CHAPTER-III
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RESEARCH METHODOLOGY

This part refers the sampling design i.e. method of taking sample from rose growers and processing units of rose based products, method & collection and analysis of data in persuasion of the objectives of present study. It is divided in two parts. The first part contains sampling design, collection of data and limitation of study while, second part deals with tools of analysis, concepts and definitions of technical terms used in this study.
Sampling Design:

Ultimate units of study were selected in two phases of sampling. Under the first phase of sampling, two stage stratified random sampling procedure was adopted for taking a true representative sample of the population of rose cultivators for the purpose of the study of economics and disposal of rose. While under the second phase of processing units of rose-based products were selected using random sampling procedure to analyse the economics of production of various rose products.

Selection of Rose growing villages:

Being a reputed area for growing rose, the Sikanderpur area of Ballia district was taken purposively for detailed study. First of all a list of villages lying under Sikandarpur area in Nawanagar block was prepared with the help of block officials.

After discussion with the block officials a sampling frame was prepared enlisting those villages only where rose was cultivated on commercial basis. Thus, only 6 villages remained in the list in which rose cultivation was on commercial scale. Therefore, all the 6 villages were included in the sample.

Selection of Rose Cultivators:

A list of rose growing farmers in respect of area under rose was prepared from records available at block
officials and verified through door to door enquiry. The list was reframed eliminating the farmers having less than 0.075 hectare area under rose cultivation. Thus, farmers having equal to or more than 0.075 hectares of area under rose were 214 in number. This effective population of 214 rose growers was stratified into four strata i.e. rose growers having 0.075 hectare to 0.10 hectare area, 0.10 to 0.15 hectare, 0.15 to 0.30 hectares and more than 0.30 hectares area under rose cultivation. About 45 percent farmers from each stratum with minimum of 5 were selected randomly for the sample survey. Table 3.1 presents the sample size from each stratum.

Table 3.1: Selected Rose Cultivators in the study area

<table>
<thead>
<tr>
<th>Strata of Rose growers</th>
<th>Number of Rose growers</th>
<th>Number of Rose growers in Sample</th>
<th>Percent to the total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.75 hec. to 0.10 hec.</td>
<td>148</td>
<td>67</td>
<td>45.0</td>
</tr>
<tr>
<td>0.10 hec. to 0.15 hec.</td>
<td>37</td>
<td>17</td>
<td>45.0</td>
</tr>
<tr>
<td>0.15 hec. to 0.30 hec.</td>
<td>23</td>
<td>11</td>
<td>45.0</td>
</tr>
<tr>
<td>0.30 hec. to and above</td>
<td>6</td>
<td>9</td>
<td>83.33</td>
</tr>
<tr>
<td>Total</td>
<td>214</td>
<td>100</td>
<td>46.73</td>
</tr>
</tbody>
</table>
Selection of Rose Processing Units:

To study the economics of various rose products viz., Rose water (Gulab Jal), Rose hair oil (Gulroghan), Gulkand and Gulabsakari, etc., rose processing units were selected applying random sampling procedure. First of all a list of the permanent processing units of various rose products was prepared separately with physical verification of these units at Sikandarpur market. About 30 percent of processing units of various rose products were selected. Thus, with the selected processing units of rose products the study of economics of various rose products was conducted. Table 3.2 provides the number of processing units of different categories in the population and size of the sample.

Table 3.2: Selected processing Units in the Study

<table>
<thead>
<tr>
<th>Categories of Units</th>
<th>Total number of processing units</th>
<th>Number of processing units selected in the sample</th>
<th>Percent to the total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Units making Rose water, Gulkand, Rose Hair oil and other perfumery products</td>
<td>38</td>
<td>12</td>
<td>30.00</td>
</tr>
<tr>
<td>2. Units making Gulabshakari only</td>
<td>35</td>
<td>11</td>
<td>30.00</td>
</tr>
<tr>
<td>Total</td>
<td>73</td>
<td>23</td>
<td>30.00</td>
</tr>
</tbody>
</table>
Collection of Data:

The data for the study were collected from primary and secondary sources both. The primary data were related to morphological studies of rose, its cultivation trend, factor cost in cultivation of rose and production cost of rose products. Whereas, the secondary data were collected for rose products prepared in the region as well as methods of extraction of perfumed oil, water, etc. was made applying case study method in view of the smaller number of processors of different categories of rose products. Pre-tested questionnaires and schedules were used to collect data at farmers level for collection of informations pertaining to economics of rose cultivation. Interview of the head of the selected farm families was conducted asking questions regarding various problems of the rose cultivation and in production of different rose products as well as disposal of rose flowers produced on the farm and marketing of rose products prepared by the processing units. The informations received from respondents were recorded.

Reference Period:

Primary data were referred to the period 1984-85 to 1986-87. Whereas, secondary informations were taken for the period 1985-86 to 1986-87.
Limitations of the Study:

One of the most important limitations of the present study is the lack of maintenance of records relating to establishment cost, inputs and outputs by the rose growers particularly when survey method of investigation is used. Though, every effort was made to elicit correct information by careful probing, it was assumed that lapse of memory on the part of respondents in regard to detail about operations and resource utilization could be completely overcome. The calculation of depreciation and interest on these expenditure is a difficult process. But every care was taken in collecting informations so that data were collected unbiasedly under the above limitations. The findings of the study are supposed to serve as the guidelines for planning and decision making in rose cultivation and production of rose products on commercial scale.

Method of Analysis:

Two types of analysis were adopted in this study. Tabular analysis based on sample averages, coefficient of variation and test of significance of means obtained is used in cost and return analysis while functional analysis was used to know the impact of different input factors on productivity of rose and rose products.
Statistical Tools of Analysis:

1. Average, S.D., S.E. and C.V. were calculated by the formula as

\[ \bar{x} = \frac{\sum x}{n} \]

Where,

- \( \bar{x} \) = Average
- \( \sum x \) = Summation of \( n \)th observation
- \( n \) = Number of observation

\[ SD = \frac{\sum (Ex - \bar{x})^2}{n - 1} \]

Where,

- \( SD \) = Standard deviation
- \( x \) = Observation
- \( \bar{x} \) = Average of the observations
- \( n \) = number of observation

\[ SE = \frac{SD}{\sqrt{n}} \]

\[ C.V. = \frac{SD}{\text{Mean}} \times 100 \]

2. To test the significance of difference of means. Fishers 't' was employed.

\[ t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{c^2}{n_1} + \frac{c^2}{n_2}}} \]
3. Cobb-Douglas production function model was applied to study the impact of the factors on production of rose.

**Functional Model**

\[ Y = a, x_1, x_2, \ldots, x_n \]

Where,

\[ Y = \text{Annual production of rose in kg.} \]

\[ x_1, \ldots, x_n = \text{Independent variables i.e. allocated establishment expenditure (Rs.), labour used (Mandays), cost of manure (Rs.), cost of fertilizer (Rs.), Irrigation cost (Rs.)} \]

4. The significance of elasticities were tested applying 't' test as,

\[ t = \frac{b_1}{\text{S.E. of } b_1} \]

Where as,

\[ \text{S.E. of } b_1 = \sqrt{\frac{(\Sigma \log X_1 Y)^2}{\Sigma \log x_1^2} - \frac{(\Sigma \log x_1 Y)^2}{\Sigma \log x_1^2} - \frac{(n-k) \Sigma \log x_1^2}{(n-k) \Sigma \log x_1^2}} } \]
5. Coefficient of multiple determination ($R^2$) was used to estimate the extent of variation in dependent variable under study due to joint explanation of the independent variables included in the function.

$$R^2 = \frac{R.S.S.}{T.S.S.}$$

Whereas,

$$T.S.S. = \Sigma \log Y^2 = \frac{\left(\Sigma \log Y\right)^2}{n}$$

$$R.S.S. = b_1 (\Sigma \log Y \cdot x_1)$$

6. Marginal physical productivity was estimated using the formula as:

$$\frac{\sum Y}{\sum x_1} = a \cdot b_1 \cdot x_1^{b_1-1} \cdot x_1 \cdot x_2 \cdot \ldots \cdot x_n$$

7. For the evaluation of variation in production trend change indices were calculated using simple index formula.

Concepts and Definitions

Population:

Universe, commonly known as population may be defined as any collection of objects or results of an operation. In present study all the cultivating households of selected village was considered as population.
Sampling:

The process of selecting sample from a population is known as sampling.

Sample

The selected number of individuals by scientific method from a population is called sample. The inference that can be made from a sample about the parent population can only be expressed in terms of probabilities.

Households

It is defined as a group of persons related by blood marriage or adoption living and taking food from a common kitchen. A single person is also considered as households.

Farm households

In this study farm households refers to the rural households engaged in agricultural production including animal husbandry and allied activities.

Fixed Capital

Fixed capital is amount which is invested upon such things which lasts or remains for a long time. Fixed capital losses its services through wear and tear till it is economically unfit for use. Fixed capital includes buildings, land, fences, establishment expenditure, drainage or water system and livestock like bullocks, etc. Depreciation and interest are charged on fixed capital.
Depreciation

The depreciation is counted in building, land, implements establishment expenditure livestock such as bullock and cow etc. The depreciation is the decline in the value of capital equipment due to wear and tear. It is caused by two factors time and use. The depreciation represents the amount by which a farm resource diminishes in value as a result of causes other than charge in general price of items. Depreciation in the reduction of value of an asset due to its use. In order to calculate depreciation following are to be kept in mind.

1. Determine the initial cost basis of value of each item of capital goods.
2. To decide effective life.
3. Estimate remaining value.
4. Determine initial value.
5. Choose the depreciation method to distribute total depreciation during operating life.
6. To set up calculations to maintain accounts.

Lastly the depreciation means the loss in the value of asset or an input due to age and use of it.

Working Capital

The working capital is the amount which is invested upon such things which are used at once or in a short
duration. For example in this study planting material (cuttings), fertilizer, irrigation water, pesticides and chemicals used in production cycle. The form will change when it is used. So depreciation is not charged upon working capital but the interest will be charged.

Irrigation Cost:

It is the amount spent or imputed on irrigating the crop taken into account the number of hours of irrigation.

Manure and Fertilizer Cost:

It is the amount in monetary terms paid or imputed for manures and fertilizers applied in cultivation of crops.

Physical Production:

It is the total product obtained after the production process usually referred in physical forms i.e. in quintals, tonnes, etc., or is the transformation of inputs into ultimate product.

Productivity:

In present study by productivity we simply mean output per unit of land.

\[
\text{Productivity} = \frac{\text{Total output}}{\text{Cultivated area under rose}}
\]
Gross Crop Income

It is the value of the rose flower (main and byproducts included) produced by sample households prior to deduction of cultivation expenditure.

Net Income

It is the amount left over after deducting crop cultivation expenses from gross crop income on farm. In this study net income from rose garden is taken into consideration.

Farm

Farm refers an area of land under single technical operation and management which is used for agriculture either to raise the crops or pasturage.

Resource:

It is any agent used in the production process. Since the interest of the farmer and the society revolves mainly physical produce. Therefore labour, fertilizer etc. used in production process is termed as resource in this study.

Human Labour Units

It is the amount of work done by labourers in a day of eight hours in any field operation. Eight hours work of women labour and child labour is treated as 0.8 and 0.5 human labour unit respectively.
Cost of Production

Cost of production is the total sum of expenses made or imputed for growing per unit quantity of rose. In this study cost of production included both fixed and variable costs. It is determined by calculating the followings:

i. Establishment cost

ii. Operational cost – which includes material cost for example manure, fertilizer, irrigation etc.

iii. Labour cost – which includes all types of labour used in cultivation of rose.

iv. Interest on working capital

v. Imputed rent on leased in land.

vi. Miscellaneous expenses along with overhead charges which includes depreciation, land revenue, interest on fixed capital. The summation of above all will give the cost of cultivation.

Net Gain

The net gain is calculated by deducting total costs from gross returns i.e. estimated cost of the growers own labour and management plus the rent paid to the land lord and the cash interest expenses paid to the credit agency etc. minus net farm income.

Rose cultivars

Rose cultivars refers to the cultivated species of garden roses i.e., Rosa centifolia, Rosa moscheta, Rosa borboniana and Rosa damascena etc.
Rose Products

The products prepared from rose flowers are known as rose products. The main rose products are rose water, rose attar, Gul roghan, Gulkand, Gulab shekari etc.

Blooming Period :

The term blooming period refers to the total days of flowering in the flowering season of rose.

Cut blooms

The term cut blooms is denoted for cut flowers which are commonly used for the direct sale for the exhibition and decorative purposes.

Distillation Process :

The method adopted for separation of volatile components from non volatile materials is called distillation process. After harvesting, the flowers are processed as quickly as possible. They are processed by water distillation method for the production of various products, such as rose water, Attar and otto. The distillation is generally done at the site of plantation. In case the quantity of flowers is too large to allow immediate distillation, the flowers are kept in 5 per cent salt solutions to check the fermentation and evaporation of oil.