resource productivity and resource use efficiency in mruga bahar sweet orange production. Investigation was carried out in Nanded district of Maharashtra specially on mruga bahar season of sweet orange. The data pertained to the year 2007-08. The study was conducted to know resource productivity, resource use efficiency and optimum resource use in mruga bahar sweet orange production. Cobb Douglas production function was fitted to the data. The results revealed that the partial regression coefficients of manure (0.126), irrigation (0.124), machine labour (0.048) and hired human labour (0.092) were positive and significant. It revealed that these resources when increased by one per cent each, that led to increase the production of sweet orange by 0.126, 0.124, 0.048 and 0.092 per cent, respectively. With regard to optimum resource use it was observed that optimum use of manure was300.34 quintals followed by irrigation (11823.26

m3), hired human labour (109.65 man days), machine labour (16.95 hours) and potash (125.91 kg).

Landge *et al*. (2010) studied on the Resource productivity and resource use efficiency in flood irrigated banana production. Investigation was carried out during the year 2008-09. About 48 flood irrigated banana growers were randomly selected from eight villages of Ardhapur tehasil of Nanded district in Maharashtra. Cross sectional data were collected from the banana growers with the help of pretested schedule by personal interview method. The study was conducted to know the resource productivity, resource use efficiency and optimum resource use in banana production. Cobb-Douglas production function was fitted to the data. The results revealed that marginal productivity with respect to area, machine labour and bullock labour was 40.410, 2.615 and 1.867 quintals respectively. It inferred that if area is increased by one hectare, machine labour increased by one hour and bullock labour increased by one pair, it would lead to increase banana production by 40.410, 2.615 and 1.867 quintals, respectively.

Thorat et al. (2012) studied on the Resource productivity and resource use efficiency in ber production Beed district of Maharashtra. Investigation was carried out during the year 2010-2011 in order to study resource productivity and resource use efficiency in ber production. The results revealed that regression co-efficient of area (0.521), was highly significant at 1 per cent level. The regression co-efficient of hired human labour (0.156), bullock labour(0.051), manure (0.016), and irrigation (0.047) were highly significant at 5 per cent level. Thus, it was inferred that these resources were underutilized and there was scope to increase them in ber production.

Pawar B.R. et al. (2013) studied on Resource productivity and resource use efficiency in custard apple production. Investigation was carried out during the year 2010-11. 60 custard apple growers were randomly selected from twelve villages of two tehasils of Aurangabad district. Cross sectional data were collected from custard apple growers with the help of pretested schedule

by personal interview method. Data were related to custard apple output as well as inputs like area under custard apple garden, economic life of custard apple garden, human labour, bullock labour, manure, fertilizers and plant protection as resources. Cobb Douglas production function was fitted to the data. The results revealed that, regression co-efficient of economic life of custard apple garden was 0.630 followed by area under custard apple garden (0.194), manure (0.021) and bullock labour (0.015) which were positive and significant at 1 per cent level. Regression co-efficient of hired human labour, nitrogen, phosphorous and potash were positive but non-significant. On the contrary, regression coefficient of plant protection was -0.018 which was negative and significant at 1 per cent level. Marginal product of area under custard apple garden was 15.507 quintals followed by that of economic life of custard apple garden (2.804 q), bullock labour (1.465 q) and manure (0.156 q) and so on. MVP to price of ratio with respect to bullock labour was 11.78 followed by potash (4.09), manure (3.20), nitrogen (2.93), phosphorus (2.71), area under custard apple (1.15), hired human labour (1.22) and economic life of custard apple garden (0.89). Hence, preference might be given to bullock labour on priority basis in custard apple production.

Thingbaijam Laxmi *et al.* (2015) studied on Resource Use Efficiency in Pineapple Cultivation – a Case Study from Manipur, India. The study analysed the resource use efficiency of pineapple (*Ananus comosus*) by using Cobb-Douglas production function with a unique set of 100 randomly selected sample farmers of Manipur district during 2009-10. Farmers could earn net income of 1,73,312.20 ($ 2888.54) ha-1. With a satisfactory benefit-cost ratio of 4.05. The average cost of cultivation was 57303.02 ($955.05) per ha. Small farmers (category-I) were found to have more profit compared to big farmers (Category-II). This could be justified with the higher values of their resource use efficiency in respect of planting material (sucker), plant protection chemical, manure and fertilizers etc. Production function analysis identified expenditure on sucker, manures and fertilizers, plant protection chemicals, labour wage being the major cost components. Marginal value product (MVP)

analysis also collaborated these findings. Judicious use of sucker, plant protection chemicals and manures and fertilizers had been found to have good and positive impact on production and the net return. Use of excess human labour made the farming less remunerative which advocated engagement of labour at optimal level.

Pokharakar *et al.* (2016) studied on conducted to examined resource use pattern, costs and returns in guava. The per hectare cost 'A', cost 'B' and cost 'C at the overall level, worked out to Rs. 48451.10, Rs.81324.33 and Rs.97168.82, respectively. The major items of cost were rental value of Rs.23332.45 (24.12%) and was followed by hired human labour Rs. 19681.84 (20.25%), family human labour Rs.15844.49 (16.30%), manures Rs. 8139.11 (8.38%) and amortized establishment cost Rs. 8105.02 (8.34%). However, the per hectare cost of cultivation in different size groups of holding was Rs. 101657.57, Rs. 99140.86 and Rs.90707.94 in small, medium and large groups, respectively. The present study was based on the primary data collected from 90 randomly selected guava growers from six villages Eight independent variables jointly explained the 70 per cent variation in output at the overall level. The production elasticity of human labour (X1) was significant for small, large and overall level. The production elasticity of bullock labour (X2) for small, medium and manure use per hectare (X3)was non-significant for all three size of group indicating excess use of manure. The factor expenses on nitrogen per hectare (X4) were significant for small, large and overall group indicating positive impact on production of guava.

Nagaraja (2016) studied on Determination of profitability and resource-use efficiency of coconut production in East Godavari district of Andhra Pradesh. The study was attempted to measure and compare the relationship between coconuts out and the various inputs used by coconut growers, elasticity and economic efficiency of resource used in production of coconuts. The study was carried out East Godavari District of Andhra Pradesh, Multistage method was adopted, the forty villages of four mandals viz., P

Gannavaram, Ainavilli, Ambajipeta, Kothapeta mandals of East Godavari District has been selected for the study and the data were collected from 400 coconut growers, sample coconut growers were classified as small and large coconut growers. Primary data were basically used with the aid of structured questionnaires administered on coconuts growers using in multistage sampling techniques. The present study was conducted to analyze the cost, returns and resource use efficiency among the beneficiary coconut growers East Godavari District of Andhra Pradesh.

Hukam Chand *et al.* (2017) studied on Resource use efficiency and marketing analysis of apple crop in Shimla district of Himachal Pradesh. The analysis was based on data collected from 50 households of Shimla district of Himachal Pradesh in 2014 providing a deep insight into the resource use efficiency and marketing channels of apple. Various factors like use of labour, pesticides, FYM, fertilizers and area under apple cultivation were regressed through Cobb-Douglas production function and the results showed that all these factors directly affected apple yield. Input of labour and fertilizers was moderately affecting the apple yield. Increase in the pesticides input and area under apple cultivation by 1 percent augmented the apple yield by 0.552 and 0.438 per cent respectively. Highest share of produce was traded through channel D (60%) followed by channel C (29%) which implies that channel D was more efficient in apple transactions to the consumers.

Iqbal Mudasir et al. (2018) studied on Assessment of resource use efficiency and instability in Ber cultivation in Jammu district. The present investigation was conducted in Jammu district of Jammu and Kashmir state during the year 2008. Two blocks were selected from Jammu district having the highest area under the ber fruit. Cobb Douglus function was used to study the relationship between output and various inputs. The inputs involved in the production of ber cultivation varied significantly at different age groups. The regression coefficient values of selected inputs mainly human labour, manures + fertilizers, plant protection and pruning + training varied significantly at the

six age groups of five years from 5th to 28th year. The coefficient of variation was highest in case of area, whereas it was low in case of yield and net returns.

Sakamma et al. (2018) studied Resource use efficiency and externality associated with banana production in Karnataka, (India)The study was conducted in hilly zones of Karnataka to assess the resource use efficiency and externalities in banana and its competing crop. Cobb-Douglas type of production function (per hectare), was used to assess the resource use efficiency in banana and its competing crops production. Resource use efficiency in banana production was high in case of chemical fertilizer (4.32) followed by sucker (3.25), FYM (2.47) and irrigation (1.93), indicating considerable scope to increase banana production by increasing the level of these inputs. The resources were over utilized in case of competing crops (paddy and ginger). Thus, farmers can reduce the wastage of resources by cultivating banana crop. The externality for resource use in banana and its competing crops was quantified.

4. Marketing channels and price spread in different marketing channels of pomegranate

Singh et al. (2001) identified the three marketing channels in the movement of guava from contractor to consumer. These three marketing channels were contractor to consumer, contractor - wholesaler - retailers - consumer and contractor - retailers - consumers. The maximum quantity (85.78 %) moved through channel - II (in which two intermediaries i.e. wholesaler and retailers were involved) followed by channel III in which only one intermediary i.e. retailer was involved (10.50 %) and the minimum quantity (3.72 %) reached the consumer by channel I in which no intermediary was involved.

Kasar *et al.* (2002) studied Marketing of Pomegranate in Western Maharashtra. The author observed three marketing channels in the study area viz. channel I (Producer →Hundekari→ Commission agent → Wholesaler → Retailer → Consumer), channel II (Producer → Commission agent →

Wholesaler → Retailer → Consumer) and channel III (Producer → Fruit trader → Wholesaler → Retailer → Consumer). The quantity sell through channel I, II and III was 52.75 per cent, 12.50 per cent and 34.75 per cent, respectively. The average cost of marketing in channel I was Rs.512 for Kolkata market and lowest marketing cost was for Surat market i.e. Rs.342. The average cost of marketing in channel II was realized highest in Hyderabad market i.e. Rs.1057 and lowest i.e. Rs.978 in Nagpur market.

Shapoo et al. (2003) studied the Apple trade in Anantnag district of Jammu and Kashmir. They noted that the length of the channel varies from commodity to commodity, depending on the quality to be moved, the form of consumer demand and degree of region specialization in production. The following were the prominent apple marketing channels patronized by growers in Ananthnag district.

Channel A :Producer-forwarding agent-commission agent

wholesaler - retailer-consumer

Channel B :Producer-pre-harvest contractor-commission agent

wholesaler - retailer - consumer.

Channel C :Producer - commission agent - wholesalers at

different point of assembling - retailer - consumer.

Channel D :Producer - processing unit - retailer - consumer.

Wadkar *et al*. (2006) studied on marketing of Alphonso Mango in Ratnagiri and Sindhudurg Districts of Konkan region in Maharashtra State. The study revealed that marketing is as important as production for perishable fruits like mango. The study has been done to estimate market costs, market margins and price spread of mango to determine the producer's share in consumer's price. The marketing system of mango is much unorganized because of the presence large number of intermediaries' mainly private individuals, pre-harvest contractors, commission agents, wholesalers, retailers etc. About 20 percent of the mango growers sold their orchards to pre-harvest

contractors on annual basis or leased them for long periods. Selling mango fruits through wholesaler/commission agent can't be considered as the best practice as producer gets only 40 percent share in consumer's price. The margin to the wholesaler/commission agent and retailer was as high as 20.31 percent and 23.03 percent, respectively.

Gondalia et al. (2007) studied Marketing of Aonla (*Emblica officnalis*) in Gujarat. The present investigation was undertaken in Gujarat with a view to study the disposal pattern, marketing cost and marketing efficiency in Aonla marketing. The results revealed that, the total marketing cost incurred by Aonla growers amounted to Rs. 103.45 per quintal. The total expenses incurred by wholesaler came to Rs. 80.28 per cent per quintal. The net realisation of wholesaler was found to be Rs. 196.39 per quintal. The total expenses incurred by retailers were Rs. 56.64 per quintal. The net realisation of retailers was Rs. 310.94 per quintal. Among the various marketing channels, channel-I (Producers → wholesaler → retailer → consumer) was the most popular among the farmers as about 91 per cent Aonla was marketed through this channel. The gross price received by growers was Rs. 1147.15 per quintal (64.04 % of retail price). In total, marketing costs and marketing margins came to Rs. 240.37 and Rs. 507.33 per quintal respectively. The producer's share in consumer's rupee was 58.26 per cent.

Mali *et al.* (2007) studied on marketing pattern and price spread of ber in Maharashtra. The study reveals that, in ber marketing the bulk of produce was sold through channel 1st and 2nd, the share of the producer in consumer's rupee for Mumbai and pune markets has been estimated and results have been presented. The per quintal price realized was Rs.757 and 744 from channel 1st and 2nd and expenses incurred by the producer where to the extent of 19 and 18% of the price realized; whereas, producer's share in the consumer's rupee was 45 and 50 percent.

Nirgude *et al.* (2007) studied on Marketing of Sapota in Thane district. They observed five marketing channels in the study area i.e. channel I

(Producer → Commission agent → Wholesaler → Retailer → Consumer), channel II (Producer → Wholesaler → Retailer → Consumer), channel III (Producer → Co-operative sangh→ Wholesaler → Retailer → Consumer), channel IV (Producer → Retailer → Consumer) and channel V (Producer → Hawkers → Consumer). At the overall level, the per hectare total quantity of 222.62 quintals was sold through five channels. Out of the total quantity sold, 46.01 quintals was sold through channel II, while, the quantity sold through channel III, channel IV and channel V was 53.31, 11.37 and 10.03 quintals respectively. Channel I ranks first through which 101.88 quintals (45.76 %) produce was marketed. The study also revealed that, the average marketing cost for channel I was Rs.325.20 and channel II and channel III was Rs.122.68 and Rs.208.39 respectively.

Murthy *et al.* (2007) studied on Marketing Losses and Their Impact on Marketing Margins: Banana in Karnataka. The explicit evaluation of the post-harvest losses at different stages of marketing and their impact on farmer's net price, marketing costs, margins and efficiency have been presented. It has been found that the existing methods tend to overstate the farmers' net price and marketing margins of intermediaries. In fact, the margin of the retailers' after taking into account the physical loss during retailing has been found to be negative (loss), which otherwise, was positive (profit) in the conventional estimation. Similarly, the producers' net share and wholesalers' margins also decrease substantially. It has been shown that marketing efficiency is inversely proportionate to the marketing losses. The co-operative marketing has been found to be a more efficient system in terms of both operations and price. Marketing cost has been identified as the major constraint in the wholesale marketing channel and bringing down the costs, particularly the commission charges as demonstrated in the co-operative channel, will help in reducing the price-spread and increasing the producers' margin. The need for specialized transport vehicles for perishable commodities has been highlighted.

Naphade et al. (2008) studied on the Economics of production and marketing of Guava in Buldhana district of Maharashtra. They studied totally three farmers groups on the basis of age of Guava orchard. Group I (0-5 years), Group II (5-10 years) and Group III (10 & above years). The author observed three marketing channels in the study area i.e. channel I (Producer → Wholesaler → Retailer → Consumer), Channel II (Producer → Retailer → Consumer) and channel III (Producer → Consumer). The study revealed that, the marketing cost per quintal of guava for group II was worked out to Rs.92 and group III was Rs.110.94. The overall grading cost, packaging cost, transportation cost and market expenses were Rs.47.5, Rs.4.8, Rs.17.4 and Rs.31.77 respectively. The total overall marketing cost was Rs.101.47 per quintal. The price spread in channel I was Rs.170, channel II Rs.113 and channel III Rs.70.

Kurkute *et al.* (2010) studied on Marketing of Banana in Pune district of Maharashtra. The study revealed that there were two important marketing channels for banana marketing i.e. channel I (Producer → Group sale agency → Commission agent → Wholesaler → Retailer → Consumer) and channel II (Producer → Co-operative marketing society → Commission agent → Wholesaler → Retailer → Consumer). It was observed that, of the total produce marketed, 52.11 per cent was sold through channel II and 47.89 per cent was sold through channel I. The per quintal cost of marketing was 109.02 at overall level. Among the different items of marketing cost, transport (44.73%) and commission charges (40.32%) were the major items of cost in the total marketing cost. Besides, harvesting (0.52%), assembling (5.54%), weighing (0.51%), loading and unloading (3.55%), postage (0.32%) charges and society (0.84%) and market (3.67%) fee were the other items of marketing cost. The highest per quintal marketing cost was noticed in channel I (Rs.117.61) whereas, in channel II, it was Rs.109.83. It was found that, channel II was more important and profitable than channel I, due to less number of intermediaries involved, low marketing cost and maximum sale than channel I

Kumaresh (2013) studied on the price spread, marketing efficiency and constraints in supply chain of mango in Krishnagiri district of Tamil Nadu. Primary data were collected from various stakeholders constituting 240 farmers and 70 intermediaries operating in various levels of supply chain channel. Five supply chain channels were identified based on the varieties i.e., Bangalora, Alphonso, Neelum and Banganapalli which occupied the larger area in the study district. Intermediaries like retailers, wholesalers and pre-harvest contractor or local trader took more profit margin in the channels I, III and IV compared to channel II and V without taking any risk. It could be concluded that channel II and V were found to be beneficial to most of the farmers. The marketing efficiency was much higher in channel II ranging from 4.07 to 7.14 and poor marketing efficiency was found in the channel I and III. From the result it showed that the movement of mango from farmers to consumer at lowest cost consistent in channel II which benefit both farmers and consumer.

Ahire (2015) studied on pomegranate fruit market chain in Dhule district of Maharashtra state. The stratified random sampling method has been adopted for the selection of the villages and sample growers and data analyses have been done. The data analyzed with help of statistical techniques and all other information is represented by charts and graphs. The benefits of pomegranate are based upon the distance between growers and consumers. To gate good returns chain needs to be smaller. There are certain market chains between growers and consumers i.e. pre-harvest contractors. Every market chain gains its own benefits, hence the rate of fruit increase. It has been survey that when growers gets 45 Rs./Kg. rate then it is sold 101Rs./Kg to consumers. It means that for the production cost for of month is 45 Rs, where market chain gains 56 Rs. Additional amount it weighs on growers. To gets good returns growers should have market awareness growers need to sell his fruit in small chain or he should directly reach to the consumers to avoid market chain.

Das *et al* (2016) studied on the raw fruits were marketed domestically and also exported. The measures of marketing efficiency (Shephard: 8.42 and

Acharya : 2.42) have suggested that pineapple cultivation was highly remunerative, but marketing of raw fruits was not done properly (a small number of buyers fixing prices with visual inspection). Therefore, price variations at producers' level are low (CV=8.55%). The producer's share was more than 66 per cent in consumer's price. Out of six marketing channels, two have the complete supply chain mechanism and only one channel is attached contractually with the private processing unit for which information seems to be limited for analysis. The processed products are also exported to the Asian and European countries. The sector has high capacity to provide employment in the rural areas. During lean season, the major demand for pineapple is fulfilled from North-East states, depriving the farmers of West Bengal to take advantage of this sector as reflected in near stagnation of pineapple area (CGR=-1.57%).

Yadav Sharad *et al.* (2018) Studied on Economics of marketing of mango in lukhnow district of Uttar Pradesh. The present study was undertaken to know the growth trend, cost and returns, producer's share in consumer's rupee and problem in marketing of mango, entitled "Economics of marketing of mango in district Lucknow, (U.P.), India". The study has been undertaken in district Lucknow, Uttar Pradesh. Data pertained for the year 2015-16. The present study attempts to examine the marketing aspects of mango in the study area. Examine the marketing aspects of mango in the study area. It included marketing functionaries/agencies, marketing channels, marketing costs and margins and producer's share in the consumers price in mango marketing. The maximum producer's share in consumer's rupee was calculated in channel III i.e. 78.71%. The price spread was in the range from 21.29% to 23.27%.

5. Constraints faced by pomegranate growers:-

Kasar *et al.* (2002) studied on Constraints in marketing of Pomegranate. The problems encountered in marketing of pomegranate by the producers were high transportation cost and non-availability of vehicles in time, damaging of fruits in transport because of overloading of low strength quality of corrugated

boxes, delay in payment and high commission charges in Delhi and Kolkata markets.

Khunt *et al.* (2003) studied on economics of production and marketing of pomegranate in Junagadh. The study revealed that the problem of mite was most severe problem (88.46%) faced by pomegranate growers. About 86% of growers faced the problems of dying young plant. Inadequacy of irrigation water was felt by 80.77% of total growers, 75% of growers faced the problem of poor quality water, short supply of electricity was also felt by 63.46 percent and 23.08 percent growers experienced that prices they received where not remunerative.

Nagesh (2006) studied on pomegranate reported that the major constraints faced by pomegranate growers were; lack of storage facility, high incidence of pests and diseases, non-availability of skilled labour for pruning, expensiveness of pruning operations, costly chemicals and fertilizers and lack of processing units .

Asrey *et al.* (2008) studied on the post-harvest losses in pomegranate were very high i.e. 25 to 30%. The share of middlemen in price paid by consumers found to 50-60 percent. More than 98% fresh produce is utilized for domestic fresh consumption and export. India produces 5 lakh tones fruits annually but export only 5000 tones. India pomegranate remains available round the year and the APEDA together with Maharashtra Government, is setting up an integrated pack house on pomegranate in Baramati. A private corporate house, Sharad-Agro, is also setting a processing unit in Maharashtra.

Maske Mahesh et al. (2011) studied on the constraints in production and marketing of papaya in Raipur District of Chhattisgarh. This study aims to define the critical constraints in production and marketing of papaya in Raipur district of Chhattisgarh. The five villages of Dharshiwa block namely Chandandih, Tendua, Bhatagaon, Datrenga and Kathadih were selected to collect the required information on constraints in production and marketing aspects of these crops. The study is confined to papaya fruit which is second

major fruit in Chhattisgarh state after banana. The growers were classified as small (upto 2 ha.), medium (2.0 to 4 ha.) and large (above 4 ha.) categories. The problem of lack of disease/insect/pest in these fruit crop is felt by about 77percent farmers followed by lack of improved verities in the fruit crop.

Manjula et al. (2011) studied on constraints faced and suggestion given by pomegranate grower in Bijapur district. The present study conducted in the surrounding area of Bijapur district of Karnataka state revealed that the majority of the farmers expressed that bacterial blight has affected the area (88.33%), that the insecticide, fungicide (81.66%) and liquid fertilizers (76.66%) are costly and timely supply of electricity (65%) were the problems coming in the way of production to greater extent. In case of marketing of fruits high transportation cost (78.33%), no guaranteed marketing (65%) and high rate of commission (48.33%) were the greater extent problems faced by the pomegranate farmers. The suggestions given by them are constant monitoring by scientists, supply of blight resistant pomegranate cultivars, evolving short duration cultivars, supply of quality antibiotics to farmers by the state Department of Horticulture and guidance to adopt organic cultivation of pomegranate to ensure good export and local market.

Dhandhlya *et al.* (2012) studied on economic viability of sapota orchard and marketing constraints of sapota (*Achras sapota* L.) in Saurashtra region, the study reveals that farmers were facing the problem of the low market price is the actual problem. The study suggested that there is need to establish organized co-operative marketing system for fruit crops in this region. Therefore, fruits cooperative marketing organization is the need of the day and fruit processing industries may be encouraged in the interest of the sapota producers.

Thorat et al. (2012) studied on Constraints faced by ber growers in production and marketing and suggestions made by them in Beed district. The study was conducted in Kaij and Beed Tahsil of Beed district. From Kaij Tahsil, 6 villages were selected and from Beed Tahsil 6 villages were selected

in which 48 respondents were selected. The findings of the study revealed that fluctuation in market prices was the major problem which was accounted to 87.50 per cent, high commission charges accounted by 83.33 per cent followed by irrigation *i.e.* less water in summer (64.58 %), non-availability of transport facility in time and at cheap rate (54.16 %), non-availability of labour in time and proper wages (52.08 %), high cost FYM and fertilizer (47.91 %), non-availability of good quality packing material (45.83 %). To overcome these constraints, they suggested that transport facility should be made in time and cheap charges, good quality packing material be available at cheap charges, availability of mechanical grading and packing facility, should create export facility forber, pruning should be done in second fortnight of April, need to establish cold storage houses and ancillary industries from preparation of ber products.

Adsul et al. (2013) studied on Constraints and suggestion made by the pomegranate growers for adoption of improved practices for control measures of oily spot disease. The present study was conducted in six tahsils from Latur and Osmanabad district of Marathwada region of Maharashtra. From these 120 farmers were selected on the basis of intensity of disease infestation. The present study was carried out to know the personal and socio-economic characteristics. The important constraints reported by most of the pomegranate growers were supply of input constraints, economical constraints, technological constraints, extension constraints and market constraints.

Jawale (2015) study in his collected primary data from 60 sample kesar mango growers of export zone of Marathwada region, who registered their orchard for export. The data pertained to year 2010-11.The statistical tools frequency and percentage method were used to analysis the data in present study. Effect of heavy rain, wind and hail stone during flowering and fruit setting time. Problem of scarcity of labour with high wage rate, irregular electricity supply were formed the crux of the cultivation problems of growers. This may be partly due to the reason that Kesar mango cultivation was

subsidiary enterprise of the sample farmers and beings perennial crop. Suggestions given by Kesar mango growers in regard to production of Kesar mango were the provision of electricity supply on time, state government should provide margin money at the time of establishment on minimum interest, state department of agriculture should provide the drip irrigation facilities on lower cost.

Anap *et al.* (2016) Studied on the Constraints faced by banana growers in production of banana in Wardha district of Maharashtra. The study aimed at understanding the constraints of banana growers regarding production. The study was conducted in Wardha district in Vidarbha region of Maharashtra state being more concentration of banana cultivation in this district (230 ha). From this district, two tahasil, were purposively selected on the basis of large area under banana production. From these tahasil six villages of banana growers and from each village 15 banana growers were selected for this study. The frequency and percentage of each constraint were worked out to measure the constraint encountered by the respondents. Constraints faced by majority of the respondents were non- availability of electricity in time, losses due to high temperature, fertilizer cost, labour efficiency and other constraints faced by banana growers like lacunae in government policies, subsidies for the banana suckers.

Meena *et al*. (2017) studied on Analysis of Adoption and Constraint Perceived by Mandarin Growers in Jhalawar District of Rajasthan State, India. Nagpur Mandarin (*Citrus reticulata* Blanco.) being grown in large acreage of Jhalawar district. But now, the majority growers get less yield, low quality fruits and irregular fruiting from their orchards. So, the present study was conducted with the objective of studying the extent of adoption and perceived constraints in adoption of recommended mandarin growing practices. Data were collected from three blocks (Pirawa, Bhawani Mandi and Jhalarapatan) of the Jhalawar district of Rajasthan. Total 120 farmers were surveyed for this study. It was found that the extent of adoption was least in case of

recommended insecticides, pesticides and fertilizers ranked at Xth followed by adoption irrigation management practices. Maximum adoption was in case of suitable variety of orange cv. Nagpur mandarin. Least extent of adoption was observed in case of plant protection and fertilizer applications (MPS+16.50). Drip Irrigation management (MPS+17.50) and recommended chemical and fungicide dose with MPS 25.17. The major socioeconomic constraint faced by the respondent farmers was lack of the technical knowledge with a mean score of 11.57 and lack of technical pursuance is very serious constraint by more than 75 per cent of the respondents. Similarly, the high cost of inputs, including machines was perceived as a very serious constraint by the more then 2/3rd of the respondents. Major technological constraints were high incidence of insect-pest with MPS+72.67 followed by disease (MPS+37.52).

Mohit Kumar *et al*. (2017) Studied on the Constraints analysis of mango growers in Saharanpur district of Uttar Pradesh. A study was conducted in Rampur Maniharan Block of district Saharanpur selected purposely. A total number of 100 Mango growers were selected through random sampling from five villages. The structured schedule was developed keeping in view the objectives and variable to be studied. The respondents were contacted personally for data collection. Out of 13 common problems the maximum number of the respondents 95% with adopt a rank of first were agreed with the statements that “Low price for produce” is the common problem, followed by “High cost of chemical fertilizers” 92% at ranks second, “Lack of Education” 91% at rank third, respectively. The maximum number of the respondents 85% with adopt a rank of first were agreed with the statements that “Flexible sources of credit” is the common problem, followed by “Training for Mango grading” 82% at ranks second, “Mango processing unit should establish” 79% at rank third, “Efforts should be made for providing fertilizers on appropriate rate” 78% at rank fourth, respectively.

Kumari Meera (2017) Studied on Estimation of Demand Supply Gap and Major Constraints in Production and Marketing of Major Fruits and

Vegetables in Bihar, India. The paper is attempted to analyse the change in consumption pattern of fruits and vegetables across different socio-economic groups as well as demand and supply projection of major fruits and vegetables up to 2031. Further, constraints associated in production and marketing in the selected districts of state were also assessed. Data of five major round i.e. 38^{th},43^{th},50^{th},95^{th} and 66^{th} pertaining to the periods of 1983-84, 1988, 1993-94, 1999-2000, 2005-06 and 2009-10 respectively, shown a positive growth in annual per capita expenditure on fruits and vegetables and found to be more in urban areas than in rural areas. Results of the study revealed that vegetables have emerged as an essential commodity fetching income elasticity of demand lower than most of non-cereal commodities, while fruits continued to be more elastic. The demand of vegetable would be increase from 12.12 million tonnes in the year 2011 to 17.46 million tonnes in the year 2031, whereas the demand for fruits will be increased from 4.55 million tonnes (2011) to 6.55 million tonnes in the year 2031. This demand could be met by increasing the productivity of vegetables and fruits alone given the limitation of area expansion. The projected supply of major vegetables indicated that Bihar shall be surplus state in vegetable production and remained to be a surplus state in2031. Study also revealed that 90 percent of farmers were facing the problems of inadequate knowledge of market information system, and dis-satisfaction from price of fruits and & major constraints identified for vegetable were unavailability of cold storage facility; lack of processing plant in the state etc. Whereas un-availability of input at right time and right prices were highly significant constraints for production of these crops in the state.

Harjot Singh Sohi et al. (2018) studied on Constraints Faced by Farmers in Adoption of Kinnow Growing in Barnala District. In Punjab, India, Kinnow *(Citrus nobilis × Citrus deliciosa)* area and production has increased profusely in arid irrigated and sub-mountainous zones. With all viable environmental conditions present in district Barnala farmers still faced some constraints in Kinnow cultivation. Major constraints in Kinnow plantation: die-back, yield, quality, planting material, technical guidance, socio-cultural, post-harvest

management. Present study was conducted with the objective to extent in adoption and perceived constraints in Kinnow cultivation. The constraints as perceived by the respondents were measured by the scores on the basis of magnitude of the problems.

Rede et al. (2018) studied on Marketing and Constraints Analysis of Pomegranate in Solapur District of Maharashtra. According to results 14 constraints have been reported by the pomegranate growers. The results reveals that majority of the farmers have opined that they are not getting remunerative price for the produce hence, it ranks first with the highest Garrett score 83.48 followed by fruit auction which is not transparent, higher transportation costs when fruits are sold outside the local area, high commission charges, lack of market information and low price paid to farmers accounting second, third, fourth, fifth and sixth position with Garrett scores 74.25, 69.17, 62.02, 58.60 and 55.55 respectively. Transport facility, lack of storage facility, fluctuations in market price etc., were some of the constraints also reported by the pomegranate growers in the study area.

METHODOLOGY

CHAPTER-III

METHODOLOGY

The object of any scientific investigation is to draw the useful conclusion in the light of objective of study. It is essential to the investigator to adopt appropriate method and procedure, keeping this in view, this chapter has denoted to explain the methodology adopted to fulfil the objective of study. The present investigation is undertaken to study the "Economics of Production and Marketing of Pomegranate in Solapur district". This chapter deals with the procedure used for the selection of method of data collection, source of data and analytical procedure used to draw inference.

3.1 Salient features of Solapur District

Salient features consists with location, soils, climate, population, cropping pattern and pomegranate cultivation practices in Solapur district.

3.1.1 Location

The Solapur district lies between $17^0 10'$ and $18^0 32'$ North latitude and $74^0 42'$ and $76^0 75'$ East latitudes. Total geographical area of Solapur district is 15,021 sq.km. Total population of Solapur district is 43,15,527. Solapur is connected by Pune- Hydrabad national highay no.9.The major railway junction in Solapur district is Kurduwadi. Solapur has the district Ahmednagar to the North, to the East Osmanabad and to the South Bijapur district of Karnataka state, Sangli, Satara and Pune are West side neighbor.

3.1.2 Soil

The soil of the Solapur district is mainly black cotton. The fertility of the soil increases near the river Bhima. The most of the area of district has covered with sandy loam slightly blackish coloured soil. The Balaghat mountains ranks flank the district on the North-East side, whereas to the South-West part of district stands the Mahadev hills. The rest of the district is flatland and plateau. The soil of the Solapur district is favourable for arid fruit crops like ber, pomegranate, custard apple and grape.

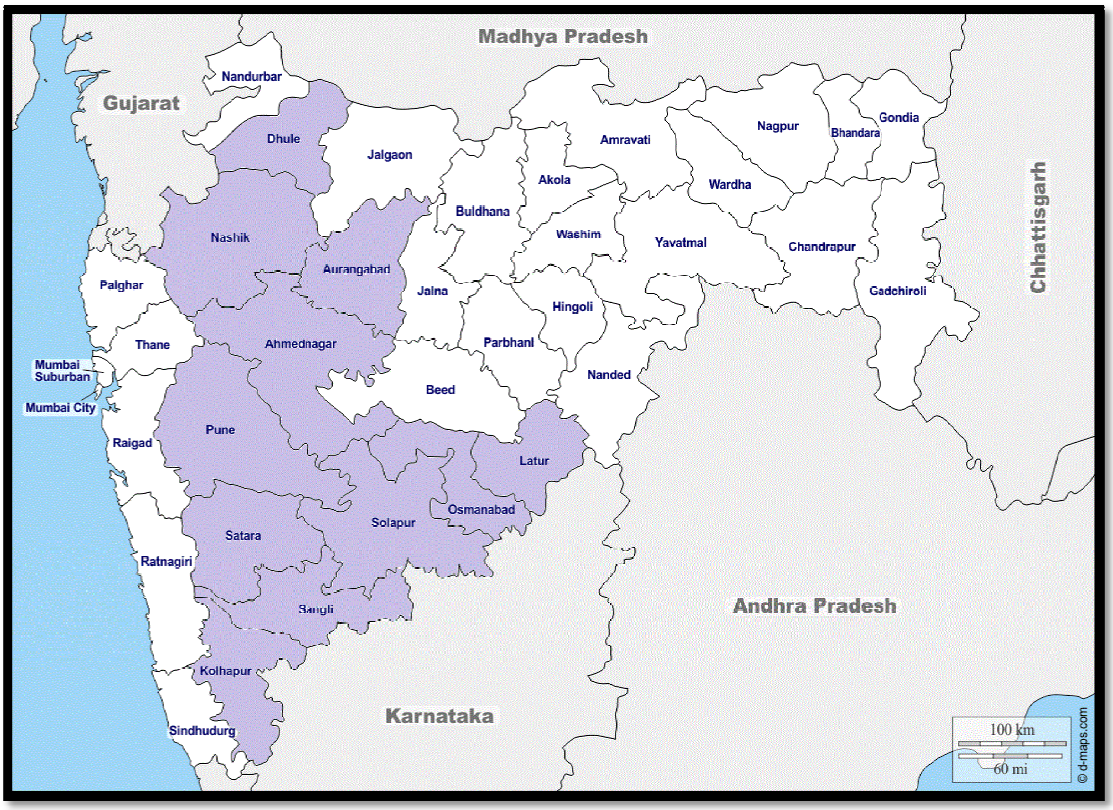

Fig.3.1 Pomegranate producing districts in Maharashtra

3.1.3 Climate

The climate of Solapur is hot and arid. The maximum temperature of district in summer touches 40-42 degree Celcius , it is known as drought prone or semi-arid region. *Bhima* is the most important river in Solapur district. It flows the North-East towards the South-West and covering a length about 290 km. *Bhima* is known by the name of '*Chandrabhaga*' in Pandharpur. A big dam has been built in 1980 on the river *Bhima* at *Ujani* on the border of Pune and Solapur districts.

3.1.4 Population

According to the Indian census in 2011, the Solapur district had a population of 43,15,527. It would seem from this study that the male population was slightly higher than the female population. Females constitute 49 percent (49%) and males 51 percent (51%). The literacy rate on average in Solapur is an incredible 71.2 percent (71.2%), 7.5 percent (7.5%) higher than

the national average of 59.5 percent (59.5%). Again males seem to dominate the percentage in this area with male literacy at 82% and females at 65 percent (65%).

3.1.5 Cropping Pattern

In Solapur district according to land utilization pattern 2016-17, cropping intensity was found to be 108%. The district leads in cultivation of cash crops like sugarcane and arid fruit crops. In *kharif* bajara, jawar, maize and some vegetable crops are grown while in *rabi,* jawar, wheat, gram and other vegetables are grown. In summer, vegetables like tomato, cucumber and watermelon are grown. While regarding perennial crop sugarcane is grown where irrigation of *Bhima* river is available. Arid fruit crop like pomegranate, ber and also grape is grown on wide area of district.

3.2 Selection of district

In the first stage, Solapur district was purposively selected for the study purpose because this district is having highest area under the pomegranate crop.

3.2.1 Sampling design:

Multistage sampling design was adopted for present study. In the first stage, Solapur district was selected purposively on the basis of area under pomegranate. In the second stage two tehsils were selected viz., Pandharpur and Sangola. In the third stage six villages from each tehsil were selected purposively thus twelve villages from two tehsils were selected. In fourth stage, eight pomegranate growers from each village were selected randomly. Thus from twelve villages ninety six pomegranate growers were selected for the present study. The data was collected from cultivars with the help of pre-tested schedule through personal interview method.

3.3 Analytical techniques

The statistical tools like tabular analysis, functional analysis, frequency and percentage analysis were employed to analyze the data for achieving the objectives of study.

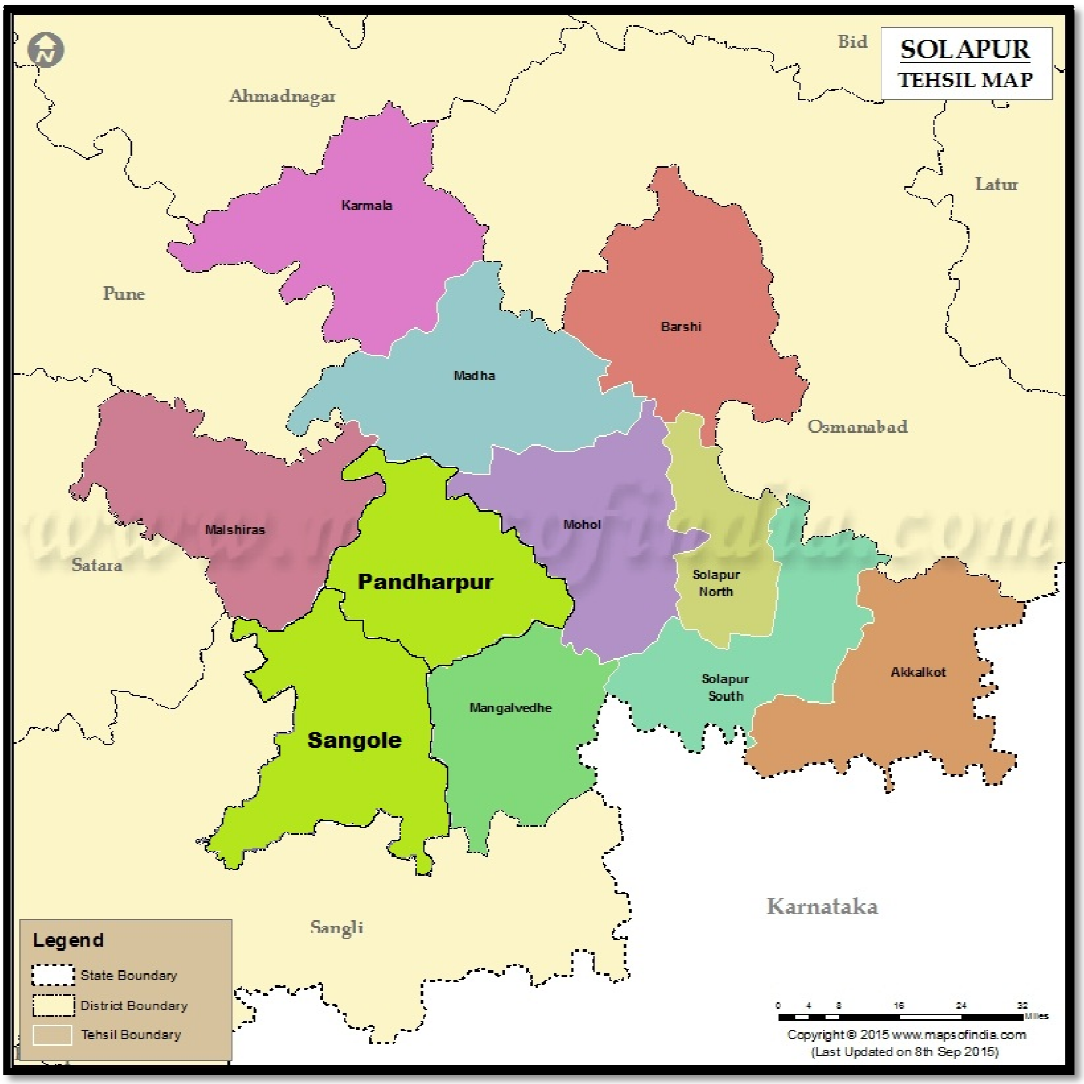

Fig. 3.2 Selected study area of Pomegranate in Solapur district

3.3.1. Tabular analysis

The first objective, that is to study socio-economic characteristics of pomegranate growers, was achieved by simple tabular analysis using average, percentage, etc.

3.3.2. Cost and Returns

The second objective, that is to study cost and returns of pomegranate production was achieved by using standard cost concepts i.e. cost 'A', cost 'B' and cost 'C'.

3.3.3 Establishment cost and its Amortization of Pomegranate crop

Amortized cost was taken into consideration as this crop has establishment cost. Calculation of per year installment of loan amount taken for establishment cost, amortized even repayment plan was applied. This method is also called as 'equal annual instalment method'. In this method the interest part decline gradually while the principal portion increases continuously. This method is mostly adopted for term loans. The term of loan was consider five years and interest was taken as 12 per cent. The formula used to work out amortized cost was as follows,

$$I = B \frac{i}{1 - (1+i)^{-n}}$$

Where, I= Annual installment in

B= Principal amount in

i = Annual interest rate

n = Loan period

3.4. Resource use efficiency

The third objective, that is to estimates resource use efficiency in pomegranate production was achieved by application of Cobbs -Douglas production function. The Cobbs -Douglas type of production was fitted goodness of fit (R^2).

The Cobb-Douglas type of Production Function was used and is usually defined as follows.

$$Y = a X_1^{b1} X_2^{b2} X_3^{b3} \text{----------} X_n^{bn} e^{u} \quad \text{……. (1)}$$

Where,

Y = Output of pomegranate crop including main produce and by produce (q/ha).

a = Intercept.

X_1, X_2, X_3,----------X_n = Different variables used or independent variables.

e_u = Error term.

b_n = regression coefficient of the respective resource variables.

The function given in equation (1) can be expressed as,

$$\text{Log } \hat{Y} = \text{Log } a + b_1 \text{ Log } X_1 + b_2 \text{ Log } X_2 \ldots . b_n \text{ Log } X_n + u \log e \ldots . (2)$$

For fitting the production function to pomegranate crop, seven input variables were considered as important factors by considering the problem of multicollinearity in estimating production function. Multicollinearity refers to situation where because of storing interrelationship among the independent variables, it becomes difficult to disentangle their separate effects on the dependent variables. Some of the independent variables are not important just because the standard errors are high. It might be due to the presence of multicollinearity. The variable hired labour and family labour are taken together and termed as labour as separate family labours were not giving the effect of resource.

The main consequences of multicollinearity are (a) the sampling variances of the estimate coefficients increase as the degree of collinearity increase between the explanatory variables, (b) estimated coefficients may become very sensitive to small changes in some of the estimates of the coefficients. This result in non-significance of regression coefficients. Sometimes it is happening that more of the regression coefficients are significant but the value of R^2 is very high.

The equation fitted was of the following formula.

$$\hat{Y} = a.X_1^{b1}.\ X_2^{b2}.\ X_3^{b3}.\ X_4^{b4}.\ X_5^{b5}.\ X_6^{b6}.X_7^{b7}.\ e^u$$

Where,

Y = Yield of the crop in tonne per hectare

a = Intercept of production function

bi = Partial regression coefficients of the respective resource variable

(i= 1,2,3..,7)

X_1 = Plants per ha

X_2 = Human labour (Hired and family labour) in man day per farm

X_3 = Machine labour in hours

X_4 = Manures in tonnes

X_5 = Fertilizer per ha

X_6 = Plant protection in litre

X_7 = Irrigation m^3

eu = Error term

i. Elasticity of production (EP)

The elasticity of the respective variables are equal to the regression coefficient of the resource in Cobb-Douglas production function.

The elasticity of production can be calculated as follows.

$$EP = \{b_a X^{b-1}\} \frac{X}{Y} = b \frac{(aX^b)}{X} . \frac{X}{Y} = \frac{bY}{X} . \frac{X}{Y} = b$$

ii. Testing of regression coefficient

Partial regression coefficients are tested for significance by applying "t" test at n-k-1 degrees of freedom as under:

$$t_{(n-k-1)} = \frac{bi}{SE\ (bi)}$$

Where,

bi = Partial regression coefficient of particular variable

SE = Standard error of bi

n = No. of observations

k = Dependent variables

iii. Marginal product (MP)

Cobb-Douglas production function allows either constant, increasing or decreasing marginal productivity. In other words, resource productivity refers to marginal product with respect to added unit of input. The marginal product equation is as:

$$MP = \frac{dY}{dX} = biaX^{b-1} = \frac{biaX^{b}}{X} = b\ \frac{Y}{X}$$

Where,

bi = Elasticity of production

Y = Geometric mean of output and

X = Geometric mean of respective input

iv. Marginal value product (MVP)

It refers to the product of MP and P_y, where MP is marginal productivity and P_y is the price of pomegranate per tonne. The MVP with respect to input factor is worked out by the following formulae

$$MVP = bi\ \frac{Y}{X} . P_y$$

Where,

bi = Partial regression coefficient of particular independent variable

$\overline{Y}$ = Geometric mean of particular independent variable

$\overline{X}$ = Geometric mean of dependent variable

P_y = Price of dependent variable

3.5. Price spread in different marketing channels

Marketing cost and marketing margin were worked out by actual data collection from selected pomegranate growers and marketing agencies for the present study.

Price spread of the produce shows the difference between the net price received by the producer in the assembling market and price paid by ultimate consumer to produce in the retail market. It includes all the market charges incurred by the producer, wholesaler and retailer as well as profit margin at wholesaler and retailer.

3.5.1 Marketing cost and market margin

Market cost and market margin were worked out from actual data collected from market intermediaries. Marketing cost incurred by producer was estimated from the data collected from selected cultivars for the present study.

3.6 Terms and concept used

3.6.1 Cost concept

In present study the cost of cultivation was worked out by using the standard cost concept of cost-A, cost-B and cost-C.

Cost-'A': It includes the items of cost like hired human labour, bullock labour, machine labour, seed, manure, fertilizer, plant protection, irrigation, land revenue, incidental expenditure, interest on working capital and depreciation on commonly used assets.

Cost-'B': It includes cost-A plus interest on fixed capital and rental value of land.

Cost-'C': It includes cost-B plus imputed value of family human labour.

3.6.2. Marketing and price spread

Market is the any place where person carry on extension transactions of pomegranate produce in Solapur market.

2. Marketing cost

Marketing costs are the actual expenses incurred in bringing goods and services from producer to consumer. It is the total cost incurred by the different intermediaries in marketing of pomegranate.

3. Market margin

Marketing margin is the actual amount or net profit received by the different marketing agencies in the marketing process.

Wholesaler market margin = Selling price of wholesaler – (Purchasing price of wholesaler + Cost incurred by wholesaler)

4. Price spread

It refers to the difference between price paid by the mill owner and price received by the producer.

Price spread = Marketing cost + Market margin

Producers share in consumer's rupee:

It is the ratio of net price received by producer to the price paid by consumer and can be calculated as follows,

$$Ps = \frac{\text{Net price received by the producer}}{\text{Price paid by the consumer}} \times 100$$

Where, PS = Producer's share in consumer's rupee

Marketing channel

The path or route followed by the commodity which connects the producer with the final consumer is known as marketing channel.

1. Wholesaler

He is intermediary working as commission agent-cum-wholesaler in the marketing of pomegranate. He charges a specific rate of commission.

2. Retailer

Retailer sells the pomegranate fruits directly to the consumer in the market. They purchase the produce either from trader or commission agent and sell it to consumers.

3. Pre-harvest contractor

He performs the function of purchase of pomegranate orchard of farmer on the farm of farmer. Then he has done the activity of collection of fruits from trees of the orchard. He also performs all activities of marketing like grading, packaging, transport and sale of pomegranate fruits.

3.4.3 Measurement and evaluation of input costs

1. Human labour

It includes both hired and family labour. Most of the labour force engaged in crop production comes from hired human labour. However, some labour force engaged in crop production comes from cultivators own family.

Hired human labour was measured in man days. One man day consist of 8 hours. Labour cost was evaluated at the rate of Rs. 300 per day per male and Rs. 150 per day per female. The female labour was converted in to man day by multiplying to number of female with 0.50.

2. Bullock labour

Hired bullock pair charges were considered for 8 hours as a day, actually paid in the study area. Family bullock labour charges accounted equal to the charges paid to the hired bullock pair. For the present study, hired bullock charge was ` 500 per day for a bullock pair.

3. Machine labour

In case of hired machine labour the prevailing rate of machine labour in the village was considered. Mostly machine labour is to be hired and charges on account of owned machine labour were accounted on the basis of charges

paid to hired machine labour. A machine charges for present study was ` 400 per hour.

4. Plants or seedlings

Home growned plants or seedlings have been valued at prevailing market rates of the study area. In case of purchased plants or seedlings actual paid values were taken for evaluating the seedling cost. The rate prevailing in the market for pomegranate plants or seedlings was ` 15/plant.

5. Fertilizers

Fertilizers in the form of urea, 18:18:10, SSP, MOP, DAP (18:46:00), 10:26:26 were used and quantity of nitrogen, phosphorus and potash was calculated in order to determine the expenditure on nitrogen, phosphorus and potash. The rate prevailing in the market for nitrogen, phosphorus and potash was ` 13.04, ` 49.66/kg and ` 26.66/kg, respectively.

6. Manure

Manure produced on the own farm was evaluated at the rate of prevailed in the village. The cost of purchased manure was accounted according to the price paid by cultivator. One cartload (CL) of manure was considering as quintals and its prevailing price was ` 150/q.

7. Plant protection

This includes the actual cost incurred on purchase of insecticides, pesticides, fungicides and their procurement.

8. Land revenue and taxes

It includes land revenue and other relevant taxes which were actually paid by the pomegranate growers for crop area.

9. Incidental expenditure

It includes minor repairs, refreshing charges and other expenditure in regard to pomegranate growers.

10. Interest on working capital

Interest on working capital was charged @ of 13 per cent on items of expenditure as hired human labour, bullock labour, machine labour, plants or seedlings, fertilizers, manure, plant protection, irrigation charge and land revenue for crop duration.

11. Depreciation of asset

Depreciation means the decrease in the value of asset through were and tear. Straight-line method was used for cultivating depreciation. The uniform rate of 10 per cent on the present value at the beginning of the year of farm implements and machinery was taken and only the proportionate charges was taken for the crop on hectare basis.

12. Rental value of land

Rental value of owned land was estimated at $1/6^{th}$ of the value of gross produce i.e. $1/6^{th}$ value of gross return minus land revenue.

Rental value of land= 1/6 (gross return)-land revenue

13. Interest on fixed capital

It was calculated by charging interest @ of 12 per cent on investment on commonly used assets like wooden plough, iron implements, equipment's and which distributed on cropped area .Commonly used assets includes plough, harrow, seed drill, hoe, bullock cart, hand sprayer, duster, machine sprayer and power sprayer.

3.4.4 Measures of income:

Following production business analysis has been carried out by using different measures at income as under.

1. Gross income.

The value of produce was calculated at prevailing price in the area.

2. Farm business income.

The difference between the gross income and cost- A represents farm business income of the producer (Gross returns – Cost 'A').

3. Family labour income.

The profit on cost- B, that is difference between the gross income and cost-B represents the income of the cultivator and accounts at his own and family labour used in particular crop (Gross returns – Cost 'B').

4. Net income:

The profit on cost-C that is the net profit from particular crop (Gross returns – Cost C).

5. Output-input ratio:

It is ratio of output (gross income) to input (cost-C).

RESULTS AND DISCUSSION

CHAPTER –IV

RESULTS AND DISCUSSION

Present investigation is intended to study the cost of production and marketing of pomegranate in Solapur district. Data regarding cost of production and marketing of pomegranate has collected by personal interview method. The data collected have processed, tabulated, analyzed and discussed with view to draw valid conclusions, it also gives implications for future policy and research. In accordance with the specific objectives the chapter is arranged in five sections.

1. Socio-economic characteristics of pomegranate grower
2. Cost and returns in pomegranate production
3. Estimation of resource productivity and resource use efficiency in pomegranate production
4. Identification of marketing channels and estimation of price spread in pomegranate marketing
5. Identification of constraints faced by pomegranate growers

4.1 Socio-economic characteristics of pomegranate grower

Socio-economic characteristics and cropping pattern of pomegranate grower are important in economics of production of pomegranate, it include age, educational level, family size, occupational level, land holding, pomegranate orchard size, and other livestock. These determinants are important in farming business because, these are influencing the gross income of the farm.

4.1.1 Socio-economic characteristics of growers

Socio-economic characteristics such as age of pomegranate growers, education level, family size, occupation level, land holding and livestock of the selected samples were studied and presented in Table 4.1.The result revealed that in case of age, the middle age farmers (31 to 50) were 61.46 per cent then the young (up to 30) which were 2.08 per cent and old age group growers

Table 4.1 Socio-economic characteristics of Pomegranate grower

Sr. No.	Particulars	Pomegranate orchard	
		No.	Percentage
1	**Age (year)**		
	i) Young (<30)	2	02.08
	ii) Middle (31-50)	59	61.46
	iii) Old (>50)	35	36.46
2	**Education level (score)**		
	i) Illiterate	13	13.54
	ii) Primary & High School	48	50.00
	iii) Higher secondary & Above	35	36.46
3	**Family size (No.)**		
	i) Small(<3)	8	08.33
	ii) Medium(4- 6)	57	59.37
	iii) Large (> 6)	31	32.30
4	**Occupational level (score)**		
	i) Agriculture	91	94.80
	ii) Industry	00	00.00
	iii) Service	5	05.20
5	**Land holding (ha)**		
	i) Small (<2)	58	60.42
	ii) Medium(2-4)	36	37.50
	iii) Large(>4)	2	02.08
6	**Pomegranate orchard size (ha)**		
	i) Up to 0.4	17	17.71
	ii) 0.4 to 1	62	64.58
	iii) More than 1.1	17	17.71
7	**Livestock (no)**		
	i) Up to 3	24	25.00
	ii) 3 to 6	57	59.37
	iii) More than 6	15	15.63

above (51) were 36.46 per cent, With respect to educational level of sample growers, only 13.54 per cent growers were illiterate, 50.00 per cent growers were educated up to primary and high school level, 36.46 per cent growers were educated up to higher secondary and college level. The family size of the growers was divided into three categories on the basis of members in family. About 8.33 per cent of pomegranate growers belonged to family size which was ranging from 1 to 3 members in a family followed by 59.37 per cent who belonged to medium family size ranging from 4-6 members and 32.30 per cent growers belonged to large family size ranging more than 6 members. In respect of occupational level,94.80 per cent growers belonged to agriculture, 5.20 per cent belong to service and no one having industry. In case of operational land holding, small group ranging up to 2 ha were 60.42 per cent, medium group ranging from two hectares to four hectares (2 to 4 ha) were 37.50 per cent and 2.08 per cent growers had more than four hectares of land. In case of land having pomegranate orchard size,17.71 per cent growers had up to 0.4 ha orchard size,64.58 per cent growers had 0.4 to 1 ha orchard size and 17.71 per cent had more than 1 ha orchard size. In case of no. of livestock, 25 per cent growers had up to 3 livestock,59.37 per cent growers had 3 to 5 livestock and 15.63 per cent growers had more than 6 livestock.

4.1.2 Cropping pattern of pomegranate growers

Cropping pattern of pomegranate growers in the study area during *Kharif*, *Rabi* and *Summer* seasons and some perennial and annual crops were studied and presented in Table 4.2.The results revealed that, the gross cropped area was 3.28 hectares. In *Kharif* season, highest area was seen under Jowar crop followed by Maize, Bajara and vegetables which was 9.45 per cent, 8.84 per cent, 3.35 per cent and 2.13 to the gross cropped area, respectively. There was a two major crops in *Rabi* season, rabi jowar and Wheat followed by gram and vegetables which was 6.40 per cent, 6.40 per cent, 5.79 per cent and 3.04 per cent to gross cropped area, respectively. In summer season, maximum area under summer Maize which had 7.62 per cent followed by Groundnut and

Table 4.2 Cropping pattern of Pomegranate growers

	Particulars	Area (ha)	Per cent
1	***Kharif***		
	i) Maize	00.29	08.84
	ii) Bajara	00.11	03.35
	iii) Jowar	00.31	09.45
	iv) Vegetables	00.07	02.13
	Sub total	**00.78**	**23.77**
2	***Rabi***		
	i) Gram	00.19	05.79
	ii) R. Jowar	00.21	06.40
	iii) Vegetables	00.10	03.05
	iv) Wheat	00.21	06.40
	Sub total	**00.71**	**21.64**
3	***Summer***		
	i) Groundnut	00.14	04.27
	ii) S. Maize	00.25	07.62
	iii) Vegetable	00.09	02.74
	Sub total	**00.48**	**14.63**
4	***Perennial***		
	i) Pomegranate	00.82	25.00
	Sub total	**00.82**	**25.00**
5	***Annual***		
	i) Sugarcane	00.49	14.94
	Sub total	**00.49**	**14.94**
6	**Gross cropped area**	**03.28**	**100.00**
7	**Net cultivated area**	**02.09**	**63.72**
8	**Double cropped area**	**01.19**	**36.28**
9	**Cropping intensity %**	**-**	**156.93**

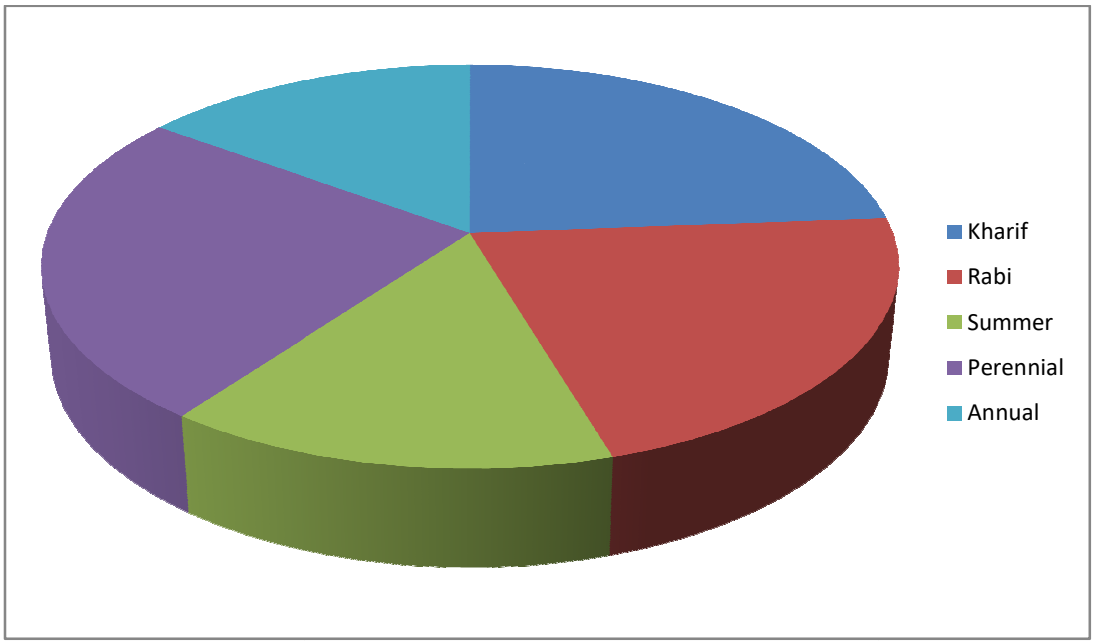

Fig. 4.1 Share of seasonal crops on Pomegranate orchard to gross crop area (3.28 ha)

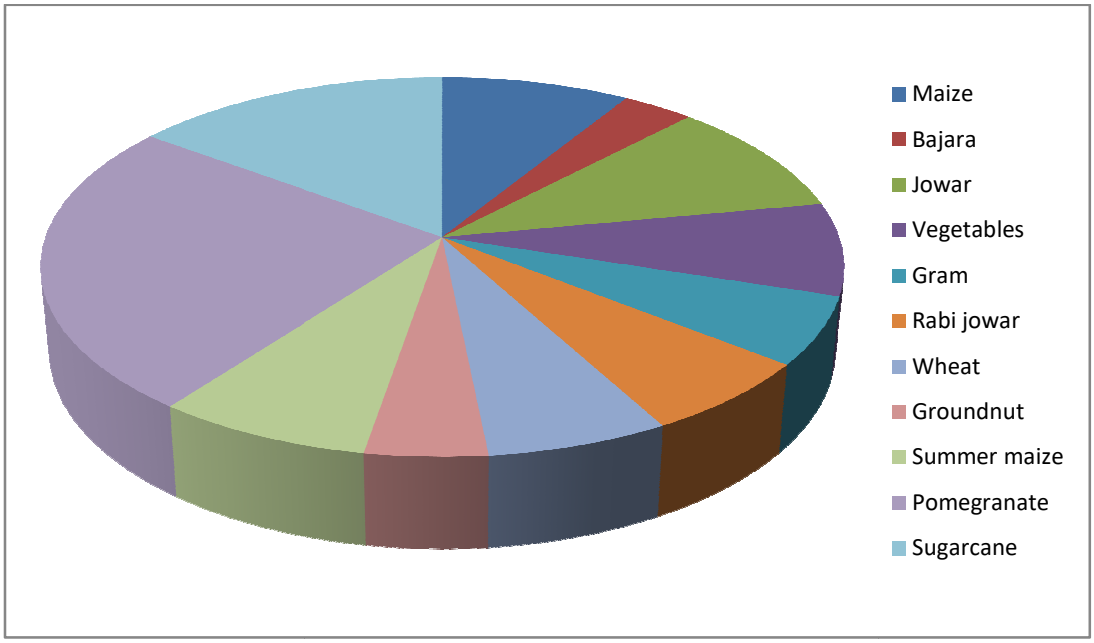

Fig. 4.2 Share of cropping pattern of Pomegranate grower (Gross cropped area 3.28 ha.)

vegetables which was 4.26 per cent, 2.74 per cent respectively. There was an one perennial crop had area under pomegranate was 25 per cent and one annual crop was sugarcane had area 14.94 per cent. The cropping intensity was 164.68 per cent share of seasonal crops on farms of pomegranate growers was estimated and is also presented in table 4.2. The results revealed that, the share of Kharif crops was (23.77 per cent) followed by Rabi crops (21.64 per cent), summer crops (14.63 per cent), annual crop (14.96 per cent) and perennial crop (25.00 per cent) to the total gross cropped area i.e. 3.28 hectares (100 per cent).Per cent share of net cultivated area and double cropped area on pomegranate growers was estimated and is presented in table 4.2. The results revealed that, the share of net cultivated area was 63.72 per cent and double cropped area was 36.28 per cent to the gross cropped area i.e. 3.28 hectares (100 per cent).

4.2 Costs and returns structure in pomegranate cultivation

The per hectare physical inputs were calculated and there physical inputs were converted into monetary term to determine the cost of cultivation per hectare. Thus with the help of costs, returns and profitability of pomegranate production was determined as follows.

Initially per hectare establishment cost of pomegranate orchard was calculated and amortized even repayment plan was applied to workout per year installment of loan amount, such estimated amortized cost is considered in cost and return structure.

4.2.1 Per ha establishment Cost of pomegranate

Per ha establishment cost of first and second year of pomegranate were calculated and are presented in Table 4.3. It is observed from the table that, average total establishment cost of pomegranate cultivation in the first and second year was ` 160127.08 in the study area. Among the all expenditure of inputs, rental value of land was maximum i.e. 47.64 per cent followed by human labour (11.27 per cent), planting (10.02 per cent), depreciation on

commonly used assets (7.11 per cent), investment on working capital (6.90 per cent), fertilizers (5.60), manures (4.83 per cent), interest on fixed capital (3.68), machine power (1.24), irrigation (1.21 per cent), bullock pair/labour (0.37), land revenue (0.12 per cent). The result also revealed that, cost incurred on hired human labour was ` 18050.68 per hectare likewise cost incurred of use of bullock pair/labour was ` 590.70 per hectare, cost incurred on use of machine power was 1977.89, cost incurred on use of manures was ` 7734.85 cost incurred on use of fertilizer was ` 8977.70, cost incurred on use of planting was ` 16039.07, cost incurred on use of irrigation was ` 1931.11, cost incurred on use of family labour was ` 6793.64, cost incurred of land revenue was ` 199.62. It is also observed from table that, in two years, interest on working capital @13 % was ` 11048, depreciation on commonly used assets@10% was 11397.02 and interest on fixed capital @12% was 5888.42.

Table 4.3 Per ha establishment Cost of pomegranate

Sr. no	Particulars	First and second Year	Percent
1	Human labour	18050.68	11.27
2	Bullock pair/labour	590.70	00.37
3	Machine power	1977.89	01.24
4	Manure	7734.85	04.83
5	Fertilizers	8977.70	05.60
6	Planting	16039.07	10.02
7	Irrigation	1931.11	01.21
8	Land revenue	199.62	00.12
9	Interest on working capital@13%	11048.00	06.90

10	Depreciation on assets@10%	11397.02	07.11
11	Rental value of land	76292.02	47.64
12	Interest on fixed capital@12%	5888.42	03.68
13	**Total cost**	**160127.08**	**100.00**

4.2.2 Per hectare physical input and output of pomegranate orchard

Per hectare physical inputs and output of pomegranate were calculated and are presented in Table 4.4. Results revealed that, use of hired human labour and the family human labour was 64.37 man days and 23.12 man days, respectively. Use of bullock labour was 1.19 pair days while the use of machine labour was 3.26 hours. In case of fertilizers, use of phosphorus was 220.25 kg followed by 215.23 kg of potassium then 95.10 kg of nitrogen. 101.61quintals of manure was used while 8.47 liters of plant protection was used to control pest and diseases on pomegranate. By using the mentioned physical inputs the yield of pomegranate orchard was 10.10 t.

Table 4.4 Per hectare physical inputs and output of pomegranate cultivation

Particulars	Unit	Quantity
1. Hired human labour	man day	64.37
2. Bullock labour/pair	pair day	1.19
3. Machine labour	hr	3.26
4. Manure	q	101.61
5. Nitrogen	kg	95.10
6. Phosphorus	kg	220.25
7. Potash	kg	215.23
8. Plant protection	L	8.47
9. Irrigation	m^3	802.37

10. Family human labour	man day	23.12
A) OUTPUT		
1. Yield	t	10.10

Fig.4.3 Fruiting stage of Pomegranate tree.

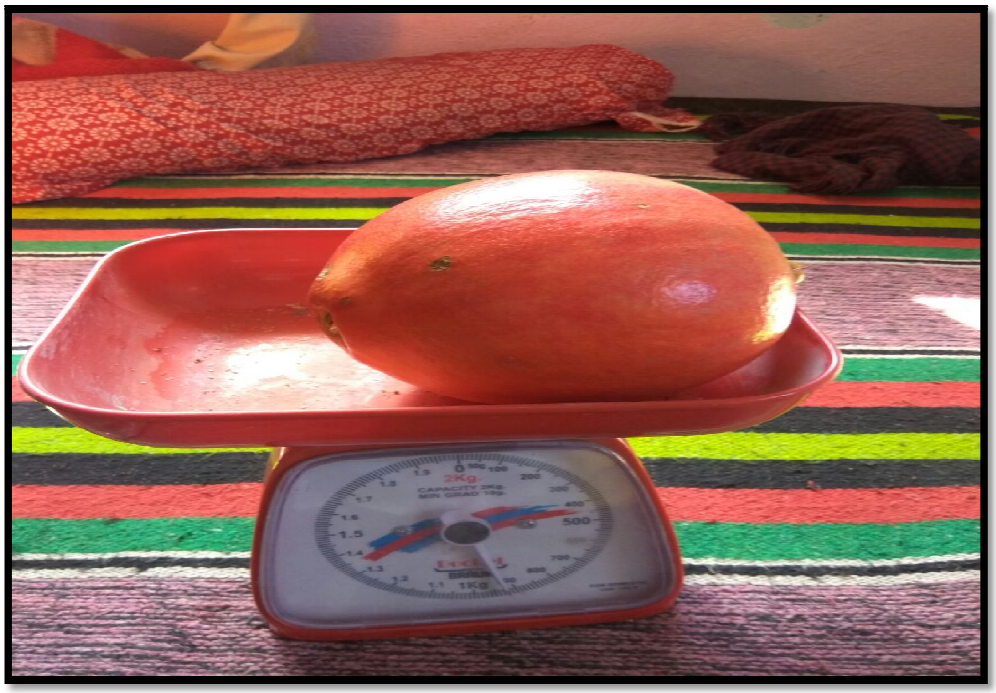

Fig.4.4 Weighing of Pomegranate fruit.

4.2.3 Cost of cultivation of pomegranate production

Per hectare costs and returns of pomegranate were calculated and are presented in Table 4.5. It is observed from the table that, Cost-C of pomegranate cultivation was ` 221043.55, Cost-B was ` 214249.90 followed by Cost-A was ` 85593.37 per hectare in the study area. Among the all items of expenditure, proportionate rental value of land was maximum i.e. 35.34 per cent followed by fertilizers (8.10 per cent), hired human labour (8.74 per cent), manures (6.90 per cent), depreciation on commonly used assets (5.49 per cent), interest on working capital (4.99 per cent), family human labour (3.07 per cent). Interest on fixed capital (2.65 per cent), plant protection (2.05 per cent), irrigation (1.15 per cent), machine power (0.60 per cent), incidental expenditure (0.35 per cent), bullock pair/labour (0.27 per cent) and land revenue (0.10 per cent). The result also revealed that, cost incurred on hired

human labour was ` 19312.65 per hectare likewise cost incurred on use of bullock labour was ` 595.60 per hectare, cost incurred on use of machine power was 1332.65, cost incurred on use of manures was ` 15241.97 cost incurred on use of fertilizer was ` 17916.36, cost incurred on use of plant protection was ` 4538.92, cost incurred on use of family labour was ` 6793.64, cost incurred on land revenue was ` 199.62 and cost incurred on incidental charges was ` 767.77.

Table 4.5 Per hectare cost of cultivation of pomegranate

Sr.no.	Particular	Amount (`)	Percentage
1	Hired human labour	19312.65	08.74
2	Bullock pair/ labour	595.60	00.27
3	Machine power	1332.62	00.60
4	Manures	15241.97	06.90
5	Fertilizers	17916.36	08.10
6	Plant protection	4538.92	02.05
7	Irrigation	2539.46	01.15

8	Land revenue	199.62	00.10
9	Incidental expenditure	767.77	00.35
10	Interest on working capital@13%	11021.12	04.99
11	Depreciation on assets@10%	12127.33	05.49
12	Cost A (∑ 1 to 11)	85593.37	38.72
13	Interest on fixed capital @12%	5874.51	02.65
14	Amortized cost	44675.60	20.21
15	Rental value of land	78106.39	35.34
16	cost B (∑12 to 15)	214249.90	96.93
17	Family labour	6793.64	03.07
18	Cost C(∑12,16,17)	221043.55	100.00

4.2.4 Profitability of pomegranate production

Per hectare profitability of pomegranate production was estimated and are presented in Table 4.6. It was observed that per hectare gross return was ` 456837.00, Farm business income, family labour income and net profit were ` 371244.63, ` 242588.10 and ` 235794.45, respectively in pomegranate production. It was inferred that the pomegranate production was more profitable and input-output ratio was 2.07. It implied that, when 1 rupee spent on pomegranate it would lead to give the returns of ` 2.07 in pomegranate production. Per tonne cost of production was ` 20094.87 in pomegranate production.

Table 4.6 Return and per hectare profitability of pomegranate production

Sr.no.	Particular	Amount (`)
1	Gross return	456837.00
2	Cost A	85593.37
3	Cost B	214249.90
4	Cost C	221043.55
5	Farm business income (Gross return-Cost A)	371244.63
6	Family labour income (Gross return- Cost B)	242588.10
7	Net profit (Gross return-Cost C)	235794.45
8	Output-input ratio (Gross return/Cost C)	2.07
9	Per t cost of production (Cost C/ total qty produced)	20094.87

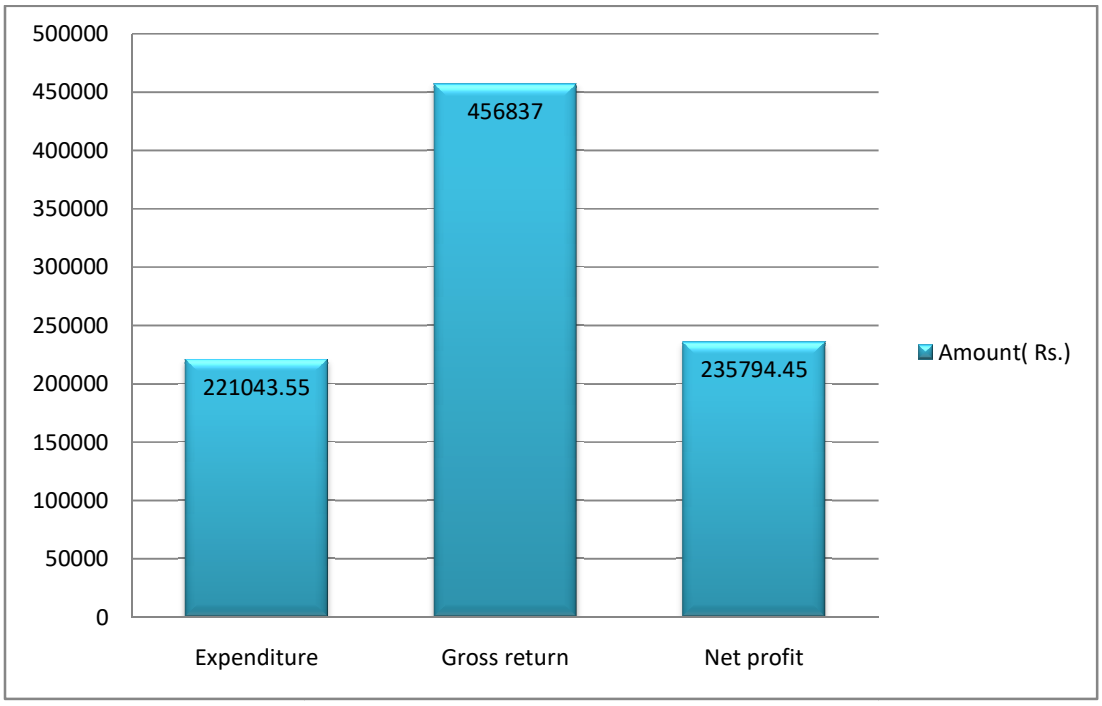

Fig.4.5 Return and per hectare profitability of Pomegranate production

4.3 RESOURCE PRODUCTIVITY AND RESOURCE USE EFFICIENCY IN POMEGRANATE

Linear and Cobb-Douglas production function were used to pomegranate production. On the basis goodness of fit (R^2), Cobb-Douglas production function was found to be fit in the data. It was clear that the correlation coefficients of independent variables with respect to production were observed and on the basis of non significant correlation coefficient, some of the variables were dropped. Similarly, in order to solve problem of multicollinearity, the correlation coefficient among independent variables which had less than the value of multiple determination were dropped. Thus, the remaining independent variables were lastly used in Cobb-Douglas production which gives elasticity of production directly. Here, the regression coefficients are the elasticity of production and used to determine the return to scale in pomegranate production

4.3.1 Estimates of Cobb-Douglas production function in pomegranate production

Estimates of Cobb-Douglas production function in pomegranate production were obtained and are presented in Table 4.7. The Results are discussed with respect to elasticity of production, marginal productivity; resource use efficiency and presented as follows.

Elasticity of production

The result revealed that coefficient of multiple determination (R^2) was 0.89 which indicated 89.00 per cent effect of all independent variables together in pomegranate production. F-value was 105.29 which were highly significant. Return to scale was 1.27 which indicated increasing trend of return to scale. The result revealed that the regression coefficient of plants was 0.25 which is positive and significant at 5 per cent level of significance. The regression coefficient of human labour were 0.33 which is positive and significant at 10 per cent. The regression coefficient of fertilizers was 0.65 which is positive and significant at 1 per cent level of significance. Thus there was a scope to increase these variables on priority basis.

Marginal productivity

It was observed that marginal product with respect to plants under pomegranate was 0.0024 per hectare which means that if plants under pomegranate cultivation is increased by one plant to geometric mean which caused to increase production of pomegranate by 0.0024 tonne. Marginal product of human labour was 0.04 man day it indicated that when there was additional use of one day of human labour which caused to give additional production of pomegranate 0.04 tonne. Marginal product of fertilizers was 0.013 kg which means that then there was addition of one kg of fertilizers, it give additional production by 0.080 tonne. Thus plants in pomegranate, human labour and fertilizers were underutilized resources in pomegranate production.

Table 4.7 Estimates of Cobb Douglas production function in pomegranate production

Sr. No.	Variables	Partial Regression Coefficient (bi)	Standard Error (SE)	't' value	Geometric mean (Xi)	Marginal Product (MP)	Marginal Value Product (MVP)	Price of Inputs (Rs)	MVP To price ratio
1.	Plants per ha	0.25	0.10	2.51**	850.36	0.0024	102.33	15	6.82
2.	Human labour (man day/farm)	0.33	0.19	1.73*	69.14	0.04	1641.52	300	5.47
3.	Machine labour in hours	0.025	0.05	0.46	2.62	0.080	3303.38	800	4.13
4.	Manures in tonnes	-0.17	0.13	-1.31	7.69	-0.19	-7709.62	6000	-1.28
5.	Fertilizers per ha	0.65	0.23	2.79***	402.08	0.013	553.18	1500	0.37
6.	Plant protection in litre	0.11	0.12	0.90	6.91	0.13	5571.49	535.71	10.40
7.	Irrigation in m^3	0.075	0.13	0.56	606.68	0.0010	42.13	3.14	13.42

Note: *,** ,***Significant at 10, 5 and 1 per cent level respectively.
F value ---------- 105.19
R^2 ---------- 0.89
Return to scale (∑bi) --- 1.27

Resource use efficiency

Resource use efficiency expressed in monetary terms as relationship of marginal value product and prices of input. Resource use efficiency was estimated and presented in the table 4.7. Marginal value product (MVP) of plants in pomegranate orchard was found to be ` 102.33. Price of input of plants in pomegranate orchard was ` 15. Hence, MVP to price ratio was 6.82. Similarly, the MVP to price ratio with respect to Human labour, Machine labour, Fertilizers was 5.47, 4.13, 0.37 respectively. It was clear that higher the MVP to price ratio there was greater chance to increase these resources. The results inferred that there was greater opportunity to increase plants in pomegranate orchards, human labour and fertilizers.

4.4 Marketing cost, margin and price spread in pomegranate marketing

4.4.1 Production, retention and marketed surplus of pomegranate

In the study of marketing of pomegranate three marketing channels were identified channel-I (Producer-Pre harvest contractor-Wholesaler-Retailer-Consumer), channel-II (Producer-Retailer-Consumer), channel-III (Producer-wholesaler-Retailer- Consumer). Production, retention and marketed surplus of pomegranate sold through different channels were studied and presented in Table 4.7. It was observed that pomegranate production increased with an increase in orchard size. At overall level, production of pomegranate was obtained to be 9.03 tonne. It was observed that share of total retention was 1.55 per cent. Share of marketed surplus was 81.50 per cent through channel-I (Producer-Pre harvest contractor-Wholesaler-Retailer-Consumer), channel-II (Producer-wholesaler-Retailer-Consumer) was 6.20 per cent and channel-III (Producer-wholesaler-Retailer-Consumer) was 10.74. Which indicates that maximum produce was sold through channel-I. Followed by channel-III and Channel-II.

Table 4.8 Production, retention and marketed surplus of pomegranate through different channels (t/orchard)

Particular	Quantity	Percentage
1. Pomegranate farm (ha)	00.82	-
2. Pomegranate production (t)	9.03	100
3. Total Retention (t)	00.14	1.55
4. Marketed surplus in Channel-I (Producer-Pre harvest contractor-Wholesaler-Retailer- Consumer)	7.36	81.51
5. Marketed surplus in Channel-II (Producer-Retailer- Consumer)	00.56	6.20
6. Marketed surplus in Channel-III (Producer-wholesaler- Retailer-Consumer)	00.97	10.74
7. Total marketed surplus (4+5+6)	8.89	98.45

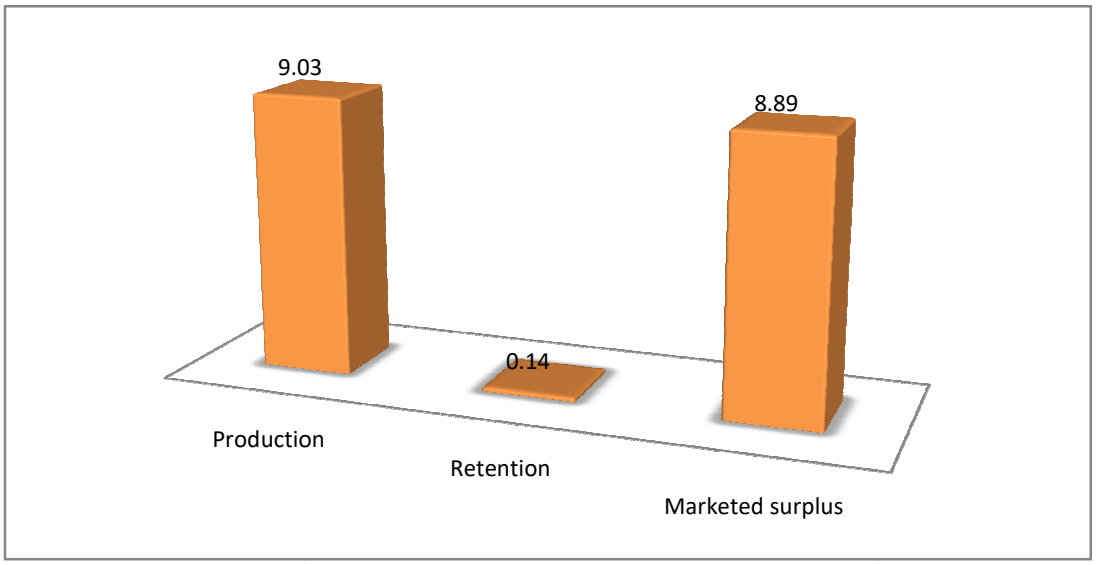

Fig. 4.6 Per orchard production, retention and marketed surplus pomegranate production

Fig.4.7 Grading of Pomegranate fruits.

Fig 4.8 Packaging of Pomegranate fruits.

4.4.2 Marketing cost incurred by producer

Per quintal marketing cost of pomegranate with respect to various items incurred by producer in different marketing channels were calculated and presented in Table 4.8. The result revealed that, the marketing cost incurred by producer in channel-III were highest ` 2055.52 as compare to channel-II ` 1834.42.

In channel-II proportion of expenditure on grading charges 6.17 per cent, weighing charge 2.11 per cent, packaging charge 44.56per cent ,loading charge 3.89 per cent, transportation charge 10.59 per cent, unloading charges 3.75 per cent, commission charge 24.29 per cent and losses 2.77 per cent. Similarly, in channel-III, grading charge 5.55 per cent, packaging charge 30.71,loading charge 3.87 per cent, transportation charge 12.83 per cent, unloading charges 3.87 per cent, weighing charge 2.571 per cent, commission charge 36.21 per cent and losses 1.97 per cent.

Table 4.9 Cost of marketing incurred by producer

(`/t)

Sr. No	Particular	channel-I	Channel-II	Channel-III
1	Grading charges	-	113.21 (06.17)	114.13 (05.55)
2	Weighing charges	-	38.83 (02.11)	52.78 (02.57)
3	Packaging charges	-	817.51 (44.56)	631.44 (30.71)
4	Loading charges	-	71.37 (03.89)	79.61 (03.87)
5	Transportation charges	-	194.31 (10.59)	263.81 (12.83)
6	Unloading charges	-	68.92 (03.75)	79.66 (3.87)
7	Commission charges	-	445.61 (24.29)	744.31 (36.21)
8	Miscellaneous charges	-	50.82	40.69
	Total cost	**-**	**1834.42** **(100)**	**2055.52** **(100)**

4.4.3 Cost of marketing of pomegranate incurred by pre-harvest contractor

Per tonne cost of marketing of pomegranate incurred by pre-harvest contractor in channel-I was calculated and is presented in Table 4.9. The results revealed that the total cost was Rs. 1827.42 in which the share of harvesting cost 15.14 per cent, grading charges 2.95 per cent, weighing charge 1.86 per cent, packaging charge 22.17 per cent ,loading charge 4.15 per cent, transportation charge 17.79 per cent, unloading charges 4.15 per cent, commission charge 28.92 per cent and miscellaneous charges 2.88 per cent.

Table 4.10 Cost of marketing of pomegranate incurred by pre-harvest contractor

(`/t)

Sr. no.	Particulars	Amount	Percentage
1	Harvesting cost	276.65	15.14
2	Grading charge	53.92	02.95
3	Weighing charge	33.92	01.86
4	Packaging charge	405.19	22.17
5	Loading charge	75.75	04.15
6	Transportation charge	325.07	17.79
7	Unloading charge	75.75	04.15
8	Commission charge	528.54	28.92
9	Miscellaneous charges	52.63	02.88
	Total cost	**1827.42**	**100**

4.4.4 Cost of marketing of pomegranate incurred by wholesaler

Per tonne cost of pomegranate incurred by wholesaler in channel-I and channel-II were calculated and are presented in Table 4.11.

Table 4.11 Cost of marketing of pomegranate incurred by wholesaler

Sr. no	Particular	Channel I	Channel II	Channel III
1	Loading charge	78.28 (04.85)	-	74.38 (04.25)
2	Unloading charge	78.28 (04.85)	-	74.38 (04.25)
3	Weighing charge	148.19 (09.19)	-	157.21 (08.98)
4	Transportation charge	327.11 (20.29)	-	375.13 (21.43)
5	License charge	42.12 (02.61)	-	32.48 (01.86)
6	Market fee	68.41 (04.24)	-	58.67 (03.35)
7	Storage cost	58.00 (03.59)	-	53.71 (3.07)
8	Miscellaneous charges	91.14 (05.65)	-	78.62 (04.49)
9	Losses	720.00 (44.67)	-	846.00 (48.33)
	Total cost	**1611.53 (100)**	**-**	**1750.58 (100)**

The results revealed that in channel-I, total cost of marketing was Rs. 1611.53 in which the share of loading charges 4.85 per cent, unloading charge 4.85 per cent, weighing charge 9.19 per cent, transportation charge 20.29 per

cent, license charge 2.61 per cent, market fee 4.24 per cent, storage cost 3.59 per cent, miscellaneous charges 5.65 and losses 44.67 per cent. Similarly, in channel-III, total cost of marketing was Rs. 1750.58 in which the share of loading charges 4.25 per cent, unloading charge 4.25 per cent, weighing charge 8.98 per cent, transportation charge 21.43 per cent, license charge 1.86 per cent, market fee 3.35 per cent, storage cost 3.07 per cent, miscellaneous charges 4.49 and losses 48.33 per cent.

4.4.5 Cost of marketing of pomegranate incurred by retailer

Per tonne cost of marketing of pomegranate incurred by retailer in different channels were calculated and are presented in Table 4.12. The results revealed that in channel-I, total cost of marketing was Rs.1073.11 in which the share of loading charges 7.94 per cent, unloading charge 7.94 per cent, transportation charge 15.48 per cent, license charge 7.31 per cent, shop rent 7.07 per cent, miscellaneous charges 8.86 and losses 45.38 per cent. Similarly, channel-II, total cost of marketing was Rs.1105.33 in which the share of loading charges 7.94 per cent, unloading charge 7.94 per cent, transportation charge 15.36 per cent, license charge 7.73 per cent, shop rent 6.49 per cent, miscellaneous charges 8.41 and losses 46.14 per cent. Similarly, channel-III, total cost of marketing was Rs.1370.29 in which the share of loading charges 8.04 per cent, unloading charge 8.04 per cent, transportation charge 14.55 per cent, license charge 8.56 per cent, shop rent 7.29 per cent, miscellaneous charges 9.00 and losses 44.51 per cent.

Table 4.12 Cost of marketing of Pomegranate incurred by retailer

Sr. no	Particular	Channel I	Channel II	Channel III
1	Loading charge	85.23 (07.94)	87.72 (07.94)	110.18 (08.04)
2	Unloading charge	85.23 (07.94)	87.72 (07.94)	110.18 (08.04)
3	Transportation charge	166.12 (15.48)	169.76 (15.36)	199.42 (14.55)
4	License charge	78.51 (07.31)	85.43 (07.73)	117.25 (08.56)
5	Shop rent	75.89 (07.07)	71.70 (06.49)	99.92 (07.29)
6	Miscellaneous charges	95.13 (08.86)	93.00 (08.41)	123.34 (09.00)
7	Losses	487 (45.38)	510 (46.14)	610 (44.51)
	Total cost	**1073.11 (100)**	**1105.33 (100)**	**1370.29 (100)**

(Fig. in the parenthesis indicates percentage to total)

4.4.6 Marketing cost, margin and price spread in pomegranate marketing

Marketing costs and margins of the intermediaries involved in the marketing of pomegranate indicated that the producer's share in consumer's rupee in channel-I was 70.94 per cent after deducting the costs and margins of the intermediaries involved in the channel. (see table 4.13) The total marketing cost incurred by pre harvest contractor accounted for 2.98 per cent of

consumer's price. The total marketing cost incurred by wholesaler and retailer amounted to ` 1611.53 per tonne and ` 1013.11 per tonne respectively. The price spread in first channel was 18530.00. The net price received by the producer seller accounted for ` 43264 (70.94 per cent). The profit shares of the pre harvest contractors was ` 4513.58 (7.30 per cent), wholesalers was ` 5006.77 (8.10 per cent) and Retailers was ` 4497.89 (7.28 per cent) respectively. This was the most popular channel of marketing in the study area, since in this channel the net price received by the producer was higher than channel – II and the pre-harvest contractor arrived to production point thus saving the time and transportation cost of the producer-seller and also due to advance payment paid by the pre-harvest contractor before taking the delivery of the produce.

The producer 's share in consumer 's rupee in channel-II was 81.19 per cent after deducting the costs and margins of the intermediaries involved in the channel. The net price received by the producer-seller in this channel was ` 41862 (81.19 per cent) after deducting the marketing cost of ` 1834.42 (3.55 per cent) per tonne incurred by him. The total marketing cost incurred by retailer amounted to ` 1105.33 per tonne. The price spread in channel –II was ` 9698.10. The profit shares of the retailers was ` 6758.35 (13.12 per cent). In channel- III, the cost of marketing incurred by the producer was ` 2055.52 per tonne (2.77 per cent). In this channel the net price received by the producer was 47534 per tonne accounting for 68.67 per cent, which was marginally high compared to channel-I and II. In this channel price paid by wholesaler and retailer was ` 49589.52 and retailer was ` 58713 respectively. The cost incurred by wholesaler and margin of wholesaler was ` 1750.58 and ` 7372.90

respectively. The cost incurred by retailer and margin of retailer was ` 1370.29 and 9140.71 respectively. The price spread was ` 21690. On the basis of result the price spread was higher in channel III as compared to channel I and channel II.

Table 4.13 Per tone marketing cost marketing margin and price spread in pomegranate marketing

Sr. no.	Particular	Channel I	Channel II	Channel III
1	Net price received by producer (Producer's share in consumer's rupee)	43264 (70.94)	41862 (81.19)	47534 (68.67)
2	Cost incurred by producer	-	1834.42 (3.55)	2055.52 (2.77)
4	Price paid by pre-harvest Contractor	43264 (70.74)	-	-
5	Cost-incurred by pre-harvest contractor	1827.42 (02.98)	-	-
5	Margin of pre-harvest contractor	4513.58 (07.30)	-	-
8	Price paid by wholesaler	49605 (80.27)	-	49589.52 (71.64)
9	Cost-incurred by wholesaler	1611.53 (2.61)	-	1750.58 (2.52)
10	Margin of wholesaler	5006.47 (8.10)	-	7372.9 (10.65)
11	Price paid by retailer	56223 (90.98)	43696.42 (84.74)	58713 (84.82)
12	Cost incurred by retailer	1073.11 (1.74)	1105.33 (2.14)	1370.29 (1.98)
13	Margin of retailer	4497.89 (7.28)	6758.35 (13.12)	9140.71 (13.20)
14	Price paid by consumer	61794	51560	69224

		(100)	(100)	(100)
15	**Total marketing cost**	**4511.83**	**2939.75**	**5176.39**
16	**Total marketing margin**	**13918.24**	**6758.35**	**16513.61**
17	**Price spread**	**18530.00**	**9698.10**	**21690**

(Fig. in the parenthesis indicates percentage to price paid by consumer.)

4.5 Problems of pomegranate growers

Pomegranate growers are facing the problems in production as well as marketing. The major problems were arranged in the form of frequency and percent are discussed as follows.

4.5.1 Problems faced by pomegranate growers

Problems faced by pomegranate growers were calculated in frequency and percentage form and are presented in Table 4.14. The result revealed that in pomegranate, the majority i.e. 94.79per cent growers opined that attack of oily spot bacterial disease is major problem followed by high cost of packaging material 86.45 per cent, Shortage and high wage rate of labour at time of harvesting was 78.12 percent of pomegranate growers. Problem of high cost of packaging material 73.96 per cent, low quality roads for transportation 68.75 per cent, lack of processing facility 63.54 per cent, irregular and short period electricity 60.41 per cent. lack of short facilities 52.08 per cent, high commission charges 45.83 per cent, non-availability of regular irrigation facility in summer 41.66 percent.

Table 4.14 Constraints faced by pomegranate growers

Sr. no.	Constraints of pomegranate growers	No. of farmer	Percentage	Rank
1	High cost of pomegranate grafts or seedlings	83	86.45	II
2	Attack of oily spot bacterial disease	91	94.79	I
3	Shortage and high wage rate of labour at time of harvesting	75	78.12	III
4	Irregular and short-period electricity	58	60.41	VII
5	Non-availability of regular irrigation facility in summer	40	41.66	X
6	Lack of storage facilities	50	52.08	VIII
7	Lack of processing facilities	61	63.54	VI
8	High cost of packaging material	71	73.96	IV
9	High commission charges	44	45.83	IX
10	Low quality roads for transportation	66	68.75	V

SUMMARY AND CONCLUSIONS

CHAPTER-V

SUMMARY AND CONCLUSION

5.1 Introduction

Pomegranate (*Punica granatum*) is one of the important fruit of tropical and sub-tropical regions of the country, which belongs to family *Punicaceae,* originated from Iran. It is commercially grown apart from India. India is second largest producer of fruits in world after China. It's share in world production of fruits is 12.6 per cent. The area under pomegranate cultivation during 2015-16 was 1.97 lakh hectares with production of 23.06 lakh MT. While in the year 2016-17,the area under pomegranate cultivation was 2.16 lakh hectare and production was 25.21 lakh MT.(www.indiastat.in).According to National Horticulture Board, Maharashtra contributes two-third area of pomegranate having 1.32 lakh hectares. At present Maharashtra is the leading state in acreage covering about 68.7% of the area under pomegranate. During 2003-2004 to 2013-2014, pomegranate production in India has increased by 102.43%. Maharashtra ranks first (9,45,000 tonnes) accounting 70.2%, followed by Karnataka (1, 34,180 tonnes), Gujarat (99,330 tonnes), Andhra Pradesh (90,010 tonnes), Telangana (25,970 tonnes), Madhya Pradesh (25,290 tonnes), Tamilnadu (13,090tonnes) and other states contributing for the rent of the production.

In Maharashtra, Nashik is major pomegranate growing district with an area 48,527 ha and production is 6.79 lakh MT followed by Solapur district with an area is 20,033 ha and production is 1.69 lakh M.T. (www.indiastat.in).

Ganesh variety has low attack of insect and pest than other varieties. There are low number of fruits on a tree giving low yield. The fruits of this variety has low rate in the market. *Bhagva* variety is also known as *Muskat, Mridula, Ashtaganda* and *Shendari.* This variety is susceptible to oily spot disease. This variety gives more yield and fruits of this variety has high rate in market. Pomegranate cultivation is profitable but it requires initial high

investment in the form of capital, labour and skilled management. It is felt to necessary to investigate the general problems faced by pomegranate growers in production and marketing.

By keeping in view the above aspects, the present study has been undertaken with following objectives.

Objectives

1. To know socio-economic characteristics of the Pomegranate growers.
2. To estimate cost and returns of pomegranate orchards.
3. To estimate resource productivity and resource use efficiency in pomegranate production.
4. To identify marketing channels and price spread in different marketing channels of pomegranate.
5. To identify constraints faced by pomegranate growers.

5.2 Methodology

Multistage sampling deign was used for the selection of district, tahsils, villages and pomegranate growers. In the first stage, Solapur district was purposely selected for the present study because there was highest area under pomegranate fruit crop in this district than other district. In second stage, Pomegranate and Sangole tehsils were selected because of more number of pomegranate cultivars. In third stage, from each selected tehsil, six villages were selected randomly. From each village 8 pomegranate growers were be achieved by rank method. Thus from 12 villages of 2 tehsils 96 pomegranate growers was selected. The data on costs incurred by marketing intermediaries was collected by visiting Solapur, Pandharpur, Sangole and Ahmadnagar pomegranate markets.

The first objective that is to know socio-economic characteristics of pomegranate growers was achieved by application of tabular analysis. The second objective that is to estimate costs and returns structure of pomegranate

cultivation was achieved by tabular analysis with cost concept of cost-A, cost-B and cost-C. The third objective that is to evaluate resource productivity and resource use efficiency in pomegranate orchard was achieved by cobb- douglas function method. The fourth objective that is to determine marketing cost, margin and price spread in different marketing channels of pomegranate was achieved by tabular analysis. The fifth objective that is to identify constraints faced by pomegranate growers was achieved by frequency and percentage method.

5.3 Results and discussion

At the overall level most of pomegranate growers were from middle age and which account for 61.46 percent. Regarding education, the growers were educated upto higher secondary and above but the higher literacy was in primary and high school level (50.00 percent). Pomegranate growers had a family size more than 6 members but the most of growers had medium family size(59.37). Regarding to land holding, 60.42 percent of pomegranate growers had land holding less than 2 hectares. In cropping pattern, gross cropped area was 3.28 hectares. The net cultivated area was 2.09 hectares and double cropped area was 1.19 hectares. In regarding to cropping intensity, 164.68 percent was observed on pomegranate growers farm.

The total establishment cost was Rs.160127.08 per hectare for pomegranate orchards. The amortized establishment cost was calculated as Rs.44675.60 per hectare for pomegranate orchard. The result reveled that Cost-C was higher as Rs.221043.55 on pomegranate orchard. It was observed that gross return was higher on pomegranate orchard as Rs.456837. It was clear that output-input ratio was higher as 2.07 of pomegranate production.

Resource use efficiency expressed in monetary terms as relationship of marginal value product and prices of input. Marginal value product (MVP) of plants in pomegranate orchard was found to be ₹ 102.33. Price of input of plants in pomegranate orchard was ₹ 15. Hence, MVP to price ratio was 6.82. Similarly, the MVP to price ratio with respect to Human labour, Machine

labour, Fertilizers was 5.47, 4.13, 0.37 respectively. It was clear that higher the MVP to price ratio there was greater chance to increase these resources. The results inferred that there was greater opportunity to increase plants in pomegranate orchards, human labour and fertilizers.

The marketing channels found in marketing of pomegranate from Solapur district were as channel-I (producer-pre-harvest contractor – wholesaler – retailer – consumer),channel-II (Producer-retailer-consumer), channel-III(Producer-wholesaler-retailer-consumer). Average production of pomegranate was 10.10 tonne per ha on average 1 hectare area and from it total retention was 0.14 tonne.

In the pomegranate marketing results revealed that in channel-I price received by producer from pre harvest contractor was Rs.43264 and net price received by producer was Rs.43264 per tonne with 70.94 percent producer's share in consumer's rupee. In channel-I marketing cost and marketing margin was Rs. 4511.83 and Rs.13918.24, respectively. In channel-II, price received by producer from retailer was Rs. 43696.42, while cost incurred by producer was Rs. 1834.42. Thus, net price received by producer was Rs. 41862 with 81.19 percent producer's share in consumer's rupee. In channel-II marketing cost and marketing margin was Rs. 2939.75 and Rs. 6758.35, respectively. In channel-III, price received by producer from wholesaler was Rs.49589.52, while cost incurred by producer was Rs. 2055.52. Thus, net price received by producer was Rs.47534 with 68.67 percent producer's share in consumer's rupee. In channel-III marketing cost and marketing margin was Rs.5176.39 and Rs. 16513.61, respectively.

In regard to the problems faced by pomegranate growers, the attack of oily spot bacterial disease was expressed by 16.66 percent of pomegranate growers. High cost of pomegranate grafts or seedlings was reported by 14.58 percent. The other major problems expressed by pomegranate growers were shortage(7.29) and high wage rate of labour at time of harvesting was(10.41), high commission charges(10.41), non-availability of regular irrigation

facility(4.16), irregular and short period electricity(7.29), lack of storage facilities(7.19), lack of processing facility(8.33) and low quality roads for transportation(9.37).

5.4 Conclusion

It was concluded that in study area, percent of middle and old age pomegranate growers was more. Pomegranate growers were more educated and having more land holding. It was observed that the per hectare total cost required for pomegranate orchard was more. It was concluded that the pomegranate cultivation was more profitable

It was concluded that the net price received by pomegranate producer and price spread were low in channel-II (Producer-retailer-consumer) and high in channel-III (Producer –wholesaler – retailer – consumer).The major problems faced by pomegranate growers were attack of oily spot bacterial disease, high cost of packaging material, high wage rate of labour at time of harvesting, high commission charges, high cost of pomegranate grafts and irregular irrigation.

5.5 Policy implications

1. In drought prone area pomegranate fruit cultivation increases income of farmers, found profitable than other crops and provides employment to agricultural labours.
2. Area under pomegranate orchard can be increased because of higher profitability, but it requires higher initial investment.
3. Pomegranate growers should get higher farm price by marketing through their co-operative marketing agency, so there is need of co-operation between them.
4. To avoid shortage and to increase efficiency of labour, there is need of contract system of labour.

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THESIS ABSTRACT

ABSTRACT

Name of student	**:** Kharat Prathmesh Balaso
Registration No.	**:** 2017 A/47 M
Degree	**:** M.Sc.(Agri.) in Agricultural Economics
Year of admission	**:** 2017-2018
Discipline	**:** Agricultural Economics
Major field	**:** Agricultural Economics
Minor field	**:** Extension Education and Computer Science
Supporting field	**:** Statistics
Major advisor	**:** Dr. R. V. Chavan Assistant Professor, Dept. of Agricultural Economics, VNMKV, Parbhani.
Title of thesis	**:** ECONOMICS OF PRODUCTION AND MARKETING OF POMEGRANATE IN SOLAPUR DISTRICT.

Pomegranate (*Punica granatum*) is one of the important fruit of tropical and sub-tropical regions of the country, which belongs to family *Punicaceae,* originated from Iran. India is second largest producer of fruits in world after China. It's share in world output of fruits is 12.6 per cent. During 2013-2014 pomegranate was cultivated over 1.31 lakh ha with an annual production of 13.46 lakh tones and productivity of 10.27 tonnes/ha in India. At present, Maharashtra is the leading state in acreage covering about 68.7% of the area under pomegranate. In Maharashtra, Nashik is major pomegranate growing district with an area of 48,527 ha and production is 6.79 lakh MT followed by Solapur district with an area is 20,033 ha and production is 1.69 lakh M.T. (www.indiastat.in) Multistage sampling design was used for the selection of district, tehsils, villages and pomegranate growers. Solapur district was purposely selected for the present study because there was more area under pomegranate fruit crop in this district.

Pandharpur and Sangole tehsils were selected because of more number of pomegranate growers. From each village 8 pomegranate growers will be achieved by rank method. Thus from 12 villages of 2 tahsils 96 pomegranate growers were selected for present study. The average landholding size was 0.82 hectares on Pomegranate farm. The results revealed that the crops on pomegranate farm were grown as income boosting crop in the cropping pattern in the study area. The cropping intensity was 156.13per cent on pomegranate orchard Net establishment cost of pomegranate orchard was Rs. 160127.08. Pomegranate production was 10.10 tonnes per hectare in orchard. Cost-C was higher as Rs.221043.55 in pomegranate orchard. Regard to pomegranate orchard gross return was Rs.456837 and per tonne cost of pomegranate were 20094.87. It was observed that, price spread obtained was higher in case of channel-III. The net price received by producer was higher in Channel-III.

APPENDIX

APPENDIX-I

Title: ECONOMICS OF PRODUCTION AND MARKETING OF POMEGRANATE IN SOLAPUR DISTRICT

SCHEDULE- I

Establishment of Pomegranate Orchard:

1] Socio-economic characteristics of pomegranate growers

1. Name:

2. Village: Tehsil: District: Solapur

3.Age in years:

4. Mob. No./Contact No.-

5.Educational level : Illiterate/Primary/High school/Higher secondary/College

6. Family size (No.) ….....Male ..…..Female ..……Children

7. Occupational level: Agricultural/Business/Service

8. Total Land holding (ha.):

Rain fed land……....ha, Irrigated land……..ha, Uncultivated land……..ha

9. Land revenue (Rs.):

10. Pomegranate orchard size (ha):

11. Age of orchard (yr.):

12. Variety:

13. Spacing (m):

2] Cropping Pattern:

Kharif			Rabi			Summer			Perennial		
Crop (Variety)	**I (ha)**	**R (ha)**	**Crop (Variety)**	**I (ha)**	**R (ha)**	**Crop (Variety)**	**I (ha)**	**R (ha)**	**Crop (Variety)**	**I (ha)**	**R (ha)**
Total											

3] Livestock:

Sr. No.	Name of livestock	No	Age	Present value (Rs)
1.	Bullock pair			
2.	Cow			
3.	Buffalo			
4.	Goat			
5.	Poultry			
6.	Other			
	Total			

4] Machinery:

Sr. No.	Assets	No./Qty.	Age	Present value (Rs)
1.	Tractor			
2.	Other			
	Total			

5] Irrigation Structure:

Sr. No.	Assets	No./Qty.	Age	Present value (Rs)
1.	Well / Tube well			
2.	Electric motor			
3.	Pipeline (length)			
4.	Other			
	Total			

6] Commonly used assets:

Sr. No.	Assets	No/Qty	Age	Present value (Rs)
1.	Plough			
2.	Harrow			
3.	Seed drill			
4.	Hoe			
5.	Bullock cart			
6.	Sprayer			
	a)Hand sprayer			
	b)Foot sprayer			
	c)Power sprayer			
7.	Weeding hook			
8.	Kudali			
9.	Pic axe			
	Total			

7] Building

Sr.No.	Type	No.	Construction year	Present value(Rs.)	Remaining life
1.	Residential				
2.	Farm house				
3.	Cattle house				

8] Operation wise labour requirement in Pomegranate orchard:

Operation	No.	Human labour				Bullock pair day	Machine Power Hours
		Hired male (day)	Hired female (day)	Family male (day)	Family female (day)		
Ploughing							
Harrowing							
Land levelling							
Layout							
Pit Digging							
Manuring							
Plantation							
Irrigation							
Application of Fertilizer							
Weeding							
Plant protection							
Pruning							
Total							

Rate of labours:

1) Male per day (Rs) :

2) Female per day (Rs):

3) Bullock pair per day (Rs):

4) Machinery charge/hr. (Rs):

9] Use of physical inputs in Establishment of pomegranate orchard:

Sr.No.	Particulars	Unit	Quantity	Rate/Unit	Value (Rs)
1.	Seedlings	No.			
2.	Manures	Qtl			
3.	Fertilizers	Bags			
I)	Nitrogen				
II)	Phosphorus				
III)	Potassium				
IV)	Compound fertiliser				
V)	Micro-nutrients				
4.	Plant protection	Kg/lit			
I)	Fungicides				
II)	Insecticides				
5.	Irrigation				
	Total				

SCHEDULE-II

ECONOMICS OF PRODUCTION OF POMEGRANATE CROP

II] Cropping Pattern:

Kharif			Rabi			Summer			Perennial		
Crop (Variety)	I (ha)	R (ha)	Crop (Variety)	I (ha)	R (ha)	Crop (Variety)	I (ha)	R (ha)	Crop (Variety)	I (ha)	R (ha)
Total											

III] Livestock:

Sr. No.	Name of livestock	No	Age	Present value (Rs)
1.	Bullock pair			
2.	Cow			
3.	Buffalo			
4.	Goat			
5.	Poultry			
6.	Other			
	Total			

IV] Machinery:

Sr. No.	Assets	No./Qty.	Age	Present value (Rs)
1.	Tractor			
2.	Other			
	Total			

V] Irrigation Structure:

Sr. No.	Assets	No./Qty.	Age	Present value (Rs)
1.	Well / Tube well			
2.	Electric motor			
3.	Pipeline (length)			
4.	Other			
	Total			

VI] Commonly used assets:

Sr. No.	Assets	No/Qty	Age	Present value (Rs)
1.	Plough			
2.	Harrow			
3.	Seed drill			
4.	Hoe			
5.	Bullock cart			
6.	Sprayer			
	a)Hand sprayer			
	b)Foot sprayer			
	c)Power sprayer			
7.	Weeding hook			
8.	Kudali			
9.	Pic axe			
	Total			

VII] Building

Sr.No.	Type	No.	Construction year	Present value(Rs.)	Remaining life
1.	Residential				
2.	Farm house				
3.	Cattle house				

VIII] Operation wise labour requirement in Pomegranate orchard:

Operation	No.	Human labour				Bullock pair day	Machine Power Hours
		Hired male (day)	Hired female (day)	Family male (day)	Family female (day)		
Ploughing							
Harrowing							
Land levelling							
Layout							
Pit Digging							
Manuring							
Plantation							
Irrigation							
Application of Fertilizer							
Weeding							
Plant protection							
Pruning							
Total							

Rate of labours:

1) Male per day (Rs) :

2) Female per day (Rs):

3) Bullock pair per day (Rs):

4) Machinery charge/hr. (Rs):

IX] Use of physical inputs in pomegranate orchard:

Sr.No.	Particulars	Unit	Quantity	Rate/Unit	Value (Rs)
1.	Manures	Qtl			
2.	Fertilizers	Bags			
I)	Nitrogen				
II)	Phosphorus				
III)	Potassium				
IV)	Compound				
V)	Micro-nutrients				
3.	Plant protection	Kg/lit			
I)	Fungicides				
II)	Insecticides				
4.	Irrigation				
	Total				

X] Yield of pomegranate fruit crop

Particulars	Total No. of trees	Bearing trees	Rate/qtl.	Quantity (qtl.)	Value (Rs.)
Pomegranate production					

XI]. Constraints in Production:

- **Constraints**

1.

2.

3.

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7.

SCHEDULE-III

MARKETING OF POMEGRANATE FRUITS

1. **General Information**

Name of Market :

Distance (km) :

I] Details of produce obtained

Area: Date of planting:

Variety: Date of starting picking:

Total no. of pickings	Quantity of fruits Obtained	Pattern of Disposal				Total
		Quantity sold	Home Consumption	Gifts	Invalid for consumption	

II] Grading

Types of grade	Specification regarding			Production
	Size of fruits	Colour	Weight	
Grade I				
Grade II				
Grade III				

Total labour charges for Grading (Rs.):

III] Packaging:

Material used for packaging:

Total cost of Material:

Total labour charges for packaging (Rs.):

IV] Channel wise produce marketed by the Grower:

Name of the Market:

Sr.No.	Channel	Quantity Marketed(qt)	Value required(Rs)
1.	Channel- I (Producer-Retailer-Consumer)		
2.	Channel-II (Producer-Pre-harvester contractor-wholesaler-Retailer-Consumer)		
3.	Channel-III (Producer-Wholesaler-Retailer-Consumer)		
4.	Channel-IV (Producer- Co-operative marketing society- wholesaler-Retailer-Consumer)		
	Total.		

V) Cost of marketing incurred by Producer

Sr.No.	Item of cost	Amount (Rs.)
1	Grading charge	
2	Packaging charge	
3	Loading charge	
4	Transport charge	
5	Unloading charge	
6	Weighing charge	
7	Commission charge	
8	Losses	
	Total cost	

VI] Cost of marketing incurred by pre-harvest contractor/Co-operative marketing society:

Sr. No.	Item of cost	Amount (Rs/qtls.)
1	Grading charge	
2	Packaging charge	
3	Loading charge	
4	Transport charge	
5	Unloading charge	
6	Weighing charge	
7	License charge	
8	Commission charge	
9	Losses	
	Total cost	

VII]Cost of marketing incurred by Wholesaler

Sr. No.	Item of cost	Amount (Rs./qtls.)
1	Loading charge	
2	Unloading charge	
3	Packaging charge	
4	License charge	
5	Weighing charge	
6	Transport charge	
7	Commission charge	
8	Market fee	
9	Losses	
10	Other	
	Total cost	

VIII] Cost of marketing incurred by Retailer

Sr. No.	Item of cost	Amount (Rs/qtls)
1	License charges	
2	Shop tax	
3	Transport charges	
4	Losses	
5	Other	
	Total cost	

IX] Constraints in Marketing:

- **Constraints**

1.

2.

3.

4.

5.

APPENDIX-II

Rates used in analysis

Particular	Rate (`/Unit)
Labour wages	
Hired male labour	300/man day
Hired Female labour	150/day
Manure	6000/t
Bullock labour (Pair)	500/ day
Machine labour	400/hour
Fertilizer	
Nitrogen	13.04/ kg
Phosphorus	49.66/ kg
Potash	26.66/ kg
DAP	1250/bag
MOP	830/bag
10:26:26	1145/bag