A STUDY OF PRODUCTION AND MARKETING MANAGEMENT OF GRAPES IN PUNE DISTRICT AND STRATEGIES FOR INCREASING PRODUCTIVITY AND PROFITABILITY.

A thesis submitted to

TILAK MAHARASHTRA VIDYAPEETH,

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By

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Under the guidance of

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AUGUST, 2014.

DECLARATION

I hereby declare that the thesis entitled,

"**A Study of Production and Marketing Management**

of Grapes in Pune District and Strategies for Increasing

Productivity and Profitability." Completed and

written by me has not previously formed the

basis for the award of any Degree or

other similar title upon me of this

or any other Vidyapeeth or

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Place : **Sd/-**

Date : **Research Student**

C E R T I F I C A T E

This is to certify that the thesis entitled "**A Study of Production and Marketing Management of Grapes in Pune District and Strategies for Increasing Productivity and Profitability.**" which is being submitted herewith for the award of the **Degree of Vidyavachaspati (Ph.D.)** in **MANAGEMENT**of **Tilak Maharashtra Vidyapeeth, Pune** is the result of original research work completed by Shri . **JAGTAP M.D.** under my supervision and guidance. To the best of my knowledge and belief the work incorporated in this thesis has not formed the basis for the award of any Degree or similar title of this or any other University or examining body upon him / her.

Place :

Date: **Research Guide**

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Place: TMV Pune

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1. INTRODUCTION

India has been a predominantly agrarian economy since time immemorial. The development efforts over the last few decades have doubtlessly strengthened our industrial base. However, agriculture continues to be the mainstay of our economy and even today as more than 59 per cent of population depends on it. The production of fruits and vegetables has vital importance as it provides three to four times more cash income than cereals per unit of land. Realizing the importance of fruit cultivation many farmers are diverting their resources towards plantation of fruit crops.

Fruit growing is one of the important branch of diversified farming. Cultivation of fruit crops contributes to the health, happiness of the people and prosperity of the nation. The standard of living of people is often judged by the production and per capita consumption of fruits. Taking into consideration the nutritive value and high income earning potential of fruits, importance is given to fruit cultivation in the agricultural planning.

Fruits are the prime source of vitamins and minerals without which human body cannot maintain proper health and resistance to the diseases. Indian Council of Medical Research (ICMR) has recommended the consumption of at least 92 grams of fruits per day and as much variety as the season permits (Anonymous, 2001). On the contrary, the per capita consumption of fruits in India is only 46 grams per day. This indicates the wide gap between the use and requirement of fruits.

1.1 Dietary importance of grapes

Importance of fruits in human diet is universally recognized. Grape fruits are very nutritious containing 10.2 per cent carbohydrates, 0.8 per cent proteins, 0.1 per cent minerals and 85.5 per cent water. Fresh grapes contain many vitamins. Fairly good amount of vitamin ‘A’ is present which retains in dehydrated grapes also. It is one of the most delicious, refreshing and nourishing fruit. Ripped grape fruits are easily digestible. They can be consumed in many forms such as, fresh grapes, rasins, juice and wine. Grape juice is a nourishing thirst quencher, a stimulant to the kidneys and acts as a laxative. The principal product made from grapes is wine. Table purpose grapes must have an attractive appearance, good eating quality, good shipping and storage quality.

Table 1.1 Nutrition content in 100 gm. fresh table grape fruits.

Sr. No.	Content	Weight/ Percentage
1	Water	85.5 %
2	Carbohydrate	10.2 %
3	Protein	0.8 %
4	Fat	0.1 %
5	Minerals	0.1%
6	Fibre	3.0 %
7	Calcium	0.3 %
8	Phosphorus	0.02 %
9	Iron	0.2 %
10	Calories	45
11	Vitamins A	15 Mg.
12	Vitamins B	40 Mg.
13	Vitamins C	3.0 Gm.

1.2 Variety wise grape cultivation

Grapevine cultivation started in 1960 with the variety of Fakadi and Bhokari as alternative fruit crops. After 1980, it has been practiced as a traditional commercial fruit crop in a large extent of area. Presently, in Pune district the new varieties like Thompson Seedless, Tas-A-Ganesh, Sonaka, Manik chaman, Sharad Seedless and Flame Seedless are more practiced than other varieties. The analysis of variety wise area under grapevine cultivation at tahsil level reveals that area under Thompson Seedless variety is more followed by Sonaka and Tas-A-Ganesh are gaining more importance. Variety wise area under grapevine cultivation in each tahsil is different.

a) Thompson Seedless:- It is vinifera grape, which originated in Asia Minor and was first grown in California by Willam Thompson near Yuba city. It is also call oval Kishmish in the Eastern Mediterranean region and Sultana in Australia and South Africa (Winkler 1974). It is believe to be grown in every viticulture country of the world. Large quantities of white desert wines are also made from this variety. However, it cannot be used for producing high quality

table vine. The area of Thompson Seedless is highest in all varieties area, which share highest percent of the total grapevine area of the study region.

b) Tas-A-Ganesh :- Tas-A-Ganesh is similar to Thompson Seedless in all respect except in the size of the berries and the clusters are larger than those of Thompson seedless. This mutant responds more to grapevine area application and girdling, resulting into a better quality fruit than Thompson Seedless. This variety was identified by the late Vasantrao in his vineyard at Borgaon in Sangli district. The area under this variety is more and it constitutes 15.35 per cent of the total area under grapevine in the study region.

c) Sonaka:- Sonaka is also similar to Thompson Seedless in all respect expect it responds to grapevine area application better than Tas-A-Ganesh and Thompson Seedless. As a result, the berry elongation is better and the berry skin is thin but it is more susceptible to berry cracking and rotting if it rains at the harvest. It was identify by Shri Nanasaheb Kale in his vineyard at Nanaj in Solapur district.

d) Manik chaman :- Manik chaman is like a variety of sonaka invented by Shri. T. R. Dabhade at Nanaj in the Solapur region . This is the third ranking variety, which constitutes 10.37 percent of total grapevine area of the study region. Other coloured varieties like Sharad Seedless and Flame seedless are also planted in the entire region .

e) Sharad Seedless : - These grapes are seedless, black in colour and are very good for table and wine purpose. This variety is made available in market in the month of January and February.

f) Flame Seedless :- This variety is red in colour. Flame seedless grapes are the result of a cross between Thompson, Cardinal and other grape varieties. Flame grapes are one of the most popular varieties along with Thompson grapes. These grapes are seedless, sweet-tart, and crunchy. This variety is also made available in market in the month of January and February.

1.3 Availability of grapes in market

The month wise availability of grapes in different states is shown in figure 1. The grapes are made available in the market for consumption from the month of mid December to mid May in Maharashtra, Karnataka and Andhra Pradesh but peak season starts from February and March month. When the season of above states over, the arrival from Punjab and Haryana starts and end in the month of July and mid August. Tamil Nadu is only state which provide the grapes in market for almost ten months.

Plate 1. Different varieties of the grapes.

Thomson Seedless

Sonaka

Flame Seedless

Sharad Seedless

Tas A Ganesh

Manik Chaman

Fig. 1 Monthwise availabity of grapes in Maharashtra and other major states.

STATES	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Maharashtra												
Karnataka												
Andhra Pradesh												
Tamil Nadu												
Punjab												
Haryana												

Source: Indian Horticulture Database, 2009

1.4 Area, production and productivity of grapes.

1.4.1 World scenario:

Grape (*Vitis vinifera*) is an important fruit crop in India. Grape is the third most widely cultivated fruit after citrus and banana. Globally grapes production contributes to about 16% of the total fruit production. According to Food and Agriculture Organization data (2009), the leading grape producing countries in the world in terms of production are Italy, China, USA and France while in term of area are Spain, France, Italy and China. The average productivity of the world is 9.77 tones / ha. . India produced 1667.70 thousand tones during 2009 which was about 2.49 per cent of the total world production. In case of productivity, India stand first (26.06 tones / Ha) in the world. The details are given in table 1.2

Table 1.2 Major producing countries of grapes in world (2009)

SI. NO.	Country	Area (000 Ha)	Production (000 Ha)	Productivity Tones /Ha.
1	Italy	827	8,519.42	10.30
2	China	466	6,787.08	14.56
3	U. S.	415	6,384.09	15.38
4	France	864	6,044.90	7.00
5	Spain	1175	5,995.30	5.10
6	Turkey	812	3,612.78	4.45
7	Iran	286	3,000.00	10.49
8	Argentina	208	2,900.00	13.94
9	Chile	184	2,350.00	12.77
10	**India**	**64**	**1,667.70**	**26.06**
11	Other	2042	19960.00	9.77
12	**World**	**6877**	**67,221.27**	**9.77**

Source: Indian Horticulture Database, 2009

1.4.2 Indian scenario

There is sizeable increase in acreage and production of grapes in India. In acreage, there is an increase from 47.3 thousand ha in 2001-02 to 80.00 thousand ha in 2008-09. Similarly the production has increased from 1,184.2 thousand tons in 2001-02 to 1,878.0 thousand tons in 2008-09.The details are given in table 1.3.

Fig. 2 Productivity of grapes (Tons/ ha.) in different countries in the world.

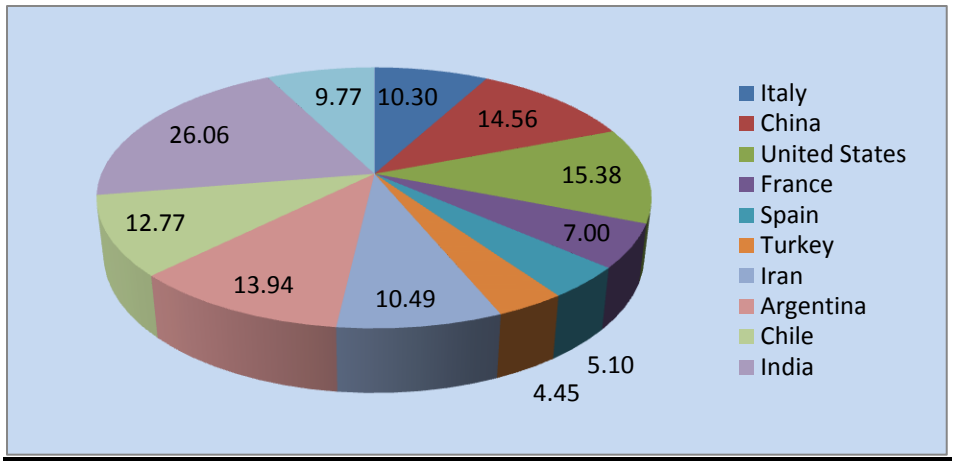
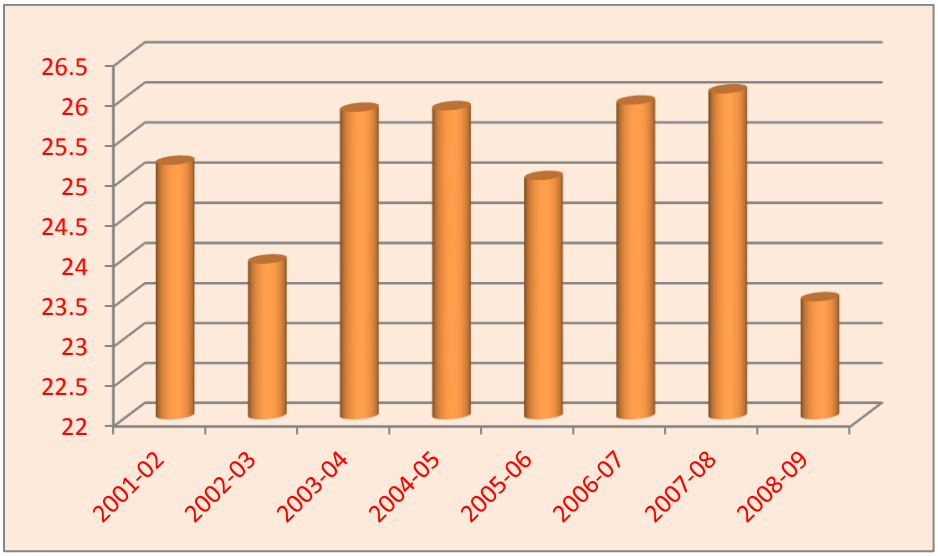


Table 1.3 Area, production, and productivity of grapes in India.

SI. NO.	Year	Area (000 Ha)	Production (000 Ha	Productivity Tones /Ha.
1	2001-02	47.30	1184.2	25.18
2	2002-03	52.10	1247.8	23.95
3	2003-04	57.08	1474.8	25.84
4	2004-05	60.50	1564.7	25.86
5	2005-06	66.00	1649.6	24.99
6	2006-07	65.00	1685.5	25.93
7	2007-08	68.00	1773.0	26.07
8	2008-09	80.00	1878.0	23.48

Source: Indian Horticulture Database, 2009.

Fig. 3. Productivity of grapes (Tons per ha.) in India.



Area and production of grapes in major producing states of India during 2007-2008 and 2008-2009 is given in the table 1.4.

1.4.3 Major Producing States in India:

Grape is an important fruit crop of India. Maharashtra, Karnataka, Tamil Nadu, Andhra Pradesh and Punjab are the major grapes growing states. Maharashtra was the largest grapes producing state accounting for 75.33 per cent of total country's production followed by Karnataka (14.32 per cent), Tamil Nadu (4.84 per cent), Andhra Pradesh (3.31 per cent) and Punjab (1.18 per cent) of total production during 2008-2009. Maharashtra and Karnataka together contributes about 89.65 per cent of total national grapes production. Maharashtra ranked first with 69.97 per cent of total area during 2008-2009.

Table.1.4 Area, production and productivity of grapes in different states.

State	**Area(000' Hectares)**			**Production(000' Tones)**			**Yield (Tones/Hectare**	
	2007-2008	**2008-2009**	**% to Total Area**	**2007-2008**	**2008-2009**	**% to Total Production**	**2007-2008**	**2008-2009**
Maharashtra	45.6	55.7	**69.97**	1290.0	1415.0	**75.33**	28.3	25.4
Karnataka	14.3	14.9	18.71	258.8	269.0	14.32	18.1	18.0
Tamilnadu	2.8		3.89	83.5	91.0	4.84	29.8	29.8
Andhrapradesh	2.8	3.0	3.76	58.0	62.2	3.31	21.0	21.0
Punjab	1.0	0.8	1.00	26.7	22.1	1.18	26.7	28.4
Other	1.9	2.2	2.76	17.6	19.0	1.01	9.4	8.7
All India	**68.3**	**79.6**	**100**	**1734.7**	**1878.3**	**100**	**25.4**	**23.6**

(Source-National Horticultural Board, database)

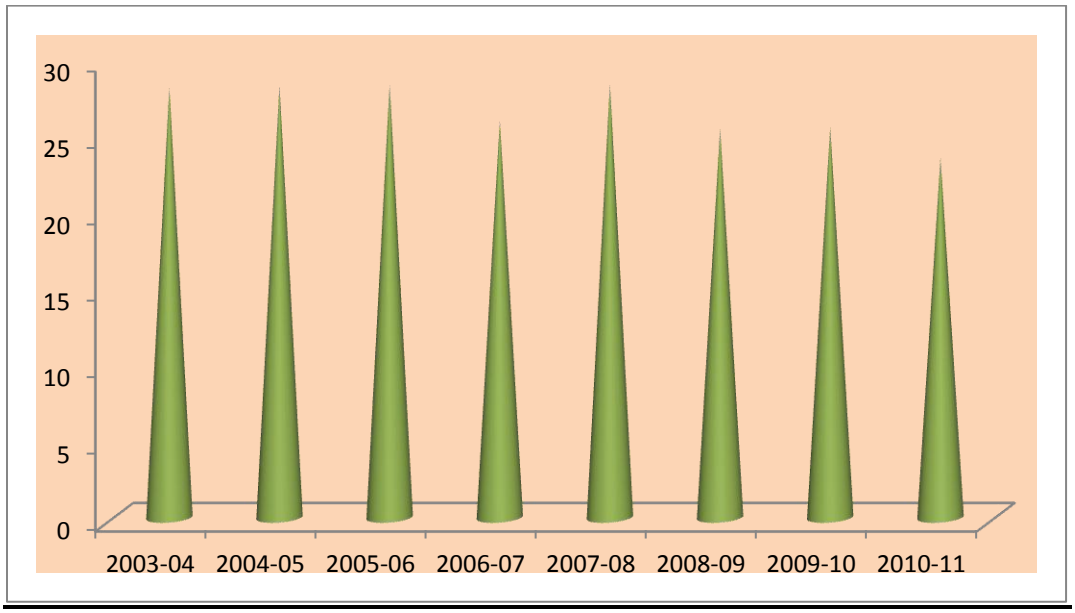
1.4.5 Maharashtra Scenario:

Table 1.5 Area, production, and productivity of grapes in Maharashtra.

SI. NO.	Year	Area (000 Ha)	Production (000 Ha	Productivity Tones /Ha.
1	2003-04	41.4	1163.10	28.1
2	2004-05	43.08	1233.90	28.2
3	2005-06	45.10	1275.00	28.3
4	2006-07	65.00	1685.00	25.9
5	2007-08	45.60	1290.00	28.3
6	2008-09	55.70	1415.00	25.4
7	2009-10	45.00	1735.00	25.5
8	2010-11	80.00	1878.00	23.5

(Source-National Horticultural Board, database)

Fig. 4. Productivity of grapes (Tons per ha.) in Maharashtra.



This might be because of extensive research, new effective techniques, advance irrigation facilities, availability of infra structure facilities and marketing management in the State. Grape cultivation is concentrated in districts viz., Nashik, Sangli, Pune, Solapur, Ahmednagar, Latur, and Aurangabad. In Sangli district, Tasgaon and in Nashik district, Niphad areas are very famous for quality production, productivity as well as for the efficiency of cultivation.

In spite of considerable increase in area and production of grapes in Maharashtra, the grape growers have to face numerous odds from point of view of natural factors like climate and rainfall as well as economical factors like marketing and prices. Due to adversity of the various factors, grape growers find difficulties in obtaining fixed and remunerative net income. The grape growers have to pay more attention to production as well as the marketing management.

1.5 Grape farming as significant agro enterprise.

The grape cultivation is considered as highly remunerative as compared to other fruit crops. However, it requires special skills and managerial abilities besides its high capital requirement. Grape as it is highly sensitive to macro and micro environment, the success of grape farming depends on selection of site, variety and production management practices coupled with marketing management. The cost of establishment of grape vine orchard is very high, mainly due to more expenditure on training structure, nutrients, labour, etc. Higher initial investment on establishment of grape orchard acts as an obstacle in increasing area under grapes. (Deshmukh, 2004).

Avoiding salty and calcareous soils, nearly all soils are suitable for grape cultivation. As it is perennial orchard having long life about 20 years (economic life 15 to 18 years), selection of variety suitable for specific agro-climatic conditions is very important from production point of view. The selection of training structures (Bower type, 'T' type, 'Y' type) depends on varieties to be grown, climatic condition, wind direction, rainfall pattern, cultural operations, etc. Grape orchard requires skilled labours for different production management practices viz., training pruning, dipping of bunches, thinning, spraying, harvesting, grading and packaging. It requires inputs such as micro nutrients, fertilizers, growth hormones, protective chemicals (fungicides, pesticides), which are costly and selective in its use. As grape most of the quantities of grapes produced are being used for table purpose, the quality production is the pre-requisite to receive better remunerative prices. In limited irrigation sources, efficient irrigation practice like drip irrigation helps to improve the quality of produce and ultimately increase the income of grape growers (Pawar and Desale, 1996).

Table.1.6 Indian grape export : 2012-13

SI.NO.	Country	Export (Tones)	Per centages
1	Netherland	7698.462	52.21
2	England	3543.639	24.49
3	Sweden	1287.967	8.90
4	Germany	589.410	4.07
5	Belgium	415.000	2.87
6	Denmark	274.500	1.90
7	Norvy	195.500	1.35
8	Finland	179.980	1.24
9	Ireland	120.450	0.83
10	Lithuania	97.512	0.67
11	Austria	48.960	0.34
12	Portugal	15.300	0.11
13	Total	14466.680	100.00

(Source Agrowon)

Table 1.7 Grape Export from Maharashtra and India -2006-11.

Si. No.	Year	Export (Tones)		Value (Cr. Rs.)	
		India	Maharashtra	India	Maharashtra
1	2006-07	85897	77307	302	272
2	2007-08	96964	87267	318	286
3	2008-09	124624	112163	408	367
4	2009-10	131153	118038	545	490
5	2010-11	99311	89379	418	370

(Source District Agriculture Officer, Pune.)

The area under grapes in Maharashtra is increasing continuously. During the year 2011-12 the total area under grapes was 70,585 thousand hectare and production was 16,81,404 tones. The major share of export was done to the European Countries. Netherland is importing 52.21 per cent of total production of grape from India. Another important Country is England whose share

is 24.49 per cent and all other remaining countries contribute about remaining 25 per cent of produce.

1.6 Need for grape production and marketing management

Grape is a perishable fruit crop, having very short-shelf life and cannot be stored for longer period under ordinary conditions. Harvesting of grapes is an important production management practice which involves ideal stage of harvesting, pattern and method of harvesting which is further coupled with grading, packaging and storage of grapes.

Merely increased production of grapes does not fulfill the requirement of the consumers, unless it is marketed efficiently which key factor for successful grape is farming. The grape has large proportion of marketable surplus in relation to the total production and the consumers are concentrated in big town, urban areas and metro cities. Only an efficient marketing system can gives fresh grapes to consumers and on the other hand grape growers can earn good returns (Pagire, 1995). The problems in marketing are concerned to grading standards, ideal packaging, proper storage, efficient transportation etc. Hence, issues on marketing of grapes have been attracted the attention of agricultural economist and agri-business managers to review the marketing management practices.

The management strategy in production and marketing of grapes found to be useful in fetching good returns. Many progressive grape growers have proved their abilities. However, many of the grape growers not in position to manage the grape production activity successfully due to one or other reasons. It is therefore, felt necessary to undertake study on production and marketing management of grapes. In view of these problems, the study is taken up in Pune district.

1.7 The research problem

The progressive cultivators are mainly attracted towards the grape cultivation. As compare to other crops, the area and production of grapes is increasing at a faster rate during last decade. On other side the cost of production and marketing is also found to be increasing day by day due to number of reasons among which the increased cost of inputs, labour, fluctuating prices, lack of infrastructure facilities for storage and processing are the major ones.

The grape growers are trying to find out suitable measures to increase the productivity and profitability by making changes in production and marketing management strategies.

Therefore, there is a need to study the production and marketing management strategies of grapes in detail. Under this situation, the present study viz., "**A Study of Production and Marketing Management of Grapes in Pune District and Strategies for Increasing Productivity and Profitability"** is under taken with the following specific objectives.

1.8.1 Objectives

1. To study the patterns of growth in area, production and productivity of grapes in the study area.
2. To examine the resource management in grapes production.
3. To analyze the cost and returns in grapes cultivation.
4. To study the feasibility of investment in grapes cultivation.
5. To identify marketing channels and to estimate price spread in grapes marketing.

1.8.2 Hypothesis

1. The area, production and productivity of grapes under the study area is increasing.
2. Different resources are used in grape production.
3. Grapes production is a profitable enterprise.
4. Investment in grapes cultivation is financially feasible.
5. There are many channels in grapes marketing.

1.9 Scope and utility of study

At present, even though the grape growers have acquired the skills in cultivation of grape but still large number of grape growers are lacking in adoption improved production technologies and efficient marketing management.

Grapevine orchard requires very large initial investment during its establishment as well as during cultivation. The study of cost and return structure will help grape growers in

deciding and managing various factors in cost and their importance in total cost of cultivation of grape vine orchard.

Marketing management of grapes is also an important activity along with production. The marketing management practice includes number of activities which can be broadly included under two heads viz., pre-harvest management and post harvest management. This study will be useful to grape growers in knowing the importance of various marketing management practices, specific markets, their marketing cost and price spread in the marketing channels preferred by them. Thus, it will be useful them in selecting market and marketing channel which will give better price to their produce with minimum cost and under taking various marketing practices which would be useful in getting better price and return from grape marketing.

Thus, study will useful in identifying the problems in production and marketing management, their seriousness and effects on production of grapes and net returns received by grape growers.

It will also useful to the officials of the Department of Agriculture, Co-operation and Marketing for planning and implementation of different programmer in cultivation and marketing of grapes. The information would also be useful to the research workers for conducting further research in near future.

The scope of the present study is limited to the outlined specific objectives; however the findings of the study would be relevant and applicable under similar situations.

1.10 Presentation of the study.

The entire study has been divided into seven chapters. Chapter I deal with the introduction to the topic specifying objectives of the study. Chapter II deals with the review of literature on earlier studies that are having relation to the objectives of the present study. Chapter III is devoted to the description of the sampling frame, the nature and source of data, the tools and technique of analysis adoption for evaluating the objectives. Chapter IV is devoted to the description of the study area, Chapter V presents data analysis and interpretation of the study. Chapter VI summaries of the overall findings, draws conclusions and outlines the policies emerging from the study and suggestions for further study. Chapter VII deals with literature cited.

2. REVIEW OF LITERATURE

The knowledge of similar research work previously carried out relating to the problem under study is useful as it provides a guidance and helpful in understanding and formulating the whole methodological framework. In this chapter, a review of past research relating the production and marketing management of grapes and strategies for increasing productivity and profitability and other relevant aspects are presented under the following sub- heads.

2.1 Patterns of growth in area, production and productivity of grapes in the study area.

2.2 Production and resource management in grapes production.

2.3 Cost and returns in grapes cultivation.

2.4 Feasibility of investment in grapes cultivation.

2.5 Marketing channels and to estimate price spread in grapes marketing.

2.6 Constraints in production and marketing of grapes and suggestions to overcome the constraints in production and marketing of grapes

2.1 Patterns of growth in area, production and productivity of grapes in the study area.

Handiganur (1995) studied the growth rates of area, production and productivity of grapes in Bijapur district from 1978-79 to 1992-93. Growth rate analysis had showed an increase of 7.12 per cent of area in Bijapur district and an increase of 0.6 per cent in area, 2.80 per cent in production and2.0 per cent in productivity of grapes was observed in Karnataka state. The increase in production and productivity was due to the use of improved cultural practices, increased use of manures, fertilizers and plant protection chemicals.

More (1999) studied the growth rate in area, production and productivity of banana in Nanded district, Parbhani district and Maharashtra state as a whole (4.50%) due to suitability of climate to cultivate banana in addition to more awareness of farmers towards horticultural crops in Nanded district. In Nanded district production growth rate had shown higher growth rate (21.04%). The higher growth in production was contributed mainly by significant increase in area coupled with productivity. The growth rate of productivity was high (1.43%) in Maharashtra state as a whole as compared to Nanded (1.40%) and Parbhani (0.90%) district. It was due to the

use of improved cultural practices, higher use of manures and fertilizers, more use of other inputs and also increased yield levels in other districts of the state.

Gangal (2002) studied the growth rate in area, production and productivity of banana in North Karnataka and Karnataka state as a whole. The growth rate in area (6.69%) in Karnataka state between 1980 and 2000 was substantially higher than all the other major banana growing states and all India average.

Shivanand (2002) studied the growth rate in area, production and productivity of banana in north Karnataka and Karnataka state as a whole. The growth rates in area (6.69%) in Karnataka state between 1980 and 2000 were substantially higher than all other major banana growing states and all India average.

Todkari(2010) studied the grapevine cultivation in Solapur District. The growth rate of grape area is flexible from region-to region and time to time according to environmental factors. The area of grapevine cultivation increasingly very slowly in study region and it decrease in the last decade. After the development of Thomson seedless, Sonaka and Tas-A-Ganesh varieties, the grape area increasing continuously.

Varghese (2004) conducted a study on trend analysis in area production and productivity and price behaviour of cardamom in Kerala. He reported that the percentage annual trend growth rate of area production and productivity of cardamom are -1.216, 414 and 5.512 respectively.

Saraswat and Rane (2006) conducted a study on production and marketing of peach fruit: a case study of Rajgarh area of district Sirimour in Himachal Pradesh 50 farmers were randomly selected for the detailed study. The compound growth rate with respect to area and production shows that the area under peach increased at the rate of 4.31 per cent per annum.

The highest area under peach was recorded in Sirmous district, whereas district Mandi registered the highest rate of production growth in the state i.e., 9.32 per cent per annum. The district wise production scenario indicate that there are variations out of 12 district only 4 district have registered a positive growth in production i.e., Solan (22.55%) followed by Una

2.2 Production and resource management in grapes production.

2.2.1 Root stock:

Prakash and Shikhamony (1993) studied effect of drought on development of grape vine orchard and reported that the highest yield was recorded in Arka Kanchan bundded on

St. George and the highest number of bunches per vine were observed by Arkawati budded on St. George whereas, the lowest number was observed in scion on own root.

Ramteke *et al.* (1999) studied the response of Tas-A-Ganesh vines of Dogridge rootstock to imposed water stress. They observed that withholding irrigation during fruiting season has reduced significantly the shoot length and internodal length which ultimately affect on fruiting percentage and yield.

2.2.2 Training:

Shaikhamany (2001) studied the training of grape vine canopy-techno-economic analysis at National Research Centre, Pune. The study revealed that in vigorous vines foliage density was more in bower leading to poor light interception, less ventilation, more disease, less labour efficiency in thining and dipping of cluster in growth regulator solution in case of seedless varieties. Whereas, gable system of training helped to overcome the disadvantages associated with bower system. It is recommended only for vine with vigorous growth. When vine vigour is inadequate, grapes are subjected to sunburn due to spure canopies and direct exposure to sun. Although higher yields are harvested on bower in favourable years, the average yield over the productive life span of vines is more in gable system. In the final analysis, the benefit-cost ratio was high in gable system compared to bower on a long run.

Peterlunger *et al.* (2002) The studied effect of training system on Pinot Noir grape and wine composition. The study examined the effect of four training systems on the adaptation of Pinot Noir. Simple Gyot, Double Guyot, Horizontal spurred cordon and vertical spurred cordon were assessed during four years (1992 to 1995). The training systems affected yield but showed little or no impact on grape and wine composition (sugars and wine phenolics). Sensory analysis could not show relevant differences among training systems. Therefore, the selection of training system may be made according to the vineyard management choices and mechanization possibilities.

2.2.3 Pruning:

Chougule and Bhujabl (1994) reported that unfuritfulness was more in delayed foundation pruning and this can be improved by adopting sub-cane pruning along with application of growth retardant (Cycocel).

Ranpise (2002) conducted investigation on standardization of number of buds on main and sub-main cane for sub-cane pruning to increase fruit fullness in grape cv. Thompson Seedless. Among the various sub-cane treatment sub-cane pruning treatment with seven buds or eight buds on the main cane and five buds on sub main cane was found to be significantly superior for increasing 65.66 per cent fruitfulness and 10.76 per cent increase in yield per vine.

2.2.4 Fertilizer management:

Chandak (1985) studied micronutrient studies in Thompson Seedless grapes and reported that average weight of bunch, total yield per vine, average weight and volume of berry were increased which ultimately result in highest yield per vine when treated with foliar application of micronutrients to Thompson Seedless grape vine.

Sally-Jean Bell and Alan Robson (1999) studied the effect of nitrogen fertilization on growth, canopy density and yield of *viits vinifera* L.cv. *Cabernet sauvignon*. Maximum vine vigour was observed upon addition of 100 g N/vine. It appeared that excessive nitrogen fertilization was an unprofitable exercise as it provided no further benefits in terms of vine productivity.

Sharma (2001) studied integrated nutrient management for grapes and observed that use of chemical fertilizer alone cannot sustain the soil health and productivity over a longer period of time. A number of organic sources are available. The proper management of it can solve the problem of nutrient imbalances and poor physical conditions, poor microbial population, etc. The essence of the integrated nutrient management is the combined use of inorganic, organic and biofertilizers in order to sustain the productivity of the crops.

2.2.5 Water management:

Magar (1987) studied irrigation method for grape and stated that with existing water resources, the drip irrigation method for grape was the most suitable. It does not only save the water to the extent of 60-70 per cent but also increase the yield of grapes to the extent of 20-25 per cent without affecting grape fruit quality and leads to increase fertilizer use efficiency.

Tambe *et al.* (1997) studied the water management techniques in grapes. It was observed that inadequate soil moisture leads to weak growth, delayed maturity and less

fruitfullness, while excessive moisture resulted into poor production due to slow growth, decreased bud brust and root rotting. The most critical stages for water management are formation of fruitful cane (40-60 days after April pruning), and berry development (60-120 days after October pruning). The grapevine gardens can be managed at stress or at shortage of water by adopting alternatives such as ideal canopy management, use of rootstocks, sub cane pruning system, use of chemicals, use of mulches and use of growth retardants.

2.2.6 Disease and pest management:

Rawal (1993) studied management of powdery mildew on grape in Punjab and observed that the induction of early sprouting in grape vines in an environment conductive for the development of powdery mildew helped in the establishment of the disease in vineyards. Due to high maximum summer temperature (above 35^0C) prevailing during the vegetative growth phase, symptoms on foliage remain undetectable and its presence when felt by growers on berries is too late a stage to be controlled with wetable sulphur. One prebloom and two post bloom sprays of eryosterol biosynthesis inhibitors, traidimefon, cyproconazole and penconazole from the traizole and fenarimol from the pyrimidies effectively controlled powdery mildew in a three year trial on both berries as well as foliage.

Indi (2004) studied alternative used of systemic and non systemic fungicides for the control of powdery mildew of grape and observed the alternative use of systemic and non systemic fungicides for the control of powdery mildew of grape vines. The results of three years study indicated that the introduction of wetable sulfur sprays in between the sprays of ESBI fungicides resulted in further reduction in the powdery mildew disease intensity on leaves and bunches to the tune of 1.38 to 2.17 and 1.55 to 2.11 per cent, respectively as compared to the spray at systemic fungicides alone. The fungicides viz., triadimefon 0.1 per cent, penconazole 0.05 per cent and mychlobutanil 0.05 per cent either alone or alternated with wetable sulfur 0.25 per cent were more effective than the others.

2.2.7 Plant Growth Regulators:

Desai *et al.* (1980) studied effect of different chemicals on keeping quality of Thompson Seedless grape and reported that matured Thompson Seedless grapes dipped in

Benzyl adenine (BA) at 10, 15 or 20 ppm and in NAA of 25 ppm as the best for retaining significantly higher sugar content and TSS than that of untreated grapes.

Orth (1991) studied effect of dipping Muscat Seedless with Gibberellic acid at different flowering stages on berry set and berry size and reported that average berry size at harvest was reduced by early dipping, but slightly enhanced by later dipping. Berry shape was changed from round to elongated with early treatments.

Tambe (2002) observed effect of Gibbrelic acid in combination with brassinosteroid on berry size, yield and quality of Thompson Seedless grapes. It indicated that the application of GA_3 in combination with brassinosteroid was found effective for cell elongation and cell division which lead to increase berry size, yield and quality of Thompson Seedless grapes.

2.3 Cost and returns in grapes cultivation.

2.3.1 Marketing in general:

Singh (1983) conducted the study on marketing management of gapes through co-operatives in Ludhiana district of Punjab. The budgeting technique was used to estimate the cost of assembling, grading, packing, transportation. The budgeting analysis showed that though co-operative marketing, the net returns, could be increased by reducing marketing cost and increasing gross returns by selling at the right place. When the produce was marketed through co-operative marketing society, cost decreased by 21.30 per cent while returns increased by 24.55 per cent.

Singh (1986) studied the marketing management of grapes in Punjab and observed that marketing study is the careful and objective study of market. It provides management with factual information as a basis for marketing decisions. Grading is the process of setting up standards to the produce. It adds value to the produce. Packaging, beside, giving protection make produce attractive. Distribution of produce is also important function of marketing management. It involves the decision relating to selection of channel and their management.

Madan (1988) studied the role of pre-harvest contractors in the marketing system of mango in Karnataka. The study revealed that 80 per cent of the total harvest is marketed by pre harvest contractors. Gross returns for the pre harvester contractor were around 37 per cent of the gross receipts from sales. He suggested that elimination of pre harvest contractor was enable the farmers to raise their share from 36 per cent of the sale proceeds to 70-80 per cent.

Subrahmanyam (1988) studied the marketing of horticultural crops in Karnataka and suggested that there is a need to control the activities of commission agents. For this purpose there is a need to introduce auctioning, grading, selling by weight etc. for orderly transaction. For elimination of pre harvest contractors and to improve marketing, steps like advancing production and market credit etc. to be taken. The co-operative societies should be developed as a real alternative channel of trade.

2.3.2 Grading and packing:

Pannu and Sidhu (1963) studied the economics of grading of oranges and found that the graded fruits fetched a premium of 12.9 per cent over the ungraded fruits.

Raghubanshi and Sharama (1977) stated that grading was a common yard stick to measure the quality variation. It helped in creating the mutual confidence between buyers and sellers. The consumer got the quality he wanted and producer got better returns.

Shrivastava (1979) in his study on transport and storage of grapes pointed out the need for quicker and proper transportation facility. He concluded that the rectangular bamboo basket having the horizontal partition reduced the wastage of grape considerably, than the conventional baskets. Moreover, fruits like grape should be transported as quick as possible and should be stored so that the quality is not deteriorated even for a distant market

Parthasarathy (1990) studied packaging of fruits and vegetables. He observed that farmers were resorting to traditional method of packaging for fruits and vegetables rather than modern packages. Some of the farmers simply filled the truck without any packaging for some fruits and vegetables. He suggested the need for educating growers, traders and consumers about the important of the need and necessity of packaging though it cost a bit more.

Satpute (1999) studied on the economics of production and marketing of grapes in Solapur district revealed that the grapes were graded into three grades (Grade I, II and III). The Grade I produce was observed to be 49.78 per cent. It was noticed that highest quantity (57.03 per cent) of produce was packed 4 kg boxes. More than 50 per cent grape growers transported the produce by both trucks and tempos.

Mohite (2002) in his study of marketing management of grapes in Dhule district observed that 23.96 per cent grape growers followed early October pruning (15 August –15 September). The grapes were graded into three grades, Grade I produce was observed to be 52.16 per cent. It was noticed that highest quantity (51.13 per cent) of produce was packed in 4 kg boxes.

2.4 Feasibility of investment in grapes cultivation.

Talathi *et al.* (2001) studied economic feasibility of *kokum* plantation established on the research farm coming under Konkan region of Maharashtra and they stated that, this crop will play unique role in improving the incomes of rural people and it will generate lot of employment opportunities for rural masses. Further study indicated that, crop is equally remunerative when compared to other crops, and the cost incurred on the establishment of *kokum* orchard per hectare worked to Rs.56,699/- and pay- back period was 9 years. Net present value (NPV) was positive at 14 per cent discount rate within the stated period and Benefit cost ratio was greater than one. Internal rate of return (IRR) was also greater than the opportunity cost of capital and hence investment in *kokum* plantation could be considered favorably.

Koujalagi and Kunnal (1992) evaluated financial feasibility of investment in pomegranate orchard in Bijapur district of Karnataka. The study showed that the per acre net present value for the entire life period of the project was found to be Rs. 8,283.81. the discounted benefit cost ratio (at 12 per cent discount rate) was 1.53. The pay -back period was 6.56 years and internal rate of return was 15.55 per cent.

Chitra *et al.* (1997) in the study on economics of ber production in and around Hyderabad city of Andra Pradesh found that, the payback period in ber cultivation was 4.42 years and the benefit cost ratio was 5.25 indicating the profitability of ber cultivation. The net present value worked out was Rs.12, 061. The IRR was 73.54 per cent which was higher than the lending rates of commercial banks. The results of the study indicated that even though ber cultivation required

relatively higher initial capital investment compared to other fruit crops, the returns were higher during the bearing period and economic indicators clearly indicated that the production of ber was economically viable.

Krishna Rao and Ramanna (1997) conducted study on Profitability of Mango cultivation in drought prone areas: A case study of Anantapur district of Andra Pradesh. The capital productivity measures indicated that the investment on mango garden in the region was profitable proposition. The investment can be recovered by the farmers in 11.5 years and the benefit cost ratio was 1.46:1. The positive net present value indicated the soundness of investment made in the mango cultivation. The internal rate of return also indicated favorable nature of return.

Sundaravardarajan and Ramanathan (2003) reported that B: C Ratio and IRR for new cashew plantations were 1.42 and 34.36 per cent, while for old cashew plantations it was 1.06 and 17.17 per cent respectively. Further, they suggested that need to create an awareness to adopt improved verities (HYV), which not only reduce the cost of cultivation but also to increase the net income among the different size group of farmers.

Anand (2005) conducted study an economic analysis of production and marketing of papaya in North Karnataka. The capital productivity measures indicated that the investment on papaya garden in the region was profitable proposition. The benefit cost ratio was 3.51. The positive net present value indicated the soundness of investment made in the papaya cultivation. The internal rate of return also indicated favorable nature of return.

Gangwar *et al.* (2008) undertake study on economic evaluation of Peach cultivation in North Indian plains by calculated with the help of different investment appraisal methods. The Net Present Value (NPV) worked out to be Rs.44807, the Benefit Cost Ratio (BCR) as 1.41 and Internal Rate of Return (IRR) as 22.20 under the present value summation method.Under the amortization method also the Net Present Value (NPV) and Benefit Cost (BC) ratio were similarly at Rs. 42877 and 1.28 respectively, indicated that Peach cultivation in Panjab and Uttarakhand (North Indian Plains) were a profitable venture.

Raikar (1990) in his findings of the study indicated that per ha. NPV was found to be Rs. 28.440.58 in case of small orchard, Rs. 16780.84 in large orchard and Rs. 21034.59 in average orchard. The B:C ratio at 12 per cent discount ratio was 2.87 in small orchard 12.25 in large

orchard and 2.49 in an average orchard. The payback period was 8.90 years 9.38 years and 9.18 years in small, large and over all orchards, respectively. The internal rate of return was found to be 20:22, 17:88 and 18:88 per cent in small, large and average orchard respectively.

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 Rs26257.00 for apples. Rs. 89222.00 for peaches, Rs. 117837.00 for plums and Rs. 160541.00 for apricots. The internal rate of return was 22, 33 and 47 per cent respectively. The benefit cost ratios were 1.36, 3.87, 4.62 and 5.10 respectively.

Hugar *et al.* (1991) examined the economic potentiality and viability of Guava cultivation under scientific management. The study revealed that the net present worth was Rs 7, 38,042 per hectare. The benefit cost ratio, internal rate of return and payback period were found to be 3.88, 57.82 per cent and six years respectively.

2.5 Marketing channels and to estimate price spread in grapes marketing.

Satpute (1999) observed that the six marketing channels of which Channel III (Producer – Commission agent – Retailer – Consumer) was the most common one through which 35.61 per cent quantity was disposed. The price premiums received per quintal between different grades, markets and marketing agencies and sale during different months were found to be considerably high.

Undirwade *et al*. (1992) conducted a study on marketing of grapes in Dhule district and observed that farmers preferred to sell their produce to pre harvest contractors (66.67 per cent). The producers share in consumer's rupee was highest (75.93 per cent) in Channel; Producer- Retailer- Consumer. The marketing cost was highest (Rs. 142.88/qt) in Channel- Producer – Wholesaler – Retailer – Consumer. There was no much variation in net profits earned by retailers in different channels of marketing.

Pagire (1995) conducted study on marketing of grapes in Maharashtra. He observed seven marketing channels and observed that 51.10 per cent grape growers marketed their produce through Channel – Producer – Commission agent – Retailer – Consumer and the quantity sold through the Channel: Producer – Export trader by 18.40 per cent sample grape

growers. The Channel: Producer – Retailer – Consumer was followed by all the sample grape growers, however, the quantity sold through it was only 5.70 per cent.

Deshpande *et al.* (1992) conducted a study on price spread in different channels of marketing of grapes in Latur district. They identified following channels. Channel I (Producer – Aditya – Retailer – Consumer). Channel II (Producer – Wholesaler – Retailer – Consumer). Channel III (Producer – Retailer – Consumer) and Channel IV (Producer – Consumer). The study revealed that the minimum marketing cost of Rs. 76.60 per quintal of grapes was in the Channel IV. The Channels I and II had the highest marketing cost of Rs. 166.95. The producer's share in consumer's rupee was maximum (91.43 per cent) in Channel IV.

Mohite (2002) in his study of marketing management of grapes in Dhule district observed five marketing channels were identified. Channel III (Producer – Commission agent – Retailer – Consumer) was the most common one through which 44.29 per cent quantity was disposed. The per quintal net average price received in Channel III was Rs. 1660.07. Nearly 30-40 per cent share was galloped by various market intermediaries.

Singh and Singh (1977) concluded the study of marketing of grapes in Haryana and Found that grading and packing together formed 72.60 per cent of the total marketing cost in the primary market and 64.13 per cent in the terminal market. Transportation accounted for another 10.96 per cent and 34.24 per cent of the total marketing cost for sale in these markets, respectively. They found that producer got the maximum share of the consumer's rupees (71.48 per cent) by selling produce to retailers through commission agents in the primary market. The producer share in consumer's rupee was minimum (53.70 per cent) when sold to the pre harvest contractor.

Deshmukh (1990) reported that more than 95 per cent of the grapes of Tasgaon farmers in Sangli district were sold through pre harvest contractors and wholesalers. Grape growers received higher returns by selling produce to retailer in sub-urban area because of savings in commissions and market charges. The per quintal marketing cost of grapes incurred by per harvest contractor was Rs. 194.00. The expenses incurred on account of various items like transportation including loading and unloading has major share (36.08 per cent) in the marketing cost. Commission charged by commission agents constituted 26.81 percent in the total marketing

cost. Packaging cost accounted for 20.61 per cent. Gross marketing margin of retailers who purchased grapes directly from the producer was Rs. 342 per quintal with selling price of Rs. 700 per quintal and the expenditure of retailer was Rs. 55 per quintal.

Sale and Nawadkar (1992) conducted a study on Impact of Producer's Associations on Marketing of Grapes and Bananas in Jalgaon and Sangli districts of Maharashtra, where producers association are actively engaged in marketing of banana and grapes, respectively. The results showed that the cost on account of transport, commission of wholesalers and marketing agencies was lower for the member of producers association than for the non members. The members of producers association could therefore, derive relatively higher profit margins from fruit trade than the non-members.

Dangat (1997) studied marketing of grapes through co-operative in Pune district and pointed out that co-operative marketing societies not only give technical guidance to members but also arrange transport and sale of grapes. The average area per farm under grapes was 1.23 ha. The average grape production per farm was 33-63 tonnes (27.42 tonnes/ha). The growers had three varieties, viz., Tas-A- Ganesh, Sonaka and Sharad Seedless. The sample grape growers sold the produce in different markets viz., Mumbai, Delhi, Ludhiana, Dubai and England through co-operatives as well as independently. About 16 per cent of the produce was sold in the garden itself. More than 50 per cent of the produce was sold in Delhi and Ludhiana markets. About 23 per cent of the produce was marketed in Mumbai market. The per kilogram cost of marketing of grapes worked out to Rs. 6, Rs. 7, Rs. 12 an Rs. 16 in Mumbai, Delhi, Dubai and England markets respectively. The average per kg gross price realized for grapes in these four markets worked out to about Rs. 10.50, Rs. 17, Rs. 20, Rs. 43 and Rs. 55 respectively.

Gawade *et al.* (2000) studied the marketing of grapes in Tasgaon region of Sangli district for organized and unorganized cultivators. They concluded that amongst the marketing cost, packaging material cost constituted the highest percentage followed by commission charges and transportation. As regards the sale in different market places 78 per cent of the total produce was sold in Mumbai market followed by Delhi (16.98 per cent). The per quintal price received was higher in Delhi market (Rs. 2059.20) than Mumbai market (Rs. 1974.80). The per quintal price received was higher in co-operative organization (Rs. 2000.01) than through commission agent (Rs. 1910.60).

Bagal (2003) studied the marketing of grapes in selected area of Sangli district and it revealed that 16.15 per cent of marketed quantity of grapes was exported from Tasgaon area. In case of domestic marketing the proportion sold was the highest in Mumbai market followed by Pune, Kolhapur and Sangli market. The per quintal cost of marketing of domestic market was Rs. 1123.68 in outside the state and Rs. 685.94 for within the State market respectively. The per quintal average net price realized by the grape growers was Rs. 1511.78 for domestic market and Rs. 1500.06 through marketing on farm sale, respectively.

It would be revealed from above studies that the share of producer's in consumers rupee was relatively very low in case of fruits. Selection of proper channel for marketing. The produce is an important aspect in the marketing. The post studies have revealed various marketing channels and have pointed out the profitable marketing channel. The studies on price spread revealed that the aspect such as packaging charges, packaging material, transportation, charges of commission agents etc were the items on which producer incurred maximum in the total market cost.

2.6 Constraints in production and marketing of grapes and suggestions to overcome the constraints in production and marketing of grapes

Govinda Reddy *et al.* (1997) identified the problems of mango growers in Srinivasapur region of Karnataka. The major constraints faced by mango growers at the production level were lack of knowledge on the application of balanced fertilizers (88% of respondents) followed by lack of awareness on drip irrigation (84%) technology, heavy rain and wind during flowering and fruit development stage (82%) , non- availability of credit (80%), non-availability of labour (78%), high cost of inputs (74%) , lack of knowledge on proper plant protection chemicals (63%), lack of knowledge on technical guidance (43%), high incidence of pests and diseases (36%) and the availability of quality grafts (26%). The major constraints in mango exports were lack of nearby processing units, storage facilities, precooling units, knowledge in chemical treatments of units, regulated markets and improved harvest. Other problems were exploitation by middlemen, lack of grading etc.

Khunt *et al.* (2001) studied economics of production and marketing of pomegranate and found that dying of young plant, problem of mite, inadequate irrigation water and its poor quality and short supply of electricity were major problems faced by pomegranate growers of Bahavnagar district.

Pagire and Jadhav (1998) studied the problems in the marketing of grapes in Maharashtra and concluded that, there was high cost of packing material, high cost of transportation and non-availability of pre-cooling and cold storage facilities etc. The number of grape growers who reported the above problems constituted 88 per cent, 83 per cent and 82 per cent, respectively of the total sample. Nearly, 50 per cent of the grape growers faced the problem of non-availability of skilled labours. About 78 per cent grape growers opined that there was undue delay in payment by the commission agents and about 93 per cent grape growers reported that the rate of commission charges was too high and the commission agents generally deduct the unauthorized deductions from the payments.

Satpute (1999) in his study on economics of production and marketing of grapes in Solapur district revealed that the farmers were facing the marketing problems such as costly packing material, lack of cold storage facilities, high commission charges, unauthorized deductions and lack of efficient market information system etc.

Kamble (2001) studied the economies of production and marketing of grapes in Sangli district. He reported that the farmers were facing the problems such as non-availability of technical guidance, costly insecticides/pesticides and growth regulators, non-availability of skilled labours at proper time, high wage rated, etc. The problems regarding marketing were as costly packing material, high commission charges and lack of efficient market information system, etc. at producer's level in the area.

Senthilnathan and Srinivasan (1994b) studied the problems in poovan banana cultivation in Trichy, Lalgudi and Kulithali taluks of Rrichirapalli district of Tamil Nadu. They reported that, in Trichy taluk 20 farmers expressed high initial investment, 16 wind damages, 12 price fluctuations and 10 disease problems. In Lalgudi taluk, 17 farmers expressed high initial investment, 11 price fluctuations, 13 diseases incidence and nine wind damage. In Kulithali, disease incidence expressed by 2, wind damage by 20, initial investment by 18 and price factor by 14 farmers.

Deorukhakar *et al.* (1995) studied the constraints in technology adoption of cashewnut cultivation in the Sindhudurga district of Konkan region, Maharashtra. They found that two third of the growers opined that there was no need to use of fertilizers and plant protection chemicals, high cost of fertilizers (13%) and plant protection chemicals (27%) were

other constraints expressed by the cashew growers. They further reported that the 41 and 32 per cent of the respondents expressed the high cost of improved planting material and irregular supply of this input, respectively.

Gunjate (1997) reported problems of cashew plantation management at regional fruit research station, Vengurla, Maharashtra, he observed that some problems in cashew plantation management that non-availability of right kind of inputs, inadequate funds, nonavailability of suitable form equipments and machinery, non-availability of qualified and experienced personnel. It was necessary to make available the grafts of the choicest variation in all the region replanting the gaps should be done as early as possible and it should never be lift beyond second year. The prophylactic sanitary measures recommended found to be quite affective against stem and root bores.

Mali *et al.* (2001), studied economics of production and marketing of banana in Jalgaon district of Maharashtra. The study identified that high cost of transportation, non availability of sufficient credit by the institutions in time, high price fluctuations, the problem of cheating in weighing of produce and lack of suitable grading of the produce according to quality as main problems in production and marketing.

Nagesh (2006) conducted study on entrepreneurial behaviour of pomegranate growers in Bagalkot district of Karnataka. The study identified production problems like lack of technical know-how, scarcity of labour, pest and diseases, lack of adequate credit facility. The farmers in the study area expressed also marketing problems like involvement of intermediaries, high cost of packaging material, high transportation charges.

Rane and Bagade (2006) studied economics of production and marketing of banana in Sindhudurg district of Maharashtra, the study revealed that farmers were facing the problem of bunchy top disease of banana and also aphids of banana in production of banana.

Vasudev and Choudhary (1999) identified problems of productions and marketing of tomato in the regions of Andhra Pradesh, lack of grading facilities, absence of market information and spoilage and malpractices were the major problems in tomato. They have concluded that providing these facilities can improve the marketing efficiency and will help the farmers in realizing better prices.

Karpagam (2000) conducted a study on turmeric growers of Tamil Nadu state and reported the problems such as price fluctuation, high cost of inputs and scarcity of labour, few respondents expressed the problem of non-availability of credit.

Govinda Gowda (2002) in his study on sustainable grape cultivation reported the important constraints in grape marketing as, no fixed price, low price, lack of regulated markets, exploitation by middle men, lack of cold storage facility, no guidance on marketing aspects and lack of transportation facilities. Further, constraints perceived by them in availing credit were non availability of credit in time and inadequate quantity of credit.

Sunil Kumar (2004) in his study on tomato growers in Belgaum district of Karnataka reported that, majority of the farmers (75.83%) faced the problem of technical knowledge and guidance about improved cultivation practices as well as post-harvest technology. Whereas 65.00 per cent of the respondents faced the problem of high fluctuation in market price, followed by high transportation cost (62.53%), labour shortage and high wages (55.83%) and lack of irrigation facilities and power shortage (46.66%).

Raghavendra (1997) in his study on knowledge and adoption behaviour of arecanut farmers of South Canara district of Karnataka suggested that, programmes relating to providing loans and subsidies to the farmers especially small and marginal group, to develop the sources of irrigation need to strengthened.

Chikhale *et al.* (1998) in his study on adoption of improved cultivation practices by orange growers in Maharashtra reported that, cent per cent of the respondents suggested to extend the facility of crop insurance scheme for the orange orchard so that the risk of failure can be covered and to provide subsidy for chemical fertilizers and pesticides. Imparting training about preparation of vermicompost, organizing visits of orange growers to the ideal orchards were the important suggestions given by the orange cultivating farmers.

Lakshmisha (2000) in his study on cashew reported that, there is need for integrated pest management (IPM) approach to manage the pests effectively in long range.

Babanna (2001) in his study on arecanut in Shimoga district suggested that, educating farmers in identification and control of pests and diseases, provision of remunerative price in time, labour availability and encourage the farmers to adopt the production technologies in arecanut cultivation.

Vedamurthy (2002) in his study on the management of arecanut gardens and marketing pattern preferred by arecanut farmers of Shimoga district in Karnataka state suggested that, educational activities needs to intensified by the extension and other agencies, irrigation facility, loans and subsidies to farmers especially for small and marginal farmers group, to develop the source of irrigation.

The above studies indicated that the lack of competition among buyers, absence of skilled labour, seasonal shortage of labour, absence of cold storage faculties, difficulties of transportation, large number of middlemen, unregulated markets, lack of proper grading and standardization, lack of packing, etc. were the major production and marketing management problems. In order to overcome these problems there must be well established production and marketing functions.

3. METHODOLOGY

Research methodology is considered as a foundation of every scientific study. For any research study, the researcher has to adopt appropriate research methodology in arriving at meaningful conclusions from the study.

It is usually thought better to discuss the details of research methodology before presenting results of the study so that researchers can understand the conclusions drawn from such study in their right perspective with this view the present chapter discusses in detail the research methodology adopted for the study.

This chapter outlines briefly the characteristics of the study area, the methods adopted in selection of the samples, the nature and sources of data and the various statistical tools and techniques employed in analyzing the data. These items are described under the following sub-heads.

3.1 Sampling procedure

3.2 Nature and sources of data

3.3 Analytical technique

3.4 Resource use management.

3.5 Definition of terms and concepts used.

3.1 SAMPLING PROCEDURE

Multistage purposive sampling procedure was adopted for selection of district, taluka and villages were selected purposively. The sampling procedure adopted for the study is detailed below.

3.1.1 Selection of the study area.

Grapes are being cultivated in different districts of Maharashtra. Pune district is one of the major producers of grapes in Maharashtra. The area under grapes in 2011-12 was 820 hectares with production of 22,501 tones. Therefore, Pune district was purposively selected for the study in the first stage.

3.1.2 Selection of sample tahsils.

Table 3.1 Tahsil wise area under the grape cultivation in Pune district.

Sr. No.	Tahsil	Area (Ha)	Per cent of total area
1	Junnar	484.00	59.02
2	Indapur	102.40	12.49
3	Baramati	94.40	11.51
4	Daund	57.20	6.98
5	Ambegaon	32.00	3.90
6	Haveli	23.00	2.68
7	Shirur	12.00	1.46
8	Khed	10.00	1.22
9	Purandar	6.00	0.73
10	Maval	0.00	0.00
11	Mulshi	0.00	0.00
12	Velha	0.00	0.00
13	Bhor	0.00	0.00
	Pune (Total)	820.00	100.00

There are 13 tahsil in Pune district and Junnar, Indapur, Baramati and Daund tahsil contribute 90.00 per cent area. Hence these tahsil are selected for the study at second stage.

3.1.3 Selection of the sample villages

A list of villages growing grapes were prepared for the tahsil. One village has been selected per 25 ha. According to this criterion, in the third stage of stratified sampling, 10 villages having highest area under grapes in Junnar tahsil, 2 each from Indapur and Baramati and 1 from Daund are selected purposively.

Table 3.2 Selected grape cultivating tahsils.

Sr. No.	Tahsil	Area (Ha)	Selected villages
1	Junnar	484.00	10
2	Indapur	102.40	2
3	Baramati	94.40	2
4	Daund	57.20	1
5	**Total**	**738.00**	**15**

The villages viz. Golegaon, Bhorwadi, Narayangaon, Warulwadi, Yedgaon, Pimpalwandi, Hiware, manjarwadi, Rajuri and Vadgaon from junnar, Bharanewadi and Bori from Indapur, katewadi and Pimpli from Baramati and lastly Patethan from Daund tahsil are selected for the study.

3.1.4 Selection of the sample respondents

In final stage, for selection of farmer the list of farmers from 15 villages was obtained from revenue records of selected villages to obtain primary data with regard to the production and marketing of grapes. A list of grape growers was prepared in ascending order according to their area of cultivation. For selection of farmers stratified random sampling is used. By using this method 40 percent of the total number of farmers i.e. 150 out of 375 farmers were selected for the study.

Table 3.3 Distribution of farmers according to area of cultivation.

Sr. No.	Area (Ha.)	Size	No. of farmers	Percentages to total farmers
1	0.01 to 2.00	Small	75	50.00
2	2.01 to 4.00	Medium	45	30.00
3	Above 4.00	Large	30	20.00
	Total		150	100.00

Table 3.3 shows that the selected grape growers were further cauterized into three size groups on the basis of size of total holding viz. small (0.01 to 2.00 ha.), medium (2.01 to 4.00 ha.) and large (above 4.00 ha) .

Off the total 150 selected farmers, 75 farmers were selected from small size group that accounts to 50.00 per cent, 45 farmers from medium size group which accounts 30.00 per cent and 30 farmers from large group which accounts to 20.00 per cent respectively.

Fig. 5 Map of Pune district of Maharashtra.

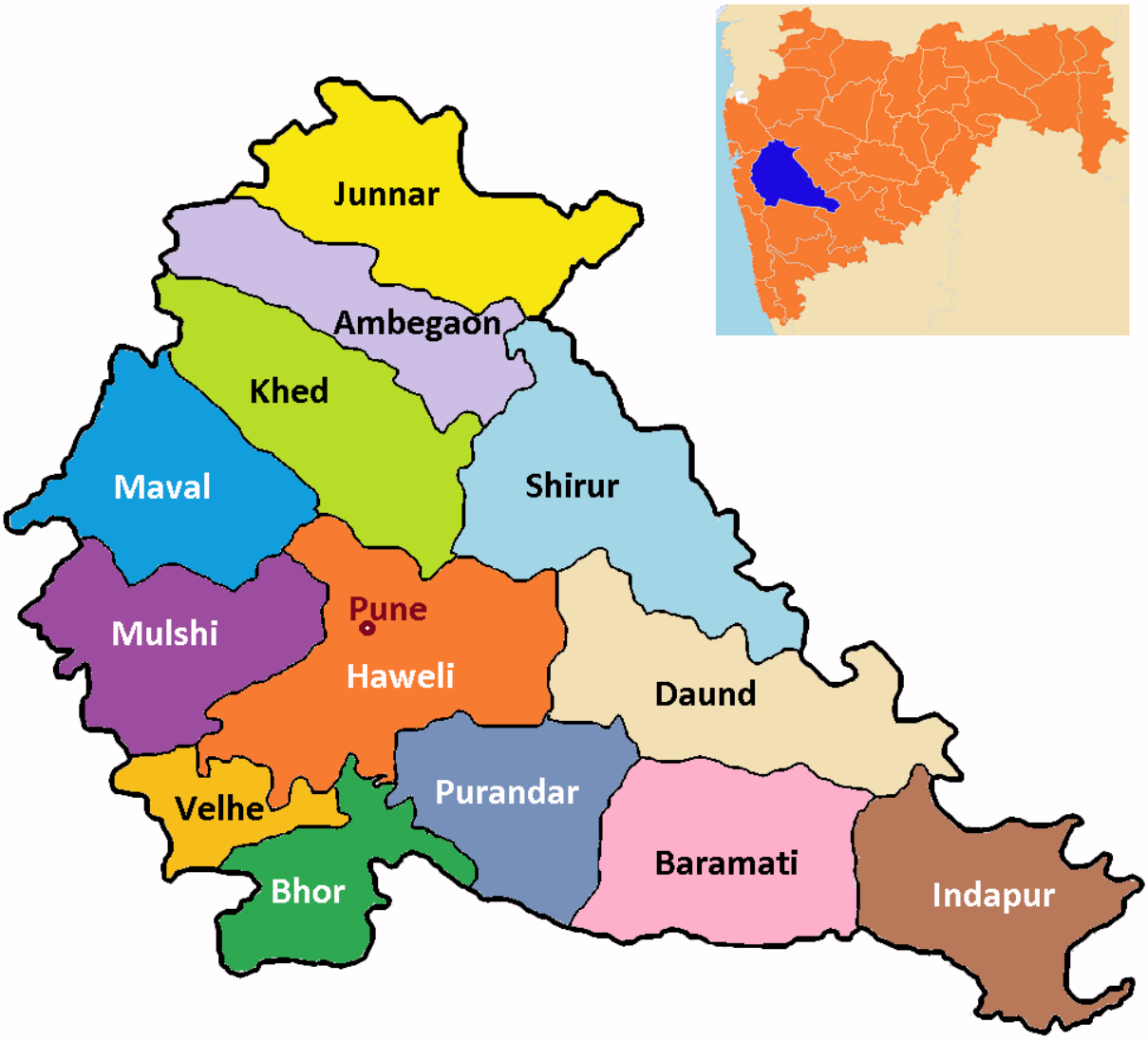


Table 3.4 Tahsil wise distribution of farmers according to size group.

Sr. No.	Tahsil	Small (0.01 to 2.00 Ha.)	Medium (2.01 to 4.00 Ha.)	Large (Above 4.00 Ha.)	Total Cultivators
1	Junnar	44	30	21	95
2	Indapur	12	7	4	23
3	Baramati	12	6	3	21
4	Daund	7	2	2	11
5	**Total**	**75**	**45**	**30**	**150**

Table 3.4 shows tahsil wise distribution of cultivators according to size groups. At overall level, out off 150 cultivators, 95 from Junnar, 23 from Indapur, 21 from Baramati and 11 from Daund tahsil were selected for the study.

3.1.5 Selection of market intermediaries

For studying the marketing aspects of grapes in all 50 market intermediaries i.e. 5 pre harvest contractors, 5 wholesalers and 15 retailers from each Pune and Mumbai market selected randomly.

3.2 NATURE AND SOURCE OF DATA

3.2.1 Primary data

The data needed for the study were collected from the respondents by personal interview method using pre-tested questionnaire. Majority of the respondents did not maintain records of expenditure and income from grapes cultivation. Hence, data collected was based on the memory of the respondents. At the time of interview, personal bias of the sample farmers was minimized by convincing them about the genuinely of the purpose for which the data were collected. The data collected from the selected respondents were to fulfill the objectives of the study. Data were based on the entire operations in establishing and maintaining the grapes orchards and the consequent costs and returns including marketing. Similarly, the data on marketing aspects from producers and intermediaries were collected by personal interview method with help of structured pre-tested schedule. Similarly the problems in production and marketing were collected through opinion survey of the respective respondents during 2012-13.

3.2.2 Secondary data

The secondary data on area, production and productivity of grapes for several years were collected from the records of Agricultural Development Officer and National Horticultural Board, Pune. Farmer's information was collected from revenue officers of respective villages and Taluka Agriculture Officer. The grape cultivation technology was adopted from National Research Station on Grape, Pune. The standard cost concept was implemented from cost of cultivation scheme implemented by Government of India at MPKV, Rahuri. The weekly prices of grapes were collected from Maharashtra State Agriculture Marketing Board, Pune. The Data regarding export was collected from MAHAGRAPE, Maharashtra State Grape Growers Association and APEDA. Other related information was collected from various books, journals, thesis and news papers. For this purpose the library facilities of Agriculture College, Pune, Jaykar library, University of Pune, TMV, Pune and MPKV, Rahuri were availed. The data for reference year 2012-13 was collected.

3.3 ANALYTICAL TOOLS AND TECHNIQUES EMPLOYED

To fulfill the specific objectives of the study, based on the nature and extent of availability of data, the following analytical tools and techniques have been adopted.

1. Tabular analysis
2. Growth rate analysis
3. Financial analysis
4. Functional analysis

3.3.1 Tabular analysis

Tabular presentation was adopted to compile the general characteristics of the sample farmers, determine the resource structure, cost structure, returns, profits and opinion of farmers regarding the problems in production and marketing. Simple statistical tools like averages and percentages were used to compare, contrast and interpret results properly.

3.3.2 Growth rate analysis

Temporal Growth of Grapes Cultivation

The area and production of grapes and its growth ratio is of immense importance. Growth rate is measured by the following equation:-

$$GR = \frac{P2-P1}{P1} \times 100$$

Where,

GR= Growth Rate

P1= Grapes area/ production/productivity in the previous year.

P2= Grapes area/ production /productivity in present the year.

3.3.3 Financial analysis

The techniques used for the financial analyses were,

1. Net present value / worth (NPV)
2. Benefit cost ratio (B:C ratio)
3. Internal rate of return (IRR)
4. Pay - back period (PBP) and

3.3.3.1 Net Present Value/ Worth

The present value represents the discounted value of the net cash inflows to the project. In the present study, a discount factor of 12 per cent will be used to discount the net cash inflows representing the opportunity cost of capital. It can be represented by

$$NPW = \frac{P_1}{(1+i)^{t1}} + \frac{P_2}{(1+i)^{t2}} + \frac{P_n}{(1+i)^{tn}} - C$$

Where,

P_1 = Net cash flow in first year,

i = Discount rate,

t = Time period and

C = Initial cost of investment.

3.3.3.2 Benefit cost ratio

The benefit cost ratio (BCR) was worked out by using following formula.

$$B:C \text{ ratio} = \frac{\text{Present worth of gross returns}}{\text{Present worth of costs.}}$$

3.3.3.3 Internal rate of return (IRR)

The rate at which the net present value of project is equal to zero is Internal Rate of Return (IRR) to the project. The net cash inflows will be discounted to determine the present worth.

$$IRR = \text{Lower discount rate} + \text{Difference between the two discount rates} \times \frac{\text{Present worth of the cash flow at lower discount rate}}{\text{Absolute difference between the present worth of cash flow at two discount rates}}$$

3.3.3.4 Pay - back period (PBP)

Pay- back period represents the length of time required for the stream of cash proceeds produced by the investment to be equal to the original cash outlay that is, the time required for the project to pay for itself. In the present study, pay -back period will be calculated by successively deducting the initial investment from the net returns until the initial investment is fully recovered.

In the present study pay- back period was calculated by using the following formula.

$$PBP = \frac{I}{E} = \frac{\text{Initial investment of project}}{\text{Annual Net cash revenue}}$$

3.3.4 Functional analysis

The Cob-Douglas type of production function will used for estimating the resources use productivities.

$$Y = a X_1^{b1} X_2^{b2} X_3^{b3} X_4^{b4} X_5^{b5} X_6^{b6} X_7^{b7} X_8^{b8} e^{u}$$

Where,

Y= Output in quintals per hectare

a = Intercept

X_1 = Per hectare use of human labour in man days

X_2 = Per hectare use of bullock labour in pair days

X_3 = Per hectare use of manures in quintals.

X_4 = Per hectare use of nitrogen in kg

X_5 = Per hectare use of phosphorus in kg

X_6 = Per hectare use of potassium in kg

X_7 = per hectare plant protection expenditure (Rs.)

X_8 = Per hectare plant growth regulator expenditure (Rs.)

b_1 to b_8 = Elasticities of production.

3.4 RESOURCE USE MANAGEMENT:

The same will be studied with the help of Cobb-Douglas type of production function.

Establishment and production cost:

The establishment cost of orchard, cost and return structure of grape crop will be estimated on the basis of standard cost concepts followed in Farm Management Studies.

3.5 DEFINITION OF TERMS AND CONCEPTS USED.

Cost concepts and items of cost.

The cost of establishment of grape orchard and cost of cultivation of grape will be studied as under.

Cost of establishment and cultivation:

i. Cost 'A': Includes the cost on account of hired human labour, total bullock labour charges, total machinery labour charges, cost of grafts, cost of manures and fertilizer, insecticides and pesticides, cost of supporting structure, irrigation charges, depreciation on implements and farm building, land revenue cesses and other taxes as well as interest on working capital.

ii. Cost 'B': Cost 'B' comprises of Cost 'A' plus rental value of owned land and interest on fixed capital.

iii. Cost 'C': Cost 'C' comprises of cost 'B' plus value of family labour. On the basis of this the establishment cost was amortized by using following formula.

$$a = \frac{A\ r\ (r+1)^N}{(r+1)^N - 1}$$

Where,

a = Amortized cost

A = Cost 'C'

r = Rate of interest

N = Economic life of grapes (yrs)

The economic life will be considered as 15 years and rate of interest will be taken as per prevailing bank rate.

Fixed cost

The various items viz., land preparation charges including pipeline cost, planting, fencing, land rent, land revenue, depreciation and also interest on equipment investment which were used in the pineapple production, comes under the fixed cost.

Variable cost

Variable cost includes the expenditure on labour and material input cost. The interest on working capital was also included under variable cost.

a. Human labour:

It includes both hired and family labour.

b. Bullock labour

Bullock labour cost will be calculated by considering the actual hiring charges prevailed in the area.

c. Machine labour:

In case of owned machines, cost will be evaluated on the basis of hired charges prevailed in the village

d. Grafts:

In case of grafts purchased from the nurseries or from the other cultivators, the actual price paid will be ascertained and charged.

e. Manures:

The cost of farm yard manures or compost produced on the farm will be evaluated at the rates prevailed in the village.

f. Fertilizers:

The fertilizers will be evaluated at the actual price paid by farmer.

g. Insecticides and pesticides:

The actual expenses incurred on insecticides and pesticides will be considered.

h. Irrigation charges:

The major sources of irrigation under study area mainly through well and lift. For estimating the irrigation charges the actual electricity charges, repairing charges, depreciation on electric motor etc. will taken into account.

i. Interest on Working Capital:

Interest on working capital will be taken as per the prevailing bank rate. Working Capital includes cash or kind expenses incurred for cultivation of the crop.

j. Land revenues, cesses and taxes:

This cost includes land revenue and other relevant taxes and cesses which are actually paid by the grape cultivators.

k. Rental value of land:

It will be evaluated at the rate of one-sixth of the value of gross output minus the land revenue

l. Depreciation on implements, machinery and farm buildings:

Farm assets like implements and farm buildings will be evaluated at the prevailing market prices taking into consideration the conditions of the assets.

m. Interest on fixed capital:

Interest on present value of fixed assets (excluding land) such as farm buildings, implements and machinery, irrigation structure and equipments and livestock (only draught animals) will be charged at the prevailing bank rate.

Market intermediaries

a. Wholesalers

Wholesalers played an important role in the marketing process. He is the first agency to receive the produce from farmers and sell to the wholesalers cum commission agents at distant market.

b. Commission agents

Commission agent is a licensed market functionary operating in APMC receives the produce from the sellers and arrange for sales. The commission agent is suppose to collect commission from the buyers of the produce as per MAPM (R) Act-1966.

c. Trader

Trader is licensed market functionary who purchases the notified commodities in APMC from either producer seller or commission agent and sells the same to different buyers.

d. Retailers

Retailers sell the grapes directly to consumers in the market. They purchase the produce from both wholesaler cum commission agent and producers.

e. Price spread

The difference between the price paid by consumer and price received by the producers was the marketing margin or price spread.

f. Gross return

Total value of produced when it was marketed is referred as the gross return.

g. Net returns

Return obtained by subtracting the total cost from gross return.

4. AGRO ECONOMIC FEATURES OF STUDY AREA.

This chapter covers the background information of the study area stating socio-physical features, land use and cropping pattern of the district and tahsil together with agricultural background of sample households selected for study. The knowledge about physical features of the district, tahsil and selected grape grower would facilitate to understand the results of the study, in general.

4.1 Physical features of Pune district

4.1.1 Location:

The district lies between 17^0-54^1 and 19^0-24^1 of Northern latitude and 73^0-19^1 and 75^0-10^1 of Eastern longitude. The Pune district has 15,620 square kilometer geographic area and it comprises to 5 per cent of the State geographic area. The district is mainly surrounded by Ahmednagar and Solapur at Northern East side, by Satara district at Southern side and by Raigad and Thane district at Western side.

4.1.2 Rainfall and climate:

The minimum temperature of 5^0c and maximum temperature of 42^0c was noticed in the year 2012-2013. The district receives. 115 cm average rainfall during the year 2012-2013.

4.1.3 Population:

As per 2001 census the total population of the district was 72, 24,224 comprising of 37,68,001 males and 34,56,223 females. The density of population of the district is 462 persons per square kilometer. For every thousand males there were 919 females. The total population Pune district was 72.24 lakh out of which the rural population was 30.32 lakhs and urban population was 41.92 lakhs.The literacy rate in Pune district was 80.45 per cent.

4.1.4 Transport

4.1.4.1 Air

Pune international Airport is located at Lohegaon, northeast of Pune city. The flights to a number of domestic and international destinations are operated from this airport.

4.1.4.2 Highways

The total road length of Pune district is 13642 km. Several National Highways and State Highways cross Pune district.

Major National Highways

- Pune-Mumbai and Pune Banglore National Highway (NH-4)
- Pune-Solapur –Hydrabad National Highway (MH 9)
- Pune-Nashik National Highway (MH 50)
- Mumbai –Pune Expressway.

Major State Highways

- Pune-Ahmednagar –Aurangabad State Highway
- Pune-Alandi State Highway
- Pune-Saswad -Pandharpur State Highway
- Pune-Paud Road State Highway
- Talegaon-Chakan State Highway

4.1.4.3 Railway Lines

All railways through line are broad guage and have double track . They belong to central railway Pune-Mumbai ,Pune-Kalyan –Nashik city, Pune-Daund-Solapur,Pune-Daund –Manmad ,Pune-Daund-Baramati ,Pune-Daund-Kurduwadi-Miraj,Pune-Miraj-Kolhapur railway are available.

4.1.5 Irrigation

The table 4.1 shows that the total irrigated area including the surface and wells in Pune district were about 269.89 thousand hectares. It was highest in Indapur tahsil.

Table 4.1 Source wise irrigated area

Particulars	Pune District	Junnar tashil	Indapur tahsil	Baramati tahsil	Daund tahsil
Total irrigated area	269.89 (100)	31.46 (100)	49.23 (100)	41.52 (100)	42.65 (100)
a) Surface	124.35 (46.07)	14.99 (47.64)	22.77 (46.25)	23.37 (56.28)	18.24 (42.76)
b) Wells	145.54 (53.93)	16.47 (52.36)	26.46 (53.75)	18.15 (43.72)	24.41 (57.24)
Gross cropped area	1247.5	99.2	112.9	113.3	115.4

4.1.4 Classification according to age group of selected grape growers

Table 4.2 Classification of the selected grape growers according to age.

Sr.No	Age Group	No. of farmers	Percentage to the total
1	21 to 30	18	12.00
2	31 to 40	52	34.67
3	41 to 50	32	21.33
4	51 to 60	27	18.00
5	Above 61	21	14.00
	Total	150	100.00

Above table shows that more than 50 percent cultivators are of age group from 30 to 50 years which is considered as active age group.

4.1.5 Classification according to education of selected grape growers.

On studying the production in agriculture a difference is always observed between the educated and non educated farmers. The selected grape growers were classified on the basis of their education. Out of total farmers, 17.33, 22.66, and 34.00 per cent have completed their S.S.C., H.S.C. and Graduation respectively. Ten per cent farmers are post graduate and 6.67 per cent are from technical side.

Table 4.3 Classification according to education of selected grape growers.

Sr.No.	Education	No. of farmers	Percentage
1	Uneducated	03	2.00
2	Less than S.S.C.	11	7.34
3	S.S.C.	26	17.33
4	H.S.C.	34	22.66
5	Graduate	51	34.00
6	Post Graduate	15	10.00
7	Technical education	10	6.67
	Total	150	100.00

4.1.4 Land utilization:

Table 4.4 Land Utilization of Pune District and selected tahsil.

(Area in '000' Ha.)

Land use category	Pune District	Junnar tashil	Indapur tahsil	Baramati tahsil	Daund tahsil
Total geographical area	1562.01 (100)	138.5 (100)	146.79 (100)	138.24 (100)	128.98 (100)
Area under forest	184.8 (11.83)	20.9 (15.09)	7.86 (5.35)	4.92 (3.55)	4.90 (3.79)
Land put on non agril use	61.0 (3.90)	2.9 (2.09)	5.86 (3.99)	4.85 (3.50)	7.27 (5.63)
Barren & Uncultivable land	188.8 (12.08)	13.2 (9.53)	2.90 (1.97)	8.8 (6.36)	12.06 (9.35)
Permanent pastures and grazing	60.5 (3.88)	6.5 (4.69)	22.7 (15.46)	5.79 (4.18)	8.75 (6.79)
Fallow land	46.1 (2.95)	2.9 (2.09)	5.96 (4.06)	9.78 (7.07)	8.03 (6.22)
i) Current fallow	23.9 (1.53)	1.5 (1.08)	4.18 (2.84)	6.86 (4.96)	4.27 (3.31)
ii) Other fallow	22.2 (1.42)	1.4 (1.01)	1.78 (1.22)	2.92 (2.11)	3.76 (2.91)
Net Sown Area	1020.8 (65.35)	92.1 (66.49)	101.5 (69.14)	104.1 (75.30)	88.0 (68.22)
Area sown more than once	228.5	7.7	11.4	9.2	27.4
Gross Cropped Area (GCA)	1247.5	99.2	112.9	113.3	115.4

(Figures in the parentheses indicate the per cent to the total geographical area)

Source: Socio– Economic Review and District Statistical Abstract of Pune district, 2010-11)

Table 4.4 indicates that the total geographical area in the district is 1562.01 thousand hectares where as the area under forest is 184.08 thousand hectare (11.83 per cent), barren and Uncultivable land is 188.8 thousand hectare,(12.08 per cent), land for non agriculture uses was 61.00 thousand hectare (3.90 per cent), while permanent pasture was 60.5 thousand hectares (3.88 per cent) ,the total fallow land was 46.10 thousand hectares (2.95per cent) and the gross cropped was 1247.5 thousand hectares which included the net area sown of 1020.8 hectares (65.35 Per cent) and double cropped area of 228.5 thousand hectares. Indapur has largest geographical area of 146.79 hectares followed by Junnar ,Baramati and Daund having total area of 138.45, 138.24 and 128.98 thousand hectares .The area under forest in Junnar was 20.9 thousand hectares, whereas Daund has largest barren and uncultivated land 12.06 thousand hectares.

4.1.5 Cropping pattern:

Table 4.5 Cropping pattern of Pune district and selected tahsils (area 000'ha)

Particulars	Pune district	Junnar	Indapur	Baramati	Daund
Total cereals	823.34 (66.00)	74.78 (62.42)	71.38 (63.22)	86.21 (76.09)	83.95 (72.74)
Total pulses	78.02 (6.25)	12.72 (10.61)	6.89 (6.10)	10.49 (9.25)	5.03 (4.35)
Total fruits	14.25 (1.14)	6.59 (5.50)	3.23 (2.86)	2.61 (2.30)	1.62 (1.40)
Total vegetables	27.37 (2.19)	9.58 (7.99)	5.01 (4.43)	6.40 (5.64)	5.46 (4.73)
Total oilseeds	14.5 (1.16)	6.59 (5.50)	8.85 (7.83)	0.68 (0.60)	1.60 (1.38)
Other cash crop	61.47 (4.93)	9.84 (8.21)	17.43 (15.43)	6.91 (6.09)	17.74 (15.37)
Total cultivable area	1018.95 (81.68)	100.4 (83.80)	101.5 (89.90)	104.1 (91.87)	88.0 (76.25)
Double cropped area	228.55 (18.32)	19.4 (16.20)	1.14 (10.00)	9.2 (8.13)	27.4 (23.75)
Gross cropped area	1247.5 (100)	119.8 (100)	112.9 (100)	113.3 (100)	115.4 (100)
Cropping intensity (%)	122.43	119.32	111.23	108.83	131.13

(Figures in the parentheses indicate the per cent to the total geographical area)

Source: Socio – Economic Review and District Statistical Abstract of Pune District (2010-2011)

It could be revealed from Table 4.5 that the cropping pattern of Pune district as a whole and Junnar, Indapur, Baramati and Daund tahsil were dominated by cereal crops and magnitudes

were 66.00, 62.42, 63.22, 76.09 and 72.74 per cent, respectively. The Baramati tahsil is the biggest producer of cereals among the district as a whole. The share of the pulse crops in the gross cropped area in the Junnar tahsil was 10.61 per cent, which was highest among other tahsil in the district. The Junnar tashil is leading in fruit and vegetable production where as Indapur has highest area under oilseed crops. The cropping intensity was highest in Daund tahsil 131.13 per cent as compare to other tahsils.

5. DATA ANALYSIS AND INTERPRETATION

Part- I

This chapter deals with the presentation and interpretation of the results. It includes the first part production management i.e. the grape production technology, it's inputs management by farmers, the cost of establishment of orchards, cultivation cost of producing vine yards, the financial feasibility of grape orchard, strategies to increase the productivity and profitability of vine yards and also examined the problems faced by the grape growers in its cultivation.

Keeping the objectives in view the data were collected from sample grape growers and market intermediaries, to draw meaningful conclusion. The data were analyzed by using appropriate tools and techniques and the results are presented under the following sub-heads.

5.1 Production management and strategies for increasing productivity.

5.1.1 Economic feature of selected grape growers.

5.1.2 Patterns of growth in area, production and productivity of grapes in the study area.

5.1.3 Grape cultivation technology.

5.1.4 Management decisions taken by grape growers in selecting grapes for cultivation.

5.1.5 Adoption behavior of grape growers.

5.1.6 Management strategies in production of grapes.

5.1.7 Cost of establishment for grape vineyard.

5.1.8 Cost of cultivation and output of grapes.

5.1.9 Costs, returns and profitability of grapes.

5.1.10 Resource use structure.

5.1.11 Production function analysis.

5.1.12 Problems faced by grape growers.

5.1 Production management.

5.1.1 Economic feature of selected grape growers:

5.1.1.1 Land utilization pattern:

The details of land use pattern of selected grape growers is given in Table 5.1. It could be seen from the table that, at the overall level on an average total land holding of the grape growers was 4.07 hectares. Of the total land possessed by the grape growers, 3.91 hectares was under cultivation and 0.16 hectares was fallow land.

At the overall level, about 66.34 per cent land was irrigated of the total holding and 29.73 per cent land was unirrigated. The gross cropped area was worked out to 2.98 ha. 5.65 ha. and 8.41 ha. for small, medium and large size groups of farms, respectively. The gross cropped area at the overall level was 5.68 ha.

Table 5.1 Land utilization pattern of sample grape growers. (Area in Ha.)

Sr. No.	Particular	Size Group			Overall
		Small	Medium	Large	
1.	Total land holding	2.12 (100)	3.85 (100)	6.25 (100)	4.07 (100)
2.	Permanent fallow	0.06 (2.83)	0.15 (3.90)	0.26 (4.16)	0.16 (3.93)
3.	Net Cropped Area (NCA)	2.06 (97.17)	3.70 (96.10)	5.99 (95.84)	3.91 (96.07)
	i) Irrigated	1.23 (58.02)	2.78 (72.20)	4.10 (65.60)	2.70 (66.34)
	ii) Unirrigated	0.83 (39.15)	0.92 (23.90)	1.89 (30.24)	1.21 (29.73)
4.	Double Cropped Area	0.34 (16.04)	1.12 (29.09)	1.55 (24.80)	1.00 (23.31)
	Gross Cropped Area (GCA)	2.98 (140.57)	5.65 (146.75)	8.41 (134.56)	5.68 (139.56)

(Figures in the parentheses indicate the percentage to the total).

5.1.1.2 Cropping pattern

The cropping pattern is another vital factor influencing the level of expenses on farm and the returns from farm business. It is also an indicator of the economic condition of selected farm families. The cropping pattern of grape growers is presented in table 5.2.

The average gross cropped area of the sample grape grower was 5.68 ha; at the overall level. The cash crops occupied major share in gross cropped area (59.15 %) at the overall level. The cereal crops were cultivated on large scale next to cash crops by the grape growers.

The proportion of area under cereals at overall level was 17.67 per cent. The proportion of area under cereals was highest in small size group followed by medium and large size groups of grape growers. Among the cash crops grapes alone occupied 43.07 per cent area at the overall level. It was highest in large size group. (50.06 %) while the lowest in small size group (24.16 %). Vegetables were next cash crop grown by the grape growers. At the overall level proportionate area under vegetables was 11.86 per cent in the gross cropped area. It was the highest in medium size group followed by large and small size groups.

Table 5.2 Average cropping pattern of sample grape growers. (Area in ha).

Sr. No.	Particular	Size group			Overall
		Small	**Medium**	**Large**	
I.	**Cereals:**				
1.	Bajara	0.32	0.36	0.43	0.37
		(10.74)	(6.37)	(5.11)	(6.51)
2.	Jowar	0.25	0.20	0.32	0.26
		(8.39)	(3.54)	(3.80)	(4.52)
3.	Wheat	0.38	0.34	0.41	0.38
		(12.75)	(6.02)	(4.88)	(6.63)
	Total cerals	**0.95**	**0.90**	**1.16**	**1.00**
		(31.88)	**(15.93)**	**(13.80)**	**(17.67)**
II.	**Pulses:**				
1.	Gram	0.12	0.18	0.22	0.17
		(4.03)	(3.19)	(2.62)	(3.05)
2.	Other pulses	0.14	0.28	0.23	0.22
		(4.70)	(4.96)	(2.74)	(3.81)
	Total pulses	**0.26**	**0.46**	**0.45**	**0.39**
		(8.72)	**(8.14)**	**(5.35)**	**(6.87)**
III.	**Oil seed:**				
1.	Groundnut	0.17	0.32	0.45	0.31
		(5.70)	(5.66)	(5.35)	(5.52)

IV.	**Cash Crops:**				
1.	Sugarcane	0.22	0.30	0.36	0.29
		(7.38)	(5.31)	(4.28)	(5.16)
2.	**Grape**	**0.72**	**2.41**	**4.21**	**2.45**
		(24.16)	(42.65)	(50.06)	(43.07)
	Vegetables	**0.25**	**0.65**	**0.95**	**0.62**
		(8.39)	(11.50)	(11.29)	(11.86)
	Total cash crops	**1.19**	**3.36**	**5.52**	**3.36**
		(39.93)	(59.47)	(65.64)	(59.15)
V.	**Fruits**	**0.15**	**0.24**	**0.31**	**0.23**
		(5.03)	(5.66)	(5.35)	(5.46)
VI.	**Fodder crops**				
1.	Maize	0.16	0.20	0.25	0.20
		(5.37)	(3.54)	(2.97)	(3.52)
2.	Jowar	0.04	0.10	0.12	0.09
		(1.34)	(1.77)	(1.43)	(1.58)
3.	Other fodder crops	0.06	0.07	0.15	0.09
		(1.68)	(1.23)	(1.78)	(1.58)
	Total fodder crops	**0.26**	**0.37**	**0.52**	**0.38**
		(8.72)	**(6.54)**	**(6.18)**	**(6.68)**
	Gross cropped area	**2.98**	**5.65**	**8.41**	**5.68**
		(100)	**(100)**	**(100)**	**(100)**
	Cropping Intensity	**144.66**	**152.70**	**140.40**	**144.90**

(Figures in parentheses are the percentage to the respective (GCA)

From the above discussion, it can be revealed that the cropping pattern of grape growers was well diversified and the commercial cropping was adopted by the grape growers.

5.1.2 Patterns of growth in area, production and productivity of grapes in the study area.

Growth of area, production and productivity of grapes in the study area for the period from 1987-88 to 2011-12 have been depicted in the table 5.3. The respective temporal growth

rates of area, production and productivity were calculated and shown in table no.5.4. It was seen from the table and graph that the temporal growth in the area under grapevine cultivation was 280 hectares in beginning of 1986-87, which jumped to 711 hectares in 1989-90. In these two years, the growth rate is 170.34 percent. In the same period the production increased from 4620 tons to 14078 tons and the growth rate is 121.18 percent. In the period form 1989-90 to 1993-94, the area and production were not increased more and the growth rate was 5 to 6 percent. In the period from 1994-95 to 1996-97, the area and production of grapevine increased from 792 hectares to 1010 hectares and the increase rate is 25.25 and 61.04 percent respectively. During the year 2004-05 area, production and productivity was increased with 16.91, 74.73 and 49.50 per cent respectively. In year 2008-09 area and production was increased by 27.42 and 20.44 percent respectively but productivity goes down to the 5.48 percent. Prayer to the year 2008 both were negative and after that it becomes positive. This fluctuation was due to change in climatic condition and the rainfall.

Table. 5.3 Area, Production and Productivity of Grapes in Pune district. (1987 to 2012.)

Year	Area (Ha.)	Production ('00' Ton./Ha)	Productivity (Ton./Ha)
1986-87	280	46.2	16.50
1987-88	263	73.64	28.00
1988-89	263	63.65	24.20
1989-90	711	140.78	19.80
1991-92	750	139.5	18.60
1992-93	750	147.75	19.70
1993-94	792	155.23	19.60
1994-95	992	249.98	25.20
1995-96	1010	286.84	28.40
1996-97	1010	250.48	24.80
1998-99	979	223.21	22.80
99-2000	811	150.04	18.50
2000-01	755	206.87	27.40
2001-02	782	197.06	25.20
2002-03	810	183.06	22.60
2003-04	822	172.04	20.93
2004-05	961	300.6	31.28
2005-06	936	357.65	38.21
2006-07	920	307.83	33.46
2007-08	857	207.82	24.25
2008-09	1092	250.29	22.92
2009-10	744	196.42	26.40
2010-11	781	210.32	26.93
2011-12	820	225.01	27.44

Source:- Agriculture statistical information of Pune district, report of Directorate of Horticulture, Pune, M.S

Figure. 6 Area, production and productivity of grapes in Pune district. (1986-87 to 2011-12.)

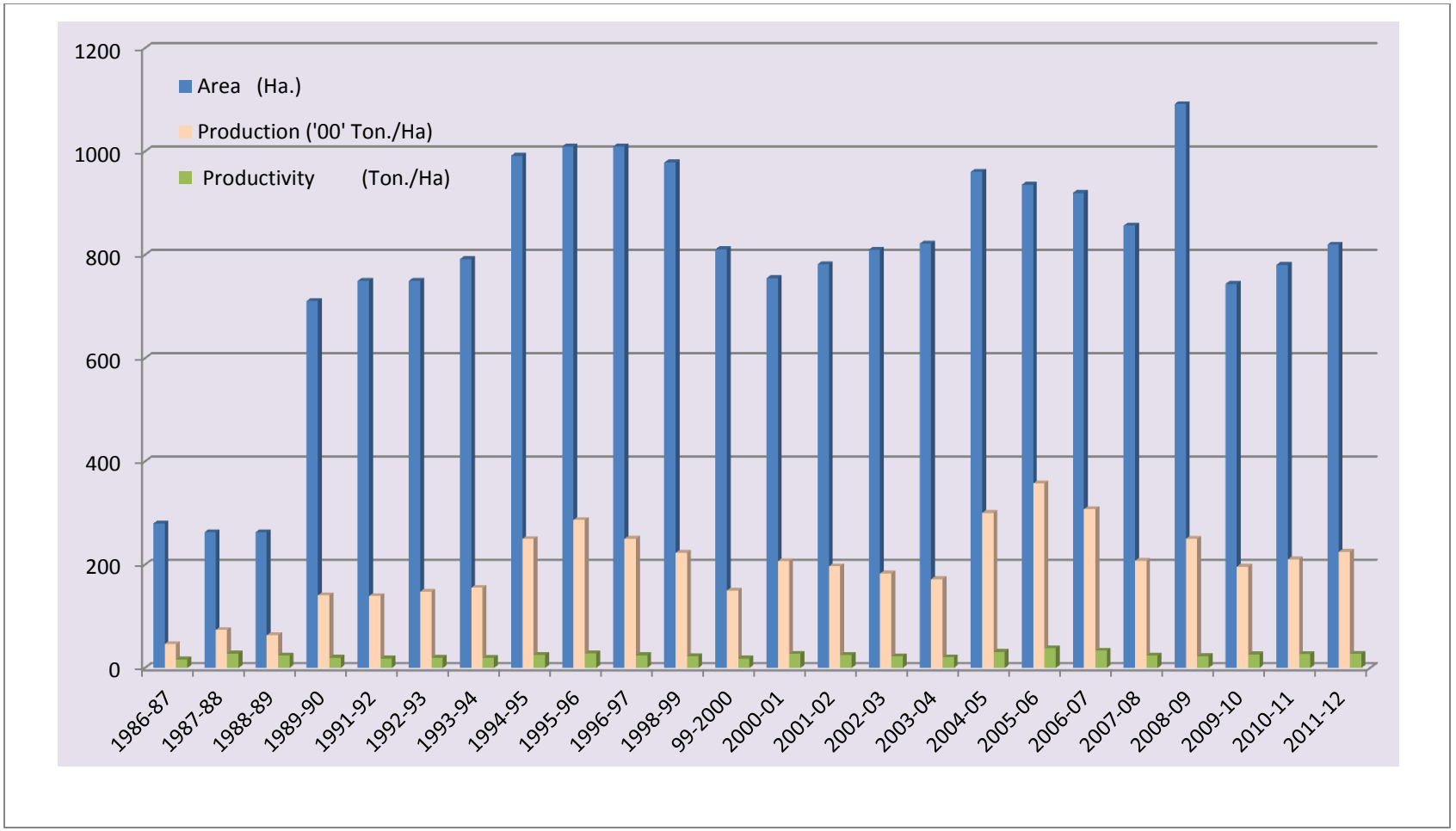


Figure. 7 Growth rates of area, production and productivity of grapes in Pune district. (1987 to 2012.)

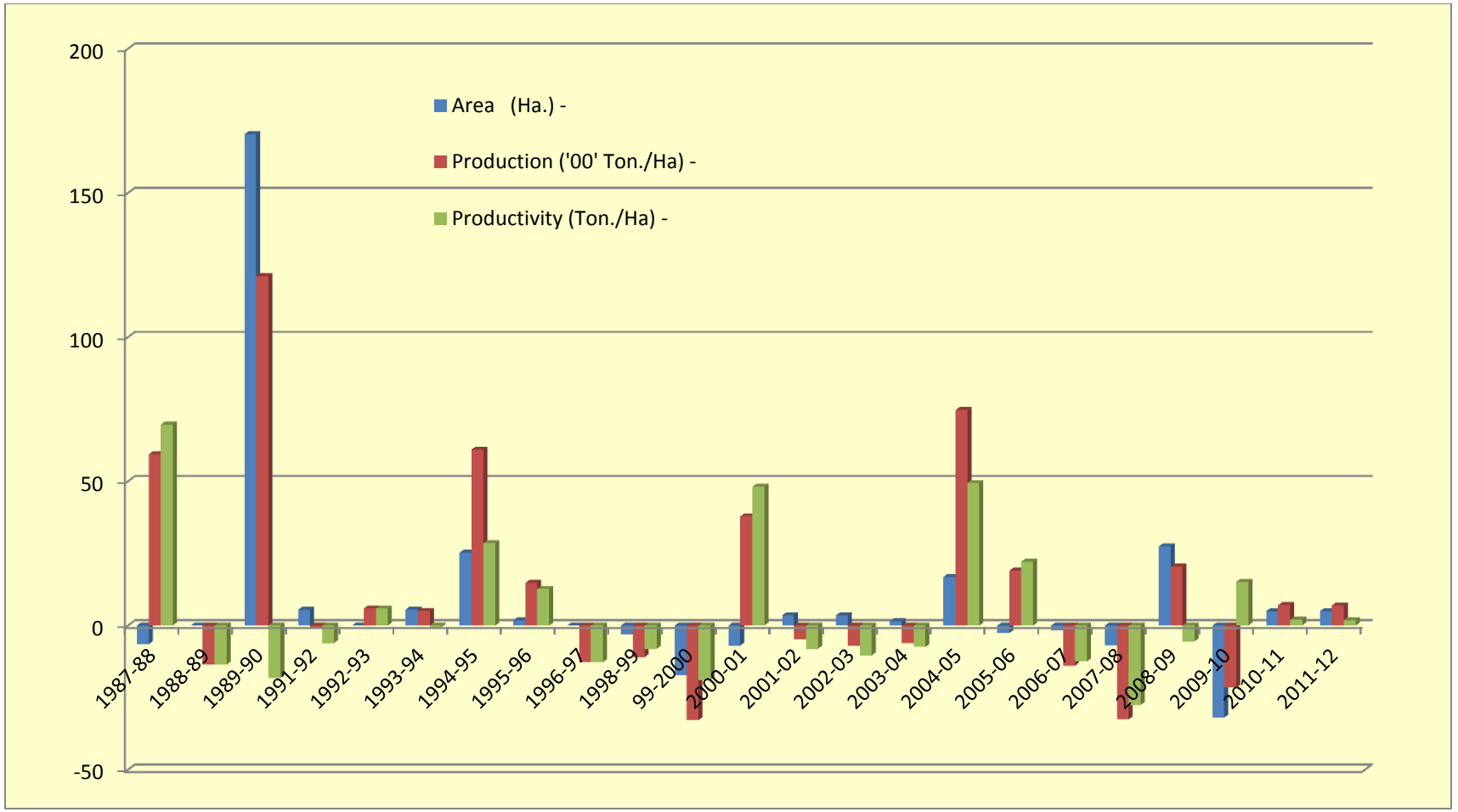


Table-5.4 Growth rates of area, production and productivity of grapes in Pune district. (1987 to 2012.)

Year	Area growth in percentage (Ha.)	Production growth in percentage ('00' Ton./Ha)	Productivity growth in percentage (Ton./Ha)
1986-87	-	-	-
1987-88	-6.46	59.39	69.70
1988-89	0	-13.57	-13.57
1989-90	170.34	121.18	-18.18
1991-92	5.49	-0.91	-6.06
1992-93	0	5.91	5.91
1993-94	5.6	5.06	-0.51
1994-95	25.25	61.04	28.57
1995-96	1.81	14.75	12.70
1996-97	0	-12.68	-12.68
1998-99	-3.07	-10.89	-8.06
99-2000	-17.16	-32.78	-18.86
2000-01	-6.91	37.88	48.11
2001-02	3.58	-4.74	-8.03
2002-03	3.58	-7.1	-10.32
2003-04	1.48	-6.02	-7.39
2004-05	16.91	74.73	49.45
2005-06	-2.6	18.98	22.15
2006-07	-1.71	-13.93	-12.43
2007-08	-6.85	-32.49	-27.53
2008-09	27.42	20.44	-5.48
2009-10	-31.87	-21.52	15.18
2010-11	4.97	7.08	2.01
2011-12	4.99	6.98	1.89

5.1. 3 Grape cultivation technology:

The grape cultivation is considered as a very remunerative fruit crop over the other fruit crops. The crop is found to be more profitable as such advanced production techniques in grape cultivation have been developed. In order to study the adoption behaviour of the grape growers, the grape cultivation technology recommended by National Research Center (NRC) for Grapes situated at Manjri, Pune is considered. The adoption behaviour of sample grape growers towards various parameters of recommended grape cultivation technology is presented in subsequent tables. The information on the major practices recommended by NRC in the cultivation of grapes such as selection of soil, variety, planting method, training system, time of pruning, fertilizer dose, irrigation method and cultural practices such as girdling, thinning, use of growth regulators, harvesting criteria, grading criteria and packing methods are presented in Table 5.5.

Table 5.5 Grape cultivation technology

Sr. No.	Parameters	Recommendation
1.	Soil	Medium deep (1m) well drained, alluvial soil with pH range 6 to 7.5
2.	Climate	Fruit of semi-arid, sub tropical region requires dry summers and cool winters with moderate rainfall, optimum temperature range 28^0C-32^0C.
3.	Varieties	Thompson Seedless Tas –A- Ganesh Manik Chaman – Table purpose } Both processing and table purpose
4.	Propogation	Harwood cutting
5.	Planting	North – South direction a. Trench method- where less planting distance b. Pit method – Long planting distance
6.	Time of planting	October – January
7.	Planting distance	Thompson Seedless – 3 x 1.5 m Tasgaon method – 1.8 x 1.2 m

8.	Training system	a. Bower system b. 'T' system c. 'Y' system
9.	October pruning	130-160 days after April pruning i.e. 15 Sep. to 15 Oct.
10.	Manures and fertilizer	

Time	FYM (ton/ha)	N (kg/ha)	P (kg/ha)	K (Kg/ha)
April pruning	25	400	300	300
May	--	100	--	--
Oct pruning	25	300	200	200
Nov	--	50	--	--
Dec	--	50	--	200
Total/ha	50	900	500	700

	Micronutrients	Ca, Mg, S, Zn, Boron etc.
11.	Irrigation	8 to 12 lit/day/plant (Drip Irrigation) 6-8 days interval (Traditional method)
12.	Girding	40 days after pruning Cane/Arm/Stem girding
13.	Thining	2-3 time Berry thinning and cluster thinning
14.	Use of Gibberalic acid	100-125 ppm with spraying and dipping
15.	Harvesting	i. Increase in sugar and decrease in acidity ii. Development of colour, flavour and texture iii. 130-145 days after October pruning
16.	Yield	20 to 25 tones/ha.

Table 5.5 contd…

Sr. No.	Parameters	Recommendation
17.	Grading	According to size and colour Grade I - Berry size 15-16 mm in diameter - Bunch weight 400 gm and above - Yellowish green colour Grade II - Berry size 12-14 mm in diameter - Bunch weight 250-400 gm - Yellowish colour Grade III - Berry size less than 10 mm diameter - Bunch weight less than 250 gm - Pinkish coloured diseased berries
18.	Packing	Corrugated paper boxes 2 to 10 kg packing size with lining material for protection and attractiveness.

(Source: Technology Recommended by National Research Centre (ICAR) for Grapes, Manjri, Pune)

5.1.4 Management decisions taken by grape growers in selecting grapes for cultivation:

The cultivator has to manage his farm by taking the decisions on various aspects of farming. The decisions are normally taken on the basis of the experience and information received from the others. Also the decisions are taken based on the perception. The perception is developed based on inspiration, source of information and utility of the decisions. As such, the information of grape growers in taking decisions to manage grape garden was collected. The points like source of inspiration, source of information, reasons and factors considered in

selecting grape enterprise. The information regarding these factors influencing managerial decision is depicted in Table 5.6.

It was observed from the table that the grape growers were inspired to think of grape cultivation on their own farms mostly by relatives (69.33 %) followed by friends (21.33 %) and lastly by progressive farmers (14.67 %). The enquiry was made on the reasons in selecting grape crop for cultivation. It was noticed that high income was the major reason told by 76.00 per cent for taking decision of grape cultivation on their own farm activity. The sources of detailed information on grape cultivation were studied and it was noticed that again the relatives (43.00 %) was the major source followed by friends (22.00%) and neighbouring farmers (18.00 %). The grape growers were also enquired for the points, they consider in managing grape crop on their farms. It was noticed that the high capital investment and careful management were the two major aspects considered by them in selecting grape crop.

Table 5.6 Management decisions in selecting grapes for cultivation.

(Numbers)

Sr. No.	Particulars	Size groups			Overall (N=150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
I.	**Source of Inspiration:**				
	1. Relatives	59 (78.67)	33 (73.33)	13 (43.33)	104 (69.33)
	2. Friends	11 (14.67)	10 (22.22)	11 (36.67)	32 (21.33)
	3. Progressive farmer	9 (12.00)	7 (15.56)	6 (20.00)	22 (14.67)
II	**Reasons for selecting grape crop:**				
	1. High income	62 (82.67)	29 (64.44)	23 (76.67)	114 (76.00)
	2. Substitute crop	12 (16.00)	4 (8.89)	4 (13.33)	20 (13.33)
	3. Interest in fruit growing	5 (6.67)	12 (26.67)	12 (40.00)	29 (19.33)

III.	**Source of information**				
	1. Relatives	34	21	10	65
		(45.33)	(46.67)	(33.33)	(43.33)
	2. Friends	16	10	7	33
		(21.33)	(22.22)	(23.33)	(22.00)
	3.Neighbouring farmers	14	7	6	27
		(18.67)	(15.56)	(20.00)	(18.00)
	4. Consulting Agency	0	2	2	4
		(0.00)	(4.44)	(6.67)	(2.67)
	5. Agro-Service Centers	15	4	1	20
		(20.00)	(8.89)	(3.33)	(13.33)
	6.Agricultural Magazines	5	5	4	14
		(6.67)	(11.11)	(13.33)	(9.33)
IV	**Points considered for decision**				
	1. High capital investment	49	14	11	74
		(65.33)	(31.11)	(36.67)	(49.33)
	2. Careful management	14	25	15	54
		(18.67)	(55.56)	(50.00)	(36.00)
	3. Risk involved	9	4	2	15
		(12.00)	(8.89)	(6.66)	(10.00)
	4. Natural calamities	8	3	2	13
		(10.67)	(6.67)	(6.66)	(8.67)

(Figures in the parentheses indicate the per cent to the total number of grape growers in the respective size groups).

5.1.5 Adoption behaviour of grape growers:

Recommended grape cultivation technologies and their adoption by various size groups of grape growers are presented in Table 5.7.

5.1.5.1 Soil Selection:

It is observed from the table that at the overall level, maximum number of grape growers (92.00%) selected the soil as per recommendations. Among the size groups, adoption of soil selection was at the higher side in large size group of farms (96.67 %), followed by medium size group of farms (95.56 %) and small size group (88.00 %). Under the soil selection, the

factors considered in selecting the soil were the soil type and soil testing. About, 7.88 per cent grape growers did not follow recommendations for soil selection.

5.1.5.2 Direction of planting:

The adoption of direction of planting as per recommendation i.e. North-South was to the extent of 82.67 per cent while the non-adoption was low (17.33 %) at the overall level because of unsuitable plot size.

5.1.5.3 Wind breaks:

Majority of grape growers adopt the component of wind breaks as per the improved technology suggestions. The adoption behaviour was to the tune of 60.67 per cent. The non-adoption of wind break was found the highest in small size group of farms (52.00) while it was the lowest in large size group of farm (20.00 %). The non-adoption was due to lack of its importance among grape growers.

5.1.5.4 Planting layout:

There is a general recommendation for planting layout which is based on type of variety and training system.

The planting distance was decided according to training system and it was adopted by 73.33 per cent grape growers, whereas 26.67 per cent grape growers considered variety as a factor for deciding planting distance. Majority of grape growers (85.33 %) followed trench method while 14.67 per cent followed pit method for planting.

5.1.5.5 Plantation management:

Two components of recommended technology viz., variety and training system are considered for plantation management of grape.

The detailed study was done on plantation management practices followed by selected grape growers. The major aspects covered under plantation management were selection of variety, type of nursery and type of training system.

Since grape vine orchards have long duration (15 to 20 years), obviously the selection of variety was of prime importance. Once the variety is selected for planting, it cannot

be changed, as it is a perennial fruit crop. The success of grape vine orchard mainly depends on selection of variety. The results of plantation management are indicated as below.

Table 5.7 Adoption behaviour of grape growers towards recommended grape cultivation technology.

Numbers

Sr. No.	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
I.	**Soil selection:**				
	Yes	66	43	29	138
		(88.00)	(95.56)	(96.67)	(92.00)
	No	8	2	1	12
		(10.67)	(4.44)	(3.33)	(8.00)
II	**Direction of planting (North-South direction)**				
	Adopted	59	37	28	124
		(78.67)	(82.22)	(93.33)	(82.67)
	Not adopted	16	8	2	26
		(21.33)	(17.78)	(6.67)	(17.33)
III.	**Wind breaks:**				
	Planted	36	31	24	91
		(48.00)	(68.89)	(80.00)	(60.67)
	Not planted	39	14	6	59
		(52.00)	(31.11)	(20.00)	(39.33)
IV	**Planting layout:**				
a.	**Planting distance**				
	As per variety	16	14	10	40
		(21.33)	(31.11)	(33.33)	(26.67)
	As per training system	59	31	20	110
		(78.67)	(68.89)	(66.67)	(73.33)
b.	**Planting method**				
	Trench method	61	37	30	128
		(81.33)	(82.22)	(100.00)	(85.33)

Table 5.7 contd.--

Sr. No.	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
	Pit method	14	8	0	22
		(18.67)	(17.78)	(0.00)	(14.67)
V.	**Plantation management**				
a.	**Selection of variety**				
	Thompson Seedless	16	8	4	28
		(21.33)	(17.78)	(13.33)	(18.67)
	Tas-A-Ganesh	41	22	14	77
		(54.67)	(48.89)	(46.67)	(51.33)
	Sonaka	21	13	9	43
		(28.00)	(28.89)	(30.00)	(28.67)
	Others	0	4	3	7
		(0.00)	(8.89)	(10.00)	(4.67)
b.	**Type of nursery:**				
	Own root nursery	6	8	11	25
		(8.00)	(17.78)	(36.67)	(16.67)
	Rootstock nursery	69	37	19	125
		(92.00)	(82.22)	(63.33)	(83.33)
c.	**Selection of training system:**				
	Bower system	71	28	15	114
		(94.67)	(62.22)	(50.00)	(76.00)
	Y- system	5	13	10	28
		(6.67)	(28.89)	(33.33)	(18.67)
	Both system	0	6	5	11
		(0.00)	(13.33)	(16.67)	(7.33)

(Figures in the parentheses indicate the per cent to the total number of grape growers in the respective size groups).

a. Selection of variety:

About 51.33 per cent of the grape growers have Tas-A-Ganesh variety as it is a famous table purpose variety followed by Sonaka (28.67%) and Thompson Seedless (18.67 %). Among the size groups it is observed that Tas-A-Ganesh variety was grown by large number of

Plate 2. Images showing adoption of recommended grape cultivation technology.

Rootstock planting

Grafting of Scion

Training after grafting

Well trained vine yard

Sub cane pruning

Fruit pruning of vineyard

grape growers (54.67 per cent) from small size group followed by medium size group (48.89 per cent) and by large size groups (46.67 per cent).

b. Type of nursery:

Rootstock nursery is the advanced technique in grape nursery. In rootstock nursery, the Dogridge rootstock is commonly used, which is having many advantages over own root method. Dogridge rootstock is tolerant to salts, water stress, water logged condition, having deep root system and sturdy stem with fast growth. By adding very small cost of production in nursery, farmers can enjoy all the advantages of rootstock nursery.

It was noticed that majority of grape growers (83.33%) were known about the advantages of the rootstock, while 16.67 per cent grape growers were use their rootstock for grape orchard's.

c. Selection of training system:

Two types of training systems were adopted by the sample grape growers in the study area. The adoption of bower system was more (76.00 %) followed by 'Y' system (18.67 %) at the overall level. The grape growers from different size groups indicated different adoption behaviour in this regard. About 7.33 per cent of grape growers adopted both the systems.

The majority of grape growers from small size groups adopted Bower type of training system followed by medium and large size groups. A reverse trend was observed in adoption of 'Y' type of training system.

5.1.6 Management strategies in production of grapes:

The timely operations in the grape orchard are very necessary to harvest good yields and also the quality produce. The management of various operations need to be done skillfully. The grape requires considerable amount of capital investment, as such the management of various factors of production are required to be done by the grape growers. Along with management factors of production the grape growers have to manage component of improved production technology from time to time, based on the environment and need of grape vines. The management strategies adopted by the grape growers in production of grapes garden are described as below in table 5.8

Table.- 5.8 Management strategies in production of grapes.

(Numbers)

Sr. No	Particulars	Size groups			Overall (N =150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
I.	**Financial management**				
a.	**Medium and long term loan;**				
	a. D.C.Co-op. Bank	40 (53.33)	22 (48.89)	17 (56.67)	79 (52.67)
	b. Nationalized banks	20 (26.67)	18 (40.00)	12 (40.00)	50 (33.33)
	c. Others	15 (20.00)	5 (11.11)	1 (3.33)	21 (14.00)
b.	**Crop loans:**				
	a. Primary Agril Co-op credit societies	35 (46.67)	20 (44.44)	14 (46.67)	69 (46.00)
	b. Nationalized Bank	25 (33.33)	20 (44.44)	15 (50.00)	60 (40.00)
	c. Others	10 (13.33)	5 (11.11)	1 (3.33)	16 (10.67)
2.	**Labour Management**				
	a. Permanent labour	15 (20.00)	16 (35.56)	15 (50.00)	46 (30.67)
	b. Daily paid labour	25 (33.33)	18 (40.00)	14 (46.67)	57 (38.00)
	c. Seasonal labour	35 (46.67)	24 (53.33)	21 (70.00)	80 (53.33)
	d. Contract labour	0 (0.00)	0 (0.00)	5 (16.67)	5 (3.33)
3.	**Irrigation management**				
	a. Drip irrigation	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
	b. Traditional method	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
	c. Mulching practices				
	i) Traditional mulching	68 (90.67)	28 (62.22)	15 (50.00)	111 (74.00)
	ii) Plastic mulching	7 (10.33)	17 (37.78)	15 (50.00)	39 (26.00)

4.	**Nutrition management**				
a.	**Fertilizer dose**				
	Below recommendation	50 (66.67)	32 (71.11)	25 (83.33)	108 (72.00)
	As above recommendation	10 (13.33)	8 (17.78)	2 (6.67)	20 (13.33)
	As per recommendation	15 (20.00)	5 (11.11)	3 (10.00)	23 (15.33)
b.	**Information about recommendation of fertilizer**				
	i) Sales representative	40 (53.33)	24 (53.33)	20 (66.67)	84 (56.00)
	ii) Seminars	12 (16.00)	9 (20.00)	10 (33.33)	31 (20.67)
	iii) Reading Materials	15 (20.00)	7 (15.56)	5 (16.67)	27 (18.00)
	iv) others	8 (10.67)	5 (11.11)	5 (16.67)	18 (12.00)
c.	**Type of fertilizer used**				
	i) organic manures	70 (93.33)	30 (66.67)	24 (80.00)	124 (82.67)
	ii) Granulars	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
	iii) liquid	25 (33.33)	23 (51.11)	20 (66.67)	68 (45.33)
	iv) Micro nutrient	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
	v) INM	30 (40.00)	25 (55.56)	14 (46.67)	69 (46.00)
d.	**Method of fertilizer use**				
	i) Single dose	5 (6.67)	5 (11.11)	1 (3.33)	11 (7.33)
	ii) Split dose	70 (93.33)	40 (88.89)	29 (96.67)	139 (92.67)
5.	**Growth Regulators**				
	As per recommendation	58 (77.33)	37 (82.22)	24 (80.00)	119 (79.33)
	Above recommendation	12 (16.00)	5 (11.11)	5 (16.67)	22 (14.67)
	Below recommendation	5 (6.67)	3 (6.67)	1 (3.33)	9 (6.00)
	Method of application				
	i. Dipping	10 (13.33)	3 (6.67)	3 (10.00)	16 (10.67)

	ii. Spraying	10 (13.33)	3 (6.67)	5 (16.67)	18 (12.00)
	iii. One dipping and Three sprayings	55 (73.33)	39 (86.67)	22 (73.33)	116 (77.33)
6.	**Pest and disease Management**				
a.	**Control measures type**				
	a. Preventive measures	60 (80.00)	42 (93.33)	25 (83.33)	127 (84.67)
	b. Curative measures	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
	c. IPM	22 (29.33)	30 (66.67)	14 (46.67)	66 (44.00)
b.	**Criteria for preventive measure of pest control**				
	a. Climate change	45 (60.00)	32 (71.11)	19 (63.33)	96 (64.00)
	b. Pest control schedule	3 (4.00)	8 (17.78)	3 (10.00)	14 (9.33)
	c. Spraying schedule	8 (10.67)	5 (11.11)	4 (13.33)	17 (11.33)
c.	**Use of sprouting chemicals**				
	a. Bordeaux paste	25 (33.33)	9 (20.00)	6 (20.00)	40 (26.67)
	b. Readymade chemicals	50 (66.67)	36 (80.00)	24 (80.00)	110 (73.33)
7.	**Mechanization**	25 (33.33)	25 (55.56)	28 (93.33)	78 (52.00)
8.	**Preventive Measures against damage from Natural calamities**	27 (36.00)	15 (33.33)	13 (43.33)	55 (36.67)
9.	**Pruning type**				
	a. Normal cane pruning	35 (46.67)	15 (33.33)	10 (33.33)	60 (40.00)
	b. Sub cane pruning	40 (53.33)	30 (66.67)	20 (66.67)	90 (60.00)

(Figures in the parentheses are the percentages to the total number of grape growers in the respective size groups.)

5.1.6.1 Financial Management:

The grape being capital intensive crop, therefore financial management is of prime importance. The enquiry was made of its management and it was noticed that grape growers in the selected area availed existing facilities and approached various financial agencies for procurement of funds.

At the overall level, highest proportion of grape growers (52.67 %) secured medium and long term loans from District Central Co-operative Bank followed by Nationalized Banks (33.33 %) growers and very few grape (14.00 %) from other sources. As regards the crop loans, highest (46.00 %) grape growers approached to Primary Agricultural Cooperative Credit Societies, followed by Nationalized Banks (40.00 %) and other sources (10.67 %).

5.1.6.2 Labour management:

The grape crop is labour intensive crop. For maintenance of grape garden, skilled and experienced labour force is required. The grape growers have to keep skilled labour on tenure basis normally for one year to manage the grape garden. It was noticed that at the overall level, 53.33 per cent grapes growers engaged seasonal labours followed by daily paid labours (38.00 % of grape growers) and permanent labour (30.00 % of grape growers).

5.1.6.3 Irrigation management:

Irrigation water is a limited resource in the study area, so irrigation management is one of the essential aspect in successful orchard management. At overall level, it was observed that 100.00 per cent grape growers adopted drip irrigation system. All grape growers have told that they were getting good results in terms of yield and quality produce due to adoption of drip irrigation.

Mulching is common practice now a day in fruit cultivation. More than 32 per cent grape growers have used plastic films as mulching material which has some additional advantages over traditional mulching practices. Use of plastic mulching was highest in large size group (50.00 %) followed by medium (37.78 %) and small size group (10.33 %). The per cent is lower in small size due to high cost of mulching material.

5.1.6.4 Nutrition management:

At the overall level, it is observed that 72.00 per cent grape growers followed recommendation below level while 15.33 per cent have applied nutrients as per recommended dose and 13.33 per cent growers have used nutrients above the recommendation. Nearly 56 per cent growers followed recommendation as per fertilizer companies and their sales representatives. All the grape growers are using granular fertilizers to supply required nutrients to plants. More than 45.33 per cent sample grape grower also applied liquid fertilizer. At the overall level, proportion of grape growers using organic manures was 82.67 per cent and 100 per cent micro nutrients. Further, it was noticed that the use of organic manures was highest in small size groups (93.33 % of the grape grower) whereas, use of liquid fertilizers was highest in large size group (66.67 % of sample grape grower). Integrated Nutrient Management adoption was maximum in medium size group (55.56 %), followed by large size group (46.67 %) and small size group (40.00 %). Still more than 50 per cent of grape growers have not recognized the importance of Integrated Nutrient Management. This cannot be stated as good management sign on part with the grape growers.

Plate 3. Fertilizer Management

(Images showing nutrient deficiency symptoms)

Ferrus Deficiency

Magnesium Deficiency

Mangenise Deficiency

Nitrogen Deficiency

Boron Deficiency

Pottasium Deficiency

Zink Deficiency

Plate 4. Development stages showing effective management of growth regulator.

Stage – 1

Stage - 2

Stage – 3

Stage - 4

Stage – 5

Stage - 6

At the overall level 92.61 per cent grape growers applying fertilizers in split doses as per need of plant whereas, 7.33 per cent applied fertilize only at the time of pruning.

5.1.6.5 Growth regulators:

Gibbrelic acid (GA_3) is most widely used growth regulator by the grape growers. Other growth retardant like Lihocin is also been used. Two or three applications of GA_3 between full bloom stage to fruit set stage helps to increase berry size, weight, improves keeping quality, yield, slightly reduces the total soluble sugar and delays maturity. GA_3 is also used for flower thinning (Natural thinning) when used in higher concentration.

More than 79.33 per cent sample grape growers used growth regulators as per recommended dose (100 to 120 ppm) whereas, 14.67 per cent used above recommendation and 6.00 per cent below recommendation. As regards to method of application of growth regulators it is observed that at overall level 77.33 per cent sample grapes grower growers followed 1 dipping + 3 sprayings which is recommended one. Adoption of this method was highest in medium size group (86.67 %) followed by large size group and small size group (73.33 %).

5.1.6.6 Pest and disease management:

Till today there are about 95 pests and 23 diseases identified among which only 7 to 8 pests and 6 to 7 diseases are major ones which are causing serious damage to the grape vine. Specific pest and disease affect the grape vine according to climatic conditions and stage of development of grape vine and berries.

It can be observed from the table that, cent per cent grape growers were adopting curative measures, while 84.67 per cent growers adopted preventive measure to control pests and diseases. Only 44.00 per cent sample grape growers adopted Integrated Pest and disease Management. Adoption of IPM was highest in medium size group (66.67 %) followed by large (46.67 %) and small size group (29.33 %). At overall level, about 64.00 per cent sample grape growers carried out preventive measures as per climatic changes whereas 9.33 per cent sample grape growers carried out preventive measures as per pest control schedule and remaining 11.33 per cent growers applied control measures as per spraying schedule.

Sprouting of canes after rest period is very important for more fruiting per vine. For this, various chemicals are used. At the overall level, 26.67 per cent sample grape growers used Bordeaux paste whereas 73.33 per cent sample grape growers applied readymade sprouting chemicals like Dormex etc. Use of readymade sprouting chemicals was done by 80 per cent of large size group grape growers whereas use of Bordeaux paste was done maximum by the small size group (33.33 %) of sample grape growers.

5.1.6.7 Mechanization:

At an overall level, it was observed that 73.33 per cent sample grape growers have mechanized operations in their grape garden. The use of machinery was highest (93.33 %) in large size group follow by medium (55.56 %) and small size group (33.33 %).

5.1.6.8 Measures to prevent damage from natural calamities:

Natural calamities like heavy rainfall, untimely rainfall and hail storms etc. cause heavy damage to the grape orchard. At the overall level it was observed that 36.67 per cent of grape growers have adopted the measures against possible natural calamities. These measures were adapted to the extent of 43.33 per cent by large size group of sample grape growers followed by medium size group sample grape growers (33.33 %) and small size group sample grape growers (36.00 %).

5.1.6.9 Type of Pruning methods:

Pruning type is the most important factor for the berries development. Micro grape bunches are developed after the April pruning. So cane development after April pruning have effect on bunches development after October pruning. It can be observed from that 33.33 per cent of large size sample grape growers following sub-cane development practice followed by 33.33 per cent of medium size growers and 46.67 per cent of small size growers. Sub cane method is very popular (60.00 %) at overall level than normal cane system. Normal cane system was popular large size group and by medium size group (66.67 %) and (53.33 %) small size group.

Plate 5. Plant protection management (Images showing pest and diseases.)

Downy Mildew

Powdery Mildew

Anthracnose

Rust

Thrips.

Mealibugs.

5.1.7 Cost of establishment for grape vine yard:

In grape cultivation cost of establishment plays an important role. It included so many items such as viz., preparation of land, fencing, supporting etc. which required large capital. In view of this, it was worth to analyze the amount spent on different materials for grape garden establishment.

The item wise per hectare cost of establishment of grapes in different size groups was carried out and is given in Table 5.9.

It can be revealed that the total cost of establishment of grape worked out to Rs. 646544.06 per hectare at the overall level and it was maximum in case of small size group grape growers i.e. Rs. 723043.00. and minimum in large size group i.e. Rs. 580922.00 due to purchasing bulk material. Among the different items of establishment cost, the important ones were irrigation structures and bower which constitute 19.59 per cent and 41.23 per cent respectively at overall level.

The item wise per hectare maintenance cost of grapes orchard during gestation period of grapes in different size groups was carried out and is given in Table 5.10.

The variable cost consist of labour and material cost. The labour cost includes land preparation, gap filling, FYM and fertilizer application, weeding, pruning and training, thinning, spraying and irrigation etc. The material cost consist of manure, fertilizers, chemicals and growth regulators. At overall level it was 12.28 per cent and 6.56 per cent respectively. Including initial investment cost and interest on working capital , total variable cost was worked out to Rs. 711198. Which constitute to 80.37 per cent of total maintenance cost.

The imputed costs such as the depreciation, rental value of land and interest on fixed capital were the items of indirect cost. Among these three items, the rental value of land was the important item sharing more or less i.e. 15 per cent in all size groups of grape cultivators. The total fixed cost consist of 19.35 per cent and per hectare overall maintenance cost during gestation period including initial establishment cost was Rs. 882411.

Table 5.9 Per hectare cost of establishment.

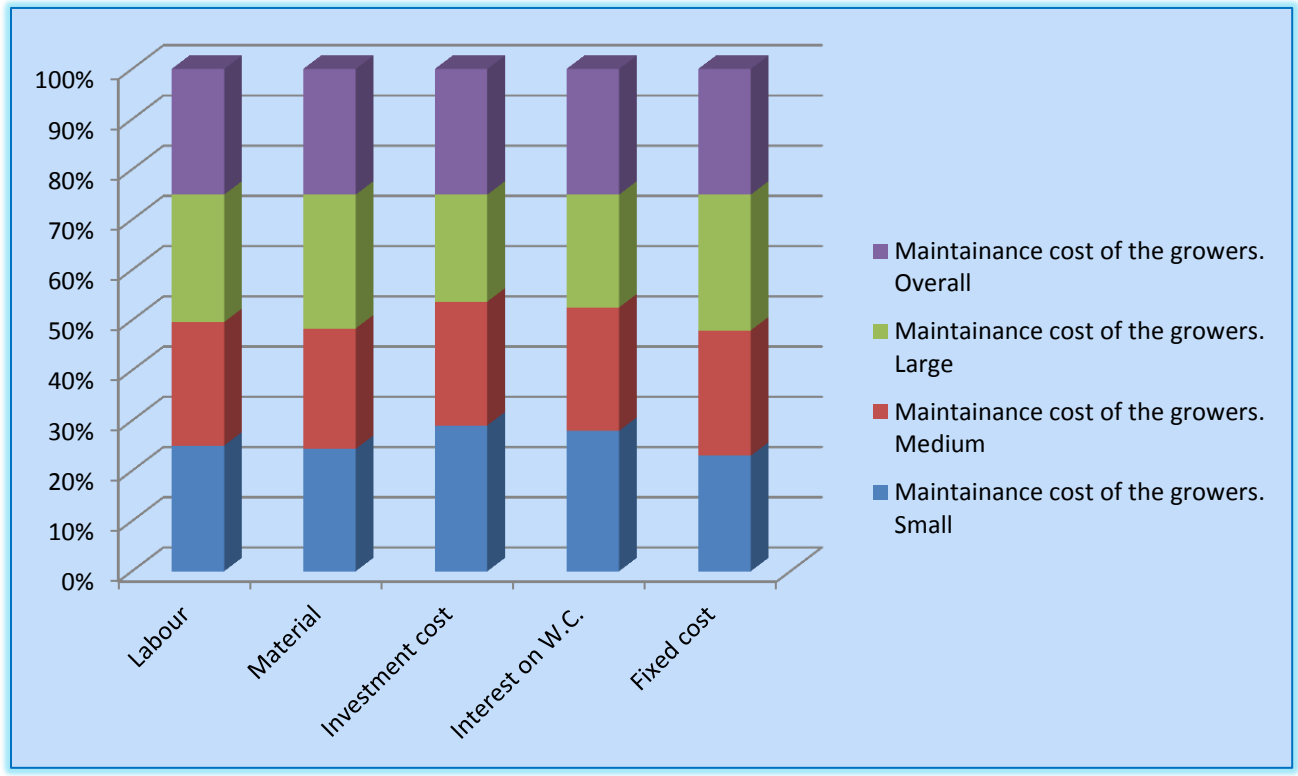
SI No	Particulars	Small Farmers		Medium Farmers		Large Farmers		Overall	
		Value	%	Value	%	Value	%	Value	%
	Investment Cost								
1	Irrigation structure	180226	24.93	119775	18.84	80000	13.77	126667	19.59
2	Plant material	24477	3.39	22255	3.5	20031	3.45	22254	3.44
3	Bower	278399	38.5	267011	42	254228	43.76	266546	41.23
4	Staking	16688	2.31	15578	2.45	13354	2.3	15207	2.35
5	Investment in digging of pits and planting	11126	1.54	10015	1.58	8902.8	1.53	10014	1.55
6	Sprayer/Duster	11185	1.55	7785.5	1.22	7835.5	1.35	8935.5	1.38
7	Grading and Packing house	35560	4.92	30696	4.83	24350	4.19	30202	4.67
A	**Total Investment Cost**	557661	77.13	473115	74.43	408702	70.35	479826	74.21
B	**Labour + Material Cost**	165381.50	22.87	162552.02	25.57	172219.88	29.65	166717.80	25.79
C	**Total Establishment Cost**	723043.00	100.0	635667.26	100.0	580922.00	100.00	646544.06	100.00
D	**Amortization cost.**	104820.05		95720.71		90654.95		97065.24	

Table 5.10 Maintenance cost of grapes orchard during gestation period.

SI No	Particulars	Small Farmers		Medium Farmers		Large Farmers		Overall	
		Value	%	Value	%	Value	%	Value	%
A)	**Variable cost**								
a)	**Labour cost**								
1	Land preparation	7590.8	0.8	6665.3	0.77	5745.7	0.7	6667.2	0.75
2	Gap filling	1668.9	0.18	1802.7	0.21	1869.6	0.23	1780.4	0.2
3	FYM application	5345.6	0.56	5865	0.67	6120	0.74	5776.9	0.65
4	Fertilizer application	8120.3	0.85	8685.5	1	8790	1.06	8531.9	0.96
5	Weeding	9350.5	0.98	9695	1.11	10451	1.26	9832.1	1.11
6	Pruning and training	10973	1.15	12599	1.45	14238	1.72	12603	1.42
7	Thinning	4389.3	0.46	5039.5	0.58	5695.1	0.69	5041.3	0.57
8	PPC spraying	15125	1.59	14285	1.64	12000	1.45	13803	1.56
9	Irrigation, watch and ward	12235	1.28	10160	1.17	7650	0.93	10015	1.13
10	Miscellaneous	5000	0.53	6000	0.69	6500	0.79	5833.3	0.66
	Total labour cost (A)	108775	11.42	106799	12.28	110317	13.35	108630	12.28
b)	**Material cost**								
1	Manures	32217	3.38	32404	3.73	37500	4.54	34041	3.85
2	Fertilizers and micronutrients	10225	1.07	8148.7	0.94	8668.1	1.05	9013.9	1.02
3	PPC spraying	8190	0.86	8340	0.96	8635	1.04	8388.3	0.95

4	Growth regulators and hormones	975	0.1	1360	0.16	1100	0.13	1145	0.13
5	Other	5000	0.53	5500	0.63	6000	0.73	5500	0.62
6	Total material cost (B)	56607	5.94	55753	6.41	61903	7.49	58088	6.56
	Sub Total (A+B)	165382	17.37	162552	18.69	172220	20.84	166718	18.84
	Total Investment Cost	557661	58.55	473115	54.41	408702	49.45	479826	54.22
A	**Establishment cost**	723043	75.92	635667	73.1	580922	70.29	646544	73.06
	Interest on working cost	72304	7.59	63567	7.31	58092	7.03	64654	7.31
	Total variable cost I	795347	83.51	699234	80.41	639014	77.32	711198	80.37
B)	**Fixed cost**								
1	Rental value of land	122900	12.9	131600	15.13	142958	17.3	132486	14.97
2	Land revenue	350	0.04	350	0.04	350	0.04	350	0.04
3	Depreciation	19988	2.1	23463	2.7	24984	3.02	22812	2.58
4	Sub total	143238	15.04	155413	17.87	168292	20.36	155648	17.59
5	Interest on fixed cost	14324	1.5	15541	1.79	16829	2.04	15565	1.76
	Total fixed cost II	157562	16.54	170954	19.66	185122	22.4	171213	19.35
C)	**Total maintenance cost (I+II)**	952910	100	870188	100	824136	100	882411	100

Fig. 8 Maintenance cost of grapes orchard during gestation period.



5.1.8 Cost of cultivation and output of grapes:

In modern agriculture, emphasis is given to intensive cultivation which is mostly capital based. It is assumed that when one applies more and more of capital, it results in to corresponding increase in profits. In view of this, it was worth to analyze the amount spent on different resources for grape cultivation and production received.

It can be revealed that total cost of cultivation of grape worked out in table no 5.11 to Rs. 614518.98 at the overall level and it was maximum in large size group of sample grape growers i.e. Rs. 641296.60. Among the different items of cost of cultivation, the important one were hired human labour, family labour, cost of manure, cost of fertilizers, charges of plant protection, interest on working capital, rental value of land, irrigation cost with their proportionate shares of 12.83, 3.74, 9.36, 5.40, 7.37, 2.69, 21.57, 2.74 per cent at the overall level. The amortized establishment cost is also important and it contributed to the extent of 15.80 per cent at the overall level. Out of the total cost of bullock labour, machinery charges, incidental charged share 1.98, 3.67, 1.47 per cent at overall level and which were lower than other costs. Land revenue and depreciation on implements and machinery together shared 3.77 per cent in the total cost at the overall level.

The paid out cost shared 51.27 per cent is total cost at the overall level. The cost 'B' shared 91.17 per cent in the total cost at the overall level.

Table-5.11 Per hectare cost of cultivation of sample grape growers.

SiNo	Item of Cost	Unit	Small Farmers			Medium Farmers			Large Farmers			Overall		
			Qty.	Value	%	Qty.	Value	%	Qty.	Value	%	Qty.	Value	%
1	a)Hired Male labour	Days	250.12	50023.1	8.49	285.45	57089.45	9.13	300.77	60153.71	9.38	278.78	55755.42	9.08
	b)Hired Female labour	Days	150.72	22607.39	3.84	154.94	23241.48	3.72	155.10	23264.80	3.63	153.59	23037.89	3.75
	Total	Days	400.84	72630.49	**12.33**	440.39	80330.93	**12.85**	455.87	83418.51	**13.01**	432.37	78793.31	**12.83**
2	I) Hired Bullock labour	Days	13.81	10357.97	1.76	15.66	11746.35	1.88	19.10	14327.31	2.24	16.19	12143.88	1.98
3	i) Hired Machinery Used	Hour	41.39	20692.84	3.51	45.76	22881.47	3.66	48.05	24027.41	3.75	45.07	22533.91	3.67
4	Manure	Ton/CL	42.96	53695.15	**9.11**	45.00	56250.00	**9.00**	50.00	62500.00	**9.75**	45.99	57481.72	**9.36**
	Nitrogen (N)	Kg.	358	5376	0.91	400.00	6000.00	0.96	445.00	6675.00	1.04	401.14	6017.15	0.98
	Phospherous (P)	Kg.	473	11830	2.01	475.00	11875.00	1.9	490.00	12250.00	1.91	479.33	11985.00	1.95
	Pottasium (K)	Kg.	349	6975	1.18	350.00	7000.00	1.12	355.00	7100.00	1.11	351.24	7024.87	1.14
	Micronutrient	Kg.		7016.17	1.19		8340.00	1.33		8980.00	1.40		8112.06	1.32
5	Total Fertilizers	Kg.		31197.17	**5.29**		33215.00	**5.31**		35005.00	**5.46**		33139.08	**5.4**
6	Plant Prote. Chemicals.	Lit.		41353.45	7.02		45000.00	7.2		49500.00	7.72		45284.45	7.37
7	Irrigation Charges	Rs.		18000.00	3.05		16850.00	2.7		15650.00	2.44		16833.33	2.74
8	Incidental Charges	Rs.		7958.43	1.35		8950.00	1.43		10200.00	1.59		9036.14	1.47
9	**Total Working Capital (Total of 1to8)**	Rs.		**255885.68**	**43.42**		**275222.77**	**44.04**		**294628.24**	**45.96**		**275245.56**	**44.81**
10	Interest on Working Capital	Rs.		15353.14	2.61		16513.37	2.64		17677.69	2.76		16514.73	2.69
11	**Total Operational Cost(9+10)**	Rs.		**271238.8**	**46.03**		**291736.1**	**46.68**		**312305.93**	**48.72**		**291760.3**	**47.5**
12	Land Revenue & Other cesses	Rs.		350	0.06		350	0.06		350	0.05		350	0.06

13	Depreciation on Implements, Machinery & Building	Rs.		19988.45	3.39		23462.61	3.75		24984.15	3.90		22811.74	3.71
14	Rental Value of land 1/6th of gross Return	Rs.		122900	20.86		131600	21.06		142958.33	22.30		132486.11	21.57
15	Interest on Fixed Capital	Rs.		14323.85	2.43		15541.26	2.49		16829.25	2.63		15564.79	2.53
16	**Total Fixed Cost**	Rs.		**157562.3**	**26.74**		**170953.9**	**27.35**		**185121.7**	**28.88**		**171212.6**	**27.87**
17	**Total Cost (11+16)**	Rs.		**428801.1**	**72.77**		**462690**	**74.03**		**497427.7**	**77.60**		**462972.9**	**75.37**
18	Total Operational Cost	Rs.		**271238.8**	**46.03**		**291736.1**	**46.68**		**312305.9**	**48.72**		**291760.3**	**47.5**
19	Land Revenue & Other cesses	Rs.		350	0.06		350	0.06		350	0.05		350	0.06
20	Depreciation on Implem. & Machinery	Rs.		19988.45	3.39		23462.61	3.75		24984.15	3.90		22811.74	3.71
21	**Cost A (18+19+20)**	Rs.		**291577.3**	**49.48**		**315548.8**	**50.49**		**337640.1**	**52.67**		**314922**	**51.27**
22	Interest on Fixed Capital (10% on Fixed Investment)	Rs.		14323.85	2.43		15541.26	2.49		16829.25	2.63		15564.79	2.53
23	Rental Value of Owned land (1/6th of gross Return)	Rs.		122900	20.86		131600	21.06		142958.33	22.30		132486.11	21.57
24	Amortization Value in Case of Fruit Crops	Rs.		104820.05	17.79		95720.71	15.32		90654.95	14.14		97065.24	15.8
25	**Cost B (21+22+23+24)**	Rs.		**533621.2**	**90.56**		**558410.7**	**89.35**		**588082.6**	**91.74**		**560038.2**	**91.17**
26	Imputed Value of Family Labour.	Rs.		26515.82	4.50		23000	3.68		19450	3.03		22988.61	3.74
27	Supervision Charges (10% of Cost A	Rs.		29157.73	4.95		31554.87	5.05		33764	5.27		31492.2	5.13
28	**Cost C (25+26+27)**	Rs.		**589294.7**	**100.00**		**612965.6**	**100.00**		**641296.6**	**100.00**		**614518.98**	**100.00**
30	Yield per hactare.	Tons	25.50	739500.00		27.30	791700.00		29.65	859850.00		27.48	797016.67	
31	**Per Tone cost**	**Rs.**		**23109.59**			**22452.95**			**21628.89**			**22362.40**	

5.1.9 Costs, returns and profitability of grapes:

An attempt has been made to compare the per hectare cost of cultivation, yields, gross returns and profit at cost 'A', cost 'B' and cost 'C' and B-C ratios for sample grape growers according to different size groups. The details in this respect are given in table 5.12.

Table 5.12 Per hectare costs, return, gross income, and B.C. ratio for grapes(Year 2012-13)

Particulars		Unit	Size groups			Overall
			Small	Medium	Large	
Total cost	i) Cost 'A'	Rs.	291577.27	315548.75	337640.08	314922.03
	ii) Cost 'B'	Rs.	533621.17	558410.73	588082.62	560038.17
	iii) Cost 'C'	Rs.	589294.72	612965.6	641296.62	614518.98
	Production	Qtls.	25.50	27.30	29.65	27.48
	Gross income	Rs.	739500.00	791700.00	859850.00	797016.67
Return	i) Cost 'A'	Rs.	447922.73	476151.25	522209.92	482094.64
	ii) Cost 'B'	Rs.	205878.83	233289.27	271767.38	236978.5
	iii) Cost 'C'	Rs.	150205.28	178734.4	218553.38	182497.69
B:C ratio		Rs.	2.54	2.51	2.55	2.53
	ii) Cost 'B'	Rs.	1.39	1.42	1.46	1.42
	iii) Cost 'C'	Rs.	1.25	1.29	1.34	1.3

It was noted from the table that per hectare total yield obtained from grape cultivation was 25.50, 27.30, 29.65 and 27.48 tones in small, medium, large size groups and at the overall level, receptively. The gross income received from the grape cultivation was Rs. 739500, Rs. 791700 Rs. 859850 and Rs. 797016.67 respectively for small, medium, large size groups and at overall level. The per hectare total cost i.e. cost 'C' was highest (Rs. 641296.62) in large size group than the other size groups. At the overall level, total cost was observed Rs. 614518.98. The per hectare net returns were highest (Rs. 218553.38) in large size group. At overall level, the per hectare net returns were worked to Rs. 182497.69. The output-input ratio i.e. B:C ratio which indicates the profitability of investment estimated for sample grape growers were 2.54, 2.51, 2.55 and 2.53 at cost 'A' for small, medium large size groups and at the overall level, receptively. At cost 'B' the output input ratio estimated was 1.39, 1.42, 1.46 and 1.42 for small, medium, large

size groups and at overall level, respectively. At the cost 'C' the output input ratio was maximum for large size grape (1.34). As the output input ratio at cost 'C' was greater than unity it indicated that the cultivation of grapes was profitable.

Yield, Cost and Return structure of sample grape growers.(Year 2008-09 to 2012-13) for last five years revealed that, per hectare yield was increased from 19.43 tones to 27.30 tones, while production cost per kg was increased from Rs. 12.98 to Rs.18.95. Simultaneously returns per kg was also increased from Rs. 15.71 Rs. 29.00 for the above five years which indicates the increasing productivity and profitability of the grapes in study area.

5.1.10 Financial feasibilities of investments in grape orchard

In order to examine the financial feasibility of investments in grape cultivation, measures of project appraisal were computed. These measures are presented in table 5.16

The measures considered were payback period, net present value, Benefit cost ratio, internal rate of return and profitability index.

Payback period

The payback period refers to the time required for the project to pay for itself. In grape the payback period was 5 years .

Net present value

The net present value is simply the present value of net returns of the project discounted at the opportunity cost of capital. The per ha net present values of grape was Rs. 83749.79 discounted at the rate of 12 per cent opportunity cost of capital.

Benefit cost ratio

The benefit cost ratio was obtained by dividing the discounted net returns by the initial investment. The net present value of costs and returns were obtained by discounting the cost and return streams by the opportunity cost of capital. The benefit cost ratio in grape was 1.05 at 12 per cent discount rate which was more than unity.

Internal rate of return

This represents the rate of return over the life period of the project. The internal rate of return was computed by inter polating two discount rates. The internal rate of return in grape was 18.15 per cent. The internal rate of return was higher than the opportunity cost of capital of 12.00 per cent. This indicates a higher average earning power of money invested in the project.

Table 5.13 Yield, cost and return structure of sample grape growers. (Year 2008-09 to 2012-13)

SI No.	Year	Yield T/ha.	Cost/ha	Returns / ha	Cost / Kg	Returns / Kg.	Returns / Rs.
1	2008-09	19.43	252201.4	305245.30	12.98	15.71	1.21
2	2009-10	22.10	323323.0	402883.00	14.63	18.23	1.25
3	2010-11	23.82	374450.4	549765.60	15.72	23.08	1.47
4	2011-12	25.68	439128.0	665882.40	17.10	25.93	1.52
5	2012-13	27.30	517453.74	797016.67	18.95	29.00	1.53

Source – Field and Market Survey.

Fig. 9 Yield, cost and return structure of sample grape growers.(Year 2008-09 to 2012-13)

(Series 1 – Yield, Series 2 – Cost, Series 3 – Return)

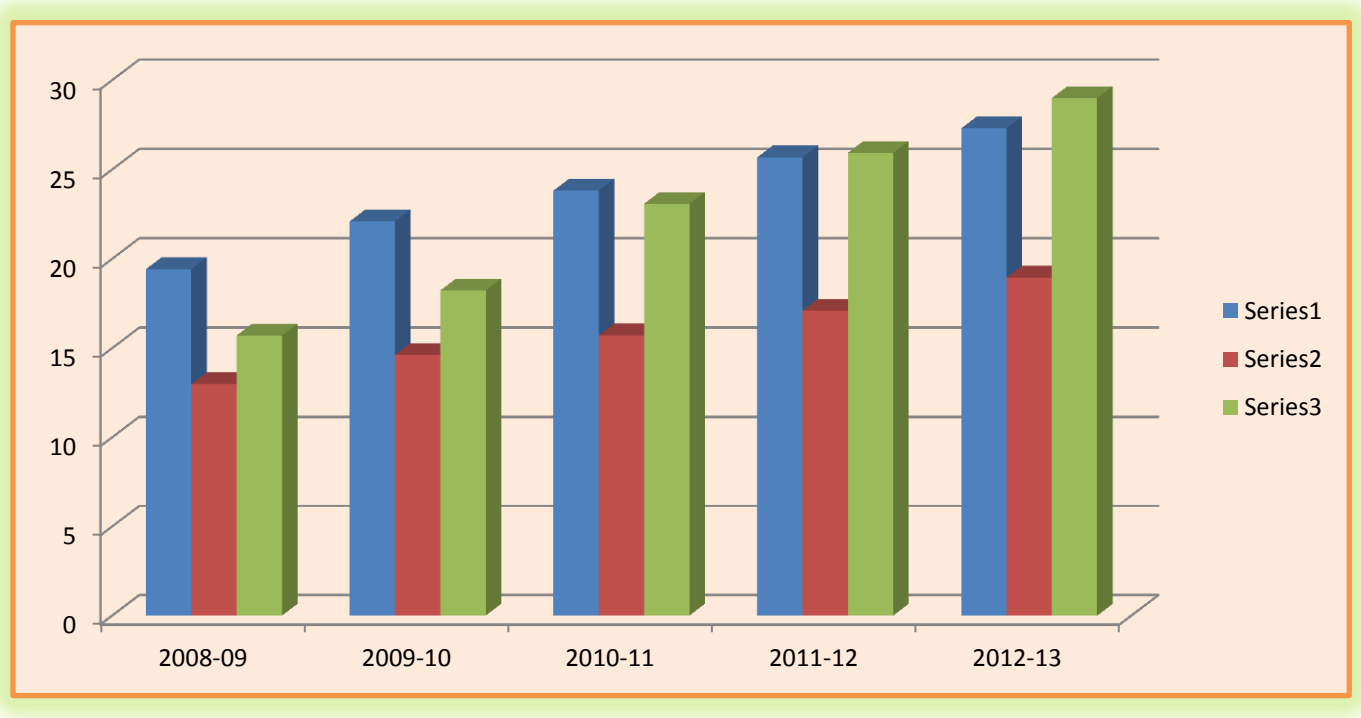


Table. 5.14 Cash flow analysis (NPW and B:C ratio) of overall sample grapes growers.

Sl No	Cash outflow (Cost)	Cash inflow (Returns)	Net cash flow(Net income)	D.F at 12%	Discounted net cash flow (Net Present worth)	Present worth of Costs in Rs.	Present worth of Gross Returns in Rs.
1	441505.63	0.00	-441505.63	0.8929	-394201.46	394201.46	0.00
2	252201.40	305245.30	53043.90	0.7972	42286.60	201054.96	243341.55
3	323323.00	402883.00	79560.00	0.7118	56630.81	230141.31	286772.12
4	374450.40	549765.60	175315.20	0.6355	111412.81	237963.23	349376.04
5	439128.00	665882.40	226754.40	0.5674	128660.45	249161.23	377821.67
6	517453.74	791700.00	274246.26	0.5067	138960.58	262193.81	401154.39
	2348062.2	2715476.30	367414.13		83749.79	1574715.99	1658465.78

Table. 5.15 Cash flow analysis (I.R.R.) of overall sample grapes growers.

Sl No	Cash outflow (Cost)	Cash inflow (Returns)	Net cash flow(Net income)	D.F at 12%	Discounted net cash flow at lower D.F. (Net Present worth)	D.F at 18.3%	Discounted net cash flow at upper Discounting Factor. (Net Present worth)
1	442505.63	0.00	-442505.63	0.8929	-395094.31	0.8453	-374053.79
2	252201.40	305245.30	53043.90	0.7972	42286.60	0.7145	37902.33
3	323323.00	402883.00	79560.00	0.7118	56630.81	0.6040	48055.22
4	374450.40	549765.60	175315.20	0.6355	111412.81	0.5106	89511.86
5	439128.00	665882.40	226754.40	0.5674	128660.45	0.4316	97866.04
6	517453.74	791700.00	274246.26	0.5067	138960.58	0.3648	100053.49
	2349062.2	2715476.30	366414.13		82856.93		-664.85

Table No. 5.16 Financial feasibility of sample grape growers in study area.

SI. NO.	Particulars	Units	Financial Ratios
1	Pay Back Period	Year	5
2	Net Present Value (At 12 % discount rate)	Rs./ha	83749.79
3	Benefit Cost Ratio (At 12 % discount rate)	------	1.05
4	Internal Rate of Return	Per centage	18.15

5.1.11 Resource use structure

The information on per hectare utilization of major resources in the cultivation of grape is presented in Table 5.17

It was revealed from the table that the per hectare use of human labour was 432.36 man days at the overall level. The per hectare use of human labour was maximum in large size group grape growers. i.e 455.87 man days. The per hectare use of bullock labour was relatively high in the case of large size group sample grape grower (19.10 pair days). The per hectare use of manure was 41.39 tones, 45.76 tones, 48.05 tones and 47.07 tones for small, medium, large size group and at overall level, respectively. The percent gap observed in utilization of manure between recommended and actual observed to be 17.22 per cent, 8.48 per cent, 3.90 per cent and 9.86 per cent for small, medium, large size groups and at overall level, respectively. The per hectare use of nitrogen was 358.43 kg, 400.00 kg, 445.00 kg and 401.14 kg thus exhibited a gap of 60.17, 55.55, 50.55 and 55.42 per cent in case of small, medium, large size groups and at overall level, respectively. The per hectare use of phosphorus was observed to be maximum (490 kg.) in large size group. Howler, the per cent gap of phosphorus use was not at considerable extent. The per hectare use of potassium was observed to be maximum (355 kg) in large size group and per cent gap observed maximum (50.18%) in small size group grape growers. The per hectare expenditure on plant protection was relatively higher (Rs. 49500) in large size group.

From the foregoing discussion it is noted that, the sample grape growers do not used the recommended doses of inputs viz,. manures fertilizers and thus it can be stated that the sample grape growers have not managed these important inputs to have maximum output.

Table. 5.17 Resource use structure of sample grape growers.

Si. No.	Item of Cost	Small Farmers			Medium Farmers			Large Farmers			Overall		
		Actual	Reco.	% Gap	Actual	Reco.	% Gap	Actual	Reco.	% Gap	Actual	Reco.	% Gap
1	Total human labour (Man days)	400.83	---	---	440.39	---	---	455.87	---	---	432.36	---	---
2	Bullock labour (pair days)	13.81	---	---	15.66	---	---	19.10	---	---	16.19	---	---
3	Manure (Tons)	41.39	50.00	17.22	45.76	50.00	8.48	48.05	50.00	3.90	45.07	50.00	9.86
4	Nitrogen (N) Kg	358.43	900.00	60.17	400.00	900.00	55.55	445.00	900.00	50.55	401.14	900.00	55.42
5	Phospherous (P) kg	473.21	500.00	5.36	475.00	500.0	5.00	490.00	500.00	2.00	479.40	500.00	4.12
6	Pottasium (K) kg	348.73	700.00	50.18	350.00	700.0	50.00	355.00	700.00	49.29	351.24	700.00	49.82
7	Plant Protection. Chemicals.kg/lits	41353.4	---	---	45000.00	---	---	49500.00	---	---	45284.4	---	---

5.1.12 Production function analysis:

The Cobb-Douglas type of production functions was used to establish relationship between the input use and output.

The results of the estimated production function are presented in to Table 5.18

The fitted production function was of the following type.

$$Y = a\, x_1^{b1}\, x_2^{b2}\, x_3^{b3}\, x_4^{b4}\, x_5^{b5}\, x_6^{b6}\, x_7^{b7}\, e^{u}$$

Where,

Y	=	Output in tonns per hectare
A	=	Intercept
X_1	=	Per hectare use of human labour in man days
X_2	=	Per hectare use of bullock labour in pair days
X_3	=	Per hectare use of manure in quintals
X_4	=	Per hectare use of nitrogen in Kg
X_5	=	Per hectare use of phosphorus in Kg
X_6	=	Per hectare use of potash in kg
X_7	=	Per hectare plant protection expenditure in Rs.
b_1 to b_7	=	Elasticilies of production.
e^u	=	Error term

Table 5.18 reveals that the 'F' ratios obtained from the analysis of variance in respect of the production function for grapes have turned out to be highly significant, indicating there by overall significance of the estimated production function. The seven resource variables included in the production analysis have explained jointly 61.86 per cent variation in the total output of grape.

The total human labour (X_1), nitrogen (X_4) and plant protection expenditure (X_7) were turned out to be positive and highly significant at 1 per cent level indicating that these are the important variables for which the output is highly responsive as all the inputs are given in split doses and have short day effects.

The regression coefficients of bullock labour (X_2) and Manure (X_3), were positive and significant at 5 per cent level indicating that, there is a scope to increase the use of their input for maximizing the output.

The regression coefficients of Phosphorus (X_5) and Potassium (X_6) were found to be non significant as once they applied have long lasting effect.

Table 5.18 Results of Cobb-Douglas production function.

Sr. No.	Variables	Regression Coefficient
1	Constant (a)	2.18
2	Total human labour days (X_1)	0.0207*****
		(0.0078)
3	Bullock labour days(X_2)	0.3693**
		(0.1431)
4	Manure (Qtls.) (X_3)	0.1712******
		(0.0559)
5	Nitrogen (kg) (X_4)	0.0188*
		(0.0067)
6	Phosphorus (kg) (X_5)	0.0053**NS**
		(0.0065)
7	Potassium (kg) (X_6)	0.0094**NS**
		(0.0093)
8	Plant protection (Rs.) (X_7)	0.0002*
		(5.8300)
	R^2 Value	0.6186
	'F' value	19.00

(Figures in the parenthesis indicates the errors of respective regression coefficient)

* and ** indicates level of significance at 1 and 5 per cent level of significance.

5.1.13 Problems in production management of grapes

The problems faced by the grape growers in managing the various resources and practices in the production of grapes are presented in Table 5.19 The problems in the resource planning and production management includes the management of Planting material, Fertilizers and manures, Insecticides and pesticides, labour, and constraint related to technical, financial, cost and general constraints etc. It was noticed that, at the overall level, 68.00 and 51.53 per cent growers were said that replacement of variety is very difficult and non availability quality planting material respectively. Fertigation is also an important aspect in grape cultivation. Grapes require nearly all nutrients in more or less quantity. Non availability of manures/fertilizer in time and shortage of fertilizers was the major problem reported by 52.67 and 87.33 per cent growers.

Increasing prices of fertilizers, and pesticides was an important problem in front of growers because prices of grapes were more or less constant on one side and costs of inputs were increasing on the other side.

Major problems of pesticide management were reported as increased resistance in paste and diseases and non availability of insecticide and pesticides in time by 80.00 and 67.33 per cent growers respectively. Grape is a labour intensive crop and many operations in grape cultivation are laborious and skillful. About 88.67 and 90.00 per cent growers at overall level reported that generally skilled labour are not available and particularly face acute problem during peak season respectively.

An improved technology is not suitable to small & fragmented land holding was told by 76.00 per cent small farmers. Financial constraint are important one. About 91.33 per cent growers at overall level reported that rate of interest is very high. More than 60.00 per cent growers reported that credit is not made available in time and its procedure to obtain is Complex, lengthy and rigid.

Table 5.19 Problems faced by sample grape growers in production management.

Sr. No.	Particulars	Size groups			Overall (N=150)
		Small (N=75)	Medium (N=45)	Large (N=30)	
A	**Planting material**				
1	Replacement of variety is very difficult	58 (70.00)	30 (60.00)	14 (46.67)	102 (68.00)
2	Non availability quality planting material	43 (63.33)	25 (53.33)	9 (30.00)	77 (51.53)
3	Lack of knowledge about improved varieties	15 (26.67)	12 (20.00)	4 (13.33)	31 (20.67)
B	**Fertilizers and manures**				
1	Non availability of manures/fertilizer in time	45 (53.33)	20 (43.33)	14 (46.67)	79 (52.67)
2	Shortage of fertilizers	50 (63.33)	35 (76.67)	26 (86.67)	131 (87.33)
3	Difficult to prepare doses of fertilizers	15 (20.00)	12 (26.67)	11 (36.67)	38 (25.33)
C	**Insecticides and pesticides**				
1	Increased resistance in paste and diseases	53 (73.33)	40 (83.33)	27 (90.00)	120 (80.00)
2	Non availability of insecticides and pesticide in time	45 (56.67)	31 (66.67)	25 (83.33)	101 (67.33)
3	Difficult to prepare the recommended concentration of solutions	18 (26.67)	9 (20.00)	12 (40.00)	39 (26.00)
D	**Labour**				
1	Non availability of skilled labour	65 (80.00)	40 (83.33)	28 (93.33)	133 (88.67)
2	Non availability of labour during peak period	66 (83.33)	40 (90.00)	29 (96.67)	135 (90.00)
3	Inefficiency of labour	17 (20.00)	9 (16.67)	8 (26.67)	34 (22.67)
E	**Technical constraints**				
1	Improved technologies not suitable to small & fragmented land holding	67 (83.33)	30 (63.33)	17 (56.67)	114 (76.00)
2	Lack of technical guidance regarding improved technologies	62 (76.67)	27 (60.00)	15 (50.00)	104 (69.33)
3	Non-availability of after sales services by companies	32 (40.00)	28 (33.33)	8 (26.67)	68 (45.33)
F	**Financial constraints**				
1	Rate of interest is very high	72 (93.33)	40 (86.67)	25 (83.33)	137 (91.33)
2	Non availability of credit in time	71 (93.33)	35 (73.33)	16 (53.33)	122 (81.33)

3	Complex, lengthy and rigid procedure of bank finance	55 (70.00)	25 (56.67)	14 (46.67)	94 (62.67)
4	Inadequate quantity of credit	64 (80.00)	30 (66.67)	11 (36.67)	105 (70.00)
G	**Constraints related to cost**				
1	High investment for various certification	10 (10.00)	9 (20.00)	9 (30.00)	28 (18.67)
2	High cost of fertilizers	71 (90.00)	39 (83.33)	20 (66.67)	130 (86.67)
3	High initial investment	73 (96.67)	43 (93.33)	26 (86.67)	142 (94.67)
4	High cost of pesticides and insecticides	70 (93.33)	38 (83.33)	25 (83.33)	133 (88.67)
5	High cost of labour	75 (100.00)	42 (93.33)	27 (90.00)	144 (96.00)
6	High cost of planting material	64 (80.00)	30 (70.00)	17 (56.67)	111 (74.00)
H	**General constraints**				
1	Irregular supply of electricity	58 (70.00)	35 (80.00)	27 (90.00)	120 (80.00)
2	Difficulty in mechanization	50 (66.67)	25 (33.33)	3 (10.00)	78 (52.00)
3	Fragmentation of land holdings	62 (76.67)	38 (50.00)	10 (33.33)	110 (73.33)
4	Lack of insurance support	50 (63.33)	32 (70.00)	25 (83.33)	107 (71.33)
5	Irregular supply of canal and river water	25 (33.33)	22 (50.00)	20 (66.67)	67 (44.67)
6	Occurrence of drought.	55 (70.00)	37 (80.00)	26 (86.67)	118 (78.67)

(Figures in the parentheses are the percentage to the number of grape growers in the respective size groups).

General constraints like irregular supply of electricity, difficulty in mechanization, fragmentation of land holdings, lack of insurance support and irregular supply of canal and river water were reported by some of the growers.

DATA ANALYSIS AND INTERPRETATION
Part – II

The second part consists of the marketing management in domestic market. The aspects of marketing such as selection and use of appropriate marketing practices viz., grading, packing, marketing channels, marketing costs, price spread and the problems faced by the grape growers in marketing were also studied in detail.

5.2 Marketing management and strategies for increasing profitability.

5.2.1 Marketing management

5.2.2 Marketing process:

5.2.3 Grape markets:

5.2.4 Marketing channels:

5.2.5 Cost of marketing:

5.2.6 Marketing costs, market margins and price spread in different marketing channel

5.2.7 Problems faced by grape growers in marketing.

5.2.1 Marketing management:

Agricultural produce has to undergo a series of functions before it finally reaches the consumers. The reducing cost with quality production and proper marketing are the key management factors which have direct bearing on returns to the producer. The important marketing management functions in the case grapes are grouped into pre-harvest and post harvest management practices.

5.2.1.1 Pre harvest practices:

The pre harvest practices affect quality, quantity as well as maturity of the produce to be sold in the market. The important practices viz., pruning, girdling, thinning, dipping, harvesting time and other practices were studied. Table 5.20 gives information regarding pruning time, girdling, thinning etc. followed by sample grape growers.

a. Time of pruning: Time of pruning has a bearing on the time of harvesting. It is an important aspect in deciding when to bring the produce in the market. At the overall level, maximum (78.00 %) sample grape growers followed timely pruning (i.e. 16th Sept. to 15th Oct.).

Early pruning helps to catch the market during the period of December – January which gives higher prices to the cultivators. However, it involves risk of heavy rains and unfavorable climatic conditions during the fruit development. The maintenance cost of an orchard may increase if early pruning is taken up. Most of the grape growers follow the timely October pruning. As regards to late pruning, the harvesting period gets extended to April-May, which many times fetches good returns to cultivators due to reduced arrivals during these months.

In the small size group, maximum sample grape growers (82.67%) carried out timely October pruning, followed by late pruning (8.00 % of sample grape growers) and early pruning (9.33 % of grape growers) whereas, timely pruning was carried out by 66.67 and 77.78 per cent of sample grape growers from large and medium size groups, respectively. At the overall level timely pruning was carried out by 78.00 per cent sample grape growers while early and late pruning was done by 13.33 per cent and 8.67 per cent grape growers, respectively. From the production technology point of view, October pruning is recommended, which was followed by majority of the grape growers (78.00 % of sample grape growers).

b. Girdling:

Girdling is an important practice for improving the quality of produce. It is the removal of a circular piece of bark of width 2.5 mm from the stem for accumulation of food material for the development of bunch. Three type of girdling, viz., cane, arm and stem is done. Commercially, stem girdling is followed. Girdling helps in improving fruit set, increasing size of berry, advancing maturity, uniform colouration thus improving the overall quality of fruits. At the overall level, girdling was followed by 94.00 per cent sample grape growers.

c. Thinning

Thinning is also on important operation to improve the quality of fruits and maximize the Grade I type fruits. Usually, berry thinning, cluster thinning and cluster tapping are done to improve the fruit quality. Cluster thinning is used to eliminate heavy fruit load i.e. too compact, too small, too large and defective berries are removed. At the overall level, it is observed that 91.33 per cent sample grape, growers followed manual thinning. About 8.67 per

cent sample grape growers followed natural thinning with the use of high concentration of G.A. solution and 91.33 per cent sample grape growers followed manual thinning 2-3 times with the help of skilled labour. Majority of the grape growers (94.67 %) from small size group carried out thinning practice followed by medium size group (88.89 %) and large size group (86.67 %).

Table 5.20 Pre –harvest management practices adopted by sample grape growers. (Numbers)

Sr. No	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
1	**Pruning time**				
	i. Early (15th Aug-15th Sep)	7 (9.33)	7 (15.56)	6 (20.00)	20 (13.33)
	ii. Timely (16th Sep-15th Oct)	62 (82.67)	35 (77.78)	20 (66.67)	117 (78.00)
	iii. Late (16th Oct onward)	6 (8.00)	3 (6.67)	4 (13.33)	13 (8.67)
2.	**Girdling**				
	i. Adopted	70 (93.33)	41 (91.11)	30 (100)	141 (94.00)
	ii. Not adopted	5 (6.67)	4 (8.89)	0 (0.00)	9 (6.00)
3.	**Thinning**				
	i. Manual	71 (94.67)	40 (88.89)	26 (86.67)	137 (91.33)
	ii. Natural	4 (5.33)	5 (11.11)	4 (13.33)	13 (8.67)
4.	**Harvesting**				
	i. Harvesting period				
	a) Period – I (Early Dec-Jan)	5 (6.67)	7 (15.56)	6 (20.00)	18 (12.00)
	b) Period – II (Regular Feb-March-April	70 (93.33)	38 (84.44)	24 (80.00)	132 (88.00)
	ii. Criteria for harvesting time				
	a) Days after oct. Pruning (120 to 135 days)	60 (80.00)	36 (80.00)	25 (83.33)	121 (80.67)

Table 5.20 contd….

Sr. No	Particulars		Size groups			Overall (N = 150)
			Small (N =75)	Medium (N =45)	Large (N=30)	
		b) colour and size development of berries	70 (9.33)	39 (86.67)	28 (93.33)	137 (91.33)
		c) Sugar content (18 to 20%)	15 (20.00)	14 (31.11)	12 (40.00)	41 (27.33)
	iii.	Harvesting time				
		a) Adopted morning	67 (89.33)	45 (100.00)	30 (100.00)	142 (94.67)
		b) Not adopted	8 (10.67)	0 (0.00)	0 (0.00)	8 (5.33)
	iv.	Number of picking				
		a) single picking	70 (93.33)	38 (84.44)	20 (66.67)	128 (85.33)
		b) More than once	5 (6.67)	7 (15.56)	10 (33.33)	22 (14.67)

(Figures in the parentheses are the percentages to the total number of grape growers in the respective size groups.)

d. Harvesting

i. Harvesting criteria

Proper stage of harvesting is very important in harvesting of grape, as it determines the quality of grapes. The grape growers determine the harvesting stage by experience and judgment. Grape growers consider three criteria for deciding harvesting time (Table 5.20) viz., days after October pruning (120-135 days), colour and size development and sugar percentage. About 91.33 per cent grape grower followed colour and size development criteria for deciding harvesting stage. The days after pruning criteria was considered by 80.67 per cent sample grape growers. Only 27.33 per cent sample grape growers checked sugar percentage for deciding harvesting stage.

ii. Harvesting period:

Generally the harvesting of grapes, started in the month of February. But when the early pruning is practiced, obviously the grape orchard's get ready for harvest in the last week of December to January. According to harvesting time, it is divided into two periods viz,

Period I- Early harvesting (December – January) and Period II. Regular harvesting (February, March, April).

Most of the sample grape growers (88.00 per cent) started harvesting in the Period II followed by Period I (12.00 per cent). In large size group early harvesting was taken up by (20.00 %) sample grape growers followed by medium size (15.56 %) and small size (6.67 %).

iii. Harvesting time:

It is recommended that harvesting should be carried out during morning hours of the day. It was followed by cent per cent sample grape growers from medium size group and large size groups followed by small size group (89.33 per cent). At the overall level harvesting during morning is followed by 94.67 per cent sample grape growers and whole day harvesting was practiced by 5.33 per cent sample grape growers.

iv. Number of pickings:

Harvesting in lots of two or more times have some advantages over whole harvesting at a time, like increased sugar percentage and better development of berries in second lot produce. Also harvesting is divided into number of pickings by farmers to reduce the risk due to price variations. But it is not followed by grape growers due to some reasons like small produce, laborious practice of selective harvesting etc.

From the table it can be observed that harvesting in two or more lots was carried out by 33.33 per cent sample grape growers from large size group followed by 15.56 per cent from medium size group and only 6.67 per cent sample grape growers from small size group. It was possible and suitable for large size group growers due to large size area and more production into split harvesting.

5.2.1.2 Disposal of grapes

The total produce of grape is disposed off as farm retention, gratis, rest is marketed. The information regarding the disposal pattern of sample grape grapes is given in Table 5.21.

At the overall level, the total marketed quantity was (99.01 %) followed by gratis (0.50 %) and farm retention (0.49 %) of the total production. The magnitude of farm retention and gratis consider together was very minute i.e. 0.99 per cent of the total produce at the overall level. Marketed quantity was the maximum in small size group (99.10 %) followed by medium size group (98.99 %) and large size group (98.95 %).

Table 5.21 Disposal pattern of grapes

(Quantity in tones./ha)

Sr. No	Size groups	Total production	Farm retention	Gratis	Marketed
1	Small	25.50	0.11	0.12	25.27
		(100.00)	(0.43)	(0.47)	(99.10)
2	Medium	27.30	0.14	0.14	27.03
		(100.00)	(0.51)	(0.49)	(98.99)
3	Large	29.65	0.15	0.16	29.34
		(100.00)	(0.51)	(0.54)	(98.95)
	Overall	27.48	0.13	0.14	27.21
		(100.00)	(0.49)	(0.5)	(99.01)

(Figures in the parentheses are percentages to the total production in respective size groups.)

5.2.1.3 Post harvest management practices:

a. Grading:

Grading determines the quality of fruits. Several studies conducted in the past revealed that grading at producers level has significant effect on realizing remunerative prices for the produce in the markets.

Farmers are grading the produce according to various criteria like colour, size, weight of bunches.

It can be seen from table that at overall level, about 78.67 per cent sample grape growers graded their produce according to size of berries, 76.67 per cent sample grape growers carried out grading taking into account the colour of bunches. Grading on the basis of size of berries was followed by maximum number of samples grape growers i.e. 93.33 per cent from large size group whereas grading on the basis of colour of bunches was followed by maximum number of sample grape growers from same size group (90 per cent). Cleaning is a common practice which is followed by all the sample grape growers. Cleaning and grading was carried out with the help of experienced and skilled labours. Sample grape growers graded the produce into three grades: Grade I, Grade II and Grade III.

Table 5.22 Post harvest management practices adopted by sample grape growers.

(Numbers)

Sr. No	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
1	Grading				
	i. Colour of bunch	55 (73.33)	33 (73.33)	27 (90.00)	115 (76.67)
	ii. Size of berries	52 (69.33)	38 (84.44)	28 (93.33)	118 (78.67)
2	Cleaning	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
3.	Packing				
	i. According to quality	65 (86.67)	40 (88.89)	30 (100.00)	135 (90.00)
	ii. According to market	13 (17.33)	15 (33.33)	20 (66.67)	48 (60.00)
	iii. According to demand	25 (33.33)	20 (44.44)	15 (50.00)	60 (80.00)
4.	Packing material used				
	i. Lining material	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)
	ii. Labels	75 (100.00)	45 (100.00)	30 (100.00)	150 (100.00)

(Figures in the parentheses are the percentages to the total number of grape growers in the respective size groups.)

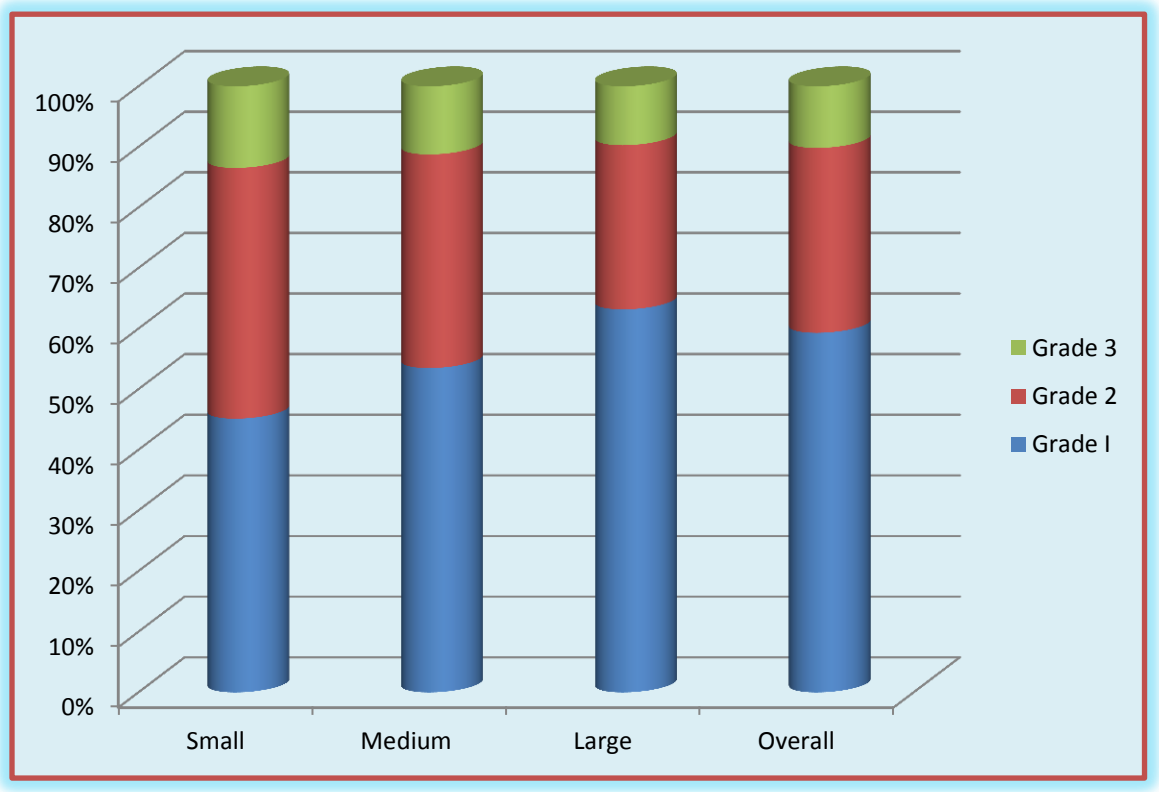
Table 5.23 Per hectare grade wise production of grapes (Tones)

Sr. No	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
1	Grade I	11.41	14.46	18.54	16.14
		(45.15)	(53.50)	(63.18)	(59.31)
2	Grade II	10.46	9.53	7.95	8.3
		(41.38)	(35.26)	(27.10)	(30.52)
3	Grade III	3.40	3.04	2.85	2.77
		(13.47)	(11.24)	(9.72)	(10.17)
	Total Quantity	25.27	27.03	29.34	27.21
		(100.00)	(100.00)	(100.00)	(100.00)

(Figures in the parentheses are percentages to the total production in respective size groups.)

Table 5.23 gives the detail information of different grades along with their quantity. It was observed that Grade I produce was maximum in large size group (63.18 %) followed by medium size group (53.50 %) and lastly in small size group (45.15 %). In case of Grade II. The small size group ranked first with 41.38 per cent of quantity followed by medium size group (35.26 % produce) and large size group (27.10 per cent produce). At the overall level, largest quantity of produce was of Grade I (59.31%) followed by Grade II (30.52 %) and Grade III (10.17 %).

Fig. 10 Per hectare grade wise production of grapes



Packing

Packing is another important marketing function. An ideal packaging ensures reduction of losses in transport and less decaying in storage. The well packed quality produce ultimately leads to better prices. Packing material is selected on the basis of market preference, durability of packing material, per unit cost, suitability for handing, ability to maintain keeping quality, distance and mode of transport. The packing size is decided by growers according to quantity of produce, market demand. About 90.00 per cent sample grape growers select packing according to quality followed by according to market (60.00 %) and according to demand (80.00 %) at the overall level. The packing is carried out by skilled labour and they were popularly known as packers. The packers only carried out the packing. They put the bunches in the boxes in such a way that only the berries are seen all over in the box and not the stalk. Thus, appearance is made very attractive. The packers are paid somewhat higher wages than that of other casual labours for the skillful job. Mostly used packing material were lining materials,

lables. It protects the grape bunch from external shock during transportation and keeps grapes in a good condition for a long period.

All the grape growers used labels. The labeling of the pack indicates the quality. The label generally shows the name of growers, the quantity of grapes and the name of marketing agency to which the produce is sent etc.

For packing of grapes in boxes, almost all the grape growers used news papers cuttings, as lining material. Few sample grape growers used the leaves of grape vines as he lining material. The use of red colour tissue paper was almost observed as it gives attractiveness to the produce in the box. One layer of lining material having 2-3 cm thickness is spread at the bottom of the box and then the tissue paper is spread over it. The actual weighted quantity of grape bunches is then put in the box. Extra quantity of 30-40 gms grapes is put in the boxes so as to compensate the weight loss during the transit period. Before closing the box, one more layer of lining material is put. For this, generally the news papers are used. The tissue paper is then wrapped very carefully and then boxes are sealed.

5.2.2 Marketing process

5.2.2.1 Assembling

The grape growers assembled the produce at a suitable assembling point. A single grape grower cannot have a full truck load of his produce at a time. Therefore, generally two to four grape growers come together and manage the full truck load at a time.

5.2.2.2 Transportation

Quick and efficient transportation of farm produce to the market place has direct bearing on the operational marketing efficiency. Transportation is essential for creation of place utility. It helps to supply timely particular commodity to reach nearby and distant places. Transport efficiency is dependent upon the availability of vehicle, conditions of road and cost per unit etc.

a. Selection of transport means

The grape growers transported the produce mainly through trucks and tempo followed by own vehicles. Very little quantity of produce is transported with own vehicles like Jeep and Tractor. Quick and efficient transportation plays vital role in reaching the produce in time in the market. Table 5.24 gives information regarding farmers criteria of selecting transport means. At the overall level, 82.67 per cent growers chosen transport means according to quantity to be marketed and 98.67 per cent growers selected the transport means according to place and cost of transportation. More than 80 per cent sample grape growers from small size group selected transport means on the basis of place and cost of its followed by medium and large size group.

Table 5.24 Selection of transport means and market places.

Sr. No	Particulars	Size groups			Overall (N = 150)
		Small (N =75)	Medium (N =45)	Large (N=30)	
1	**Selection of transport means**				
	a. According to quantity	65	40	29	124
		(86.67)	(88.89)	(96.67)	(82.67)
	b. According to place and cost	60	40	28	148
		(80.00)	(88.89)	(93.33)	(98.67)
2.	**Selection of market place**				
	a. According to price	39	10	8	57
		(52.00)	(22.22)	(26.67)	(38.00)
	b. According to marketing cost and price realized	32	32	20	84
		(42.67)	(71.11)	(66.67)	(56.00)
	c. According to easiness in marketing	8	6	2	16
		(10.67)	(13.33)	(6.67)	(10.67)

(Figures in the parentheses are the percentages to the total number of grape growers in the respective size groups.)

5.2.3 Grape markets:

Grapes from production area are marketed to the area where it has great demand. Thus the selection of market place plays an important role in receiving better prices.

From the table it can be seen that at overall level about 56.00 per cent growers selected the market place according to cost of marketing and price was realized. About 71.11 per cent growers from medium size group considered this factor followed by 66.67 per cent from large size group and 42.67 per cent from small size group. At the overall level 32.00 per cent grape growers selected market place according to price. Only 10.67 percent growers, at the overall level considered the easiness in transportation.

5.2.3.1 Different grape markets used by growers:

Grapes from the study area are marketed in different markets viz., local markets, within state markets and outside state markets.

i) Local markets:

Generally, the farmers having less area under grapes sell their grapes in this type of markets, as their quantity of produce is small. These include the markets like, Junnar, Otur, Manchar and other major weekly market places in the study area.

ii) Within state market:

Grape growers, of the area under study used to sell their grapes in the markets such as Pune, Mumbai. In these markets, grapes are sold in 2kg boxes and in few cases 5 kg boxes. Farmers also use 20 Kg. plastic crate.

iii) Outside State markets:

The markets such as Ludhianan, Delhi are included as outside markets. Grapes are marketed in 5 and 2 kg boxes as well as some times in 20 kg plastic crates in these markets.

Farmers choose markets generally on the basis of prices prevailing in the market, cost of marketing and easiness in marketing, i.e. availability of easy transport and type of payment.

5.2.4 Marketing channels:

The consumer always prefers fresh grapes. To meet this and to fetch good prices it becomes necessary to the reach grapes as quickly as possible to the consuming centers. It mostly depends on the type of marketing channel followed and it's efficiency. Marketing channel indicates how the produce passes through different agencies from producer till it reaches to the final consumer. Following different marketing channels were observed.

I. Producer – Retailer – Consumer.

II. Producer – Commission Agent – Retailer Consumer.

III. Producer –Wholesaler cum Commission agent –Retailer-Consumer.

IV. Producer – Pre harvest contractor – Retailer – consumer.

The detailed information on the quantity of produce sold through different channels by the grape growers in different markets is presented in table. 5.25. It can be seen from table that there are four different marketing channels in grape marketing.

Table 5.25 **Quantity of grapes sold through different channels in different markets** (Tones./ha)

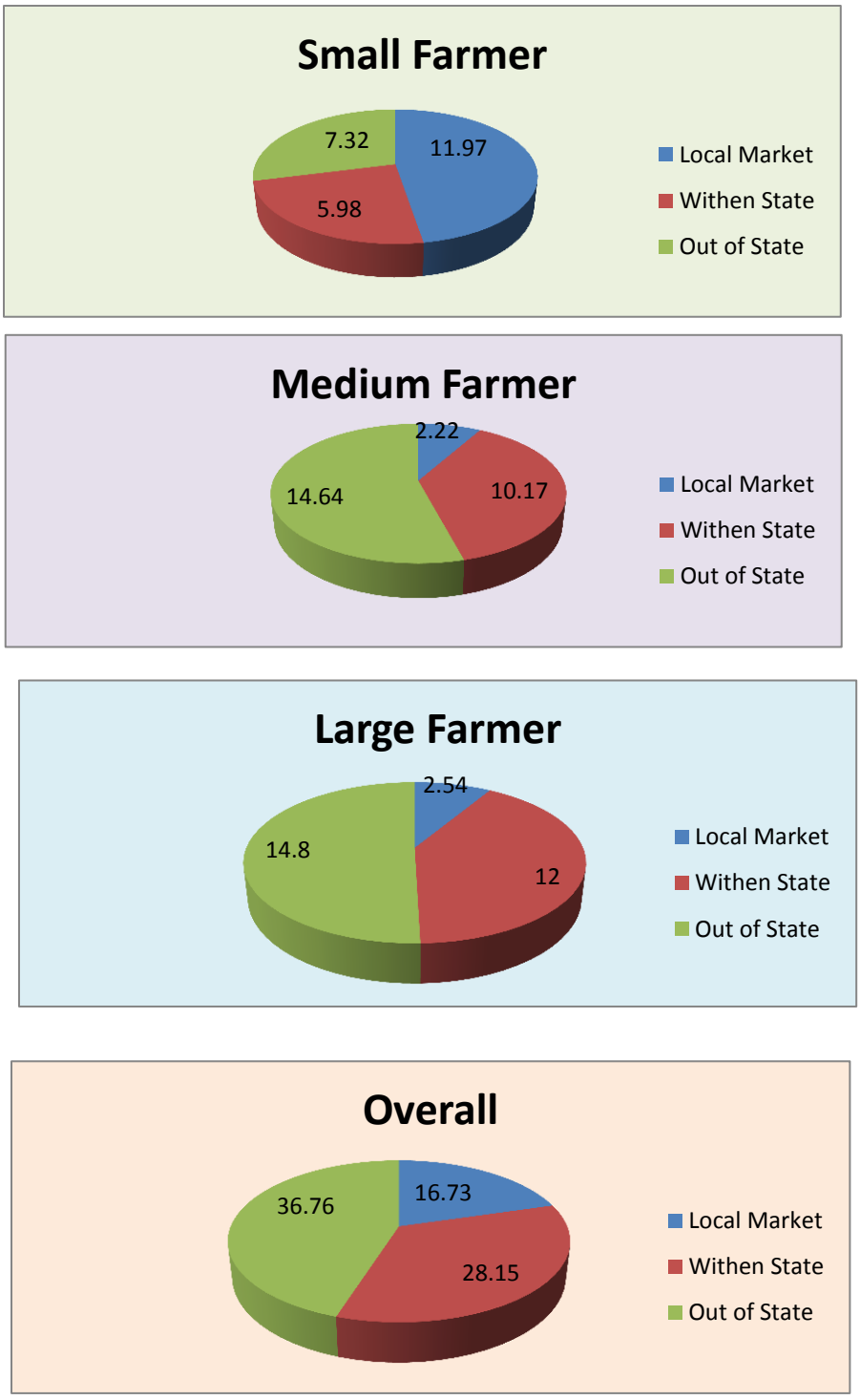
Size group	Channel	No. of farmers	Quantity sold	Market		
				Local	Within state	Outside state
Small	I	12	2.02	2.02	--	--
		(16.00)	(7.99)	(16.87)	--	--
	II	20	3.21	3.21	--	--
		(26.67)	(12.69)	(26.82)	--	--
	III	23	6.74	6.74	--	--
		(30.67)	(26.69)	(56.31)	--	--
	IV	20	13.3	--	5.98	7.32
		(26.67)	(52.63)	--	(100.00)	(100.00)
	Sub total	75	25.27	11.97	5.98	7.32
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Medium	I	6	0.3	0.3	--	--
		(13.33)	(1.11)	(13.51)	--	--
	II	9	1.92	1.92	--	--
		(20.00)	(7.07)	(86.49)		
	III	12	6.83	--	2.95	3.88
		(26.67)	(25.28)	--	(29.01)	(26.50)
	IV	18	17.98	--	7.22	10.76
		(40.00)	(66.54)	--	(70.99)	(73.50)
	Sub total	45	27.03	2.22	10.17	14.64
		(100.00)	100	(100.00)	(100.00)	(100.00)

Contd. Table 5.25

Size group	Channel	No. of farmers	Quantity sold	Market		
				Local	Within state	Outside state
Large	II	6	0.20	0.20	--	--
		(20.00)	(0.65)	(24.39)	--	--
	III	10	12.00	2.34	4.18	5.48
		(33.33)	(40.93)	(75.61)	(34.83)	(37.03)
	IV	14	17.14	--	7.82	9.32
		(46.67)	(58.42)	--	(65.17)	(62.97)
	Sub total	30	29.34	2.54	12.00	14.80
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)
Overall	I	18	2.32	2.32	--	--
		(12.00)	(2.84)	(13.87)	--	--
	II	35	5.33	5.33	--	--
		(23.33)	(6.52)	(31.86)	--	--
	III	45	25.57	9.08	7.13	9.36
		(30.00)	(31.32)	(54.27)	(25.33)	(25.46)
	IV	52	48.42	--	21.02	27.40
		(34.67)	(59.32)	--	(74.67)	(74.54)
	Sub total	150	81.64	16.73	28.15	36.76
		(100.00)	(100.00)	(100.00)	(100.00)	(100.00)

(Figures in the parentheses are the percentage to the total)

Fig. 11 Quantity of grapes sold in different markets. (Tones./ha)



Channel I	-	Producer – Retailer – Consumer
Channel II	–	Producer – Commission agent – Retailer Consumer
Channel III	-	Producer-Wholesaler cum Commission agent- Retailer-Consumer.
Channel IV	–	Producer – Pre harvest contractor – Retailers –Consumers

Information on quantity sold through each marketing channel, number of grape growers following the particular marketing channel and quantity of grapes sold in different markets is presented in the table.5.25. The marketing channels observed in this study are similar to those reported by Undirewade *et al.* (1992) and Satpute (1999). It was observed that at the overall level about 34.67 per cent growers preferred channel IV (Producer – Pre harvest contractors-Retailer – Consumer) also quantity sold is large which is 59.32 per cent. Quantity sold through channel I, II and III was 2.84 per cent, 6.52 per cent and 31.32 per cent respectively.

In case of small group, the maximum quantity 52.63 per cent of total produce was marketed through Channel IV (Producer-Pre harvest contractors – Retailer Consumer) followed by Channel III (Producer – Hundekari – Wholesaler cum Commission agent – Retailer – Consumer) 26.69 per cent, Channel II (Producer-Commission Agent – Retailer-Consumer) 12.69 per cent and Channel – I (Producer – Retailer – Consumer) 7.99 per cent. In the small size group total quantity sold in local market was 11.97 tone./ha of which 16.87 per cent through Channel I, 26.82 per cent through Channel II, and 56.31 per cent through Channel III. Within state market and outside state market, quantity sold was 5.98 tone/ha and 7.32 tone/ha, respectively through Channel IV.

The grape growers from medium size group sold the highest quantity of produce (66.54 per cent) through channel IV followed by marketing channel III (25.28 per cent) 7.07 per cent, channel II, 1.11 per cent, channel I. Most of the quantity 14.64 tone/ha sold in outside state market followed by within state market 10.17 tones/ha.

In the large size group highest quantity of produce was sold through channel IV (58.42 per cent) followed by channel III (40.93 per cent) and channel II 0.65 per cents.

From the forgoing discussion it is clear that marketing channel IV (producer – pre harvest contractor – Retailer – Consumer) was the main channel. Channel IV was generally followed to market the grapes to outside state market and to within state markets.

5.2.5 Cost of marketing:

The different marketing functions viz., grading, packing, transportation and handling of produce, etc. are required to be performed in the marketing of grapes. The cost incurred for performing these operations is very important in grape marketing because it reflects on the consumers price and the returns to the producers.

Table 5.26 Cost of marketing of grapes in different packing (Rs/kg).

Sr. No.	Items of marketing cost	Type of packing		
		20 kg crate	5 kg box	2 kg box
1	Grading charges	2.85 (3.25)	0.85 (2.98)	0.36 (3.46)
2.	Packing material and packing charges	6.23 (7.10)	7.72 (27.11)	1.9 (18.29)
3.	Transport charges	18.65 (21.25)	4.25 (14.92)	1.65 (15.88)
4	Commission charges	57.25 (65.23)	14.5 (50.91)	5.8 (55.82)
5	Postage and telephone charges	0.28 (0.32)	0.21 (0.74)	0.15 (1.44)
6	Hamali	2.00 (2.28)	0.6 (2.11)	0.25 (2.40)
7	Other charges	0.50 (0.57)	0.35 (1.23)	0.28 (2.69)
8	Total marketing charges	87.76 (100.00)	28.48 (100.00)	10.39 (100.00)
9	Per kg. marketing cost	4.39	5.70	5.20

(Figures in the parenthesis are the percentage to the total marketing cost)

The cost incurred on performing the operations such as grading, packing, transpiration and commission are worked out and presented in table 5.26.

The per kg cost of grading was less as compared to per kg cost of packing and transportation. The per package cost of grading ranged from Rs. 0.36 to Rs. 2.85. The per kg cost incurred on packing material was high in comparison with other items of cost. The per kg cost of packing material includes the cost of tissue paper, paper cuttings, gum tape and cost of corrugated paper boxes. It was the highest (27.11 per cent) in 5 kg packing followed by 2 kg packing (18.29 per cent) and 20 kg packing (7.10 per cent). The per kg cost of transportation ranged from Rs. 0.83 to 0.93. The commission of intermediaries was Rs. 2.90 per kg. The per kg cost incurred on Octroi, Postage, Charity was less than 2.00 per cent of the total cost. The per Kg. marketing cost for 20 kg. crate, 5 kg. box and 2 kg. box was worked out to Rs. 4.39 Rs.,5.70 Rs. and Rs. 5.20 respectively.

From the forgoing discussion it is clear that major item of marketing cost were packing material and packing charges and commission charges. The cost of marketing decrease with increase in size.

5.2.6 Marketing costs, market margins and price spread in different marketing channels

Price spread refers to the difference between the price paid by the consumer and price received by the producer. This consists of marketing costs and margins of the intermediaries. The cost and margins of each agency in different channels worked out and the details are presented in table 5.27.

It can be revealed from the table that per kg price received by the grape growers ranged from Rs. 27.48 to Rs. 30.96 in different channels. The study of selected marketing channels was under taken. The selected three marketing channels are.

Channel I - Producer – Retailer – Consumer

Channel II – Producer – Commission agent – Retailer Consumer

Channel IV – Producer – Pre harvest contractor – Retailers –Consumers

The price spread in Channel I, i.e. local markets and channel II in Pune market and channel IV (on farm sale) was worked out. The producers shares in consumers rupees in case of channel – I was about 71.06 per cent and in case of channel II it was about 61.70 per cent and in case of channel – IV it was about 63.48 per cent. The per kg cost of marketing in case of channel I was about 6.04

Table 5.27 Price spread in selective marketing channel (Rs/kg)

Particulars	Marketing channel		
	I	**II**	**IV**
Price paid by consumers i.e. price received by retailers.	38.67 (100.00)	46.29 (100.00)	48.77 (100.00)
Cost incurred by retailers	1.65 (4.27)	2.10 (4.54)	2.52 5.17
Margin of the retailers.	5.15 (13.32)	4.78 (10.33)	4.35 8.92
Price paid by retailers i.e. price received by producers /Commission agent / Pre harvest contractor	31.87 (82.41)	39.41 (85.99)	43.90 90.01
Cost incurred by Commission agent/ Pre harvest contractor	------	1.21 (2.61)	2.46 5.04
Margin of Commission agent /Pre harvest contractor	------	3.94 (8.51)	4.34 8.90
Price paid by Commission agent / Pre harvest contractor i.e. price received by farmers.	------	34.26 (74.00)	36.16 74.14
Cost incurred by producers	4.39 (11.35)	5.70 (12.31)	5.20 10.66
Net price received by producers	27.48 (71.06)	28.56 (61.89)	30.96 63.48
Producer's share in consumer rupee %	71.06	61.70	63.48

(Figures in the parentheses are the percentages to total)

Rs. where as in case of Channel II it was observed to be Rs. 9.01 and in case of Channel IV it was Rs. 10.18. The commission of intermediaries in case of channel I was Rs. 5.15 per kg in Channel II it was 8.72 per kg and in case of Channel IV Rs. 8.69 per kg. The per kg consumers price was Rs. 38.67 in case of Channel I in local market and in the domestic market through channel II and Channel IV consumers price was 46.29 per kg and Rs. 48.77 per kg respectively. The lowest consumer price was observed in channel – I, this was due to less marketing cost where as highest consumers price is in channel III.

From the foregoing discussions, it can be concluded that up to 40 per cent share was galloped by the market intermediaries in the marketing of grapes. Because of this, producer's share in the consumer's rupee was reduced to 60 per cent only.

5.2.7 Problems faced by grape growers in marketing management:

The efficient marketing system not only helps in giving good returns to producer but also satisfies the consumers with minimum price for better quality. The proper marketing management practices fetch the good prices to grapes. Here, an attempt has been made to highlight the problems in marketing, packing, marketing intelligence etc in table no 5.28.

Packaging is an important aspect in marketing management 48.67 per cent growers at overall level pointed out that cost of packing material used for grape marketing is costly. With the increasing input cost, cultivation cost is increasing alone with it cost of marketing is also increasing over packing material and other things.

Due to the more arrival of the produce during the peak harvest period prices fall due to which producers get lower price to their produce. About (94.00 %) growers reported that fluctuation of prices is the major problem in grape marketing.

Table 5.28 Problems faced by sample grape growers in marketing management:

Sr. No.	Particulars	Size groups			Overall (N=150)
		Small (N=75)	Medium (N=45)	Large (N=30)	
I	**Marketing Constraints**				
1	Costly packing materials	45 (60.00)	18 (40.00)	10 (33.33)	73 (48.67)
2	Fluctuations in market price	72 (96.00)	40 (88.89)	29 (96.67)	141 (94.00)
3	High cost of transportation	33 (44.00)	18 (40.00)	7 (23.33)	58 (38.67)
4	Exploitation by middlemen and whole sellers	63 (84.00)	30 (66.67)	19 (63.33)	112 (74.67)
5	High commission charges	75 (100.00)	41 (91.11)	25 (83.33)	141 (94.00)
6	Low prices to the produce in market	50 (66.67)	27 (60.00)	15 (50.00)	92 (61.33)
7	Lack of information regarding arrival and prices.	50 (66.67)	24 (53.33)	13 (43.33)	87 (58.00)
8	Lack of market infrastructural facilities.	25 (33.33)	18 (40.00)	14 (46.67)	57 (38.00)
9	Delayed cash payment	30 (40.00)	27 (60.00)	21 (70.00)	78 (52.00)
10	Absence of support price in case of glut in market	21 (28.00)	15 (33.33)	13 (43.33)	49 (32.67)
11	Non availability of packing and grading facility	15 (20.00)	15 (33.33)	13 (43.33)	43 (28.67)
12	Inefficiency of Grape growers co-op. societies	30 (40.00)	20 (44.44)	14 (46.67)	64 (42.67)
II	**Export constraints**				
1	Difficult to meet export standards	15 (20.00)	11 (24.44)	8 (26.67)	34 (22.67)
2	Lengthy procedures and formalities for export	18 (24.00)	9 (20.00)	13 (43.33)	40 (26.67)
3	Lack of knowledge about export procedure	24 (32.00)	10 (22.22)	4 (13.33)	38 (25.33)
4	Non-availability of updated export market information	21 (28.00)	18 (40.00)	15 (50.00)	54 (36.00)
5	Non-availability of refrigerated vans	9 (12.00)	6 (13.33)	7 (23.33)	22 (14.67)
6	Un availability of exportable varieties.	17 (22.67)	11 (24.24)	12 (40.00)	40 (26.67)

(Figures in the parentheses are the percentage to the number of grape growers in the respective size groups).

About 94.00 per cent growers have pointed out that commission charges of intermediaries were high and Exploitation by them was to the tune of 74.67 per cent.

In the modern era of information technology formers thinking and deciding about marketing of produce, with sitting at home but this is practically is very difficult for small and scattered farmers situated in rural area to get acquainted with modern marketing practices and marketing intelligence. About 58.00 per cent growers were facing problem of unavailability of market information.

Other major important problems like lack of market infrastructural facilities, non availability of packing and grading facility, absence of support price in case of glut in market and inefficiency of grape grower's co-operative societies were reported by almost one third of farmers.

Some of the farmers engaged in export of the grape revealed that the major obstacles in export of the grapes were difficult to meet export standards, lengthy procedures and formalities for export. Other minor problems like lack of knowledge about export procedure, non-availability of updated export market information, non-availability of refrigerated vans, and un availability of exportable varieties were important one .

6. FINDINGS, CONCLUSIONS AND SUGGESTIONS

6.1 Findings.

Fruit cultivation has been practiced in India since ancient times. This art of growing fruits has now gradually changed into one of the skillful and commercial propositions. Cultivation of fruits plays an important role in the economy and prosperity of a nation. It is believed that standard of living of people of a country can be judged by per capita production and consumption of fruits. Importance of fruits in the human diet is universally recognized.

As is well known, India with its diversity of soils and climate is advantageously placed for producing practically all varieties of tropical and subtropical fruits. Grape is one of these fruits. In India it is predominantly grown in states like Maharashtra, Karnataka, Tamil Nadu, Punjab and other major states. The predominant grape growing districts are Nashik, Sangali, Pune , Solapur, Ahmed Nagar and Osmanabad district.

In Maharashtra grape cultivation has acquired place of pride in the economy of state. During the year 2003-04 area under grapes in State was 35,236 hectares with the production of 9.8 lakh MT. Having realized, the importance of grape cultivation, Government of Maharashtra is providing special infrastructure facilities to boost the production, marketing including processing and export of grapes in the State. Being a very perishable produce, grapes cannot be stored for a longer period under ordinary condition so produce has to reach to the consumer well in time, in fresh and good quality. So both production and efficient marketing management become prime concern.

The efforts are underway to evolve location specific technologies transfer them to grape growers field and assure input supply to grape growers in right time at right place and of a good quality. The rate at which new technology and yield increasing inputs are adopted by the grape growers is affected by the prices of input and output. Simultaneously the consumers also expect the availability of goods at reasonable prices. For achieving these conflicting objectives grapes production management and marketing system has to play a crucial role.

An attempt has been made in present study to examine the various aspects of production and marketing management in Pune district with the specific objectives:

1. To study the Patterns of growth in area, production and productivity of grapes in the study area.
2. To examine the resource management in grapes production.
3. To analyze the cost and returns in grapes cultivation.
4. To study the feasibility of investment in grapes cultivation.
5. To identify marketing channels and to estimate price spread in grapes marketing.

The Pune district was purposively selected for the study. Fifteen villages having highest area under grapes were selected from the Junnar, Indapur, Baramati and Daund tahsil. A list of grape growers was prepared by grouping the grape growers on the basis of area under grape vine orchard into three size groups viz., Small (below 2 ha), medium (2 to 4 ha) and large (above 4 ha). A sample of 150 grape growers from above size groups along with 50 market intermediaries was studied.

Data pertaining to various aspect of the study were collected personally in a specially designed schedule by the survey method. From the selected grape growers and co – operative organization for the year 2012-13. The data relating to agro economic features of the study area viz, land use, cropping pattern, soil, climate etc. were collected from the secondary sources. The data collected were complied and analyzed for interpretation of results. Both tabular and statistical method of analysis was used to accomplish the objectives of the study.

The findings are briefly summarized below.

1) As regards to land utilization pattern of the sample grape growers, at the overall level the average size of land holding was 4.07 hectares. The per farm cultivated area was 3.91 hectares. The proportionate area under irrigation was to the extent of 66.34 per cent to the total operational holding.

2) Cropping pattern of the sample grape growers was dominated by cash crops constituting Grape, sugarcane and vegetables. Among these crops, grape occupied major shared, i.e. of 43.07 per cent in the gross cropped area. The cropping intensity worked out to 144.90 per cent.

3) The respective temporal growth rates of area, production and productivity of grapes in the study area for the period from 1987-88 to 2011-12 were calculated and It was seen from the table and graph that the area under grapevine cultivation was 280 hectares, the production was 46.2 tone and the productivity was 16.5 tons per hectare in beginning of 1986-87, which jumped to 1010 hectares with production 286.84 tone and productivity was 28.40 tons in 1995-96. Later on area, production and productivity was reduced to 820 ha, 225.01 tone and 27.44 tons respectively.

4) It was observed that, at the overall level, the source of inspiration regarding managerial decision in selecting grape for cultivation was mainly from the relatives (63.33%) followed by friends (24.44). Sample grape grower preferred cultivation of grapes because of fetching and generate high income as compared to other fruit crops. Mostly high capital investment and careful management is a key factor in deciding the decision of grape cultivation.

5) At the overall level, adoption behaviour of grape growers towards recommended cultivation technology viz., soil selection, direction of planting, planting distance as per training system, trench planting method, selection of Tas-A-Ganesh variety, own root nursery and bower training system found to be at the higher side (i.e. more than 50 % sample grape grower) as per the recommendation.

6) As regard to the management practices in production of grapes such as financial, labour, irrigation, nutrition, use of growth regulators, pest and diseases management and mechanization played vital role. At the overall level, most of the grape growers (88.89%) preferred co-operative sector and Nationalize Bank as main source of medium term and long term loan for establishment of grape garden. Seasonal labor plays important role in cultivation practices as they contributed 64.38 per cent in total labour management, at overall level. About 100.00 per cent of grape growers preferred drip irrigation method for grapes. At the overall level, 48.84 per cent of the total grape growers adopted Integrated Nutrient Management. While 92.22 per cent grape growers applied fertilizers in split doses. As regards to method of application of growth regulators, 78.89 per cent grape growers at overall level followed dipping along with the sprayings. About 48.84 per cent grape growers adopted Integrated Pest and disease Management techniques.

7) At the overall level the per hectare cost of establishment of grape garden was worked to Rs. 6, 46,544.06. It was decreased with increase in size group. Major items of the establishment cost were the cost of supporting structure and irrigation system installation which together contributed 63.17 per cent of to the total cost.

8) Including initial investment cost and interest on working capital, total variable cost was worked out to Rs. 7, 11,198 which constitute to 80.37 per cent of total maintenance cost. The total fixed cost was calculated to Rs.1, 71,213.00 which consists of 19.35 per cent of total maintenance cost and per hectare overall maintenance cost during gestation period including initial establishment cost was Rs. 8, 82,411.

9) It can be revealed that total cost of cultivation of grape worked out in table no 5.11 to Rs. 6,14,518.98 at the overall level and it was maximum in large size group of sample grape growers i.e. Rs. 6,41,296.60. The amortized establishment cost is also important and it contributed to the extent of 15.80 per cent at the overall level. The paid out cost shared 51.27 per cent is total cost at the overall level. The cost 'B' shared 91.17 per cent in the total cost at the overall level. Per tone cost of cultivation for small, medium and large farmers was Rs. 23,109.59, 22,452.95 and 21,628.89 respectively.

10) It was noted from the table that per hectare total yield obtained from grape cultivation was 25.50, 27.30, 29.65 and 27.48 tones in small, medium, large size groups and at the overall level, receptively. The gross income received from the grape cultivation was Rs. 7,39,500, Rs. 7,91,700 Rs. 8,59,850 and Rs. 7,97,016.67 respectively for small, medium, large size groups and at overall level. At the overall level, total cost was observed Rs. 6 14,518.98. At overall level, the per hectare net returns were worked to Rs. 1,82,497.69. The output-input ratio i.e. B:C ratio which indicates the profitability of investment estimated for sample grape growers were 2.53,1.42 and 1.30 at cost 'A' 'B'and 'C' for small, medium, large size groups and at overall level, respectively. As the output input ratio at cost 'C' was greater than unity it indicated that the cultivation of grapes was profitable.

11) Yield, Cost and Return structure of sample grape growers.(Year 2008-09 to 2012-13) for last five years revealed that, per hectare yield was increased from 19.43 tones to 27.30 tones, while production cost per kg was increased from Rs. 12.98 to Rs.18.95. Simultaneously

returns per kg was also increased from Rs. 15.71 Rs. 29.00 for the above five years which indicates the increasing productivity and profitability of the grapes in study area.

12) The financial feasibility of investments in grape cultivation, measures of project appraisal was computed. In grape the payback period was 5 years. The per ha net present values of grape was Rs. 83749.79 discounted at the rate of 12 per cent opportunity cost of capital. The benefit cost ratio in grape was 1.05 at 12 per cent discount rate which was more than unity. The internal rate of return 18.5 per cent was higher than the opportunity cost of capital i.e. 12.00 per cent. This indicates a higher average earning power of money invested in the project.

13) It was revealed from the table that the per hectare use of human labour was 432.36 man days at the overall level. The per hectare use of bullock labour was relatively high in the case of large size group sample grape grower (19.10 pair days). The percent gap observed in utilization of nitrogen and potassium between recommended and actual observed to be 55.42 per cent and 49.82 per cent at overall level, respectively. The per hectare use of manures and phosphorus was observed to be as per recommended dose. Thus it can be stated that the sample grape growers have not managed these important inputs to have maximum output.

14) The seven resource variables included in the production analysis have explained jointly 61.86 per cent variation in the total output of grape. The total human labour (X_1), nitrogen (X_4) and plant protection expenditure (X_7) were turned out to be positive and highly significant at 1 per cent level indicating that these are the important variables for which the output is highly responsive as all the inputs are given in split doses and have short day effects. The regression coefficients of bullock labour (X_2) and Manure (X_3), were positive and significant at 5 per cent level indicating that, there is a scope to increase the use of their input for maximizing the output. The regression coefficients of Phosphorus (X_5) and Potassium (X_6) were found to be non significant as once they applied have long lasting effect.

15) It was noticed that, at the overall level, 58.89 and 48.49 per cent growers were said that replacement of variety is very difficult and non availability quality planting material

respectively. Non availability of manures/fertilizer in time and shortage of fertilizers was the major problem reported by 47.78 and 75.56 per cent growers. Increasing prices of fertilizers, and pesticides was an important problem in front of growers because prices of grapes were more or less constant on one side and costs of inputs were increasing on the other side.

Major problems of pesticide management were reported as increased resistance in paste and diseases and non availability of insecticide and pesticides in time by 82.22 and 68.89 per cent growers respectively. About 85.56 and 90.00 per cent growers at overall level reported that generally skilled labour are not available and particularly face acute problem during peak season respectively. An improved technology is not suitable to small & fragmented land holding was told by 83.33 per cent small farmers. Financial constraints are important one. About 87.78 per cent growers at overall level reported that rate of interest is very high. More than 50.00 per cent growers reported that credit is not made available in time and its procedure to obtain is Complex, lengthy and rigid. General constraints like irregular supply of electricity, difficulty in mechanization, fragmentation of land holdings lack of insurance support and irregular supply of canal and river water were reported by some of the growers.

16) The marketing management was broadly classified into pre harvest and post harvest practices. The pre harvest practices viz., girdling, thinning were adopted by 95.56 per cent and 90.00 per cent sample grape growers. In case of pruning time 76.11 per cent grape growers adopted timely pruning. (16^{th} Sep. to 15^{th} Oct.)

17) As regards to pre harvest practices viz., harvesting criteria, time, single pickings etc. were followed by majority of grape growers as per recommendation as it is indicated 81.11, 95.56 and 80 per cent.

18) At the overall level, it was seen that the marketed surplus was 99.01 per cent in the total production. It decreases from 99.10 to 98.95 per cent with increase in size group.

19) The sample grape growers graded their produce in three grades. Grade I, Grade II and Grade III which constituted 59.31, 30.52 and 10.17 per cent of the total produce at overall level.

20) Almost 91.11 per cent sample grape grower carried out packing according to quality of grape. Cent per cent grape growers used lining material and labels.

21) As regards to quantity of grapes sold different markets at the overall level the largest portion (36.76 tones.) 45.02 per cent of the total quantity of grapes was sold in the outside state market. The quantity sold in local and within the state market were (16.73 tones) 20.50 per cent and (28.15 tones) 34.48 Per cent respectively at the overall level. In case of small size group grape growers major quantity sold (11.97 tones) 47.36 per cent in local market. In case of medium and large size group, the quantity sold in the outside state market were (14.64 tones) 54.16 per cent and (14.80 tones) 50.44 per cent respectively.

22) The per kg marketing cost for 20 kg, 5 kg and 2 kg box were Rs. 4.39, Rs. 5.70 and Rs. 5.20, respectively

23) In all four marketing channels were identified in sale of grapes viz.,

a) Channel –I (Producer – Retailer – Consumer),

b) Channel – II (Producer-Commission agent – Retailer – Consumer),

c) Channel III- (Producer-Hundekari-Wholesaler – Cum-Commission agent-Retailer-Consumer) and

d) Channel IV (Prouder-Pre harvest contractor – Retailers – Consumers).

24) The producer's share in consumer's rupee was maximum in Channel I (71.06 %) followed by Channel IV (63.48%) and Channel II (61.70%).

25) Packaging is an important aspect in marketing management 44.44 per cent growers at overall level pointed out that cost of packing material used for grape marketing is costly. With the increasing input cost, cultivation cost is increasing alone with it cost of marketing is also increasing over packing material and other things. About (94.44 %) growers reported that fluctuation of prices is the major problem in grape marketing. About 88.89 per cent growers have pointed out that commission charges of intermediaries were high and Exploitation by them was to the tune of 71.11 per cent. Other major important problems like

lack of market infrastructural facilities, non availability of packing and grading facility, absence of support price in case of glut in market and inefficiency of grape grower's co-operative societies were reported by almost one third of farmers.

26) Some of the farmers engaged in export of the grape revealed that the major obstacles in export of the grapes were difficult to meet export standards, lengthy procedures and formalities for export. Other minor problems like lack of knowledge about export procedure, non-availability of updated export market information, and un availability of exportable varieties were important one .

6.2 Conclusions

On the basis of findings of the present study, the following conclusions are put forth

1. The average size of land holding of sample grape grower 4.0 hectares and 95.35 per cent area was under cultivation. The cropping pattern was dominated by cash crops, grape occupied major shared i.e. of 43.07 per cent.

2. Co-operative sector and Nationalized Banks were the main source for long and medium term loans for the establishment of grape garden.

3. The respective temporal growth rates of area, production and productivity of grapes in the study area for the period from 1987-88 to 2011-12 showed increasing trend.

4. The source of inspiration regarding managerial decision in selecting grape for cultivation was mainly from the relatives and friends. Adoption behaviour of grape growers towards recommended cultivation technology was more than 50.00 per cent.

5. The management practices in production of grapes such as financial, labour, irrigation, nutrition, use of growth regulators, pest and diseases management and mechanization played vital role.

6. The per hectare cost of establishment and maintenance cost during gestation period of grape garden was worked to Rs. 646544 and Rs.882411.

7. Average per hectare yield obtained from grape cultivation was 27.48 tones, cost of cultivation of grape worked out Rs. 614518.98, net returns was worked to Rs. 182497.69. and B: C ratio was 1.30 which indicated that the cultivation of grapes was profitable.

8. The measures of project appraisal such as pay-back period (5 years), net present values (Rs. 83749.79), benefit cost ratio (1.05), internal rate of return (18.5 per cent) was higher than the opportunity cost of capital i.e. 12.00 per cent. This indicates a higher average earning power of money invested in the project.

9. The per hectare use of manures and phosphorus was observed to be as per recommended dose while rest of inputs were underutilized.

10. The total human labour (X_1), nitrogen (X_4) and plant protection expenditure (X_7) were turned out to be positive and highly significant at 1 per cent level indicating that these are the important variables for which the output is highly responsive.

11. At the overall level growers were said that replacement of variety is very difficult and non availability quality planting material, non availability of manures/fertilizer in time and shortage of fertilizers, increasing prices of fertilizers, and pesticides, increased resistance in paste and diseases, unavailability of skilled labour, credit is not made available in time and its procedure to obtain is Complex, lengthy and rigid.

12. General constraints like irregular supply of electricity, difficulty in mechanization, fragmentation of land holdings, and lack of insurance support and irregular supply of canal and river water were reported by some of the growers.

13. The marketing management was broadly classified into pre harvest and post harvest practices. At the overall level, it was seen that the marketed surplus was 99.01 per cent in the total production. The total produce was graded in proportion of 6:3:1 in Grade I, II an III respectively.

14. As regards to quantity of grapes sold different markets at the overall level the largest portion 45.02 per cent of the total quantity of grapes was sold in the outside state market. The

quantity sold in local and within the state market were 20.50 per cent and 34.48 Per cent respectively at the overall level.

15. Majority of grape grower marketed their produce through Channel IV (Producer-Pre-harvest contractor-Retailers-Consumers).

16. The per kg marketing cost for 20 kg, 5 kg and 2 kg box were Rs. 4.39, Rs. 5.70 and Rs. 5.20, respectively.

17. The producer's share in consumer's rupee was maximum in Channel I (71.06 %) followed by Channel IV (63.48%) and Channel II (61.70%).

18. Most of the farmers pointed out that cost of packing material used for grape marketing is costly, fluctuation of prices, more commission charges, and exploitation by intermediaries, difficult to meet export standards, lengthy procedures and formalities for export. Other minor problems like lack of knowledge about export procedure, non-availability of updated export market information, and un availability of exportable varieties were the major constraint.

6.3 Policy implications

Major policy implications based on the findings of the study, the necessary steps to be taken up in the areas of investment, production, marketing and strategies to increase productivity and profitability of grapes are drawn and are presented as under:

1. The growth rate analysis indicated that there is increase in area, production and productivity, production is increased more due to increase in area rather than productivity which calls for intensive efforts to increase productivity of grapes in the study area as well as Maharashtra and country as a whole even though we are leading in productivity of grapes in World and still we have lot of scope to increase the share in world marker by introducing high yielding varieties with exportable quality production.

2. As indicated by the financial measurements, the investment in grape orchard was found to be financially feasible. And as there is higher initial investment in grape orchards the farmers who wish to establish the orchards, timely and enough financial assistance may be provided by the institutional agencies at lower rate of interest.

3. The production function analysis revealed that the major inputs like nitrogen and potassium has been underutilized per hectare. Hence, this calls for increase in dose of both nutrient to achieve recommended level to boost the productivity of grapes and efforts should made to educate and demonstrate to farmers to adopt recommended application of fertilizers, plant protection chemicals, since they are being important and costly inputs which affect quality and quantity of produce.

4. The study revealed that the producer's share in consumer rupee is very less. Market intermediaries enjoy lion's shares and producers are hard hit. In order to reduce the unwanted clutches of intermediaries, the producers themselves can take up marketing of produce in farmers market and distant market by collective marketing process.

5. It was revealed from the study that use of FYM or organic manure and bio-pesticides is increasing in the study area. Increased awareness and there by increased demand for organically grown products in recent years is of crucial importance in terms of marketability of the produce. Therefore, the cultivators may think in these lines to produce organic grapes.

6. Scientific storage and cold chain facilities with refrigerated vans for the perishable agricultural commodities like grapes has very important role to play to enhance the self life of the products and thus offer the commodity for sale in a phased manner to avoid unnecessary glut in the market and there by slump in the prices.

7. This crop has good commercial potential and the area under this crop is significantly increasing in the study area, hence Government should plan for establishing new processing (Raisins and Wine) units and arrange marketing set up in the region to safeguard the interest of grape growers and processors.

8. As the grapes have more potential for export, established market but no assurance of getting money in time due to involvement of pre harvest contractors in export trade, Government should make provision to give bank guaranty for delayed payments.

9. The linkages with research, education and extension system like, SAU, NRC, IIHR, DOA, NHM, APEDA, MSGGA and MAHAGRAPE are found to be weak. There is

need for problem based, result oriented and time bound action on this research, education and extension work. Long standing research needs such as effective management of pest and diseases, developing downy and powdery mildew resistant varieties should be considered on priority.

4. Suggestions for the future research

In the present investigation, an attempt has been made to study grape production, marketing management and strategies for increasing productivity and profitability of grape.. Hence following suggestions are made for future research.

1. Investigations may be taken up in different regions of the state/country with varying ecological, cultural and socio-economic backgrounds. This will help to make valid and wider generalization regarding production, marketing management and strategies for increasing productivity and profitability of grape growers.

2. Identification of different market channels and profit share of different stake holders can be worked out to facilitate policy formation for ensuring equal share of benefits.

3. Analysis of the specific functions played by different agencies in boosting production and export of grape can be documented.

4. Assessment of research needs and the impact of research out come to enhance grape export.

5. Focused study on documenting important management practices to ensure export quality grape production.

Study of production and marketing management of grapes in a Pune district and strategies for increasing productivity and profitability.

ABSTRACT

The focus of the present study was on Production, Marketing management and strategies for increasing productivity and profitability of grape in Pune District of Maharashtra. A sample size of 150 farmers and 50 market intermediaries was selected using proportionate random sampling method. Field level data were elicited for the agriculture year 2012-13 through personal interview method. For analyzing the data collected during the study, trend, tabular, financial and functional analysis were employed.

The temporal growth rate analysis of area, production and productivity of grape showed positive growth. The per hectare cost of establishment and maintenance cost during gestation period of grape garden was worked to Rs. 646544 and Rs.882411. Average per hectare yield obtained from grape cultivation was 27.48 tones, cost of cultivation of grape worked out Rs. 614518.98, net returns was worked to Rs. 182497.69. and B:C ratio was 1.30, which indicated that the cultivation of grapes was profitable.

pay-back period (5 years), net present values (Rs. 83749.79), internal rate of return (18.5 per cent) was higher than the opportunity cost of capital indicated higher average earning power of money invested and hence cultivation was profitable. The per hectare use of manures and phosphorus was observed to be as per recommended dose while rest of inputs were underutilized. Functional analysis showed use of human labour, nitrogen and plant protection chemical was positive and highly significant.

Out of total harvest 60 per cent produce graded in grade I was sold in out state market and rest in local and state market. Major channel was Producer-Pre-harvest

contractor-Retailers-Consumers. The per kg marketing cost for 20 kg, 5 kg and 2 kg box were Rs. 4.39, Rs. 5.70 and Rs. 5.20, respectively. The producer's share in consumer's rupee was 63.48 per cent.

At the overall level growers were said that replacement of variety is very difficult and non availability quality planting material, non availability of manures/fertilizer in time and shortage of fertilizers, increasing prices of fertilizers and pesticides, increased resistance in paste and diseases, unavailability of skilled labour, credit is not made available in time and its procedure to obtain is complex, lengthy and rigid. Main constraint in marketing were costly packing material, fluctuation of prices, more commission charges, exploitation by intermediaries and difficult to meet export standards.

7. LITERATURE CITED

Appendix- I

A) Abbreviations.

1. APMC - Agricultural Produce Market Committee
2. APP- Area Production and Productivity.
3. APEDA – Agricultural Processed Food products Export Develop Authority
4. BA - Benzyl Adenine.
5. BCR - Benefit Cost Ratio
6. CDF - Cob-Douglas Function.
7. DCA - Double Cropped Area
8. DOA – Department of Agriculture
9. EP - Elasticities of production.
10. FC - Fixed cost
11. FYM - Farm Yard Manure
12. GA - Gibberellic Acid.
13. GR - Growth Rate
14. GCA - Gross Cropped Area
15. HYV -High Yielding Varieties
16. Ha- Hectare
17. ICMR - Indian Council of Medical Research

18. IPM - Integrated Pest Management

19. IRR - Internal Rate of Return.

20. ICAR - Indian Council of Agricultural Research

21. IIHR – Indian Institute of Horticulture Research.

22. MAPMRA- Maharashtra Agricultural Produce Marketing Regulation Act

23. MSGGA – Maharashtra State Grape Growers Association

24. NAA - Napthal Acitic Acid.

25. NCA - Net Cropped Area

26. NHB - National Horticultural Board

27. NHM – National Horticulture Mission

28. NPV - Net Present Value

29. NRC - National Research Center

30. PM - Powdery Mildew

31. PPM - Parts Per Million.

32. PBC - Pay Back Period

33. SAU - State Agriculture Universities

34. TSS - Total Soluble Solids.

35. VC - Variable cost

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B. Websites Referred.

1. www.agmarknet.nic.in
2. www.agricoop.nic.in
3. www.nhb.gov.in
4. www.ncdc.nic.in
5. www.apeda.com
6. www.mahagrapes.com
7. www.icar.org.in
8. www.fao.org
9. www.agriculturalinformation.com
10. www.kisan.net
11. www.nic.in/eximpol
12. www.nhm.nic.in
13. www.mofpi.nic.in
14. www.krishiseva.com
15. www.agriproductsinindia.com
16. www.agricoop.nic.in
17. www.mahaagri.nic.in

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Appendix- II

A) Reference Books

1. Bose T.K. 'Fruits of India' Tropical and Subtropical, Naya Prakashan,Calcutta.
2. Case and Williams (1957) 'Fifty Years of Farms Management' Mc grew Hill Book Company, New York
3. Datta R. and Sundaram K.P.M (1995) 'Indian Economy 'S. Chand and Company Ltd. Ramnagar, New Delhi.
4. Norman J.E (1975) ' Principles of Farm Management ' Mc Grew,1.N.C.New York.
5 Rao C.R., Mitra S., Nethai A and Ramamurthy K.G(1975) 'Formulae and Tables for Statistical Work , Statistical Publishing society.
6. Jhol.S.S. and Kappor T.R. Fundamentals of Farms Business Managements, Kalyani Publishers, New Delhi.
7. Heady E.O. and Dillon J.L. Agricultural Production Functions , Kalyani Publishers, New Delhi.
8. Singh and Dhondyal, Hand book of Farm Management ,Jain Brothers, New Delhi.
9. Gupta S.P. Statistical Methods S. Chand and Sons, New Delhi.
10. Mandal R.C. Agricultural Statistics ,Techniques and Procedures, Agro Bios India, Jodhpur.
11. Kothari. C.R. Research Methodology ,Methods and Techniques, Wishwa Prakashan, Pune.2002.
12. Kotlar Phillp , Marketing Management , Dorling Kindersley pvt.Ltd. New Delhi
13. Ramaswamy , Marketing Management , Mac million Publication, New Delhi.2005.
14. Memoria C.B. , Principles and Practices of Marketing in India, Kitab Mahal Agencies, Patna.1988.

15. Reddy Subba , Agricultural Economics, Oxford and IBH Publishing company Pvt. Ltd. New Delhi.

16. Bose and Mitra, Fruits Tropical and Subtropical, Naya Udyog Colcutta.

17. Jagdish Prasad, Indian Agricultural Marketing, Mittal Publication, New Delhi.2000.

18. Michael V. P. Research Methodology in Management, Himalaya Publishing House, Pune.

19. Pardeshi P.C. Research Methodology, Nirali Prakashan, Pune.2003.

20. Zimare A. Agricultural Economics, Suyash Publication, Pune.2002.

21. Desai , Bhalerao, Agricultural Economics, Nirali Prakashan, Pune.1995.

22. Kulkarni M. A. Research Methodology and Project Work, Nirali Prakashan, Pune.2003.

23. Waghmare, Bhapkar D. J, Shetiche Hishob, 2002.

24. Patil, Chavan S. D, Bharatiy Draksha – Sheti, MAU, Parbhani. 1989.

25. Dabholkar S. A, Adhunik Draksha Lagawad, Mehata Publishing house, pune – 30.

26. Shinde Jagannath, Draksha Lagawad, Godawari Publication, Nashik.

27. Rahudkar B.V., Bagayati Phalzade- Draksha, prestige Publication, Pune.

28. Krishi Darshani, Mahatma Phule Krishi Vidyapeeth, Rahuri, A.Nagar.

29. Acharya, S.S. and Agarwal, N.L. (1999). Agricultural Marketing in India (Third Edition) Oxford and IBH Publishing Co. Pvt. Ltd. New Delhi. pp 311.

****

B) Journals

1. Azad, K.C. And Sikka, B.K., 1991, Production and marketing of temperate fruits in northwest region of India. *Acta.Horticulturae,* **270**: 67-74.
2. Chikhale, N. J. Deshmukh, S. K. And Bhople, S. R., 1998, Adoption of improved cultivation practices by orange growers.*Maharashtra Journal of Extension Education,* **17** : 317 – 322.
3. Chitra, V.T., and Ravishankar,C., 1997. Economics of ber production in and around Hyderabad city of Andhra Pradesh. *Indian J. Agric. Mktg.,* 42(4) : 438-445.
4. Chougule, B. and B.G. Bhujabal. 1994. Subcanepruning.Drakshavritta.June 94:21.
5. Dangat, S.B., D.V. Kasar, and D.B. Yadav, 1997. Marketing of grapes through cooperatives in Pune district. Indian J. Agril. Econ. 52(3): 642-643.
6. Deshpande, B.S., C.D. Deole, and J.N. Borle, 1992. Price spread in different channels of marketing of grapes -in Latur district Maharashtra. J. Agril. Econ. 4(1): 27-28
7. Desai, U.T., A.V. Patil and S.N. Kaulgud. 1980. Effect of different chemicals on keeping quality of Thompso Seedless grapes. South Indian Hort. 28(2): 56-57.
8. Deorukhakar, A.C., Veerkar, P.D., Talathi, J.M. And Thakare, G.C.1995, Yield gap and constraints in technology adoption of cashewnut cultivation in the Konkan Region of Maharashtra. *Cashew,* **9** (4): 13-7.
9. George, M.V. and H.S. Malik, 1997. Cost and returns from grape cultivation of Haryana state, Research Bulletin, 7-12-16, Deptt. of Agril. Econ. Haryana Agril. Univ., Hissar.
10. Gangwar, L.S**.,** Dinesh Singh and Gautam Mandal, 2008, Economic Evaluation of Peach Cultivation on North Indian Plains. *Agricultural Economics Research Review,* **21.**123-129.
11. Gunjate, R.T., 1997, Cashew plantation management: Problems Prospects and Approaches. *The Cashew*, **11** (2): 15-19.

12. Hugar, L.B., Murthy, P.S.S., Umesh, K.B. And Reddy, B.S., 1991, Economic feasibility of guava cultivation under scientific management – An empirical evidence. *Agricultural Situation in India*, **46** (4) : 211-214.

13. Orth, C.H.F. 1991. Effect of dipping Muscat seedless with gibberellic acid at different flowering stages on berry set and berry size Decideuous fruit growers, 1990. 40(1): 428-432.

14. Indi, D.V. 2004. Alternate use of systemic and non-systemic fungicides for the control of powdery mildew of grape vines. Maharashtra J. Agril. Univ. 29(2): 182-184.

15. Khunt, K.A., Gajipara, H.M., Gadhvi, B.K. and Vekariya, S.B., 2001, Economics of production and marketing of pomegranate. *Ind. J. Agric. Mkting*, **17** (1): 100-108.

16. Koujalagi, C.B. and Kunnal, L.B., 1992, Input use efficiency in pomegranate orchards in Bijapur district, Karnataka. *Indian J.Agric. Econ.,* 47(3) : 527-530.

17. Krishna Rao, V.S., and Ramanna. R., 1997, A study on profitability of mango cultivation in drought prone areas in Anantapur. *The Andhra Agric. J.*, 35(1) : 253-257.

18. Madan, M.S. 1988. Role of pre – harvest contractors in the production and marketing system of mango in Karnataka Indian. J. Agril. Mktg. 2(1): 37-38.

19. Mali, B.K., Bhosle, S.S., Shendage, P.N. and Kale, P.V., 2001, Economics of production and marketing of banana in Jalgaon district of Western Maharashtra. *Indian J. Agric. Mktg.*, 17(1) : 173-179.

20. Pagire, B.V. and M.S. Jadhav, 1998. Problems in the marketing of grapes in Maharashtra. Drakshvritta Souvenir, 13(4): 137-140.

21. Pannu, A.S. and D.S. Sidhu. 1963. Economics of grading sweet oranges fruit under AGMARK. The Punjab Hort. J. 3(1): 38-39.

22. Prakash, G.S. and S.D. Shikhamany. 1993. Selection and identification of grape root stocks. Drakeshvritta Souvenir Sept. NO. 6: 113-117.

23. Patel, R.K. and Sunita Bhaler, 1997. Management of Indian horticultural export under liberalization Indian. J. Agril. Mktg 11(1 and 2): 18.

24. Peterlunger, E., Celotti, E., D.D. Dalt, Stefanellis and G. Gollino. 2002. Effect of training system on Pinot Noir grape and wine composition. American. J.Enol. Vitic.,53(1): 14-18.

25. Raghubanshi, C.S. and R.K. Sharma. 1977. Grading a common yard stick. Indian J. Mktg., 7(6): 19-24.

26. Ranpise, S.A., B.T. Patil, T.A. More, Birade and T.K. Ghure. 2002. Effect of sub-cane pruning on fruitfulness and yield of grape cv. Thomson Seedless. J. Maharashtra. Agril. Univ. 27(3): 258-259.

27. Rawal, H.S. 1993. Management of powdery mildew on grapes in Punjab. J. Maharashtra Agril. Univ., 20(2): 140-143.

28. Sale, D.L. and D.S. Nawadkar. 1992. Impact of producer's association on marketing of grapes and banana: A comparative case study of Maharashtra. Maharashtra J. Agril. Econ. 4(1): 52-53.

29. Saraswat and Rane, 2006, Production and marketing of peach fruit – A case study of Rajgarh village. *Ind. J. Agril. Mkting*, **8** (5): 318-325.

30. Sally, Jean Bell and Alan Robson. 1999. Effect of nitrogen fertilization on growth canopy density and yield of *vitis vinifera L*. cv. Cabernet Sanvignon. American J. Enol. Vitic. 53(1): 15-18.

31. Senthilathan, S. And Srinivasan, R., 1994, Production and marketing of poovan banana in Trichirapalli district of Tamil Nadu. *Indian Journal of Agricultural Marketing*, **8** (1): 46-53.

32. Sharma Jagdev, 2001. Integrated nutrient management for grapes. Drakshvritta Souvenir: 121-14.

33. Shikharmany, S.D. 2001. Training of grape vine canopy – Techno-economic analysis. Drakshvritta Souvenir: 109-113.

34. Shrivastava, H.C. 1979. Transport and storage of grapes. Agril. Mktg. 14(1):15-18.

35. Singh,K. and G. Singh. 1977. Determinants of market margins and their significance. J. Agril. Econ. 32(2): 182-189.

36. Sundaravaradharajan, K.R. and Ramanathan, G., 2003, Cost returns an economic viability of cashew plantation in Tamil Nadu. *Agric. Situ. India*, 59(1) : 9-16.

37. Singh, V.K. 1986. Marketing and marketing management in an agriculture. Haryana Agril. Univ. J. Mktg. Res. 14(2): 140-147.

38. Subrahmanyam, K.V. 1988. Marketing of Horticultural crops in Karnataka. Present status and future requirement. Indian J. Agril. Mktg., 2(1): 15-22.

39. Sutar, T.B. 1997. Constraints in the adoption of selected scientific grape technologies. J. of Soils and Crops, 7(1): 59-62.

40. Tambe, T.B., A.S. Patil and S.B. Gurav. 1997. Water management techniques in grapes. Drakshavritta Souvenir: 116-121.

41. Tambe, T.B. 2002. Effect of gibbrelic acid in combination with brassinosteriod on berry size, yield and quality of Thompson seedless grapes J. Mah. Agric. Univ. 27(2): 151-153.

42. Todkari, G. S., and Patil B. D. A note on the Grapevine cultivation in Solapur District of Maharashtra, Journal of Horticulture Letters, Vol. 1, Issue 2, 2010, pp-01-07

43. Undirwade, S.B., N. Bidwai and M.N. Nighot. 1992. A study on marketing of grapes in Dhule district, Maharashtra J. Agril. Econ. 4(1): 30-31.

44. Varghese, P.R., 2004, Trend analysis in area, production and productivity and price behavior of cardamom in Kerala. *Ind. J. of Agril. Econ*., 59 (4): 798-806.

****

C) Reports, Workshops and Paper presentation

1. Anonymous, 2004 a. Horticultural development in Maharashtra, Report of Govt. of India, Office of Commissioner, M.S., Pune, P.S.

2. Anonymous, 2004 b. Vision 2004 published by National Research Centre on Grape.

3. Anonymous, 2003 a. Annual report: National Research Centre for Grapes (ICAR), Pune. pp 3-5

4. Anonymous, 2003 b. Statistical Report of horticultural crops. Directorate of Horticulture, Maharashtra State, Pune. pp 47-52.

5. Gawade, B.B., R.R. Suryawanshi, and D.S. Hange, 2000. Relative economic efficiency of organized vis-à-vis unorganized marketing of grapes. AGRESCO-Report,Deptt. Of Agril. Econ.M.P.K.V., Rahuri: 232-238.

6. Parthasarthy, P.B. 1990. Packaging of fruits and vegetables. A case study of Hyderabad market. Papers presented at National workshop on harvest management of fruits and vegetables at Nagpur. Dec. 22-25.

7. Magar, S.S. 1987. Irrigation method for grape. Regional rural youth workshop on grapes, Directorate of Extension Education, M.P.K.V., Rahuri. 48-51.

8. Ramteke, S.D., R.G. Somkumar and J. Satisha, 1999. Response of Tas-A-Ganesh on Dogridge rootstock to imposed water stress. Paper presented in National dialogue on sustaining the productivity of grapes under adverse situation at Pune on June, 7-8. 1999. PP. 46-50.

9. Talathi, J.M., Naik, V.C. and Wadkar, S.S., 2001, *Kokum* plantation – A boost to the Konkan economy. *Proceeding of First National Seminar on Kokum*, 12-13 May 2001, pp.72-77.

****

D) Thesis

1. Anand, C., Shivannavar, 2005, An economic analysis of production and marketing of papaya in North Karnataka. *M. Sc. (Agri.) Thesis,* Univ. Agric. Sci., Dharwad,Karnataka (India).
2. Babanna, T., 2001, Information source consultancy and training needs of farmers in Arecanut cultivation under Tungabhadra command area in Shimoga district. *M.Sc. (Agri.) Thesis,* University of Agricultural Sciences, Bangalore.
3. Bagal, A.A. 2003. The study of marketing of grapes in selected area of Sangli district M.Sc. (Agril.) thesis (Unpublished) submitted to P.D.K.V. Akola (M.S.).
4. Chandak, O.B. 1985. Micronutrient studies in Thompson Seedless grapes (*vitis viniferaL.*). M.Sc. (Agril.) thesis (Unpublished) submitted to M.P.K.V. Rahuri, (M.S.).
5. Deshumukh, I.D. 1990. Marketing of grapes in Sangli district M.Sc. (Agril.) thesis (Unpublished) submitted to M.P.K.V., Rahuri, (M.S.).
6. Gangal, s.m., 2002, Performance of banana plantation in North Karnataka– An economic analysis. *M.Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.
7. Govinda Gowda, V., 2002, A study on sustainable grape cultivation practices adopted by Bangalore blue and Thompson seedless growers in Bijapur and Bangalore rural districts in Karnataka. *Ph. D. Thesis,* University of Agricultural Sciences, Bangalore.
8. Handiganur, S., 1995, Economics of production and processing of grapes in Bijapur district, Karnataka. *M.Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.
9. Kamble, B.H. 2001. Economics of production and marketing of grapes of Sangli district M.Sc. (Agril.) thesis (Unpublished) submitted to M.P.K.V., Rahuri (M.S.).
10. Karpagam, C**.,** 2000, A study on knowledge and adoption behaviour of turmeric growers in Erode district of Tamil Nadu state. *M. Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.
11. Lakshmisha**,** 2000, Impact of cashew demonstration knowledge and adoption and yield levels of farmers in Dakshina Kannada district. *M. Sc. (Agri.) Thesis*, University of Agricultural Sciences, Bangalore.
12. Mohite, V.S. 2002. Marketing management of grapes in Dhule district M.Sc. (Agril.) thesis (Unpublished) submitted to M.P.K.V., Rahuri (M.S.).

13. More, S.S., 1999, Economics of production and marketing of banana in Maharashtra state. *M.Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.

14. Nagesh., 2006, Study on entrepreneurial behavior of pomegranate growers in Bagalkot district of Karnataka. *M. Sc. (Agri.) Thesis,* University of Agricultural Sciences Dharwad.

15. Pagire, B.V. 1995. A study of marketing of grapes in MaharashtraPh.D.thesis (Unpublished) submitted to M.P.K.V., Rahuri (M.S.).

16. Raghavendra, M. R., 2004, Knowledge and adoption level of post harvest technologies by redgram cultivators in Gulbarga district of Karnataka. *M. Sc. (Agri.) Thesis,*University of Agricultural Sciences, Dharwad.

17. Rane, and Bagade., 2006, Economics of production and marketing of banana in Shidhudurg district. *M. Sc. (Agri.) Thesis,* Mahatma Phule Krishi Vidyapeeth, Rahuri.

18. Raikar, N.A**.,** 1990, Investment in production and marketing of cashew in Karnataka. *M.Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.

19. Satpute, S.V. 1999. Relative economics of marketing of grapes in domestic and foreign market at producer's level in Solapur district. M.Sc. (Agri.) thesis (Unpublished) submitted to M.P.K.V. Rahuri (M.S.).

20. Singh, K. 1983. Marketing management of grapes in Punjab with special reference to Jallandhar and Ludhiana. M.Sc. (Agril.) thesis (Unpublished) submitted to PAU. Ludhiana.

21. Shivanand, S.G., 2002, Performance of banana plantation in north Karnataka. An economic analysis. *M.Sc. (Agri.) Thesis*, Univ. Agril. Sci., Dharwad.

22. Sunil Kumar, G. M., 2004, A study on farmers knowledge and adoption of production and post harvest technology in tomato crop of Belgaum district in Karnataka. *M. Sc. (Agri.) Thesis*, University of Agricultural Sciences, Dharwad.

23. Vedamurthy, H. J., 2002, A study on the management of areca gardens and marketing pattern preferred by the Arecanut farmers of Shimoga district in Karnataka. *M. Sc. (Agri.) Thesis,* University of Agricultural Sciences, Dharwad.

****

E) News Papers

1. Agrowon
2. Sakal
3. Loksatta
4. Pudhari
5. Lokmat
6. Maharashtra Times
7. Indian Express
8. Times of India.

F) Periodicals

1. Krishi Panan Mitra, Maharashtra State Agricultural Marketing Board, Pune.
2. Shetkari, Commissioner of Agriculture, Pune.
3. Baliraja, Baliraja Publication, Pune.
4. Godawa, Publication, Pune.
5. Drakhavruta, Maharashtra State Grape Growers Association, Pune.
6. Sharad Krishi, CITA, Pune.
7. Kisanshakti, Publication, Sangli.
8. Agricultural Marketing, Directoret of Marketing and Inespection, Nagpur.
9. Agricultural Economics Research Review, New Delhi.
10. Prabandhan, Indian Journal of Management, New Delhi.
11. Indian Journal of Agricultural Economics by Indian Society of Agricultural Economics, Mumbai.

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Appendix- III

A) Questionnaire (For farmers)

" A Study of Production and Marketing Management of Grapes in Pune District and Strategies for Increasing Productivity and Profitability"

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1. Name of the Grape grower :

Village: Age: Occupation:

Education: Tal: Dist.:

2. Family information

Sr. No.	Name	Relationship with head of family	Age in Years	Education	Occupation	Income (Rs.)

3. Cropping pattern

Sr. No.	Season	Crop	Variety	Area		Total production (Qtls.)
				Irrigated	Unirrigated	
1.	Kharif					
2.	Rabi					
3.	Summer					
4.	Annual					
5.	Pernnial					

4. Information about growers physical property

a. Information about land holding

Sr. No.	Soil type	Area (ha)		Land revenue	Present value (Rs.)
		Irrigated	Unirrigated		
1.					
2.					
3.					

b. Other property

Sr. No.	Property	Number	Purchase year	Purchase cost (Rs.)	Repairing charges (Rs.)	Remaining life	Present value (Rs.)
1.	House						
2.	Farm building						
3.	Well						
4.	Electric motor						
5.	Drip system						
6.	Tractor						
7.	Spray pump an duster						
8.	Fodder cutting machine						
9.	Plough						
10.	Harrow						
11.	Bullock cart						
12.	Pipe line						
13.	Livestock						
	Cow						
	Buffalo						
	Bullocks						
	Others						

5. **Cost of establishment and cultivation**

Area: Year of planting: Training system type:

Vareity: Planting distance: Number of plants

Sr. No.	Operation	Materials			Labour				Cost				Total cost (Rs.)
		Name	Qty.	Value	Male	Female	bullock	Machinery	Male	Female	bullock	Machinery	
1.	Ploughing												
2.	Harrowing												
3.	Layout												
4.	Trenches												
5.	Grafts												
6.	Planting												
7.	Gap filling												
8.	Supporting structure												
9.	Growth management												
10.	Manure												
11.	Fertilizer												
12.	Micronutrients												
13.	Inter cultivation												
14.	Pest and disease												
15.	Irrigation water Manage.												
16.	Grand Total												

6. **Details of Grape cultivation**

Sr.No.	Survey Plot No.	Area (Hector)	Variety	Planting Distance.	Irrigation method	Number of trees	Year of planting

8. **Production and disposal / sales of grapes**

Sr.No.	Mode	Quantity
1.	Quantity sold	
2.	Quantity used for consumption	
3.	Quantity given on gratis	
4.	Quantity used for processing	

Detail information about management practices given by the farmer.

1. Source of inspiration :
2. Source of information :
3. Reasons of selecting grape crops:
4. Factors considered for decision
5. Soil selection:

   As per recommendation Yes/No.

6. Wind breaks planted Yes/No.
7. Planting layout
   a. Planting distance As per variety
   b. Planting method used a) Trench method b) Peat method
8. Plantation management
   a. Variety grown:
   b. Rootstock used:
      i) Own rootstock
      ii) Purchase Rootstock
   c. Training system used
9. Financial management
   a. Source for medium and long term loan
   b. Source for crop loan
10. Labour management
    a. Permanent labour used b. Daily paid laboru used
    c. Seasonal labour d. Contract labour
11. Irrigation method
    a. Drip irrigation

b. Traditional methods

c. Other practices

d. Type of mulching practice followed

12. Nutrition management

a. As per recommended dose

b. Above recommended dose

c. Below recommended dose

13. Types of fertilizer used

a. Organic manures b. Granular fertilizers

c. Liquid fertilizer d. Micronutrients

e. Integrated nutrient management

f. Method of application: Single/Split dose

14. Growth regulators

a. As per recommended dose

b. Above recommended dose

c. Below recommended dose

15. Method of growth regulators application

a. Dipping b. Spraying

c. 1 Dipping + 3 spraying

16. Pest and disease management

a. Preventive measures b. Curative measures

c. IPM d. Other chemicals used

17. Criteria for preventive measures

a. Climate change

b. Pest schedule

c. Spraying schedule

d. Sprouting chemicals used: Bordeaux paste/Ready made

18. Mechanization Yes/No

19. Preventive measure towards natural calamities Yes/No

20. Cane development: Super / Sub cane

21. Cane testing followed Yes/No

22. Pruning time: Early /timely/late

23. Girdling followed

24. Thinning practices: Manual/Natural Yes/No

25. Harvesting practices

a. Period first (Early-December-January)

b. Period second (Regular-February-March)

c. Criteria for harvesting

Days after pruning/colour size development/sugar per cent

d. Harvesting time: Single/more than once

26. Post harvest practices

a. Grading: Cleanin/Colour wise/size wise

*Do you grade the produce? Yes/No

* Name of different grades and quantity produced

i. qtls. ii. qtls. iii. qtls.

* Items taken to consideration while grading

i. Berry size/colour ii. Size of bunch iii. Place of market

b. Packing: According to quality/market/demand/cost of packing material

Sr. No.	Size of packing	Place of market	Quantity packed	Cost of packing
1.	20 kg crate			
2.	5 kg box			
3.	2 kg box			

c. Use of other packing materials

Grape guard paper/Lining material/Labels and brand names

27. Mode of Transportation

i) Road a) Own b) Hired ii) Railway iii) Airways

28. Selection of place market: According to price/cost and easiness in marketing

Sr. No.	Place of market	Marketing channel	Grade	Quantity qtls.	Rate/pack	Gross return (Rs.)	Total cost (Rs.)	Net returns (Rs.)
1.	Local							
2.	With in state							
2.	Outside state							

2 Marketing cost of grapes

Sr. No.	Place of marketing and channel	Quantity sold (qtls.)	Grading cost (Rs.)	Packing cot (Rs.)	Transport cost (Rs.)	Market expenses (Rs.)				Total marketing cost
						Postage and telephone	Hamali	Other charges	Commission charges	

Selling of grapes

a. In which market you have got higher price?
Local/State/Outside state

b Do you sell the produce through co-operative Sangh? Yes/No

c. Do you prepare raisin from grape? Yes/No

1. Quantity of produce used for raisin making Qtls.
2. Total cost for preparing raisin Rs/qtls.

II) Questionnaire for

A) Wholesaler B)Retailer C) Commission agent D) Pre harvest contractor

1. Name: Age:
   Education:
2. How many years your are in this occupation?
3. Jurisdiction
4. How many grape growers you have contracted during this season?
5. During which months you go for contracts?
6. Terms and conditions of contacts
   a. Price :
   b. Harvesting :
   c. Grading :
   d. Packing :
   e. Transportation :
   f. Other :
7. Do you give the advance to the grape growers?
8. Which variety you prefer?
9. Total quantity of grapes marketed
10. What facilities you have provided to the grape growers?
11. Marketing of grapes
    a. Purchase of grapes Rs/kg
    b. Total cost for grading, packing, transportation and storage Rs/kg
    c. Selling price Rs/kg
    d. Place of market Rs/kg
12. Annual average price of grapes 1. This year Rs/kg
    2. Last 4 year
13. Total commission from selling of grapes Rs.