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.

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

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.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil</th>
<th>Area (Ha)</th>
<th>Selected villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Junnar</td>
<td>484.00</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Indapur</td>
<td>102.40</td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td>Baramati</td>
<td>94.40</td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td>Daund</td>
<td>57.20</td>
<td>1</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>738.00</td>
<td>15</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Area (Ha.)</th>
<th>Size</th>
<th>No. of farmers</th>
<th>Percentages to total farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.01 to 2.00</td>
<td>Small</td>
<td>75</td>
<td>50.00</td>
</tr>
<tr>
<td>2</td>
<td>2.01 to 4.00</td>
<td>Medium</td>
<td>45</td>
<td>30.00</td>
</tr>
<tr>
<td>3</td>
<td>Above 4.00</td>
<td>Large</td>
<td>30</td>
<td>20.00</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td>150</td>
<td>100.00</td>
</tr>
</tbody>
</table>

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.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Tahsil</th>
<th>Small (0.01 to 2.00 Ha.)</th>
<th>Medium (2.01 to 4.00 Ha.)</th>
<th>Large (Above 4.00 Ha.)</th>
<th>Total Cultivators</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Junnar</td>
<td>44</td>
<td>30</td>
<td>21</td>
<td>95</td>
</tr>
<tr>
<td>2</td>
<td>Indapur</td>
<td>12</td>
<td>7</td>
<td>4</td>
<td>23</td>
</tr>
<tr>
<td>3</td>
<td>Baramati</td>
<td>12</td>
<td>6</td>
<td>3</td>
<td>21</td>
</tr>
<tr>
<td>4</td>
<td>Daund</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>11</td>
</tr>
<tr>
<td>5</td>
<td>Total</td>
<td>75</td>
<td>45</td>
<td>30</td>
<td>150</td>
</tr>
</tbody>
</table>

Table 3.4 shows tahsil wise distribution of cultivators according to size groups. At overall level, out of 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

\[
NPW = \frac{P_1}{(1 + i)^1} + \frac{P_2}{(1 + i)^2} + \frac{P_n}{(1 + i)^n} - C 
\]

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.
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.

\[
Y = a X_1^{b_1} X_2^{b_2} X_3^{b_3} X_4^{b_4} X_5^{b_5} X_6^{b_6} X_7^{b_7} X_8^{b_8} e^u
\]

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
\[ X_6 = \text{Per hectare use of potassium in kg} \]

\[ X_7 = \text{per hectare plant protection expenditure (Rs.)} \]

\[ X_8 = \text{Per hectare plant growth regulator expenditure (Rs.)} \]

\[ b_1 \text{ to } b_8 = \text{Elasticities of production.} \]

**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.