

**ECONOMICS OF PRODUCTION OF KESAR MANGO IN LATUR  
DISTRICT OF MAHARASHTRA**

***DISSERTATION***

*Submitted to the  
Marathwada Agricultural University, Parbhani  
in partial fulfillment of the requirement for the  
degree of*

T5847

**MASTER OF SCIENCE**

**(Agriculture)**

**IN**

**AGRICULTURAL ECONOMICS**

**BY**

**BASAVARAJ JAMAKHANDI S/o RAMAPPA**

**B.Sc.(Agri.)**



**DEPARTMENT OF AGRICULTURAL ECONOMICS AND STATISTICS  
COLLEGE OF AGRICULTURE, LATUR  
MARATHWADA AGRICULTURAL UNIVERSITY,  
PARBHANI - 431 402 (M.S.), INDIA.**

**MAY, 2009**

## CANDIDATE'S DECLARATION

*I hereby declare that the dissertation  
or part there of has not been  
previously submitted by me  
for a degree of any  
University or  
Institute*

Place : LATUR

Date : 27 / 05 / 2009

  
(BASAVARAJ JAMAKHANDI S/o RAMAPPA)

REG. NO. 27/ML/A/07



**Dr. A.M.Degaonkar**

M.Sc.(Agri.), Ph.D.

Associate Professor,

Department of Agril. Economics and Statistics,

College of Agriculture,

Latur-431 512 (M.S.) India.

## CERTIFICATE I

**MR. BASAVARAJ JAMAKHANDI S/o RAMAPPA** has satisfactorily prosecuted his course of research for a period of not less than four semesters and that the dissertation entitled “**ECONOMICS OF PRODUCTION OF KESAR MANGO IN LATUR DISTRICT OF MAHARASHTRA**” submitted by his is the result of original research work and is of sufficiently high standard to warrant its presentation to the examination. I also certify that he has not previously submitted the dissertation or part thereof for a degree of any other University.

Place : LATUR

Date : 27/05/2009


  
(Dr. A.M.Degaonkar)

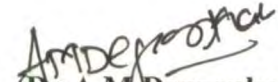
Research Guide



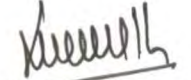
## CERTIFICATE II

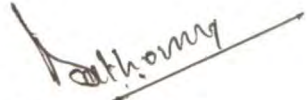
This is to certify that the dissertation entitled “ECONOMICS OF PRODUCTION OF KESAR MANGO IN LATUR DISTRICT OF MAHARASHTRA” submitted by MR. BASAVARAJ JAMAKHANDI S/o RAMAPPA to the Marathwada Agricultural University, Parbhani in partial fulfilment of the requirement for the degree of MASTER OF SCIENCE (Agriculture) in the subject of Agricultural Economics has been approved by the Student’s Advisory Committee after oral examination in collaboration with the External Examiner.

  
(Dr. V. G. Dhondkarkar)  
External Examiner

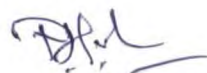
  
(Dr. A. M. Degaonkar)  
Research Guide

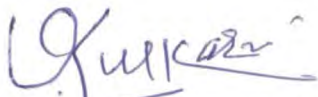
### Members of Advisory Committee

  
(Prof. R. D. Shelke)

  
(Dr. B. M. Thombre)

  
(Dr. A. S. Kadam)

  
Associate Dean (P.G.)  
College of Agriculture,  
M.A.U., Parbhani-431 402.

  
Associate Dean and Principal  
College of Agriculture, Latur.



## ACKNOWLEDGEMENT

*Ambitions in any one kind are sky touching to achieve the glittering success. In the ambition, hard work in paramount, along with one motivation and inspiration are cordial. They play outstanding role to the successful in the ambition.*

*Indeed the words at my command are inadequate to express my gratitude to my Research Guide, Dr. A.M.Degaonkar, Associate Professor, Department of Agricultural Economics and Statistics, College of Agriculture Latur Marathwada Agricultural University, Parbhani for suggesting need based research project scholastic and versatile guidance, constant inspiration throughout the course manuscript leaf into completion of dissertation.*

*My sincere and heartfelt thanks to Dr. B.R.Pawar Professor, Department of Agricultural Economics and statistics, College of Agriculture, Latur and Dr.R.B.Changule, Assistant professor of Agricultural Economics, College of Agriculture, Latur, they give me moral support to completion of thesis.*

*It is my privilege to record sincere thanks to members of my advisory committee Department of Agricultural Economics and Statistics, Prof. R.D.Shelke, Assistant Professor, Department of Agricultural Economics and Statistics, Dr.B.M.Thombre, Professor, Department of Extension Education, Dr. A.S.Kadam, Associate Professor, Department of Horticulture for their valuable guidance and useful suggestion during the course of investigation.*

*I am thankful to Dr. T.G.Satpute Head, Department of Agricultural Economics and Statistics for providing the facilities and suggestions at the time of presentation of ORW in the Department of Agricultural Economics and Statistics, Parbhani.*

*I have immense pleasure in expressing my wholehearted sense of gratitude and indebtedness to Dr. S.S Dhavan, Associate Dean and Principal, College of Agriculture, Latur for extending required facility to completion of my M.Sc.(Agri) research work.*

*I am grateful to Hon'ble Vice-Chancellor, M.A.U., Parbhani and Associate Dean and (PG), M.A.U., Parbhani for providing the facilities for prosecuting the investigation.*

*I express my thanks to librarian, Prof. V.G. Tambarwade and shri. Birajdar for excavating literature from library and special thanks to Prof. M.V.Bajpai sir, Latur District Mango Growers Co-operative Society Latur, for their kind co-operation during my research work,*

*It seems one use the choicest work to measure the boundless love of the some one. I convey my unbounded gratitude and sentiments for the latent love of my respectful father Mr. Ramappa Jamakhandi and No words are enough to express the great sacrifice, devotion and inspiration of my beloved respectful mother Mrs. Tangemma Jamakhandi and Sister Mrs. Sheela Chigari Words are not sufficient to take account of encouraging and evergreen love of my brother Mr. Bhimaray Jamakhandi. Lovely grandmother shantabai, jiju Mr. Ashok and little stars Manu, Maheshwari, Arun, Kiran, Abhay and Megha.,*

*Friendship is pleasant experience most of all, my word and very special thanks to my friends, Somanath, Dnyaneshwar, Ajit, Sherkar, Sanjay, Umesh, Amol, Sangonda, Parmeshwar, Dhiraj, Nitin, Praveen, Shrikanth, Shrishail, Dhareppa, Mahantesh, Kedar, Neeta, Geeta, Dhanashri, Preeti, and my seniors Swapnil, Vijay, Dhiraj, Roma, Gopika and all Juniors of M.Sc (Agri) Atul, Venkatesh, Sunita, Neeta, Anjana.*

*My sincere thanks to my classmates Sameer, Nalini, Shailaja, Vanita, Supriya, for their good will and moral support. I give special thanks to my best friend Galleppa.*

*Last but never the least, it is difficult to list all those to whom express my gratitude for their good will and moral support during my academic attainments, through nobody is mentioned none is forgotten too.*

*Place : Latur*

*Date : 27-05-09*

  
*(B.R. Jamakhandi.)*

## CONTENTS

Chapter	Title	Page
I	INTRODUCTION	01-05
II	REVIEW OF LITERATURE	06-18
III	METHODOLOGY	19-31
IV	RESULTS AND DISCUSSION	32-55
V	SUMMARY AND CONCLUSION	56-63
	LITERATURE CITED	64-67
	APPENDIX	I-XI



## LIST OF TABLES

Table No.	Title	Page No.
Table 4.1	Socio economic characteristics of Kesar mango growers	33
Table 4.2	Effect of socio-economic characteristics on productivity of Kesar mango garden	35
Table 4.3	Cropping pattern of Kesar mango growers	36
Table 4.4	Per hectare physical inputs and outputs in Kesar mango production	40
Table 4.5	Per hectare cost of cultivation of Kesar mango garden	42
Table 4.6	Profitability of Kesar mango production	45
Table 4.7	Estimates of Cobb-Douglas production function as partial regression coefficients in order to know resource productivity, resource use efficiency and optimum resource use in Kesar mango production	48
Table 4.8	Estimates of financial feasibility of Kesar mango garden through discounted measures of project worth	50
Table 4.9	Constraints of Kesar mango growers	53
Table 4.10	Suggestions of Kesar mango growers	55



## LIST OF FIGURES

Figure No.	Title	Page No.
Fig. 3.1	Map of Latur district	20
Fig. 4.1	Share of cropping pattern in Kesar mango garden with respect to gross cropped area of 9.45 hectares	37
Fig. 4.2	Kesar mango plant of three years age	38
Fig. 4.3	Kesar mango orchard at Harangul, Taluka and District Latur	38
Fig. 4.4	Percentage expenditure to cost-C (Rs.89619.84) in Kesar mango garden	43
Fig. 4.5	Kesar mango plant bear profusely	44
Fig. 4.6	Kesar mango fruits	44
Fig 4.7	Per hectare profitability of Kesar mango garden	46





# INTRODUCTION



## CHAPTER – I

### INTRODUCTION

Mango (*Mangifera indica*, L.) belongs to family Anacardiaceae, originated in South – East Asia. It is one of the most important fruit crop grown in India. Mango is indigenous to India. It is as old as Indian civilization and mango has been cultivated in India since antiquity and records show that Huien-Tsang (606 – 647 AD) has testified its cultivation during the time of his visit to India. India occupies a prominent place in the cultivation of mango. Its cultivation is distributed throughout the warmer countries and is confined regions between 30 N and 30 S of the equator.

In India, mango is popularly known as “king of fruits”. Amir Khusrau (1330AD) has stated : ‘The mango is the pride of the garden the choicest fruit of Hindustan, other fruits we are content to eat when ripe, but the mango is good in all stages of growth’.

It is used as a raw material in industries for the preparation of mango juice, mango pulp, mango chutney and mango pickles etc. Mango fruits are used at various stages as young and unripe fruits due to their acidic taste are utilized for culinary purposes. Mango fruits are utilized in preparing squash, nectar, jam, toffee, baby food etc. Bark of trees used for tanning production, which is used for leather industries.

The ripe mango fruit contain 90.00 per cent moisture, 8.8 per cent carbohydrate, 1.00 per cent protein, 0.1 per cent fat, 1.1 per cent fibre, 0.8 per cent lipid, 0.01 per cent calcium, 0.02 per cent phosphorus, 4.5 mg per 100 g iron, carotene (as vitamin A – 150 i.u.), 30 mg per 100 g ascorbic acid (Anonymous. 1962).

Often per capita fruit consumption is taken as an index of Standard of living of a country. The Indian Council of Medical Research (ICMR) has recommended consumption of 120 gms of fruits per capita and as many variety as season permits, but the per capita consumption of fruit in India is only 40 gms. There is a potential for exporting raw and processed fruits. In view of the ever increasing facilities and improved technology of handling, processing, storing and transportation of fruits, the potential is likely to grow at a faster rate. Looking in to these factors it is not only

necessary to step up production, but also, to see that fruits are made available during off season.

In recent years mango is gaining more and more importance in the national as well as international markets. There is great demand for fresh fruit as well as processed products prepared out of mango. The main importing countries of Indian mango are USA, ASSR, Middle East and European countries.

At present mango covers 1.523 million hectares of area with a total production of 10.24 million tones which works out to a low average productivity of 6.72 metric tones per hectare. Mango is grown in 87 countries in the world. Despite India's share of 60 per cent in world's mango production, her productivity is very low when compared to other mango producing countries. Hundreds of hectares of new mango orchards have been established under corporate farming by big companies in Australia, Kenya, Nigeria, Zimbabwe and South Africa with single variety keeping an eye on export.

The hardy nature and adaptability of mango to a wide range of climate and soil conditions is a relative advantage. Mango can be grown well in all types of soil, ranging from alluvial to laterite soil, except black cotton soil which is considered to be poor. The deep and well drained loamy soil is considered best for Kesar mango. It prefers slightly acidic soil. It does well at a temperature ranging from 20 to 40<sup>0</sup>. Higher temperature during maturity of fruit improves size and quality of fruits; it can do well in areas having rainfall ranging from 25 cms to as high as 250 cms.

India can be safely referred to as the fruit basket of the world being the second largest producer of fruits next to Brazil. India is the largest producer of mango in the world. The total area under mango in India is 22.05 lakh hectares with an annual production of 137.92 lakh metric tonnes and its productivity was 6.3 metric tonnes per hectare in 2007-08. Some of the popular varieties of mango grown in India in different regions are Dashehari, Langra; Chausa and Bombay green in Northern region. Himasagar, Fazil, Zardalu, Krishna bhog and Gulabkhas in Eastern region. Alphanso, pairi, Kesar, Rajapuri, Malkura and Jamadar in western region. Alphanso (badami), Bangalora, Neelum, Swarna-rakha, Pairi and Mulgoa in Southern region.

At present mango crop is mainly grown in Andhra Pradesh, Uttar Pradesh, Karnataka, Gujarat, Bihar, Tamil Nadu and Maharashtra. The area, production and productivity of the different states are given below-

In area, four leading states are Andhra Pradesh 483500 hectares, Uttar Pradesh 265900 hectares, Karnataka 132000 hectares and Gujarat 109600 hectares. In production, four leading states are Andhra Pradesh with 386.52 lakh metric tonnes, Uttar Pradesh 325.66 lakh tonnes, Karnataka 133.77 lakh tonnes and Gujarat 93.01 lakh tonnes and productivity of four leading states was as like in Andhra Pradesh (8 metric tonnes / hectare), Uttar Pradesh (12.2 metric tonnes / hectare), Karnataka (10.1 metric tonnes / hectare) and Gujarat (8.5 metric tonnes / hectare) in the year 2007-08.

Maharashtra is an important mango growing state in India with 455800 hectare area with a total production of 7.1 lakh metric million tonnes which works out to a low average productivity of per hectare. The important mango growing districts in Maharashtra are Ratnagiri, Sindhudurg, Raigad, Ahamadnagar, Nashik, Beed, Aurangabad, Latur and Osmanabad. Among this Aurangabad, Beed, Latur, Ahamadnagar and Nashik districts are recognized as export zone for Kesar variety of mango by government of Maharashtra.

Kesar is one of the finest varieties of Indian mangoes and is rated to be the best at the home and abroad. The fruits are very attractive, large sized and oval in shape. The taste is superb with an excellent sugar / acid blend. It is favorite fruit of the processing industries since it retains its characteristics flavour even after processing. Kesar variety released from Balashad district of Gujarat.

The present study was under taken in Latur district of Maharashtra, which is one of the major mango growing districts. Marathwada is one of the important mango growing region of Maharashtra with an 89,587 hectare area. Latur is an important Kesar mango growing district having 14,406 hectare area with the productivity of 5 metric tonnes per hectare. This district accounts about 15 per cent of total area of Marathwada region under Kesar mango. The long, warm to hot, dry summers and medium cool winters prevailing in this district are most suited for best quality mango production. Due to implementation of different schemes from central and state

government like NHM (National Horticulture Mission), NHB (National Horticulture Board) and Horticultural development through employment guarantee schemes (EGS), the area under fruit crop in general and mango in particular is increasing very rapidly during last decade. Very recently the state government has also developed facilities for pre-cooling, grading, packaging of mango fruits at Latur. This situation has favoured for export mango. From this district mangoes are exported to Hongkong and Japan during last three years. The export of mango is increasing day by day on account of higher price realized by the farmer and export facilities developed.

In agriculture, the production of fruits and vegetables is a vital importance as it provides three to four times more cash income than cereals to the per hectare of land. The fruit crops hold a great promise for accelerating income of the farmers. Realizing the importance of fruit cultivation many farmers are diverting their resources towards plantation of fruit crops. Area under fruit crops is therefore, increasing day by day. A combination of cereals and millets and fruits form a balanced diet, since the former provide carbohydrates and later provide vitamins, minerals and protein which are necessary to maintain proper health and acquire resistance to diseases.

There is not enough farm business data on cost of production of mango in Latur region. The information on establishment cost, operating cost and input requirement of mango orchard would be immense help to mango growers of Latur region. It enables the farmers in making decision in farm planning and enterprise selection. The results will be of immense use to the financial institutions in fixing the scale of financial and of repayment.

Government of India included Latur district in as 'Kesar mango export zone'. Hence, the present study covers the economics of production and identifies the problem faced by the Kesar mango growers in its cultivation. It envisages suggesting possible corrective measures to bring about the desired improvement in production and marketing of Kesar mango.

The study was under taken with the following specific objectives

1. To know the socio-economic characteristics of Kesar mango grower
2. To estimate cost and returns of Kesar mango garden

3. To examine the input output relationship and resource use efficiency in Kesar mango
4. To study the financial feasibility of Kesar mango garden
5. To identify the various constraints and suggestion of Kesar mango growers in Kesar mango production



# REVIEW OF LITERATURE



## CHAPTER – II

### REVIEW OF LITERATURE

It is always worthwhile to study the work done on various aspects related to the present study by different research workers. It helps to have clear idea in respect of concepts used; methods employed in analysis and interpretation of data collected. This chapter is divided into four heads as under.

- 2.1 Socio-economic characteristics
- 2.2 Costs and returns
- 2.3 Input – output relationship and resource use efficiency
- 2.4 Economic feasibility
- 2.5 Constraints and suggestions

#### **2.1 SOCIO-ECONOMIC CHARACTERISTICS**

Kothekar (1980) worked on socio-economic study of village Sarolla (Kh.) in Pathri taluka of Parbhani district. The result was obtained that the average size of family in village was 6 persons per family. The proportion of literate persons was 26 per cent and 74 per cent, respectively.

Sogekar (1989) studied an impact of training and visit system on farmers economy. He studied socio-economic characters of selected farmers and result revealed that the average family size of contact farmer was 5.06 persons of which share of male was 35.38 per cent followed by female (23.72 per cent) and share of child was 40.90 per cent while the average family size of non contact farmer was 4.58 persons of which contribution of male, female and child was 36.89 per cent, 22.75 per cent and 40.36 per cent, respectively.

Chikhale *et al.* (1996) studied factors influencing adoption of orange production technology by the growers. The present study was confined to Achalpur and Chandur Bazar panchayat Samiti of Amaravati district of Maharashtra state. Ten villages each having an area of 75 ha under orange orchard were selected purposefully. From these 20 villages, a sample of 200 oranges collected interview method. The result

revealed that majority of the orange growers were middle age (59.50 per cent), educated up to high school level (60.50 per cent), having medium level of orange growing experience (82.00 Per cent), medium farmers (64.00 Per cent) having annual income over Rs. 45,000 (51.50 per cent) with middle socio-economic position in their village (98.50 per cent) and medium level social participation (42.00 per cent), economically motivated and management oriented to the medium extent (75 and 71 per cent) respectively with medium level of infrastructure (62.00 per cent) and access to the various sources of information to the medium extent (63.50 per cent)

Nagargoje (2000) conducted a study on economic analysis production and marketing of banana in Marathwada region (M.S.) and observed that, average size of family comprised 6.91 members and majority of the heads of the respondent families belonged to middle age (48.89 per cent) followed by young (37.22 per cent) and old (13.39 per cent), respectively. Study revealed that, the higher number of respondents had their level of education up to primary followed by secondary and up to graduation.

✓ Kadrekar (2001) conducted a study on economics of production and marketing of sweet orange in Marathwada region. The study revealed that, the most of sweet orange growers were in middle age group that was 56.66 percent. It was observed that about 57.78 percent of sweet orange growers were educated at high school level, while 23.34 percent growers were illiterate and 18.80 were educated at college level. It was observed that most of sweet orange growers (45.56) had 6 to 10 family members. On an average size of sweet orange garden were 2.96 ha.

✓ Katkar (2001) observed that a majority (45.33 per cent) of the mango growers from Akole tahsil of Ahmednagar district received primary education followed by secondary education (28.00 per cent) and very few (7.34 per cent) of them had received higher education, while (19.33 per cent) of them were found illiterate.

✓ Dhakane (2005) revealed that most of grape grower (81.33 per cent) from Barshi tahsil of Solapur district had received formal education. The proportion of respondents who received primary education was largest (46.00 per cent). This was followed by those who received secondary level of education i.e. 27.34 per cent very

few (8.00 per cent) respondent had received higher education .however about 18.66 per cent of respondent could not avail 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 per cent). He noticed that, about (44.44 per cent) with lower education up to 10<sup>th</sup> standard and having family size of 1 to 5 members (42.22 per cent) majority of papaya growers (37.77 per cent) had papaya garden with size of 19 hectares about 64.40 percent had papaya growers and main occupation as agriculture and regard 1-3 livestock on farm.

Raut (2006) conducted study on production constraints of orange cultivation in Nagpur district of Maharashtra. For socio-economic characteristics of orange grower he was selected 3 tehsils of 2 villages for the study. Thus total 90 samples selected. From study he concluded that, the majority (53.33 per cent) of the orange growers were middle aged followed by old age (30.00 per cent) and young age (16.67 per cent), respectively. With respect to the education that majority (87.78 per cent) of orange growers was literates and remaining 12.22 per cent was illiterate.

Most of the researchers studied impact of socio-economic characteristics on the adoption knowledge / productivity by using tabular as well as multiple regression analysis.

## **2.2 COST AND RETURNS**

Kahlon and Randhawa (1960) studied the higher profit margin for citrus grower. The Indian Citrus growers is not aware of the fact that they get only 30 or 35 per cent of the price money and that 70 per cent goes in the pocket of traders. They concluded that in Abohur, a grower received Rs.3225 for his produce of 7 acres, while it was sold to consumer for some amounting to Rs.12660.50. The grower's shares in consumers rupee was only 26.3 per cent and the contractors reaped a profit of 73.7 per cent amounting to Rs.3480.50.

Sharma and Pandey (1972) studied the costs and net profits from guava orchard in Uttar Pradesh. The cost of raising guava orchard was estimated at Rs. 3,964.82 per

hectare in the first year. The maintenance costs amounted to Rs. 589.49 per hectare per year. The net return from the inter crops during the three year period worked out to Rs. 6,287.50 per hectare. It was observed that the guava orchard generated a net return of Rs. 6,500.00 per hectare.

George and Gupta (1974) examined the profitability of Nagpur santra cultivation. Excluding the land cost, investment in this project has been Pay Back Period of 7 to 9 years and Internal Rate of Return of 29.3 to 45.9 per cent depending upon size of garden. The net present value and benefit cost ratio even at a high discount rate 12 per cent varies from Rs. 4260 to Rs.7910 acre and Rs.1.85 to 2.64, respectively. Orange grower need not be replanted until it gives fruit yielding Rs.529 per acre in garden of up to one acre.

Krishna Murthy *et al.* (1978) studied the economics of production and marketing of co-org mandarin oranges in Karnataka and found that the pre-harvest contractors made a net profit of Rs. 25.06 per thousand fruits and incurred expenses of Rs. 24.24 commission charges which were Rs. 10.71 per thousand fruits formed 44.18 per cent of the total marketing cost. Harvesting and transportation costs were the other important items of marketing costs. The grower received Rs. 57.89 per thousand fruits.

Subrahmanyam and Mohandass (1982) estimated the costs and returns from coorg mandarin oranges in Karnataka. They found that the mandarin orange tree requires seven year to establish and starts bearing from eight year. The average cost of maintenance from the eight year on words was found to vary from Rs.65.00 to Rs.590.00 with an average of Rs.370.00 per acre. The per acre returns ranged between Rs.219.00 and Rs.3,000.00. The average gross return per acre was found to be Rs. 992.00.

Sunderesan and Thanasekaran (1984) studied production and marketing of grapes in Madurai district of Tamilnadu. The study revealed that on an average cost was Rs. 49,467 per hectare were required for establishing vines up to bearing stage of which operation and maintenance costs amounted to be Rs. 26,658. The cost of production of grape was Rs.1.58 per kg for the first four years, Rs. 1.80 from the fifth to eighth year and Rs. 2.29 per kg after eighth year.

Malave (1990) studied the cost of cultivation of mango. The over all per hectare cost of cultivation was Rs.13,631.70 and Rs. 5,802.14 was marketing cost, out of marketing cost of production 17.64 per cent (Rs 3,429.10 per hectare) was incurred on human labour 7.85 per cent was on manures and fertilizers and 5.19 per cent on plant protection. The benefit cost ratio in bearing mango orchard was 1.58.

Raikar (1990) studied investment in production and marketing of cashew in Karnataka. The study revealed that, the per annual maintenance cost of cashew plantation was higher on small size (Rs. 1,674.17) plantation compared to large size plantations (Rs.1,303.65). The per hectare gross returns over maintenance cost was highest (Rs. 3,787.61) on small farms compared to large size plantations (Rs. 2,919.84). The gross returns were Rs. 3,234.32 for the overall size group of plantations. The net return over total cost was found to be Rs. 1,487.42, Rs. 800.77 and Rs. 1,049.61 on small, large and overall size groups of plantations respectively.

Adokar (1995) studied on economic analysis of orange production in Amaravati district of Maharashtra State. He studied the total cost for establishing the orange orchard up to the five year age was Rs.52452.67 per cent share to total at each year ranges from 17.18 percent to 30.93 percent and maximum cost of establishment was observed in planting from first year i.e. Rs.16224.42 and minimum second – third year age group i.e. Rs.9015.11.

Deoghare *et al.* (1999) studied economics of drip irrigation system in production of banana. The present study was undertaken in Seloo tehsil of Wardha district during 1995-96. with the objective of comparative economics of drip irrigation over conventional system of respect of banana cultivation. Study pertains to 24 banana cultivars under each category. The result revealed that cost-c was Rs. 78174.12 and Rs. 86644.05 in drip and conventional irrigation system, respectively. The data reveals per hectare gross returns of Rs. 1,37,600 and Rs. 1,75,895.49 for conventional and drip irrigation respectively. Net return at cost C in respect of conventional irrigation system were Rs. 50,955.95 and for drip irrigation system Rs.87,721.37. The per quintal cost of production for conventional irrigation and drip irrigation system was Rs. 122.93 and

Rs. 113.80 respectively. Indicating low cost of production and higher profitability of drip irrigation system over conventional one.

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.2,58,750.70 and net return of Rs.146791.94.

Naphade and Tingre (2008) studied the economics of production and marketing of guava in Buldhana district of Maharashtra. They selected five tehsils of Buldhana district namely Buldhana, chikhali, mehakar, lonar and deulgaon. They used simple tabular analysis and the standard cost concept i.e., cost A, cost B and cost C were used to work out the cost of cultivation of guava. This study revealed that the per hectare cost of establishment of guava orchard was Rs. 34,333.00. The per hectare cost of production was Rs. 22,522.00. per hectare average yield estimated was 372 quintals with a profit of Rs. 80,036.00 per year. It was found that profit was increasing with the age orchard.

Most of the researchers estimated different costs, viz. cost A, cost B and cost C.

### **2.3 INPUT - OUTPUT RELATIONSHIP AND RESOURCE USE EFFICIENCY**

Koujalagi and Kunnal (1992) examined the resource use efficiency in cultivation. Cobb-Douglas type of production function was used. The variables considered were, land, number of plants per acre, labour, plant protection chemicals, irrigation and manures and fertilizers. The functional analysis revealed that 70 per cent of the variation in gross return was explained by the six independent variables included in the model. The regression coefficients of land, labour, manures and fertilizers indicated that contribution of these inputs to gross income was significant, but the regression coefficients of number of plants per acre and plant protection chemicals were negative and non significant. The marginal value productivities of inputs

indicated that labour, irrigation and plant protection chemicals were used efficiently, while manures and fertilizers were used optimally.

Lalith achoth (1978) studied the economics of tea production in Nilgiris district of Tamilnadu. Employed Cobb-Douglas type of production function separately for large and small estate groups where in the considered the yield in kilograms as dependent variable and area under tea, expenditure on plucking and tipping, expenditure on fertilizers, expenditure on plant protection and herbicides, expenditure on labour and over heads as independent variables. The production function analysis revealed that the coefficients of only two variables in large estates namely area under tea (0.68053) and expenditure on plucking and tipping (0.35192) were found to be significant at 5 per cent level and variables like land and expenditure on plucking and tipping were significant in case of small estate groups.

Khan (1983) studied on comparative economics of sweet orange, mandarin orange and sour lime in Marathwada region. For study on resource use productivity he used Cobb Douglas Type of production function. He concluded that the age of plant is significant for mandarin orange with a MVP as 797.89. In sour lime the MVP calculated for manures and fertilizers was 15.57 and 10.00, respectively. Also he concluded that in mandarin orange an unit increase in the age of plant increases a total income of Rs.797.89. For sour lime an unit increase in the expenditure on the use of manures and fertilizers increases total income of Rs.15.57 and Rs.10.00, respectively.

Dayanand and Hiremath (1995) undertaken a study in Bijapur and Indi talukas of Bijapur district in Karnataka state on resource use efficiency in ber orchard. The Cobb-Douglas production function analysis revealed that the regression coefficient of fertilizer in small orchard farm and fertilizer in large orchard were negative, implying that reduction in their use in respective orchard. The regression coefficient for land is positive and significant in both the size of groups. The MEP to MFC ratio for land was also more than unity in both the size of groups indicated that there is a scope for increasing profit by increasing the area under ber in both the size of groups. The five variables in the function explained about 52 and 87 per cent variation in ber production in small large orchards respectively.

Mane and Vijaykumar (1996) comparative economic analysis was conducted for the profitability of grape cultivation using drip irrigation and the traditional method of irrigation. The study was conducted in three tehsils of Latur district. The data for 1991-92 were collected by means of personal interviews with a samples of 80 cultivators (40 using drip and 40 using the traditional method of irrigation). Profitability of grape cultivation was Rs.15964 per hectare higher for drip irrigation than for the traditional method of irrigation due to savings in cost of labour, manures, fertilizers and plant protection chemicals. Adoption of drip irrigation resulted in labour displacement of 207 man days per hectare.

Bansode (2001) studied on economics of production of fig in Aurangabad district of Maharashtra. He analysed that the mean use of male labour days were 58 days per hectare as against 98 days for the female. The MVP (Marginal Value Product) for the male labour use was Rs.1001.5 as against marginal cost Rs.50. The MVP of female labour use was Rs.376.3 as against the marginal cost Rs.25 per day. The MVP for use of N was Rs.44.44 against the expenditure 9.56 per kg. thus it can be concluded that use of male and female labour and nitrogen can substantially be increased to achieve desirable level of production by increasing the average consumption of these variables considerably low as compared to recommended.

Verma *et al.* (2004) studied the economic analysis of production, resource use efficiency and constraints of onion in Indore district of Madhya Pradesh. A multi-stage sampling technique was adopted for data collection. The Cobb – Douglas production function which gave the best fit was selected to establish the input–output relations per farm as dependent variable eight inputs as independent variables. The marginal value product (MVP) of each input was worked out at its geometric mean level of inputs. The study reveals that, all farms were utilizing, human labour, bullock labour, machine power, seed, manures and fertilizers, irrigation and plant protection excessively on the farms. The negative marginal value product of bullock labour and plant protection, which were available in abundance on all farms, was used excessively and inefficiently. Hence, there is lot of scope for increasing the use of these inputs up to the optimal level in order to achieve their efficient use.

Singh and Singh (2008) studied the economics of production and marketing of mushroom in Haryana. The study was conducted in Sonapat and Gurgaun districts of Haryana during 2003-04. They used break even point (BEP) of output was calculated. The average mushroom production amongst small, medium, and large growers was 2639, 6978 and 21910 kg., respectively. Furthermore, the gross return ranged between Rs.88202 and Rs.735100 across categories of farms. The average returns were computed to be Rs.351567 with the average mushroom production of 10509 kg and with average selling price of mushroom being Rs.33.37. the gross return increased with the increase in the quantity of compose used. The net returns from mushroom production, which ranged between Rs.33519 and Rs.333792 across from farm categories, also increased with the increase in size of the farm. This study revealed that the use of compost had positive relationship with the farm size. There existed a positive relationship between the mushroom production and farm size.

For studying input-output relationship and resource economics, most of the researchers used tabular analysis as well as the Cobb – Douglas production function.

#### **2.4 ECONOMIC FEASIBILITY**

Upton (1966) applied discounted cash flow technique to compare the returns from investment on tree crops with returns from annual crops in western Nigeria. He discounted the expected future returns from new varieties of cocoa, oil palm and rubber over 32,35 and 53 years, respectively to arrive at net present worth. This was compared with returns per acre from annual crops like cotton, rice, maize, sorghum and tobacco. The analysis indicated that with the exception of rubber, all other crops showed a lower return than the annual crops and therefore it was concluded that use of land for tree crops was less profitable when compared with the use of land for annual crops.

Gangawar (1982) conducted a study on economic feasibility of ber cultivation in Haryana. The study revealed that, the investment in ber orchard in Haryana was profitable proposition in the area where irrigation water was scare. Capital cost of ber orchard is recoverable in a period of six years and ber crop provide regular net income

of Rs.1500 per hectare per annum. The benefit to cost ratio showed on investments of Rs.1 in ber would fetch return of Rs.3.

Patil and Kumar (1986) they studied the economic viability of investments in alphanso mango plantations in Ratnagiri district of Maharashtra. Considering 72 orchards from six villages. The study revealed that, the capital investment in alphanso mango plantations was an economically viable proposition. The benefit cost ratio was (21.78) the internal rate of return was higher than interest rate of bank (18 per cent) and pay back period was 10 years.

Subrahmanyam (1987) studied the costs and returns of mango orchards in Karnataka. It was observed that on an average the establishment of mango orchards required Rs. 3000 per hectare. The maintenance cost of mango orchards was only Rs. 200 per hectare. The gross return from a hectare of mango orchard was Rs. 1200 in Karnataka. As indicated by the study the payback period was 11 years. Internal rate of return was 30 per cent and B:C ratio was to indicating that the investment was profitable.

Azad and Sikka (1991) in their study on production and marketing of temperate fruits applied project evaluation measures to study the economic viability of fruits such as apples, peaches, plums and apricots. The net present value was Rs.26257 for apples. Rs.89,222 for peaches. Rs.1,17,837 for plums and Rs.160541 for apricots. The internal rate of return were 22, 33 and 47 per cent respectively. The benefit cost ratios were 1.36, 3.87, 4.62 and 5.10.

Koujalagi. (1995) undertaken study on financial feasibility of investment in pomegranate orchards in Bagalkot taluka of Bijapur district of Karnataka. The total size of the sample selected for his study was 70. The financial feasibility of investment in pomegranate orchard was judged by computing the net present value, benefit cost ratio, pay back period and internal rate of return. The net present value of pomegranate orchard at 12 per cent discount rate was Rs.8283.81 per acre. The benefit cost ratio at 12 per cent discount rate was 1.53 which is greater than one. The pay back period worked out to be 6.56 years and internal rate of return was 15.55 per cent. It was

clearly indicated that investment in pomegranate orchard was financially sound and economically viable.

Dayanand *et al.* (1996) conducted study on economic feasibility of ber cultivation in Karnataka. Seventy six ber cultivators were collected to examine the financial feasibility of ber production. The financial measures of project evaluation such as net present value, benefit cost ratio, internal rate of return and pay back period were employed besides sensitivity analysis. They analysed that the net present value, benefit cost ratio, internal rate of return and pay back period were employed besides sensitivity analysis. They analysed that the net present value and benefit cost ratio of ber orchard at 14 percent discount rate was varies from Rs2,155,059 to Rs 2,69,114 for small, Rs.2,51,450 to Rs 3,52,010 for large orchard, respectively. Internal rate of return of one hectare of ber orchard was found to be high as 53.9 percent in small and 61.9 percent in large orchard. The capital cost of ber orchard is recoverable in a period of 3.85 years in case of small and 3.62 years in large orchard. Orchard was found to be high as 53.9 percent in small and 61.9 per cent in large orchard. The capital cost of ber orchard is recoverable in a period of 3.85 years in case of small and 3.62 years in large orchard.

Sharanesh *et al.* (1997) studied on economic feasibility of grape cultivation in Bijapur district of Karnataka. For the study 80 samples of grape grower were selected and they were classified into four categories namely, the farmers who have adopted spacing (6' x4') and spacing (6'x6') under pandal system and spacing 111(9'x5')and spacing (9'x7') under telephone trellis system of training. The financial feasibility measures like net present value, benefit cost ratio and internal rate of return were high and pay back period was minimum. The net present values were Rs.10,96,393.13 in I, Rs.7,50,800.75 in II, Rs.5,84,859.12 in III and Rs.5,08,597.60 in IV training system. The benefit cost ratios were 2.03. 1.82. 1.78 and 1.76 for spacing I, II, III and IV, respectively. The internal rate of return were 54.09, 49.26, 48.44 and 46.22 per cent, respectively for different spacing at 15 per cent discount rate. The pay back periods were 2.7, 3.2, 3.1 and 3.2 years for I, II, III and IV spacing.

For economic feasibility analysis, the measures of project evaluation such as net present value, internal rate of return, pay back period and benefit cost ratio were employed besides sensitivity analysis.

## 2.5 CONSTRAINTS AND SUGGESTIONS

Dahiya and Bhatia (1989) analyzed the potato exports and revealed that inadequacy of cold storage capacity and transport bottlenecks along with non-availability of refrigerated shipping tonnage capacity as main obstacles in promotion of potato exports.

Govinda Reddy *et al.* (1997) studied the constraints in production and marketing of mangoes: A case study in Srinivaspur region. The data for the study were collected by the survey method from a sample of 200 mango growers by the personal interview method. Based on the largest area and production of mangoes three tehsils namely Srinivaspur, Chintamani and Kolar were selected to study the production aspects. The study revealed that, the major constraints faced by the mango growers at the production level in the study area were lack of application of recommended fertilizers, irrigation, heavy rains, winds and hail storms during the flowering and fruit development stage and non-availability of credit and high cost of inputs.

Ahire *et al.* (1999) studied by selecting 150 growers in Bhokardan taluka which had the highest area under grape in 1996-97. The data were collected with the pre-tested interview schedule by personally contacting growers. The constraints in the use of technology as reported by grape growers were non-availability of varietal cutting susceptibility of varieties to pest and diseases, non-availability of required fertilizer mixture, costly pesticides and growth regulators, preparation of recommended concentration of growth regulators is killed job, non-availability of near by market and transport facilities and high rate of commission agent.

Khot *et al.* (1999) studied the knowledge of grape growers about the standards specified for production of quality grape was conducted in Dhule district of Maharashtra state. The study concluded 40 grape growers drawn randomly from the grape cultivars of Dhule district. The data were collected by using pre-structured

interview schedule. The study revealed that, the majority of grape growers did not possess the knowledge about high cost of production, lack of infrastructure facilities, non-availability of skilled labour and lack of guidance about quality parameters were the major constraints reported by the grape growers in production of quality grapes.

Hymajyothi *et al.* (2003) analyzed the onion exports and revealed that phytosanitary problem, lack of demand from importing countries, lack of export promotion measures and lack of infrastructural facilities are the major obstacles in export of vegetables.

Khunt *et al.* (2003) studied the economics of production and marketing of pomegranate. The Bhavnagar district of Gujarat having maximum area under pomegranate crop in the Saurashtra region was selected purposively for the study. In all 52 pomegranate growers, 48 from Bhavnagar and 4 from Umralla tehsils were selected for the study. The study revealed that the problems faced by the pomegranate growers of Bhavnagar district are as follows difficulties faced in initial stage of orchard that was dying of young plants, inadequate irrigation facility, problems of electricity supply, lack of knowledge about plant protection and low price of marketing problem. By using tabular analysis method constraints were analysed.



# **METHODOLOGY**

## **CHAPTER –III**

### **METHODOLOGY**

Methodology is of vital importance in the economic study. It includes salient feature of study area, sampling design, analytical techniques as well as terms and concepts used in the study.

#### **3.1 SALIENT FEATURE OF LATUR DISTRICT**

Salient feature consist with location, soil, climate, population and cropping pattern of district. There aspects are described as fallows.

##### **3.1.1 Location**

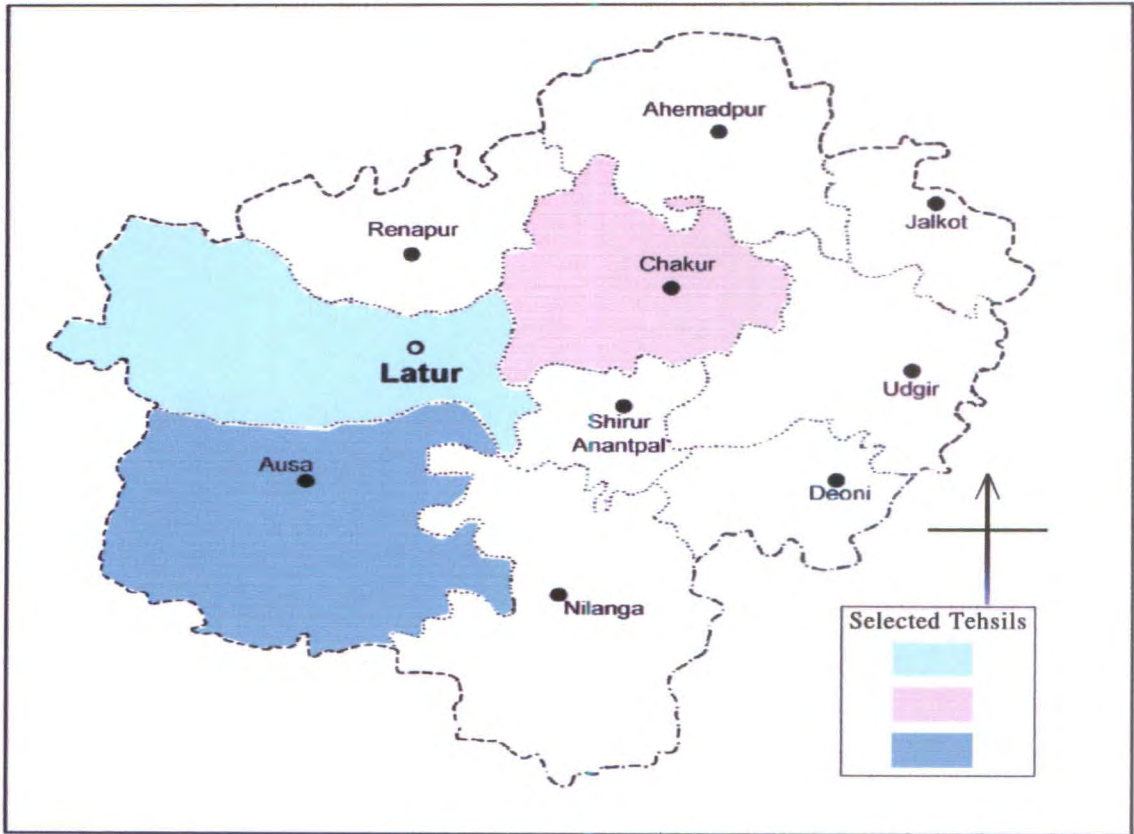
Location of Latur district is at the South-East of Marathwada region. Its geographical area is 7,157sq.km. Latur district is situated between 17°52' to 18°50' North latitude and 16°12' to 77°18' East longitude. The counter of district is irregular. It is situated on North on North East fringes of Maharashtra. It is one of the district of Marathawada region and lies in the Manjara basin.

##### **3.1.2 Soils**

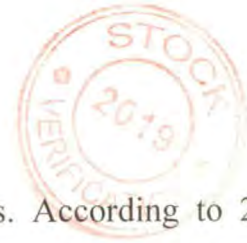
Latur district has alluvial to laterite soil and the soils of selected AUSA, Chakur and Latur tehsil are highly moisture retaining capacity and well drained soils.

##### **3.1.3 Climate**

Climate of Latur district is subtropical. The rainy season which is from June to September are warm and pleasant, during it the temperature normally ranges between 20<sup>0</sup> to 30<sup>0</sup>C. The winter season is comparatively dry and it is from October to January. January is the coldest month of year. The hot dry season is from February to May and ends in May. The maximum temperature is in the month of May it rises even as high as 40<sup>0</sup> C. During summer the hot days are dry and semi-hot and nights are fairly cool. The minimum temperature recorded is 12.1<sup>0</sup> C. The average rainfall of district is 750-1000 mm.



**Fig. 3.1 Map of Latur District**



### **3.1.4 Population**

Latur district has 10 tehsils, 5 towns and 945 villages. According to 2001 census the population of Latur district is 20.80 lakh which contributes about 2.15 per cent. The total literacy percentage of Latur district is 72.34 per cent in which male literacy is 83.63 per cent and female literacy is 60.28 per cent to total literacy.

### **3.1.5 Cropping pattern**

In Latur district the total geographical area was 7.15 lakh hectares out of these 6.65 lakh hectares (92.99 per cent) area was cultivated. This district leads in Mango, grape, papaya, guava, pomegranate and sugarcane as a cash crop. In kharif, jowar, tur, mung and udid are major crops. In winter season wheat, gram and rabi jowar are major crops. In summer season under irrigated condition groundnut and other vegetable crops are taken.

## **3.2 SAMPLING DESIGN**

Multistage sampling design was adopted for selection of district, tehsil, villages and Kesar mango growers. In the first stage, Latur district was purposely selected for present study because of favorable climate to grow the Kesar mango crop and also comes under export zone for Kesar mango. At second stage three tehsils of Latur district was selected on the basis of highest area under Kesar mango. In the third stage from each selected tehsils two villages were selected on the basis of highest area under Kesar mango. The selected villages were namely Sonvati, Bori, Savargaon, Chakur, Vaijapur and Belkund. At the fourth stage 10 Kesar mango growers were selected at random from each village. Thus in all 60 Kesar mango growers were selected at randomly.

Data were collected from the sampled Kesar mango growers by personal interview method with the help of pre-tested schedule. The information on various item like Kesar mango yields, price of Kesar mango, quantity of inputs and its value were collected for the year 2007-08.

### 3.3 ANALYTICAL TECHNIQUES

Tabular analysis, Cobb-Douglas production function analysis, discounted cash flow technique, frequency and percentage method were used to analyse the data in present study.

#### 3.3.1 Tabular analysis

The first objective like socio-economic characteristics of Kesar mango growers was achieved by application of tabular analysis as well as linear functional analysis.

$$Y = f(x_1, x_2, x_3, \dots, x_n)$$

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + \dots + b_nx_n$$

Tabular analysis comprised to arithmetic means, percentages and ratios. This method was also used to determine the cost and returns of Kesar mango cultivation.

#### 3.3.2 Cobb-Douglas production function analysis

On the basis of goodness of fit ( $R^2$ ), Cobb-Douglas type of production function was used to determine the resource productivity in Kesar mango production. The data were, therefore, subjected to functional analysis by using the following form of equation.

$$Y = ax^{b_1} x^{b_2} x^{b_3} \dots x^{b_n} e^u$$

In this functional form 'Y' is dependent variable, 'X'i showed independent resource variable, 'a' is the constant representing intercept of the production function and 'b'i indicated the regression coefficients of the respective resource variables. The regression coefficients obtained from this function directly represent the elasticities of production which remain constant throughout the relevant range of inputs. The sum of coefficients i.e. 'bi' indicates the nature of returns to scale. This function can easily be transformed into a linear form by working logarithmic transformation: After logarithmic transformation, this function is

$$\text{Log } Y = \log a + b_1 \log x_1 + b_2 \log x_2 + \dots + b_n \log x_n + a \text{ loge}$$

The main consequences of multicollinearity area (a) the sampling variances of the estimate coefficients increases as the degree of collinearity increase between the explanatory variables (b) estimated coefficients may become very sensitive to small

changes in data i.e. addition or deletion of a few observations produce a drastic change in some of the estimates of the coefficients. Sometimes it so happens 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.

$$\hat{Y} = aX_1^{b_1} \cdot X_2^{b_2} \cdot X_3^{b_3} \cdot X_4^{b_4} \cdot X_5^{b_5} \cdot X_6^{b_6} \cdot X_7^{b_7} \cdot X_8^{b_8} \cdot X_9^{b_9} \cdot X_{10}^{b_{10}}$$

Where,

$\hat{Y}$  = estimated yield of the crop in q per farm

a = intercept of production function

$b_i$  = partial regression coefficients of the respective resource variable ( $i = 1, 2, 3, \dots, 10$ )

$X_1$  = area under Kesar mango garden (ha/garden)

$X_2$  = hired human labour (man day/garden)

$X_3$  = bullock labour (pair days/garden)

$X_4$  = machine labour (hours/garden)

$X_5$  = manures (q/garden)

$X_6$  = nitrogen (kg/garden)

$X_7$  = Phosphorus (kg/garden)

$X_8$  = potash (kg/garden)

$X_9$  = insecticide (kg or lit /garden)

$X_{10}$  = Irrigation ( $m^3$  /garden)

$R^2$  is coefficient of multiple determinations. 't' value for  $R^2$  was tested at (n-1) degree of freedom. Intercept (a) is the mean of Kesar mango production obtained in the absence of selected variables and regression coefficients were tested for significance by applying 't' test at n-k-1 degree of freedom where 'k' are explanatory or independent variable and 'n' be number of observations or number of Kesar mango growers.

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

Where,

$b_i$  = Regression coefficient of  $i^{\text{th}}$  independent variable.

SE ( $b_i$ ) = Standard error of  $i^{\text{th}}$  independent variables.

### 3.3.3 Measures of productivity and resource use efficiency

#### i) Marginal product (MP)

Cobb-Douglas production function allows constant, increasing or decreasing marginal productivity. The marginal product equation is as:

$$MP = \frac{dy}{dx} = bax^{(b-1)} = \frac{bax^b}{X} = b \frac{Y}{X}$$

Marginal value of productivity resource indicates the addition of gross value of farm production for a unit increase in the  $i^{\text{th}}$  resource with all other resources fixed at their geometric mean levels. The MVP of different input factors is worked out by the following formula.

$$MVP = b \frac{\bar{Y}}{\bar{X}} P_y$$

Where,

$b$  = Regression coefficient of particular independent variable.

$\bar{X}$  = Geometric mean of particular independent variable.

$\bar{Y}$  = Geometric mean of dependent variable.

$P_y$  = Price of dependent variable.

#### ii) Elasticity of production (EP)

$$E_p = bax^{(b-1)}$$

### 3.3.4 Discounted measures of project worth

When costs and benefits fall during the life of the project differ from one another. The most common means of doing this is to subtract year-by-year, the costs from the benefits to arrive at the incremental net benefit stream, the so called cost flow and then to discount that this approach will give one of three discounted cash flow and then two discount cash flow measures of project worth. The net present worth, the internal rate of return or the net benefit investment ratio. Another discounted measure of project worth is to find the present worth of the cost and benefit to streams separately and then to divide the present worth of benefit stream by the present worth of the cost stream to obtain the benefit cost ratio. Because the benefit and cost streams are discounted the benefit cost ratio is a discounted measure of project worth. But because the benefit and cost streams are discounted separately than subtracted than from one another year by year, the benefit cost ratio is not a discounted cash flow technique.

Incremental net benefit can be derived as under. When use consider a project, we see it as earning of a gross benefit stream from which we must deduct the capital investment and the operating cost what is then left over is residual that is available to recover the investment made in project (the return of capital) and to compensate for the use of resource invested in the project) the return to or an capital). This residual is the net benefit stream. The net benefit flows was distinguished from the profit of the business partly by the fact the no allowance for the depreciation was taken from the benefit stream, which thus included all the cash generated. The measure characteristic of the incremental net benefit stream or incremental cash flow is that it includes, without differentiation, both the return of capital at the return to capital. The definition of the incremental net benefit or incremental cash flow applies specifically to investment analysis.

#### I) Net present worth (NPW)

The most straight forward discounted cash flow measure of project worth is the net present worth (NPW). The Net present worth (NF

finding the difference between the present worth of benefit stream less the present worth of cost stream. Net present worth (NPW) may be interpreted as the present worth of the income stream generated by an investment. Although the net present may be computed by subtracting the total discounted present worth of the cost stream from that of benefit stream, it is easier and useful practice to compute it by discounting the incremental net benefit stream or incremental cash flow.

## II) Internal rate of return (IRR)

Another way of using the incremental net benefit stream or incremental cash flow for measuring the worth of a project to find the discount rate that makes the net present worth of the incremental net benefit stream or incremental cash flow equal zero. This discount rate is called the internal rate of return. It is the maximum interest that a project could pay for resources used if the project is to recover its investment and operating cost and still break even.

There is no formula for finding the internal rate of return. We are forced to resort to a systematic procedure to trial and error to find the discount rate which will make the net present worth of the incremental net benefit stream equal zero. The rule for interpolating the value of the internal rate of return lying between discount rate too high on the one side and too low on other is:

$$IRR = (Low\ discount\ rate + difference\ between\ two\ discount\ rates) \times \frac{Present\ worth\ of\ incremental\ net\ benefit\ stream\ (cash\ flow)\ at\ lower\ discount\ rate}{Sum\ of\ present\ worths\ of\ incremental\ net\ benefit\ stream\ (cash\ flow)\ at\ two\ discount\ rates\ (signs\ ignored)}$$

## III) Benefit Cost Ratio (BCR)

A third discount measure of project worth is the benefit cost ratio. This is the ratio obtained when the present worth of the benefit stream is divided by the present worth of the cost stream.

In practice, it is probably more common not to compute the benefit cost ratio using gross cost gross benefit, but rather to compare present worth of the net benefit present worth of the investment cost plus operation and maintenance cost. More specifically, the ratio is computed by taking present worth gross benefit less “associated” cost and then comparing it with present worth of “project economic cost”. The associated cost is the value of goods and services over and above those include in

project cost needed to make the immediate produce or services of the project available for use or sale. Project economic cost is the sum of installation costs, operation, maintenance and replacement costs and induced costs.

#### **VI) Net benefit- investment ratio (N/K ratio)**

The net benefit- investment ratio is simple to determine when an incremental net benefit, or cash flow, has been calculated for the project. This is so because the net benefit may taken to be the net present worth of the incremental net benefit stream in those years after the stream has turned positive and investment may taken to be the present worth of the incremental net benefit stream in those years of the project when stream has negative. Thus to calculate this measure, simply divide the sum of the present worth after the incremental net benefits early years of the project. The reasons for calculating the net benefit- investment ratio in this manner is that we are interested in an investment measure that selects projects on this basis of return to investment during the initial phases of a project (Gittinger, 1982).

The formal mathematical statements of discounted measures of project worth discussed in early part are given below.

$$\text{Net present worth} = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t}$$

$$\text{Internal Rate of Return (IRR)} = \sum_{t=1}^n \frac{B_t - C_t}{(1+i)^t} = 0$$

$$\text{Benefit cost ratio} = \frac{\sum_{t=1}^n \frac{B_t}{(1+i)^t}}{\sum_{t=1}^n \frac{C_t}{(1+i)^t}}$$

$$\text{Net benefit investment ratio} = \frac{\sum_{t=1}^n \frac{N_t}{(1+i)^t}}{\sum_{t=1}^n \frac{K_t}{(1+i)^t}}$$

In this four mathematical formulations,

$B_t$  = Benefit in each year

$C_t$  = cost in each year

$N_t$  = incremental net benefit in each year after stream has turned positive

$k_t$  = incremental net benefit in initial years when stream is negative

$t = 1, 2, \dots, n,$

$n$  = number of years

$i$  = interest (discount) rate

### **3.4 TERMS AND CONCEPTS USED**

#### **3.4.1 Items of Cost**

In present study the cost of cultivation was worked out by using the cost concept such as cost-A, cost-B and cost-C were used. cost-A includes the items of cost like hired human labour, bullock labour, machine labour, manure, fertilizer, plant protection, irrigation, land revenue, incidental expenditure, interest on working capital and depreciation on asset. Then, Cost-B consists with cost-A plus, rental value of land and interest on fixed capital and amortised establishment cost, Cost-C includes the cost -B plus, imputed value of family labour.

#### **3.4.2 Measurement and evolution of cost items**

##### **i. Hired human labour**

Hired human labour was measured in man day. One man day consists with 8 hours. Labour cost evaluated at the rate of Rs 80 per day for male and Rs.60 per day per for female. The female labour was converted into man days to multiplying to number of female with 0.75.

##### **ii. Bullock labour**

Hired bullock labour charges were considered for 8 hours a day, actually paid in the locality. Family bullock labour charges accounted equal to the charges paid to the hired bullock labour. For the present study, hired bullock charge was charged at the

rate of Rs.150.00 per day for one bullock pair.

**iii. Machine labour**

Machine labour in case of owned machine was evaluated as per the hired charges prevailed in the village and in case of hired machine that was Rs.270 per hour.

**iv. Manure**

Manure produced on the own farm was evaluated at the rate prevailed in village. The cost of purchased manure was accounted according to the price paid by cultivators. One cartload of manure was considered as four quintals and its prevailing price was Rs.50 per quintal.

**v. Fertilizers**

Fertilizers in the form of urea, diamonium phosphate (DAP), Single Super Phosphate (SSP) were used and quality of nitrogen, phosphorus and potash was calculated in order to determine the actual expenditure on nitrogen, phosphorus and potash. The rate prevailing in the market for nitrogen phosphorus and potash was Rs.10.86 per kg, Rs.22.25 per kg and Rs.8.33 per kg, respectively.

**vi. Plant protection**

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

**vii. Irrigation charges**

Electricity bill of electric motor which was used to draw irrigation water was charged in proportionate to the area under irrigated crops.

**viii. Land revenue**

It includes land revenue and other relevant taxes, which were actually paid by the Kesar mango growers.

**ix. Incidental expenditure**

It includes minor repairs, refreshing charge and other expenditure in regard to Kesar mango growers.

**x. Interest on working capital**

Interest on working capital was charged at the rate of 10 per cent on items of expenditure as hired human labour, bullock labour, machine labour, manure, fertilizer, plant protection, irrigation, land revenue and incidental charges for crop duration. (one year period).

**xi. Depreciation of asset**

Depreciation means the decrease in the value of asset through wear and tear. 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 were taken for the crop on hectare basis.

**xii. Rental value of land**

Rental value of owned land will be estimated as  $(1/6)^{\text{th}}$  of the value of gross produce minus land revenue.

$$\text{Rental value of land} = \frac{\text{Gross return}}{6} - \text{Land revenue}$$

**xiii. Interest on fixed capital**

It was calculated by charging interest at the rate of 12 per cent on investment on commonly used assets like wooden implements and iron implements.

**xiv. Commonly used asset**

It includes plough, harrow, hoe, bullock cart, hand sprayer, machine sprayer, and power sprayer.

**xv. Irrigation structure**

It includes capital investment on well, electric motor, pipeline and electric motor shed. Annual expenditure on irrigation structure mean, electric charge, repairing charge, depreciation on electric motor (@ 10 per cent), depreciation on well (@ 2 per cent), depreciation on pipeline (@10 per cent) and interest on fixed capital was (@ 12 per cent).

**xvi. Subsidy**

Those farmers who have got subsidy to drip irrigation system they were few in number and were considered and the subsidized amount were considered in drip

investment.

**xvii. Amortisation cost**

Annual amortised establishment cost can be calculated by using capital recovery factor in following formula.

$$A = P \left[ \frac{i}{1 - (1+i)^{-n}} \right]$$

Where,

A = Annual amortised cost (Rs.)

P = Present establishment cost (Rs.)

n = Economic life of garden (Year)

i = Discount rate at 12 per cent.

T 5847





# RESULTS AND DISSCUTION



## CHAPTER - IV

### RESULTS AND DISCUSSION

In this chapter, the results of the study are presented in following section.

1. Socio-economic status of Kesar mango grower
2. Costs, returns and profitability in Kesar mango production
3. Use of Cobb-Douglas production function in Kesar mango production
4. Financial feasibility of Kesar mango garden
5. Constraints and suggestions of Kesar mango production

#### 4.1 SOCIO-ECONOMIC STATUS OF KESAR MANGO GROWER

Socio-economic character and cropping pattern of Kesar mango growers are important aspects in production of Kesar mango crop.

##### 4.1.1 Socio-economic status of Kesar mango grower

Socio-economic characteristics of Kesar mango grower were calculated and are presented in Table 4.1. The result revealed that age of owner was higher as 47.29 years with respect to Kesar mango grower. Education level was slightly higher 2.79 score with respect to Kesar mango grower. Family size 6.92 persons were also higher of Kesar mango grower. Occupation level of Kesar mango grower was higher as 1.29 scores in Kesar mango garden. It was observed that land holding was 8.81 hectares with respect to Kesar mango garden. It was clear that bullock pair was 1.06 in numbers in Kesar mango garden respectively. Similarly, milch animal was 1.29 in numbers in Kesar mango garden. In regard to investment, commonly used assets and building was Rs.38775.83 in Kesar mango garden and area under Kesar mango was 2.09 hectares.

**Table 4.1 Socio economic characteristics of Kesar mango growers**

<b>Particular</b>	<b>Kesar mango garden</b>	
	<b>Mean</b>	<b>C.V. %</b>
1. Age of farmers (year)	47.29	28.00
2. Education level in 5 quantum score (Illiterate/Primary/High school/Higher secondary/College level)	2.79	35.41
3. Family size (person)	6.92	50.33
4. Occupation level in 3 quantum score (Agriculture/Industry/Service)	1.29	50.40
5. Land holding (ha)	8.81	103.05
6. Bullock pair (No.)	1.06	68.38
7. Milch animal (No.)	1.29	138.27
8. Investment on commonly used assets and farm building (Rs.)	38775.83	104.11
9. Area under Kesar mango (ha)	2.09	142.94

#### **4.1.2 Effect of socio-economic characteristics on productivity of Kesar mango garden**

Effects of socio-economic characteristics on productivity of Kesar mango garden was estimated and are presented in Table 4.2. The result revealed that when one pair of bullock was increased over mean value of bullock pair (1.06 bullock pair), it would lead to increase Kesar mango productivity of 22.03 quintals in Kesar mango garden. It implied that there was scope to increase bullock pair in Kesar mango garden. On the contrary the regression coefficient with respect to investment on commonly used asset was also found negatively and highly significant that was -0.0004. It means that when investment on commonly used asset increased by one rupee that would lead to decrease Kesar mango productivity by 0.0004 quintals. In regard to age of garden it was observed that regression coefficient was 8.862 which was significant at 1 per cent level. It implied that when one year age of garden was increased over a mean value, it would lead to increase Kesar mango productivity of 8.862 quintals in Kesar mango garden. Similarly, area under Kesar mango was observed that regression coefficient was 15.449 which was significant at 1 per cent level. It implied that when one hectare area under Kesar mango garden was increased over a mean value, it would lead to increase Kesar mango productivity of 15.449 quintals in Kesar mango garden. It was also observed that regression coefficients of education level and land holding were found positive but non-significant while regression coefficient of age, family size, occupation level and milch animal were found negative but non-significant.

It was observed that  $R^2$  was 0.918 which indicated that Kesar mango productivity was influenced by all variables together with 91.89 per cent. The effect of Kesar mango productivity was considerable because F value was 37.07 which was highly significant at 1 per cent level.

## **4.2 COSTS, RETURNS AND PROFITABILITY ON KESAR MANGO GARDEN**

### **4.2.1 Cropping pattern of Kesar mango growers**

Cropping patterns of Kesar mango growers were estimated and are presented in Table 4.3. The result revealed that gross cropped area was 9.45 hectares in Kesar

**Table 4.2 Effect of socio-economics characteristics on productivity of Kesar mango garden**

Variable	Regression coefficient	Standard Error	t value
1. Age (year)	-0.324	0.189	1.714
2. Education level (five quantum score)	4.613	3.137	1.470
3. family size (person)	-1.093	0.798	1.369
4. Occupation level (three quantum score)	-7.379	5.434	1.358
5. Land holding (ha)	0.518	0.423	1.224
6. Bullock pair (No.)	22.030	6.554	3.361**
7. Milch animal (No.)	-3.212	1.625	1.976
8. Investment on commonly used assets ( Rs.)	-0.0004	0.0002	2.957**
9. Age of Kesar mango garden (year)	8.862	1.592	5.567**
10. Area under Kesar mango garden (ha)	15.449	1.947	7.933**

Intercept a = -57.949

$R^2$  = 0.918

F value = 37.074\*\*

\* Significant at 5 per cent level

\*\* Significant at 1 per cent level

**Table 4.3 Cropping pattern of Kesar mango growers**

Particular	(Area in ha)	
	Kesar mango garden	
<b>KHARIF</b>		
1. Mung	0.23	(2.43)
2. Udid	0.2	(2.12)
3. Soybean	1.44	(15.24)
4. Tur	0.88	(9.31)
5. K.jowar	0.4	(4.23)
6. Sunflower	0.12	(1.27)
7. Kesar mango	2.09	(22.12)
<b>RABI</b>		
8. R.jowar	0.66	(6.98)
9. Wheat	0.92	(9.74)
10. Gram	0.46	(4.87)
11. Ground nut	0.55	(5.82)
<b>SUMMER</b>		
12. Vegetables	0.58	(6.14)
13. Sugar cane	0.92	(9.73)
Gross cropped area	9.45	(100.00)
Net sown area	6.28	
Cropping intensity (Per cent)	150.48	

Oil seed   Pulses   Other cereales   Kesar mango   Sugarcane   Vegetable

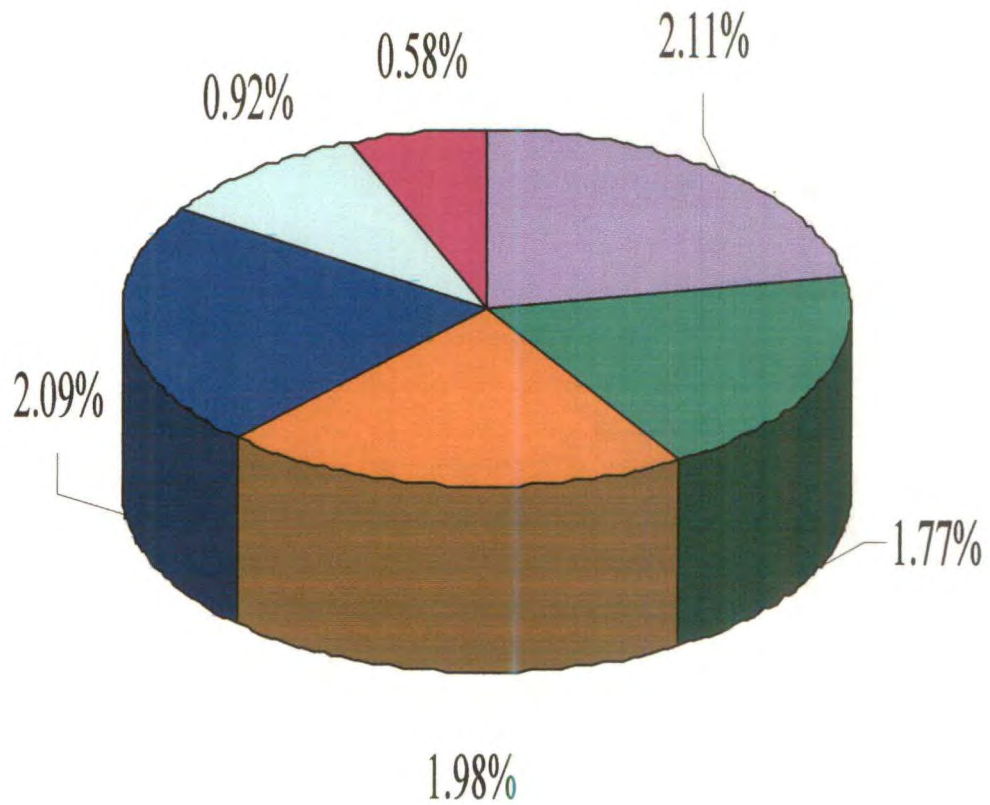


Fig 4.1 Share of cropping pattern in Kesar mango garden with respect to gross cropped area of 9.45 hectares



**Fig. 4.2 Kesar mango plant of three years age**



**Fig. 4.3 Kesar mango orchard at Harngul, Taluka and District Latur**

mango garden. It was observed that proportionate share of Kesar mango was the highest as 22.12 per cent in Kesar mango garden. It inferred that the farmers were giving more importance to Kesar mango crop in cropping pattern. Hence, Kesar mango crop would be considered predominance crop in the study area. The proportionate area under soybean was 15.24 per cent in Kesar mango garden. In general, the proportionate area under wheat was 9.74 per cent in Kesar mango garden, respectively. Similarly, the proportionate area under rabi jowar was 6.98 per cent in Kesar mango garden in rabi season. It inferred that rabi jowar is used for grain and fodder purpose in that area. The proportionate area under vegetables and sugarcane was 6.14 and 9.73 per cent, respectively in Kesar mango garden. It inferred that the farmers also giving more importance to vegetables and sugarcane as cash crop in cropping pattern. In next order tur, kharif jowar, udid, mung, and sunflower were important crops grown in the study area. In regard to cropping intensity, it was observed that, the highest cropping intensity was 150.48 per cent in Kesar mango garden.

Physical inputs can be transformed in production of Kesar mango production. The inputs can be converted into monetary term to determine the cost of cultivation per hectare. Similarly, Kesar mango production can be converted into monetary term to know gross return with the help of costs and returns profitability with respect to Kesar mango production were determined as follows.

#### **4.2.2 Physical inputs and outputs in Kesar mango production**

Per hectare physical inputs and outputs in Kesar mango production were estimated and are presented in Table 4.4. Use of hired human labour was the higher as 127.53 man days in Kesar mango garden. Use of bullock labour was 4.07 pair days in Kesar mango garden, respectively. On the contrary, use of machine labour was higher as 3.99 hours in Kesar mango garden. In regard to manure, the higher quantity of 17.05 quintals was used in Kesar mango garden. Use of nitrogen, phosphorus, and potash was slightly higher as 73.70, 60.86 and 48.83 kg, respectively in Kesar mango garden. Use of plant protection system was 61.73 liter in Kesar mango garden. Use of irrigation was higher as 11765.85 cubic meters in Kesar mango garden. Use of family human labour was higher 19.09 man days in Kesar mango garden.

**Table 4.4 Per hectare physical inputs and outputs in Kesar mango production****(Unit/ha)**

<b>Particular</b>	<b>Unit</b>	<b>Kesar mango garden</b>
<b>INPUT</b>		
1. Hired human labour	man day	127.53
2. Bullock labour	pair day	4.07
3. Machine labour	hour	3.99
4. Manure	q	17.05
5. Nitrogen	kg	73.70
6. Phosphorus	kg	60.86
7. Potash	kg	48.83
8. Plant protection	lit	61.73
9. Irrigation	m <sup>3</sup>	11765.85
10. Family human labour	man day	19.09
<b>OUTPUT</b>		
Kesar mango production	q	120.67

It is also observed that table 4.4 that Kesar mango production was 120.67 quintals in Kesar mango garden.

#### **4.2.3 Cost of cultivation of Kesar mango production**

Per hectare cost of cultivation of Kesar mango production was calculated and is presented in Table 4.5. The results revealed that cost-C was higher as Rs.89619.84 in the Kesar mango garden. Among the various items of expenditure, the proportionate share of rental value of land was predominant as 55.85 per cent and irrigation 12.73 per cent in Kesar mango garden. It inferred that due to higher yield the share of rental value of land was higher in the Kesar mango garden while the higher quantity irrigation, the share of expenditure on irrigation was higher in Kesar mango garden. The similar results were found by Deoghare (1999) in regard to cost-C as Rs.88174.12 per hectare in Kesar mango garden.

#### **4.2.4 Profitability of Kesar mango production**

Profitability of Kesar mango production was estimated and is presented in Table 4.6. It was observed that gross return was Rs.301675.00 in the Kesar mango garden. It was clear that farm business income, family labour income and net profit was Rs.270844.73, Rs.213582.36 and Rs.212055.16 respectively, in the Kesar mango garden. It was clear that Output-Input ratio was higher as 3.37 in the Kesar mango garden. Per quintal cost of production was Rs.742.69 in the Kesar mango garden. It implied that cost of production can be reduced due to drip irrigation system. The results are conformity with the results obtained by Deoghare (1999).

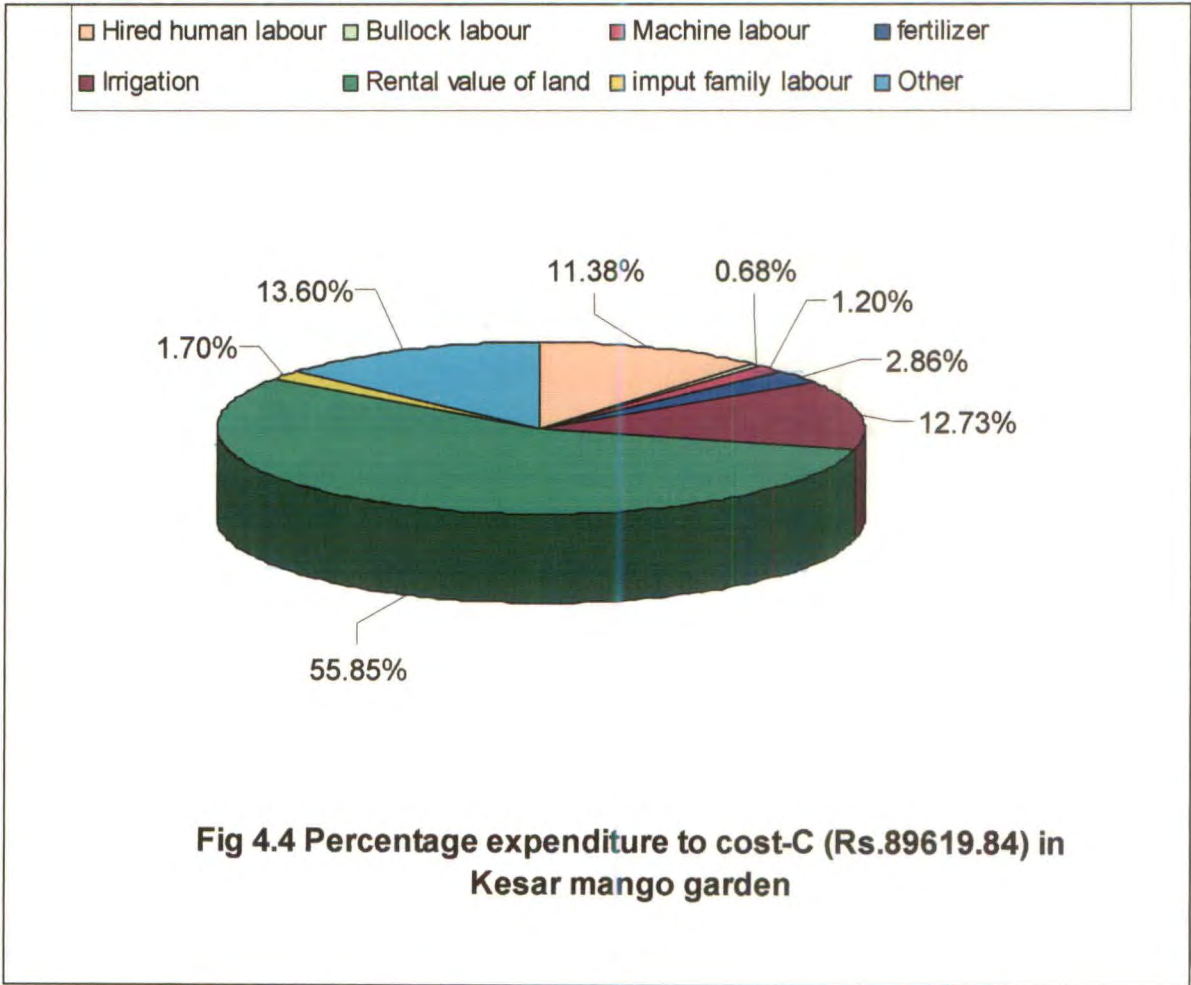
### **4.3 USE OF COBB-DOUGLAS PRODUCTION FUNCTION IN KESAR MANGO PRODUCTION**

Linear and Cobb-Douglas production function were used in Kesar mango garden. On the basis of goodness of fit ( $R^2$ ) Cobb-Douglas production function was

**Table 4.5 Per hectare cost of cultivation of Kesar mango garden**

Particular	(Rs./ha)
	Kesar mango garden
1. Hired human labour	10202.40 (11.38)
2. Bullock labour	610.50 (0.68)
3. Machine labour	1077.30 (1.20)
4. Manures	852.50 (0.95)
5. Fertilizers	2561.27 (2.86)
6. Plant protection	677.93 (0.76)
7. Irrigation	11412.87 (12.73)
8. Land revenue	229.17 (0.26)
9. Incidental expenditure	30.55 (0.03)
10. Interest on working capital	2765.45 (3.09)
11. Depreciation on capital asset	410.33 (0.46)
12. Cost-A (item 1 to item 11)	30830.27 (34.40)
13. Rental value of land	50050 (55.85)
14. Interest on fixed capital	492.39 (0.55)
15. Amortised cost @ 12 per cent discount for year	6719.98 (7.50)
16. Cost-B (item 12 + 13 + 14+15)	88092.64 (98.30)
17. Family human labour	1527.20 (1.70)
18. Cost-C (item 16+17)	89619.84 (100.00)

(Figures in parentheses indicate percentages to cost-C)





**Fig. 4.5 Kesar Mango Plant bear profusely**

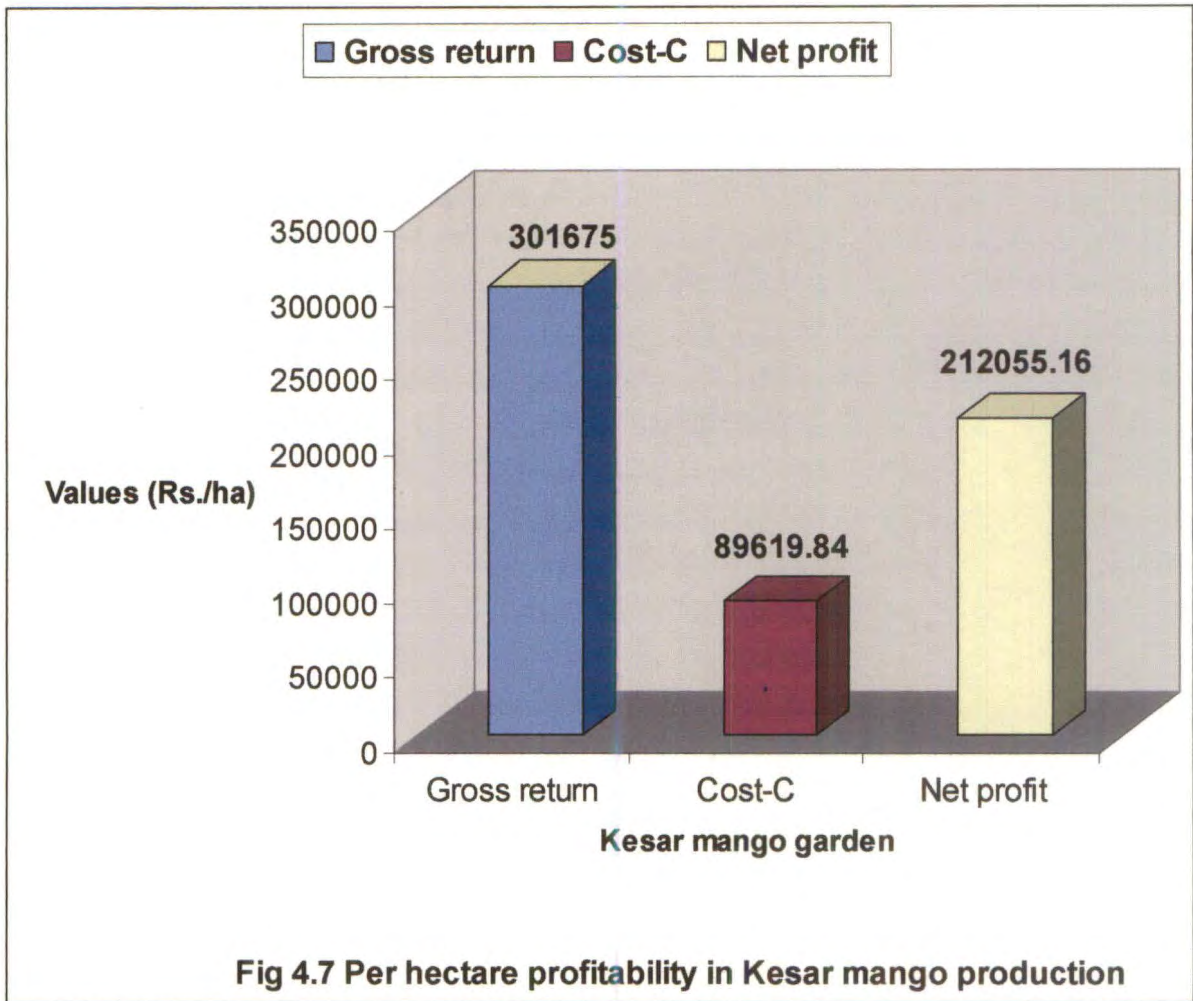


**Fig. 4.6 Kesar Mango Fruits**

**Table 4.6 Profitability of Kesar mango production**

(Rs./ha)

<b>Particular</b>	<b>Kesar mango garden</b>
Gross return	301675.00
By produce	0.00
Cost-A	30830.27
Cost-B	88092.64
Cost-C	89619.84
Farm business income (Gross returns minus cost-A)	270844.73
Family labour income (Gross returns minus cost-B)	213582.36
Net profit (Gross returns minus cost-C)	212055.16
Output - Input ratio (Gross returns divided by cost-C)	3.37
Per quintal cost of production	742.69



found to be fit in the data. In case of Kesar mango production, variables were selected in production function with the help of correlation of matrix with respect to Kesar mango production. The variable of plant protection was dropped because they not correlated with Kesar mango production. Similarly, problem of multi-colliniarity was also solved in the cases by considering the correlation value more than 0.80. Where the regression coefficients are the elasticities of production and used to determine return to scale in Kesar mango production.

#### **4.3.1 Estimates of Cobb-Douglas production function in Kesar mango production**

Regression coefficients with respect to various explanatory variables were calculated and are presented in Table 4.7. Regression coefficient of hired human labour was 0.025 which was positive and highly significant at 1 per cent level. Regression coefficient of bullock labour was 0.195 which was positive and highly significant at 5 per cent level. Similarly, regression coefficient of irrigation was 0.043 which was positive and highly significant at 5 per cent level. On the contrary, regression coefficient of potash (-0.043) which was negative. Coefficient of multiple determination ( $R^2$ ) was 0.928 which indicated 92.80 per cent variation in Kesar mango production was explained due to variation in all independent variables. F value was highly significant (47.797). It was clear that is explanatory variable on its own was not very important but together they explained significantly part of variation in Kesar mango production. The sum of regression coefficient was -5.821 which indicate decreasing return to scale.

Resource productivity with respective various explanatory variables was estimated and is presented in Table 4.7. It was obvious from table that marginal productivity with respect to area under Kesar mango garden was highest as 3.084 quintals followed by that of bullock labour (1.229 q), manure (0.504 q), machine labour (0.115 q), phosphorous (0.091 q), family human labour (0.033 q), nitrogen

**Table 4.7 Estimate of Cobb-Douglas production function as partial regression coefficients in order to know resource productivity, resource use efficiency and optimum resource use in Kesar mango production**

Independent variables	Regression coefficient (bi)	Standard error bi (SE)	't' value	Geometric mean of input ( $\bar{x}_i$ )	Marginal product (q)	Marginal value product (Rs.)	Price of input (Rs.)	MVP to price ratio	Optimum resource use
1. Area of Kesar mango (ha/garden)	0.138	0.121	1.14	1.412	3.084	7710.70	50050.00	0.154	-
2. Hired human labour (manday/garden)	0.25	0.011	2.27**	62.012	0.012	31.81	80.00	0.397	24.654
3. Bullock labour (Pairday/garden)	0.195	0.091	2.14*	5.007	1.229	3072.60	150.00	20.484	102.563
4. Machine labour (hours/garden)	0.021	0.019	1.10	5.714	0.115	289.95	270.00	1.073	6.163
5. Manure (q/garden)	0.201	0.134	1.49	12.583	0.504	1260.26	50.00	25.205	317.157
6. Nitrogen (kg/garden)	0.059	0.149	0.39	64.220	0.028	72.48	10.86	6.674	428.619
7. Phosphorous (kg/garden)	0.112	0.119	0.94	38.685	0.091	228.42	22.25	10.265	397.134
8. Potash (kg/garden)	-0.190	0.119	1.59	40.950	0.146	366.15	8.33	43.955	-
9. Irrigation (m <sup>3</sup> /garden)	0.043	0.020	2.15*	15531.710	0.000087	0.22	0.97	0.225	3497.407
10. Family human labour (man day/ garden)	0.036	0.027	1.33	33.739	0.033	84.18	80.00	1.05	35.502

Intercept (Log a) = -5.821  
 F value = 47.797  
 R<sup>2</sup> = 0.928  
 Return to scale ( $\Sigma bi$ ) = 0.640

NOTE : Geometric mean ( $\bar{Y}$ ) of Kesar mango production was 31.558 quintal per garden and price was Rs.2500/q

\* Significant at 5 per cent level  
 \*\* Significant at 1 per cent level

(0.028 q), hired human labour (0.012 q) and irrigation (0.000087 q). It inferred that if area under Kesar mango production was increased by one hectare at its geometric mean level, it would lead to increase production of Kesar mango with 3.084 quintals. Similarly, per unit of bullock labour, manure, machine labour, phosphorous, family human labour, nitrogen, hired human labour and irrigation increased, it would cause to increase the production of Kesar mango by 1.229, 0.504, 0.115, 0.091, 0.033, 0.028, 0.012 and 0.000087 quintals, respectively. In regard to resource use efficiency, it was also evident to table 4.8 that use of manure in Kesar mango production indicated MVP to price ratio (25.205) followed by hired human labour (20.484), phosphorous (10.265), nitrogen (6.674), machine labour (1.073), and family human labour (1.05), which were greater than unity. It implied that there was scope to increase these resources in Kesar mango production. On the contrary in regard to potash MVP to price ratio was negative.

In regard to optimum resource use it was observed that use of optimum hired human labour was 24.654 man days over its geometric mean followed by bullock labour (102.563 pair days), machine labour (6.136 hours), manure (317.157 q), nitrogen (428.619 kg), phosphorous (428.619 kg) and irrigation (3497.407 m<sup>3</sup>) and family human labour (35.502 man days). The results were found by Koujalagi (1992) in regard to coefficient of multiple determination ( $R^2$ ) in production of Kesar mango garden.

#### **4.3 FINANCIAL FEASIBILITY OF KESAR MANGO GARDEN**

Estimates of financial feasibility of Kesar mango garden through discounted measures of project worth are calculated and presented in Table 4.8. The result revealed that the life of Kesar mango garden was forty years. It was observed that incremental capital investment was for four years in the form establishment cost and asset, in other words sum of incremental capital investment was found to be Rs.3.65

**Table 4.8 Estimates of financial feasibility of Kesar mango garden through discounted measures of project worth**

(Rs in lakhs/ha)

Life of garden in years	Incremental capital investment (establishment cost + asset)	Incremental production cost = [(cost-C) - (depreciation+interest on fixed capital+amortised cost)]	Incremental gross cost	Lower discounted factor @ 12 per cent	Present worth of cost @ 12 per cent	Incremental gross benefit	Present worth of benefit @ 12 per cent	Incremental net benefit cash flow	Present worth of net benefit @ 12 per cent	Higher discounted factor @ 34 per cent	Present worth of net benefit @ 34 per cent
1.	1.08	0.00	1.08	0.892	0.963	0.00	0.00	-1.08	-0.963	0.746	-0.805
2.	0.86	0.00	0.86	0.797	0.685	0.00	0.00	-0.86	-0.681	0.556	-0.478
3.	0.75	0.00	0.75	0.712	0.534	0.00	0.00	-0.75	-0.038	0.415	-0.311
4.	0.96	0.00	0.96	0.636	0.610	0.00	0.00	-0.95	-0.604	0.310	-0.294
5.	0.00	0.20	0.20	0.567	0.113	0.09	0.051	-0.11	-0.062	0.231	-0.025
6.	0.00	0.27	0.27	0.507	0.136	0.19	0.096	-0.08	-0.040	0.172	-0.013
7.	0.00	0.47	0.47	0.452	0.212	0.69	0.311	0.22	0.099	0.128	0.028
8.	0.00	0.47	0.47	0.404	0.189	0.90	0.363	0.43	0.173	0.096	0.041
9.	0.00	0.49	0.49	0.361	0.176	0.93	0.335	0.44	0.158	0.071	0.031
10.	0.00	0.55	0.55	0.322	0.177	1.80	0.579	1.25	0.402	0.053	0.066
11.	0.00	0.76	0.76	0.287	0.218	2.25	0.645	1.49	0.427	0.039	0.058
12.	0.00	0.84	0.84	0.256	0.215	3.30	0.844	2.46	0.629	0.029	0.071
13.	0.00	0.85	0.85	0.229	0.194	5.32	1.218	4.47	1.023	0.022	0.098
14.	0.00	1.20	1.20	0.205	0.246	13.72	2.812	12.52	2.566	0.016	0.200
15.	0.00	1.70	1.70	0.183	0.311	107.25	19.626	105.55	19.315	0.012	1.266
16.	0.00	0.37	0.37	0.163	0.060	1.00	0.163	0.63	0.102	0.009	0.005
Total	3.65	8.17	11.82	6.973	5.039	137.44	27.043	125.63	-2.38 24.89		-0.062

Note : NPW = Rs.22.50 lakh. N/K ratio = 10.42  
BCR = 5.36

IRR = 33.93

lakhs. Economic life garden started from fifth year. Sum of incremental production cost was Rs.8.17 lakhs. Thus, series of incremental gross cost with respect to each year was created sum of incremental gross cost was observed to be Rs. 11.82 lakhs. Discounting factor @ 12 per cent for each year over the period of garden was determined. With help of discounting factor related to individual year, present worth incremental gross cost was calculated. In short, sum of present worth of cost was found to be Rs.5.03 lakhs. It was also evident from the table that incremental gross benefit for each year was estimated for sixteen years. Sum of incremental gross benefit was Rs.137.44 lakhs. Present worth for each year was also calculated @ 12 per cent for incremental gross benefit. Thus sum of present worth of benefit was Rs.27.04 lakhs. Thus it is noted that net present worth (NPW) was Rs.25.50 lakh which was calculated by present worth benefit minus present worth of cost.

In regard to benefit cost ratio (BCR), it was also observed from the table that present worth of benefit was higher than present worth of cost, hence BCR was found to be 5.36. In consideration of forty years as life of garden the relationship between benefit and cost with application of discounting technique was greater than one, hence this project was found to be profitable.

Incremental net benefit cash flow could be determined by incremental gross benefit minus incremental gross cost of the specific year. The series of incremental net benefit cash flow was determined by incremental gross benefit minus incremental gross cost for over the period of time for sixteen years. Sum of incremental net benefit cash flow was found to be Rs.125.63 lakhs. Net present worth of incremental net benefit for individual years was calculated for sixteen years. It was obvious that for initial six years present worth of net benefit was negative while that was positive for remaining ten years. This concept was considered to determine N/K ratio. In short sum of negative stream for six years was Rs.2.38 lakhs that could be designated as K. Similarly, sum of the positive stream for ten years was Rs.24.89 lakhs that could be considered as N. Thus, N/K ratio was found to be 10.42 which indicated that project was worth while. Similarly, sum of present worth of net benefit was Rs.22.50.

It was also clear that by trial and error method, discounting factor @ 34 per cent for individual years was calculated for sixteen years. Then present worth of net benefit @ 34 per cent was calculated for individual years sum of present worth of net benefit @ 34 per cent was -0.062 when the figure is minus and could tend to unity that could be considered that the discounted factor was approved. Hence the internal rate of return (IRR) was found @ 34 per cent by trial and error method similarly, lower discount rate was @ 12 per cent while higher discount as 33.93.

#### **4.4 CONSTRAINTS AND SUGGESTIONS OF KESAR MANGO GROWERS**

Kesar mango growers are facing the problems in production. In order to solve the problems, the opinion of the Kesar mango growers in the form of their suggestions must be considered for the solution of the problems. The problems and suggestions were arranged in the form of frequency and percentage method and major problems and suggestions were arranged as follows.

##### **4.5.1 Constraints faced by Kesar mango growers**

Constraints faced by Kesar mango growers were calculated in frequency and percentage form and are presented in Table 4.9. The results revealed that non-availability of electricity during flowering stage was severe problem which was expressed by 85.42 per cent in Kesare mango growers, respectively. Non-availability of labour during harvesting period was next major problem which was expressed by 83.33 per cent of Kesar mango growers. Heavy rains winds and hail stone during flowering and fruit developing stage was obtained by 79.17 per cent of Kesar mango growers, respectively. High cost and non-availability of fertilizers was expressed by 72.92 per cent of Kesar mango growers. Lack of knowledge on technical guidance was also found as one of the major problem which was expressed by 68.75 per cent of Kesar mango growers. In next order, Lack of knowledge in chemicals was expressed by 62.50 per cent of Kesar mango growers. Lack of drip irrigation facilities was expressed by 60.41 per cent of Kesar mango growers. In short difficulties in control of weed, shortage of irrigation water, at the time of establishment margin money is not available

**Table 4.9 Constraints of Kesar mango growers**

Constraints	Kesar mango garden	
	Frequency (n=48)	Percentage
1. Difficulties in control of weed	25	52.08
2. Non-availability of labour during harvesting period	40	83.33
3. Lack of drip irrigation facilities	29	60.41
4. Non-availability of electricity during flowering	41	85.42
5. High cost and non-availability of fertilizers	35	72.92
6. At the time of establishment margin money is not available	17	35.42
7. Lack of knowledge on technical guidance	33	68.75
8. Lack of extension services	16	33.33
9. Heavy rains, winds and hail stone during flowering and fruit developing stage	38	79.17
10. Lack of knowledge in chemicals	30	62.50
11. Shortage of irrigation water	22	45.83

and Lack of extension services were also considerable problems of Kesar mango growers. The results are conformity with the result obtained by Govinda Reddy *et al.* (1997) in regard to mango production.

#### **4.5.2 Suggestions of Kesar mango growers**

Suggestions of Kesar mango growers were calculated in the form of frequency and percentage and are presented in Table 4.10. It was observed that 79.17 per cent of the Kesar mango growers suggested the supply of electricity through utilization of non-conventional energy sources and utilization of generator in subsidization rate. Similarly, Lack of knowledge on technical guidance was suggested by 75.00 per cent of the Kesar mango growers were take up the consistent follow up on technical guidance by state department of horticulture training centre talegaon dabhadre near Pune with their trained staff with co-ordination of state agricultural universities. In next order Provision of live fencing around the orchard garden for wind breaking, Provision of low rate of fertilizers by government should available at village level and the fertilizers should available with in the critical stages of Kesar mango plant, state department of agriculture should provide the drip irrigation facilities on lower cost and mechanization used in farm were suggested by 72.92, 70.83, 62.50 and 60.42 per cent of Kesar mango growers, respectively. It was clear that some of the suggestions were minor but important in which In depth knowledge of chemical ingredients and its use provided to the cultivation to avoid hazards effect was suggested by 45.83 per cent of Kesar mango growers followed by availability of cheap and effective weedicide (41.67 per cent), Conserve the water by constructing farm pond, earthen pot technique or irrigate the garden with drip system where ever water source is available (35.42 per cent) Effective adoption visiting and training system of extension on field level (31.25 per cent) and State government should come to the rescue of the credit availability on minimum interest and also see that loans are properly utilized to the object (22.92 per cent) were suggested by the Kesar mango growers.

**Table 4.10 Suggestions of Kesar mango growers**

Suggestion	Kesar mango garden	
	Frequency (n=48)	Percentage
1. Availability of cheap and effective weedicides	20	41.67
2. Mechanization used in farm	29	60.42
3. State department of agriculture should provide the drip irrigation facilities on lower cost	30	62.50
4. Utilization of non-conventional energy sources and utilization of generator in subsidization rate	38	79.17
5. Provision of low rate of fertilizers by government should available at village level and the fertilizers should available with in the critical stages of Kesar mango plant	34	70.83
6. State government should came to the rescue of the credit availability on minimum interest and also see that loans are properly utilized to the object	11	22.92
7. Take up the consistant follow up on technical guidance by state department of horticulture training centre Talegaon dabhade near Pune with their trained staff with co-ordination of state agricultural universities	36	75.00
8. Effective adoption visiting and training system of extension on field level	15	31.25
9. Provision of live fencing around the orchard garden for wind breaking	35	72.92
10. In depth knowledge of chemical ingredients and its use provided to the cultivation to avoid hazards effect	22	45.83
11. Conserve the water by constructing farm pond, earthen pot technique or irrigate the garden with drip system where ever water source is available	17	35.42



# **SUMMERY AND CONCLUSION**

## CHAPTER – V

### SUMMARY AND CONCLUSION

#### 5.1 Introduction

Mango (*Mangifera indica*, L.) belongs to family Anacardiaceae, originated in South – East Asia. It is one of the most important fruit crop grown in India. Mango is indigenous to India. It is used as a raw material in industries for the preparation of mango juice, mango pulp, mango chutney and mango pickles etc. Mango is grown in 87 countries in the world. Despite India's share of 60 per cent in world's mango production, her productivity is very low when compared to other mango producing countries. India is the largest producer of mango in the world. The total area under mango in India is 22.05 lakh hectares with an annual production of 137.92 lakh metric tonnes and its productivity was 6.3 metric tonnes per hectare in 2007-08. The present study was under taken in Latur district of Maharashtra, which is one of the major mango growing districts. Marathwada is one of the important mango growing region of Maharashtra with an 89,587 hectare area. Latur is an important Kesar mango growing district having 14,406 Hectare area with the productivity of 5 metric tonnes per hectare. The information on establishment cost, operating cost and input requirement of mango orchard would be immense help to mango growers of Latur region. The present study entitled “Economics of production of kesar mango in Latur district of Maharashtra” has been under taken with the following objectives :

#### Objectives

1. To know the socio-economic characteristics of Kesar mango grower
2. To estimate cost and returns of Kesar mango garden
3. To examine the input output relationship and resource use efficiency in Kesar mango
4. To study the financial feasibility of Kesar mango garden
5. To identify the various constraints and suggestion of Kesar mango growers in Kesar mango production

Latur district was purposively selected for the present study because of favourable climate and soil to grow Kesar mango crop. Multistage sampling design was adopted for selection of district, tehsil, villages and Kesar mango growers. In the first stage, Latur district was purposely selected for present study because of favorable climate to grow the Kesar mango crop and also comes under export zone for Kesar mango. At second stage three tehsils of Latur district was selected on the basis of highest area under Kesar mango. In the third stage from each selected tehsils two villages were selected on the basis of highest area under Kesar mango. The selected villages were namely Sonvati, Bori, Savargaon, Chakur, Vaijapur and Belkund. At the fourth stage 10 Kesar mango growers were selected at random from each village. Thus in all 60 Kesar mango growers were selected at randomly. Data were collected from the sampled Kesar mango growers by personal interview method with the help of pre-tested schedule. The information on various item like Kesar mango yields, price of Kesar mango, quantity of inputs and its value were collected for the year 2007-08. Tabular analysis, Cobb-Douglas production function analysis, discounted cash flow technique, frequency and percentage method were used to analyse the data in present study.

### **5.3 Results and discussion**

Age of owner was higher as 47.29 years with respect to Kesar mango grower. Education level was slightly higher 2.79 score with respect to Kesar mango grower. Family size 6.92 persons were also higher of Kesar mango grower. Occupation level of Kesar mango grower was higher as 1.29 scores in Kesar mango garden. It was observed that land holding was 8.81 hectares with respect to Kesar mango garden. It was clear that bullock pair was 1.06 in numbers in Kesar mango garden respectively. Similarly, milch animal was 1.29 in numbers in Kesar mango garden. In regard to investment, commonly used assets and building was Rs.38775.83 in Kesar mango garden. Age of the Kesar mango garden was higher as 8.96 years and area under Kesar mango was 2.09 hectares. One pair of bullock was increased over mean value of bullock pair (1.06 bullock pair), it would lead to increase Kesar mango productivity of

22.03 quintals in Kesar mango garden. It implied that there was scope to increase bullock pair in Kesar mango garden. In regard to age of garden it was observed that regression coefficient was 8.862 which was significant at 1 per cent level. It implied that when one year age of garden was increased over a mean value, it would lead to increase Kesar mango productivity of 8.862 quintals in Kesar mango garden. Similarly, area under Kesar mango was observed that regression coefficient was 15.449 which was significant at 1 per cent level. It implied that when one hectare area under Kesar mango garden was increased over a mean value, it would lead to increase Kesar mango productivity of 15.449 quintals in Kesar mango garden. It was also observed that regression coefficients of education level and land holding were found positive but non-significant. It was observed that  $R^2$  was 0.918 which indicated that Kesar mango productivity was influenced by all variables together with 91.89 per cent. The effect of Kesar mango productivity was considerable because F value was 37.07 which was highly significant at 1 per cent level.

In regard to gross cropped area was 9.45 hectares in Kesar mango garden. It was observed that proportionate share of Kesar mango was the highest as 22.12 per cent in Kesar mango garden. It inferred that the farmers were giving more importance to Kesar mango crop in cropping pattern. Hence, Kesar mango crop would be considered predominance crop in the study area. The proportionate area under soybean was 15.24 per cent in Kesar mango garden. In general, the proportionate area under wheat was 9.74 per cent in Kesar mango garden, respectively. Similarly, the proportionate area under rabi jowar was 6.98 per cent in Kesar mango garden in rabi season. It inferred that rabi jowar is used for grain and fodder purpose in that area. The proportionate area under vegetables and sugarcane was 6.14 and 9.73 per cent, respectively in Kesar mango garden. Physical inputs can be transformed in production of Kesar mango production. The inputs can be converted into monetary term to determine the cost of cultivation per hectare. Similarly, Kesar mango production can be converted into monetary term to know gross return with the help of costs and returns profitability with respect to Kesar mango production. Use of hired human labour was the higher as 127.53 man days in Kesar mango garden. Use of bullock labour was 4.07

pair days in Kesar mango garden, respectively. Kesar mango production was 120.67 quintals in Kesar mango garden. cost-C was higher as Rs.89619.84 in the Kesar mango garden. Among the various items of expenditure, the proportionate share of rental value of land was predominant as 55.85 per cent and irrigation 12.73 per cent in Kesar mango garden. It inferred that due to higher yield the share of rental value of land was higher in the Kesar mango garden while the higher quantity irrigation, the share of expenditure on irrigation was higher in Kesar mango garden. In regard to gross return was Rs.301675.00 in the Kesar mango garden. It was clear that farm business income, family labour income and net profit was Rs.270844.73, Rs.213582.36 and Rs.212055.16 respectively, in the Kesar mango garden. It was clear that Output-Input ratio was higher as 3.37 in the Kesar mango garden. Per quintal cost of production was Rs.742.69 in the Kesar mango garden.

Linear and Cobb-Douglas production function were used in Kesar mango garden. On the basis of goodness of fit ( $R^2$ ) Cobb-Douglas production function was found to be fit in the data. Regression coefficient of hired human labour was 0.025 which was positive and highly significant at 1 per cent level. Regression coefficient of bullock labour was 0.195 which was positive and highly significant at 5 per cent level. Similarly, regression coefficient of irrigation was 0.043 which was positive and highly significant at 5 per cent level. On the contrary, regression coefficient of potash (-0.043) which was negative. Coefficient of multiple determination ( $R^2$ ) was 0.928 which indicated 92.80 per cent variation in Kesar mango production was explained due to variation in all independent variables. F value was highly significant (47.797). It was clear that is explanatory variable on its own was not very important but together they explained significantly part of variation in Kesar mango production. The sum of regression coefficient was -5.821 which indicate decreasing return to scale. The marginal productivity with respect to area under Kesar mango garden was highest as 3.084 quintals followed by that of bullock labour (1.229 q), manure (0.504 q), machine labour (0.115 q), phosphorous (0.091 q), family human labour (0.033 q), nitrogen (0.028 q), hired human labour (0.012 q) and irrigation (0.000087 q). It inferred that if area under Kesar mango production was increased by one hectare at its geometric mean

level, it would lead to increase production of Kesar mango with 3.084 quintals. Similarly, per unit of bullock labour, manure, machine labour, phosphorous, family human labour, nitrogen, hired human labour and irrigation increased, it would cause to increase the production of Kesar mango by 1.229, 0.504, 0.115, 0.091, 0.033, 0.028, 0.012 and 0.000087 quintals, respectively. In regard to resource use efficiency, it was also evident to table 4.8 that use of manure in Kesar mango production indicated MVP to price ratio (25.205) followed by hired human labour (20.484), phosphorous (10.265), nitrogen (6.674), machine labour (1.073), and family human labour (1.05), which were greater than unity. It implied that there was scope to increase these resources in Kesar mango production. On the contrary in regard to potash MVP to price ratio was negative. In regard to optimum resource use it was observed that use of optimum hired human labour was 24.654 man days over its geometric mean followed by bullock labour (102.563 pair days), machine labour (6.136 hours), manure (317.157 q), nitrogen (428.619 kg), phosphorous (428.619 kg) and irrigation (3497.407 m<sup>3</sup>) and family human labour (35.502 man days).

The life of Kesar mango garden was forty years. It was observed that incremental capital investment was for four years in the form establishment cost and asset, in other words sum of incremental capital investment was found to be Rs.3.65 lakhs. Economic life garden started from fifth year. Sum of incremental production cost was Rs.8.17 lakhs. Thus, series of incremental gross cost with respect to each year was created sum of incremental gross cost was observed to be Rs.11.82 lakhs. Discounting factor @ 12 per cent for each year over the period of garden was determined. With help of discounting factor related to individual year, present worth incremental gross cost was calculated. In short, sum of present worth of cost was found to be Rs.5.03 lakhs. It was also evident from the table that incremental gross benefit for each year was estimated for sixteen years. Sum of incremental gross benefit was Rs.137.44 lakhs. Present worth for each year was also calculated @ 12 per cent for incremental gross benefit. Thus sum of present worth of benefit was Rs.27.04 lakhs. Thus it is noted that net present worth (NPW) was Rs.25.50 lakhs which was calculated by present worth benefit minus present worth of cost. In regard to benefit cost ratio (BCR), it was also

observed from the table that present worth of benefit was higher than present worth of cost, hence BCR was found to be 5.36. In consideration of forty years as life of garden the relationship between benefit and cost with application of discounting technique was greater than one, hence this project was found to be profitable. Sum of incremental net benefit cash flow was found to be Rs.125.63 lakhs. Net present worth of incremental net benefit for individual years was calculated for sixteen years. It was obvious that for initial six years present worth of net benefit was negative while that was positive for remaining ten years. This concept was considered to determine N/K ratio. In short sum of negative stream for six years was Rs.2.38 lakhs that could be designated as K. Similarly, sum of the positive stream for ten years was Rs.24.89 lakhs that could be considered as N. Thus, N/K ratio was found to be 10.42 which indicated that project was worth while. Similarly, sum of present worth of net benefit was Rs.22.50. It was also clear that by trail and error method, discounting factor @ 34 per cent for individual years was calculated for sixteen years. Then present worth of net benefit @ 34 per cent was calculated for individual years sum of present worth of net benefit @ 34 per cent was -0.062 when the figure is minus and could tend to unity that could be considered that the discounted factor was approved. Hence the internal rate of return (IRR) was found @ 34 per cent by trial and error method similarly, lower discount rate was @ 12 per cent while higher discount as 33.93.

Constraints faced by Kesar mango growers were non-availability of electricity due to load shading was severe problem which was expressed by 85.42 per cent in Kesare mango growers, respectively. Non-availability of labour was next major problem which was expressed by 83.33 per cent of Kesar mango growers. Heavy rains winds and hail stone during flowering and fruit developing stage was obtained by 79.17 per cent of Kesar mango growers, respectively. High cost and non-availability of fertilizers was expressed by 72.92 per cent of Kesar mango growers. In regard to suggestions of Kesar mango growers were 79.17 per cent of the Kesar mango growers suggested the supply of electricity through utilization of non-conventional energy sources and utilization of generator in subsidization rate. Similarly, Lack of knowledge on technical guidance was suggested by 75.00 per cent of the Kesar mango growers

were take up the consistent follow up on technical guidance by state department of horticulture training centre talegaon dabhade near Pune with their trained staff with co-ordination of state agricultural universities. In next order Provision of live fencing around the orchard garden for wind breaking, Provision of low rate of fertilizers by government should available at village level and the fertilizers should available with in the critical stages of Kesar mango plant.

#### **5.4 Conclusion**

Age of owner was higher as 47.29 years with respect to Kesar mango grower. Education level, bullock pair, land holding, age of Kesar mango garden and area under Kesar mango garden could be considered most important variables because they were positively influencing Kesar mango productivity. It was observed that there was age, family size, occupation level, milch animal and investment on commonly used assets were negative effects on Kesar mango productivity. Area under Kesar mango garden was 2.09 hectares which showed the dominant share in cropping pattern with 22.12 per cent in Kesar mango garden. The gross return was Rs.301675.00, cost-C was Rs.89619.84 and Net profit was Rs.212055.16 in Kesar mango production. Regression coefficient with respect to hired human labour, bullock labour and irrigation were found positive and significant. Hence, there was scope to increase these variables. In regard to financial feasibility of Kesar mango garden were NPW was Rs.22.50 lakhs, BCR was 5.36, N/K ratio was 10.42 and IRR was 33.93. In general Kesar mango growers face many problems like non-availability of electricity due to load shading, non-availability of labour, heavy rains winds and hail stone during flowering and fruit developing stage and lack of knowledge on technical guidance. In regard to suggestions it was observed that supply of electricity through utilization of non-conventional energy sources and utilization of generator in subsidization rate, mechanization used in farm, Provision of live fencing around the orchard garden for wind breaking and take up the consistent follow up on technical guidance by state department of horticulture training centre talegaon dabhade near Pune with their trained staff with co-ordination of state agricultural universities.

**Policy implication**

1. On priority basis use of bullock labour, manure, nitrogen and phosphorous can be increased in production of Kesar mango because MVP to price ratio was higher with respect to these variables in Kesar mango production.
2. Kesar mango garden was found financial feasible because of higher NPW, BCR, N/K ratio and IRR on the basis of acceptable criteria of project evaluation.



**LITERATURE  
CITED**

## LITERATURE CITED

- Adokar, V.S., 1995. Economic analysis of orange production in Amaravati district of Maharashtra state. M.Sc.(Agri) Thesis, Submitted to Marathwada Agricultural University, Parabhani, 94 p.
- Ahire. R.D., R.R. Kulkarni, R.B. Kale and B.C. Farkade, 1999. Adoption of grape technology : consumer analysis. *J Maharashtra. Agric. Univ.*, 24 (1) : 64-66.
- Azad,K.C and B.K.Sikka., 1991. Production and marketing of temperate fruits in north west region of India : *Acta Horticulturae*, 270 (1) : 67-74.
- Bansode, S.D., 2001. Economics of production of fig in Aurangabad district. M.Sc.(Agri) Thesis, Submitted to Marathwada Agricultural University, Parbhani, 62 p.
- Chikhale. N.J., P.V.Deshpande and P.V.Thakre, 1996. factors influencing adoption of orange production technology by the growers. *Maharashtra J. Extn. Edn.*, 15(1) : 176-180.
- Dayanand, G.S and G.K. Hiremath, 1995. Resource use efficiency in ber orchards. *Agric. Banker*, 18(1) : 13-15.
- Dayanand, G.S., G.K. Hiremath and M.B. Koppad, 1996. Economic feasibility of ber cultivation in Karnataka. *Agric. Banker*. 19(2) : 43-48.
- Deoghare,B.L., M.N.Ingley and Miss D.Borkar., 1999. Economics of drip irrigation system in production of Mango. *Maharashtra J. Agric. Econ.*, 9 (1 and 2) : 22-25.
- Dhahiya,S.V., P.N.Bhatia., 1989. An analysis of export of potato. *Agric. Situation in India*. 50 (9) : 273-290.
- Dhakane, I.P., 2005. The effectiveness of grape production under different vine growing conditions. Cited in world Agricultural economics and rural sociology Abstract. 23(6) : 505.
- Gangawar, A.C., 1982. Economic feasibility of ber cultivation in Haryana *Agri. Univ., J. Res.*, 12(1) : 140-147.

- George, P.S and G.S. Gupta., 1974. profitability of Nagpur santra cultivation. *Indian J. Agric. Res.*, 29(3) : 134.
- Govinda Reddy.D.M., M.V.Srinivasa Gowda, M.V.Srinivasa Reddy and G.T.Prasanna Kumar, 1997. Constraints in production and marketing of mangoes – A casestudy in srinivasapur region. *The Bihar J. Agric. Mktg.* 5(2) : 234-237.
- Hyma J., S.V. Raju., N.G.Acharya and Ranga., 2003. Export performance of onion and potato from India. An economic analysis. *Indian J. Agric. Mktg. (Conf.spl.)* 17 (1) : 131-139.
- Kadrekar, P.M 2001. Economics of production and marketing of sweet orange in Marathwada region of Maharashtra. M.Sc.(Agri.) Thesis, Submitted to Marathwada Agricultural University, Parbhani. 52p.
- Kahlon, A.S and Randhwa, G.S, 1960. Higher profit margin for citrus growers *Indian Hort.*, 18(2) : 15-16.
- Katkar, P.L ., 2001. An economic analysis of mango in Ahmednagar city market. *Indian J.Agric. Mktg.*,2(1) : 133-135.
- Khan, M.Z., 1983. Comparative economics of sweet orange Mandarin orange and sour lime in Marathwada region M.Sc. (Agr.) Thesis, Submitted to Marathwada Agricultural University. Parbhani. 58 p.
- Khot, B.B., G.K. Sawant and R.P. Patil, 1999. scope for production of quality grape. *Indian J. Agric. Econ.*, 52(2) : 312-314.
- Kothekar, V.T., 1980. Socio-economic study of village Saralla (Kh.) in Puthri talukaof Parbhani district. M.sc.(Agri.) Thesis, submitted to MAU. Parbhani. 72p.
- Koujalagi, C.B and L.B. Kunnal, 1992. Input use efficiency in pomegranate orchards in Bijapur district of Karnataka. *Indian J. Agric. Econ.*, 47(3) : 527-530.
- Koujalagi, C.B and L.B. Kunnal and P.K. Mandanna, 1995. Resource use efficiency in pomegranate production. *Agric. Banker.*, 18(3) : 39-42.

- Khunt, K.A., H.M.Gajipara, B.K.Gadhvi and S.B.Vekariya, 2003. Economics of production and marketing of pomegranate. *Indian J. Agric. Mktg.*, 17(1) : 100-107.
- Krishna Murthy. A.N., C.S. Chandrashekar, and H.G. Shankar Murthy, 1978. Economics of production and marketing of oranges in Karnataka. *Indian J. Mktg.*, 11(3) : 25-29.
- Lalith achoth., 1978. Economics of tea production in the Nilegirs district. An unpublished M.Sc.(Agri) Thesis, Submitted to the University of *Agricultural Sciences., Bangalore.* 78 p.
- Malave,T.Y., 1990. Economics problems of horticultural plantations in *Maharashtra.* *Indian J. Agric. Econ.*, 24(4) : 249-255.
- Mane, K.M and H.S. Vijaykumar, 1996. comparative economics of cultivation of grape by different methods of irrigation. *Karnataka J Agric. Sci.*, 9(1) : 129-134.
- Mate, A.S., 2006. Economics of production and marketing of papaya in Solapur district. M.Sc.(Agri) Thesis, Submitted to Marathwada Agricultural University, Parbhani. 78 p.
- Nagargoje, S.R., 2000. Economic analysis of production and marketing of banana in Maratawada region (M.S) Ph.D. Thesis, Submitted to Marathwada Agricultural University, Parbhani. 120 p.
- Naphade, S.A and A.S.Tingre., 2008. Economics of production and marketing of Guava in Buldhana district of Maharashtra. *Indian J. Agric. Mktg.*, 22 (2) : 32-41.
- Patil, H.N and Pramod Kumar., 1986. Economics of evaluation of capital investment in Alphanso mango plantations in Ratnagiri district. *J. Maharashtra Agric. Univ.* 11 (1) : 218-221.
- Raut. P.N., 2006. Production constraints of orange cultivation in Nagpur district of Maharashtra. *Asian J. Extn. edu.*, 25(1 and 2) : 16-20.

- Riakar, N.A., 1990. Investment in production and marketing of cashew in Karnataka. An unpublished M.Sc.(Agri) thesis, Submitted to University of Agricultural Sciences, Dharwad. 72 p.
- Sharma, B.D and H.K. Pandey., 1972. Economics of guava production and marketing : A case study. *Indian Horticulture*. 17(1) : 5-6.
- Sharanesh, S.H, G.K. Hiremath, S.V. Deshpande and K.C. Gumgolmath 1997. Economic feasibility of grape cultivation in Bijapur district of Karnataka. *Agric. Banker*, 20(1) :16-20.
- Shinde, R.B., 2007. Economics of production and marketing of fig in Maharashtra. M.Sc.(Agri.) thesis, Submitted to Marathwada Agricultural University, Parbhani,75 p.
- Singh, R.A and A.P.Singh., 2008. Economics of production and marketing of mushroom in Haryana. *Indian J. Agric. Mktg.*, 22 (2) : 184-195.
- Sorgekar,P.K., 1989. Impact of trainig and visit system and formers economy. M.Sc.(Agri.) Thesis, submitted to Maratawada Agricultural University, Parbhani. 123p.
- Subrahmanyam, K.V and V. Mohandass, 1982. Economic evaluation of coorg mandarin (orange) in Karnataka. *Indian J. Agric. Econ.* 137(1) : 70-76.
- Subrahmanyam, K.V., 1987. Economics of investment in mango cultivation in Karnataka. *The Mysore J. Agric. Sci*, 211(2) : 96-200.
- Sunderesan, R., M. Thanasekaran, 1984. Production and marketing of grapes in Madurai district. *Indian J. Mktg.* 14(1) : 26-29.
- Upton, N., 1966. "Tree crops – A long term investment." *Indian J. Agric. Econ.*, 17 (1) : 82-87.
- Verma, A.R., A.M.Rajput and R.S.Patidar., 2004. Economic analysisof production, resource use efficiency and constraints of onion in Indore district of Madhya Pradesh. *Indian J. Agric. Mktg.*, 4 (1) : 22-31.

## ABSTRACT

1. Name of the student : Mr. BASAVARAJ JAMAKHANDI S/o RAMAPPA
2. Registration No : 27 / ML / A / 2007
3. Degree : M.Sc. (Agri)
4. Year of admission : 2007
5. Discipline : Agriculture Economics
6. Major field : Agriculture Economics
7. Minor fields : Agricultural statistics and mathematics
8. Major advisor : Dr. A.M.Degaonkar  
Associate Professor,  
Dept. of Agril. Econ. And Stat.  
College of Agriculture, Latur.
9. Title of thesis : “ ECONOMICS OF PRODUCTION OF KESAR MANGO IN  
LATUR DISTRICT OF MAHARASHTRA”

Mango (*Mangifera indica*, L.) belongs to family Anacardiaceae, originated in South – East Asia. It is one of the most important fruit crop grown in India. Mango is indigenous to India. India is the largest producer of mango in the world. The total area under mango in India is 22.05 lakh hectares with an annual production of 137.92 lakh metric tonnes and its productivity was 6.3 metric tonnes per hectare in 2007-08. Maharashtra is an important mango growing state in India with 455800 hectare area with a total production of 7.1 lakh metric million tonnes. Multistage sampling design was adopted in selection of district, tehsils and villages. Latur district comes under export zone for Kesar mango. The techniques like tabular analysis, Cobb-Douglas production function analysis, discounted cash flow technique, frequency and percentage method were used to analyse the data in present study. In order to determine profitability of Kesar mango garden, costs and returns are important aspects. The gross return was Rs.301675.00, cost-C was Rs.89619.84 and Net profit was Rs.212055.16 in Kesar mango production. In general, output-input ratio was 3.37 in Kesar mango garden. Per quintal cost of production was Rs.742.69 in Kesar mango garden, respectively.

In regard to Kesar mango garden Regression coefficient with respect to hired human labour, bullock labour and irrigation were found positive and significant. Hence, there was scope to increase these variables. In general, the life of Kesar mango garden was forty years. It was observed that incremental capital investment was for four years in the form establishment cost and asset, in other words sum of incremental capital investment was found to be Rs.3.65 lakhs. Economic life garden started from fifth year. In regard to benefit cost ratio (BCR), it was also observed from the table that present worth of benefit was higher than present worth of cost, hence BCR was found to be 5.36. In consideration of forty years as life of garden the relationship between benefit and cost with application of discounting technique was greater than one, hence this project was found to be profitable. In general, NPW was Rs.22.50 lakhs, N/K ratio was 10.42 and IRR was 33.93 in Kesar mango garden. In general Kesar mango growers face many problems like non-availability of electricity due to load shading. In regard to suggestions it was observed that supply of electricity through utilization of non-conventional energy sources, utilization of generator in subsidization rate and load shading was minimized by government.



# APPENDIX

## APPENDIX-I

Title : ECONOMICS OF PRODUCTION OF KESAR MANGO IN LATUR DISTRICT OF  
MAHARASHTRA

### SCHEDULE-I

#### ESTABLISHMENT COST OF KESAR MANGO GARDEN FOR FIVE YEARS

##### 1. General information

Name of farmers :

Area under kesar mango (ha) :

Spacing :

##### 1<sup>st</sup> year

Operation	No.	Human labour				Bullock pair day	Machine power hours
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		
Ploughing							
Harrowing							
Digging of pits							
Manuring							
Planting							
Irrigation							
Fertilizing							
Weeding							
Spraying							
Hoeing							
If any							
Total							

**2<sup>nd</sup> year**

Operation	No.	Human labour				Bullock pair day	Machine power hours
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		
Ploughing							
Harrowing							
Digging of pits							
Manuring							
Planting							
Irrigation							
Fertilizing							
Weeding							
Spraying							
Hoeing							
If any							
Total							

**3<sup>rd</sup> year**

Operation	No.	Human labour				Bullock pair day	Machine power hours
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		
Ploughing							
Harrowing							
Digging of pits							
Manuring							
Planting							
Irrigation							
Fertilizing							
Weeding							
Spraying							
Hoeing							

If any							
Total							

#### 4<sup>th</sup> year

Operation	No.	Human labour				Bullock pair day	Machine power hours
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		
Ploughing							
Harrowing							
Digging of pits							
Manuring							
Planting							
Irrigation							
Fertilizing							
Weeding							
Spraying							
Hoeing							
If any							
Total							

## SCHEDULE-II

### INFORMATION OF KESAR MANGO PRODUCTION

#### 1) Socio-economic status of kesar mango grower

1. Name :
2. Village : Taluka : District :
3. Age in year :
4. Education level : Illiterate/ Primary /Secondary (middle school) / Higher  
College level
7. Family size (no.) :
8. Occupation level : Agriculture / Industry / Service
9. Land holding (ha) :  
Uncultivated land \_\_\_\_\_ ha, Irrigated land \_\_\_\_\_ ha, Rainfed land \_\_\_\_ ha.
10. Land revenue :
11. Kesar mango garden size (ha):
12. Age of the garden (years):
13. Variety :

#### 2) Cropping pattern

Kharif			Rabi			Summer		
Crop (variety)	I (ha)	R (ha)	Crop (variety)	I (ha)	R (ha)	Crop (variety)	I (ha)	R (ha)
Mung			R. jowar			Groundnut		
Urid			Safflower			Vegetable		
Soybean			Wheat			Sugarcane		
Tur			Gram			Fruits		
K. jowar			Cash crop					
Cotton			Groundnut					
1. K. Mango			Vegetable					

#### 3) Livestock

Sr. No.	Name of livestock	No.	Age	Present value (Rs.)
1.	Bullock pair			
2.	Cow			

3.	Buffalo			
4.	Goat			
	<b>Total</b>			

#### 4) Machinery

Sr. No.	Assets	No./Qty.	Age	Present value (Rs.)
i)	Tractor			
ii)	Thresher			
	<b>Total</b>			

#### 5) Irrigation structure

Sr. No.	Assets	No./Qty.	Age	Present value (Rs.)
i)	Well			
ii)	Electric motor			
iii)	Shed for elec. Motor			
iv)	Pipeline (length)			
	<b>Total</b>			

#### 6) Commonly used assets

Sr. No.	Assets	No./Qty.	Age	Present value (Rs.)
i)	Plough			
ii)	Harrow			
iii)	Seed drill			
iv)	Hoe			
v)	Bullock cart			
vi)	Sprayer			
	a) Hand sprayer			
	b) Foot sprayer			
	c) Power sprayer			
Vii)	Farm building			
	<b>Total</b>			

#### 7) Operation wise labour utilization per annum for maintenance of kesar mango garden

Operation	No.	Human labour				Bullock pair day	Machine power hours
		Hired male (Manday)	Hired female (Manday)	Family male (Manday)	Family female (Manday)		

Ploughing							
Harrowing							
Cleaning							
Manuring							
Sowing							
Irrigation							
Fertilizing							
Weeding							
Hoeing							
Harvesting							
If any							
<b>Total</b>							

8) Use of physical inputs in kesar mango production

Particular	Unit	Qty.	Rate/ unit	Value (Rs.)
1. Kesar mango plants	No.of plants			
2. Type of fertilizers	Bag			
i) 10:26:26				
ii) potash				
iii) Single super phosphate				
iv) DAP				
v) Urea				
3. Manure	q			
i)				
ii)				
4. Plant protection	kg/lit			
i)				
ii)				
5. Irrigation (Drip / Flood )	No.			

**9) Yield of kesar mango fruit crop.**

<b>Particular</b>	<b>Qty. (q)</b>	<b>Rate/q</b>	<b>Value (Rs.)</b>	<b>Remarks</b>
1. Kesar mango production				

**10. Constraints and suggestions of kesar mango growers**

**1. Constraints**

- i)
- ii)
- iii)
- iv)

**2. Suggestions**

- i)
- ii)
- iii)
- iv)

## APPENDIX-II

### Score and rates used in analysis

	Particular	Score/rate
1.	Education :	
	Illiterate	1
	Primary	2
	High school	3
	Higher secondary	4
	College level	5
2.	Occupation level	
	Primary	1
	Secondary	2
	Higher	3
3.	Fertilizers	
	Urea	Rs.250/bag
	DAP (18:46:0)	Rs.475/bag
	10:26:26	Rs.375/bag
	Nitrogen	Rs.10.86/kg
	Phosphorus	Rs.22.25/kg
	Potash	Rs.8.33/kg
5.	Hired male labour	Rs.80/day
	Hired female labour	Rs.60/day
6.	Manure	Rs.50/quantal
7.	Irrigation	Rs.0.97/m <sup>3</sup>
8.	Price of commodities	
	Kesar mango production	Rs.2500/quantal

## APPENDIX-III

### i. Per hectare physical inputs in establishment of Kesar mango production

(Unit/ha)

Particular	Unit	Kesar mango garden
<b>INPUT</b>		
1. Hired human labour	man day	25.26
2. Bullock labour	pair day	1.97
3. Machine labour	hour	3.73
4. Manure	q	5.76
5. Nitrogen	kg	43.24
6. Phosphorus	kg	37.17
7. Potash	kg	38.38
8. Plant protection	lit	20.61
9. Irrigation	m <sup>3</sup>	14283.63
10. Family human labour	man day	7.02

**ii. Per hectare establishment cost of Kesar mango production**

Particular	(Rs./ha) Kesar mango garden
1. Hired human labour	2020.80 (3.90)
2. Bullock labour	295.50 (0.57)
3. Machine labour	1007.10 (1.95)
4. Plants	3000.00 (5.80)
5. Manures	288.00 (0.56)
6. Fertilizers	1616.33 (3.10)
7. Plant protection	284.62 (0.55)
8. Irrigation	13855.12 (26.80)
9. Land revenue	129.93 (0.25)
10. Incidental expenditure	20.47 (0.04)
11. Interest on working capital	2251.79 (4.40)
12. Depreciation on capital asset	618.59 (1.20)
13. Cost-A (item 1 to item 11)	25388.25 (49.11)
14. Rental value of land	25000.00 (48.36)
15. Interest on fixed capital	742.31 (1.44)
16. Cost-B (item 13 + 14+15)	51130.56 (98.91)
17. Family human labour	561.60 (1.09)
18. Cost-C (item 16+17)	51692.16 (100.00)

## APPENDIX-IV

### Year wise incremental average costs and returns of Kesar mando garden

Economic life of garden	Kesar mango garden			
	Code No.	Frequency	Incremental average production cost = [(cost-C) - (Depreciation + Interest on fixed capital + Amortised cost)]	Incremental average cash flow (average gross return)
1	13, 14, 15	3	20279.84	9166.61
2	16, 17, 18, 19, 20	5	27803.58	19900.00
3	21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33	13	47168.19	69653.84
4	34, 35, 36, 37, 38, 39, 40	7	47465.45	90642.85
5	41, 42, 43, 44	4	49628.51	93000.00
6	45, 46, 47	3	55119.75	180000.00
7	48, 49	2	76884.83	225000.00
8	50, 51	2	84791.10	330000.00
9	52, 53, 54, 55	4	85309.28	532500.00
10	56, 57	2	120899.70	1372500.00
11	58, 59	2	170519.58	10725000.00
12	60	1	37906.60	100000.00
Total	48	48	8237764.41	13747363.30