CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

Agriculture is the backbone of the Indian economy. It provides employment to around 65 per cent of the total workforce in the country. It has also been the main source for the supply of the raw materials to the industries. There are a number of sub sectors in the agricultural sector such as sericulture, floriculture and horticulture. Among those fields horticulture has played a dominant role in the total agricultural output throughout India\textsuperscript{1}.

Tropical and sub tropical fruit crops like mango, banana, citrus, grapes, guava, sapota, papayya, pomegranate, custard, apple, pineapple, mango steen, amla, phalsa, avocado and the like has been grown all over India. Fruit crops which grow well under cool temperature and at high attitudes are known as temperature fruits\textsuperscript{2}. India is the second largest producer of fruits in the World.

India is the fore runner in respect of many fruits with a considerable share in World total production\textsuperscript{3}.

Mango (\textit{Mangifera indica}) has occupied a prominent place among the various fruits grown in India. It has been acknowledged that mango is the king among the various fruits grown India has been ranked as the first among the World mango producing countries. India share in the World production of mango has been estimated to be about 54 per cent. Mango has been in cultivation in the Indian subcontinent for well over 4000 years. It has been grown over an area of 1.2 million hectares in the country producing nearly 11.0 million tonnes per year. It has accounted for 22.10 per cent of total area 5-6 million hectares under fruit crops and 22.90 per cent of the total production of fruits 47.90 million tonnes in the country. Uttar Pradesh, Gujarat, Andhra Pradesh, Maharashtra, Bihar, Karnataka, Tamil Nadu and Punjab are the major mango producing states in India\textsuperscript{4}. Mango has been the choicest fruit of India and it came next only to that of banana, apple and orange on the basis of the World average and production. Probably, no fruit crop can surpass the spread, the popularity and the commercial value of the mango in India.


Indo-Burmasian region and the Philippines are considered to be the probable places for the origin of the mango. The fully ripened fruits are not only considered as delicious table fruits but have also been used in preparations like pickles, chutney, nectar, baby foods, jams, jellies, squashes, syrups and toffees.

In terms of nutrition, fruits are a very good source of several vitamins, minerals salts and dietary fibers, which are very essential for maintaining good health. Fruits are health promoting as well as pleasure giving items of food. Because of their low energy density and appreciable amounts of dietary fibers fruits are very good maintaining good health.

The World market has provided a good opportunity for the development of the fresh and the processed fruits and for the vegetables industry of India. From the point of view of the domestic market also, the horticulture products have provided a food items of nutrition value. Their cultivation has generated higher employment opportunities and higher returns to the farmers than the cereals and other agricultural cash crops\(^5\). The diverse agro-climatic conditions and of soils and of temperature allow India to cultivate a wide range of fruits and vegetables under natural climatic conditions as against the artificial conditions that are needed in most of the developed countries, for instance, in Europe, electrical

cables have to be installed in the farms to heat the soil for the cultivation of some of the horticulture products\(^6\).

Mango is one of the cheapest fruits in India, which could be consumed even by the poorest of the poor. In India a very large number of agriculturists have been cultivating the mango trees for their very livelihood. Mango cultivation is a seasonal agricultural activity and therefore during the off-seasons, the growers have to go in search of alternative employment. Based on the findings, of a number of studies one could easily understand the background of the mango growers and also could take an appropriate decision for the benefit of the growers. The growers have been facing a number of problems during their cultivation, operational and their marketing practices. The more serious problems faced by the cultivators, among the various other problems faced by them are their financial indebtedness to others, and the fluctuations in the mango yield due to changes in the rainfall and other weather conditions. But the main reason for the lower production in the yields of mango is the frequent climatic changes in the areas of their cultivation.

1.2 CHARACTERISTIC FEATURES OF MANGO

The Word *Mangifera* has been derived from a combination of two words, ‘mango’ and ‘fero’. In Latin, they mean bare mango from Indica, meaning

pertaining to India. The common names in the different languages are mango, mangaa, mangot, mangue, mangou, aam, amb and amba.

Mango, a member of the Anacharsdiaceae family is an erect, broad specimen that could reach a height of 100 feet and spread up to a width of 125 feet. A tree of this size developed a deep tap root and an extensive root system of its own. However the pruning or the containerizing process could control the size of the tree. Mango is the choicest fruit of Hindustan and it is one of the most delicious fruits in the World. The mango is also one of the best-known fruits of India. There are several varieties of the fruit and each variety is known by a special name assigned to it. The mango timber is rather soft, rough grained and non durable. It is used for rough purposes only.

The mango has been widely cultivated throughout the tropics and more especially in India. It is also of considerable economic importance in South America. A mango tree of less than five years of age is regarded as a young tree and if it is of five years or more it is considered as a tree of fruit bearing age. Mango is the most popular fruit of the orient and it has been called as the “King of all the fruits”, but it has also been styled as ‘a ball tow soaked in turpentine’ or ‘fit to be eaten in the bathtub only’. Ripe mango are eaten or canned or used for

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making juices, jams and other preserved items and pickles and chutney are prepared from the unripe mango fruits.

1.2.1 Characteristics of Important Mango Varieties

(i) Alphonso

Alphonso is the leading commercial variety of mango in the Maharashtra state and it is one of the choicest varieties of mango in the country. This variety is known by different names in the different regions, namely Badami, Gundu, Khaser, Appas, Happus and Kagdi Happus.

(ii) Bangalora

Bangalora is a commercial variety of mango of south India. The common synonyms of this variety are Totapuri, Kallamai, Thevadiyamuthi, Collector, Sundersha, Burmodilla, KilliMukku and Gilli Mukku.

(iii) Banganapalli

Banganapalli mango is a commercial variety of Andhra Pradesh and Tamil Nadu. It is also known as Chapta, Safeda, Baneshan and Chapai. The fruit is large in its size and obliquely oval in its shape. The colour of the fruit is golden yellow.

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(iv) **Bombai**

Bombai is a commercial variety of mango of the Bihar state. It is also known as Malda in West Bengal and in Bihar. The fruit size is of medium size and the shape is ovate oblique and the colour is yellow.

(v) **Bombay Green**

Bombay Green mango is commonly grown in north India due to its early fruit yielding quality. It is also known as Malda in northern India. The fruit size is medium, its shape is ovate oblong and the fruit colour is spinach green.

(vi) **Dashehari**

The Dashehari mango variety has derived its name from the village Dashehari near Lucknow where it is grown. It is a leading commercial variety of north India and is one of the best varieties of mango of our country. The fruit is small to medium in its size, its shape is oblong oblique and the colour of the fruit is yellow.

(vii) **Fajri**

The Fajri variety of mango is commonly grown mainly in the states of Uttar Pradesh, Bihar and West Bengal. The fruit is very large in its size, obliquely oval in its shape and the fruit colour is light brown.
(viii) Fernandin

Fernandin mango is one of the oldest varieties of mango of Bombay. Some people think that this variety has originated in Goa. The fruit size is medium to large, the fruit shape is oval to obliquely oval and the fruit colour is yellow with a blush of red on its shoulders.

(ix) Himsagar

The Himsagar mango is an indigenous mango variety of Bengal. This is one of the choicest varieties of Bengal mango and it has gained extensive popularity. The fruit is of medium size, ovate to ovate oblique in its shape and the fruit colour is yellow.

(x) Kesar

Kesar mango is a leading mango variety of Gujarat with a red blush on the shoulders. The fruit size is medium, the shape is oblong and the keeping quality is good and it is an early season variety.

(xi) Kishen Bhog

The Kishen Bhog mango indigenous variety of Murshidabad in West Bengal. The fruit size is medium and the fruit shape is oval oblique and the fruit colour is yellow.
(xii) Langra

Langra mango is an indigenous mango variety of the Varanasi area of Uttar Pradesh. It has been extensively grown in northern India. The fruit is of medium size, oval in shape and is of lettuce green in its colour.

(xiii) Mankurad

Mankurad variety of mango is of commercial importance in Goa and in the neighbouring Ratnagiri district of Maharashtra. This mango variety develops black spots on its skin during the rainy seasons. The fruit is medium in its size, ovate in its shape and yellow in its colour.

(xiv) Mulgoa

Malgoa is a commercial variety of mango of south India. It is quite popular among the lovers of mango owing to the high quality of the fruit. The fruit is large in its size round and oblique in its shape and yellow in its colour.

(xv) Neelum

Neelum also is a commercial mango variety which is indigenous to Tamil Nadu. It is an ideal variety of mango for transporting to distant places owing to its high keeping quality. The fruit is medium in its size, ovate oblique in its shape and saffron yellow in its colour.
(xvi) Samarbehisht Chausa

Samarbehisht Chausa is a mango variety which has originated as a chance seedling in the orchard of a Talukdar of Sandila district in Hardoi in Uttar Pradesh. It is commonly grown in the northern parts of India due to its characteristic flavor and taste. The fruit is large in its size, ovate to oval oblique in its shape and light yellow in its colour.

(xvii) Suvernarekha

Suvernarekha mango is a commercial variety of the Visakhapatnam district of Andhra Pradesh. The other synonyms of this variety are Sundari, Lal Sundari and China Suvernarekha. The fruit is medium in its size and ovate oblong in its shape and the colour of the fruit is light cadmium with a blush of jasper red.

(xviii) Vanraj

Vanraj is a highly priced mango variety of the Vadodara district of Gujarat which fetched very good returns. The fruit is medium in its size, ovate oblong in its shape and its colour is deep chrome with a blush of jasper red on the shoulders.

(xix) Zardalu

The Zardalu variety of mango is an indigenous variety of Murshidabad in West Bengal. It has derived its name from Zardalu, a dry fruit, which is popular in the north western frontier province and Sindh in Pakistan owing to its similarity in
its shape with Zardalu. The fruit size is medium, oblong to obliquely oblong in its shape and golden yellow in its colour.

### 1.2.2 General Uses of Mango

Every part of the mango tree from its root to its top, could be used in a variety of ways. The fruit itself, in the various stages of its development, could be used in many different ways. In its raw stage, the fruit could be used for the extraction of tannin and other astringent products as well as for the preparation of delightful chutneys, curries and pickles.

The ripe fruits could be eaten as fresh fruits, could also be preserved and canned and the mango stones and the mango leaves could be given to livestock as cattle feed. Mango leaves could be used to decorate houses during festive occasions. The fruit is regarded as the nectar of the Gods. Dried branches and twigs could be used as fuel wood, while the trunk of the tree has timber values and could be used for making items of furniture.

### 1.2.3 Industrial Uses

No other fruit could be put to so many diversified uses in the form of processed products as that of the mango fruit. It has been used extensively by the food processing industry to prepare a wide variety of products. Both ripe and unripe mango has been utilized for this purpose. A number of mango products
could manufactured from the ripe mango fruits. Canned mango slices in syrup, mango pulp, mango jam, mango squash, mango juice, mango nectar, mango cereals and flakes, mango custard powder, mango toffee, mango leather and mango juice powder.

A large variety of mango products could be manufactured from the unripe mango. Such as mango pickles, mango chutneys, Brined mango slices, dried green mango slices and mango powder and mango wine. Various other products such as candy, jam, jelly, preserves, squash and the like could also prepared from the unripe mango⁹.

1.3 STATEMENT OF THE PROBLEM

Since independence, India has made substantial progress in the field of agricultural sector in terms of increase in output, yields and in areas under many agricultural crops. The technology development in the field of agriculture has made India self-sufficient in respect of food grains as also a leading producer of several agricultural commodities in the world. At present, India is the largest producer of fruits, cashew nuts, coconuts, tea and milk in the world the second largest producer in wheat, vegetables, sugar and fish and the third largest producer of in respect of rice and tobacco. The green revolution in the major crops, the yellow revolution in respect of the oilseeds, the white revolution in milk

production, the blue revolution in fish production and the golden revolution in respect of the horticultural products have significantly contributed to the present achievement in the several sub sectors. However, in recent years, the output and growth has declined in respect of many crops. The costs and returns of agricultural commodities have been determined by demand and supply, patterns of production, costs incurred in production and such other factors. The agricultural commodities are perishable in their nature and their needs and production are vital to the memory.

Mango is one of the most important tropical fruits of the World and it is popular both in its fresh and in its processed form. It is commercially grown in more than 80 countries of the World. The leading mango producing countries in the World are India, China, Mexico, Pakistan, Indonesia, Thailand, Nigeria, Brazil, Philippines and Haiti. Mango has been the main fruit of Asia and this fruit has developed its own importance all over the World. Besides, because of its fine taste and several good qualities, it has been referred to as the king of all the fruits.

Production is at one end of the food problem in India, and at the other end the problem is related to distribution. Agricultural marketing systems have an important role to play in the predominantly agrarian economy. Inadequate market infrastructure and unproductive prices accelerated agricultural development in India. Markets for farm products have been found to be proverbially imperfect with a few well organized traders and a large number of unorganized producers.
dumping their produce under the seasonal patterns of production and harvesting.
While market imperfection and the consequent known marketing efficiency are the common problems in respect of all the farm products, they are found to have been more pronounced in the markets for perishable products. Among all the perishables, fruits have to face all the marketing problems discussed in this section and the performance of the markets for fruits has much scope for improvement. Mango has a pride of place not only for its diverse uses but also for its special preference by the consumers, rich and the poor, alike while it is also subjected to the production and the marketing problems referred to in this section. Therefore, an analysis of mango cultivation in the study area of Dindigul district and Tamil Nadu has deserved a special attention not only to understand the problems in respect of production but also to identify the specific strategies that could be adopted to improve the performance of the market for mango.

1.4 OBJECTIVES OF THE STUDY

The specific objectives of the present study are:

1. To study the socio-economic conditions of the mango growers in the study area.

2. To analyse the costs and returns of mango cultivation in the study area.
3. To examine the resource – use efficiency in mango cultivation among the different categories of the farmers.

4. To understand the marketing problems of the mango growers in the study area.

5. To suggest remedial measures for improving the existing system of the mango cultivation.

1.5 METHODOLOGY

Designing a suitable methodology and the selection of the appropriate analytical tools is very important for a meaningful analysis of any research problem that has been undertaken. This section has been devoted to a description of the methodology which has included the choice of the study area, the sampling procedure, adopted the collection of data, the period of study, the methods of analysis, the tools of analysis and the measurement of the variables.

1.6 THE CHOICE OF THE STUDY AREA

Dindigul district has been purposively selected for the study as it is one of the most important mango producing districts in Tamil Nadu. The district formed an important source of mango supplies throughout the year for the different parts of Tamil Nadu, more particularly from the southern part of Tamil Nadu. The soil
and the climatic conditions are highly suited and most favorable for mango cultivation in this district. Hence, this district has been chosen as the study area.

1.7 THE SAMPLING PROCEDURE

The multi-stage random sampling technique has been adopted for the study with the Dindigul district as the universe, and the block, the village and the mango cultivators have been considered as the different stratum. The Dindigul district is comprised of 14 blocks. Mango is mainly cultivated in the Sanarpatti and the Natham blocks and hence the selection of sample villages has been restricted to these two blocks. A list of the areas under mango cultivation during the year 2010-11 for all the villages in the two blocks is got from the records of the Joint Director of Agriculture, Dindigul. Five villages in each block, which have accounted for the highest area under mango cultivation in their descending order of magnitude has been, selected as the study units for purposes of primary data collection. A list of mango cultivators in the selected villages is obtained from the records of the Joint Director of Agriculture, Dindigul district. The proportionate random sampling technique has been adopted to select 150 cultivators each from the groups of small and the large farmers cultivating mango from these (ten) villages. The list of selected villages and the number of cultivators selected for study has been given in Table 1.1
### Table: 1.1: Selected Villages and the Number of Selected Farmers

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Names of the Block and Village</th>
<th>Total Cropped Area in Hectares</th>
<th>Number of the Small Farmers</th>
<th>Number of the Large Farmers</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Area (in acres)</td>
<td>No. of Sample Farmer</td>
</tr>
<tr>
<td>I – Sanarpatti</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.</td>
<td>Anjukulipatti</td>
<td>732.600</td>
<td>314.246</td>
<td>17</td>
</tr>
<tr>
<td>2.</td>
<td>Kambiliampatti</td>
<td>548.432</td>
<td>223.645</td>
<td>12</td>
</tr>
<tr>
<td>3.</td>
<td>Kombaipatti</td>
<td>467.905</td>
<td>198.29</td>
<td>11</td>
</tr>
<tr>
<td>4.</td>
<td>Timmananallur</td>
<td>387.325</td>
<td>183.475</td>
<td>10</td>
</tr>
<tr>
<td>5.</td>
<td>Vembarpatti</td>
<td>328.964</td>
<td>146.863</td>
<td>9</td>
</tr>
<tr>
<td>II. Natham</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.</td>
<td>Mulaiyur</td>
<td>1094.865</td>
<td>423.767</td>
<td>24</td>
</tr>
<tr>
<td>7.</td>
<td>Punnapatti</td>
<td>911.195</td>
<td>369.872</td>
<td>20</td>
</tr>
<tr>
<td>8.</td>
<td>Pillaiyarnattam</td>
<td>845.180</td>
<td>306.365</td>
<td>17</td>
</tr>
<tr>
<td>9.</td>
<td>Pudur</td>
<td>724.642</td>
<td>298.638</td>
<td>16</td>
</tr>
<tr>
<td>10.</td>
<td>Rediapartti</td>
<td>596.248</td>
<td>277.067</td>
<td>14</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>6634.356</td>
<td>2742.228</td>
<td>150</td>
</tr>
</tbody>
</table>

Source: G-Returns, Office of the Joint Director of Agriculture, Dindigul District, 2009-10.

In order to achieve the objectives of the study, the total numbers of sample farmers of 300 have been stratified into two categories namely the small and the
large farms. The farms with less than 5 acres in area are classified as small farms (orchards) and farms with five or more acres in extent are grouped and classified as large farms.

1.8 COLLECTION OF DATA

The primary data are collected from the cultivators for the present study. Based on the information gathered at the orchard level, a well-designed schedule is drafted, pre-tested and used for the field survey to collect primary data through the personal interview method. The objectives of the study are clearly explained to the orchard cultivators personally and their co-operation is secured. Even though the orchard owners did not maintain adequate farm records and accounts, they are able to furnish the particulars in view of their long association with mango farming. However, to minimise the recall bias, suitable cross checks and rechecks have been carried out by the researcher.

1.9 THE PERIOD OF THE STUDY

The field survey is carried out during the period August to November 2011 for the purpose of the collection of the primary data. This period is related to the harvesting period of mango in the study area. The data collection pertains to the agricultural years of 2010-11.
1.10 **TOOLS OF ANALYSIS**

The following form of the regression model has been used to identify the factors which have influenced the Gross Income from the mango orchards.

\[
\log Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + U \\
\]

\[\ldots \ldots \ (1.1)\]

Where,

- \( Y \) = Gross income in rupees from mango,
- \( X_1 \) = Human labour in rupees,
- \( X_2 \) = Cost of tillage practices in rupees,
- \( X_3 \) = Cost of plant protection measures in rupees,
- \( X_4 \) = Age of the orchard,
- \( X_5 \) = Number of fruit bearing trees in the orchard and
- \( U \) = The disturbance term and

\( \beta_0, \beta_1, \beta_2 \ldots \beta_5 \) are the parameters to be estimated.

The model is estimated by the method of least squares separately for the small, and the large pooled category of the orchards.

The Chow’s test of following form has been used to test the structural relationship between the small and the large farms.

\[
F^* = \frac{\sum e^2 - (\sum e^2_1 + \sum e^2_2)}{k} \quad \frac{1}{k} \\
\]

\[
\frac{1}{k} (\sum e^2_1 + \sum e^2_2) / (n_1 + n_2 - 2k) \\
\]

\[\ldots \ldots \ (1.2)\]
Where,

\[ \Sigma e^2 \] = Unexplained or residual sum of squares of the pooled sample of both the farms

\[ \Sigma e^2_1 \] = Unexplained or residual sum of squares of the sample corresponding to the small farmers,

\[ \Sigma e^2_2 \] = Unexplained or residual sum of squares of the sample corresponding to the large farms,

\[ n_1 \] = Number of observations in the small farms,

\[ n_2 \] = Number of observations in the large farms and

\[ k \] = Number of parameters included in the regression method.

If differences exist between the small and the large farms, the intercept and slope dummies are introduced in the equation (1.1) to find out as to whether the differences have occurred at the intercept level or at the slope level or at both the levels. The equation (1.1) then become,

\[
\log Y = \alpha_0 + D + \sum_{i=1}^{5} \beta_i \log X_i + \sum_{j=1}^{5} \gamma_j D \log X_j + u \quad \text{.....(1.3)}
\]

In the equation (1.3) ‘D’ is the dummy variable representing ‘0’ for small farms and ‘1’ for others. The above equation (1.3) is estimated by the method of least squares.
1.11 RESOURCE – USE EFFICIENCY

In order to examine the resource-use efficiency of the factor inputs, the marginal value products of the inputs have been calculated by using the following formula.

\[
\text{MVP}_{Xi} = \frac{\overline{Y}}{\overline{X}} \beta_i \quad \cdots \cdots \quad (1.4)
\]

Where,

\[
\beta_i = \text{Estimated value of the co-efficient of the } 1^\text{th} \text{ input}, \\
Y = \text{Geometric mean level of gross income and} \\
X = \text{Geometric mean level of the } i^\text{th} \text{ input factor.}
\]

1.12 SIZE-PRODUCTIVITY RELATIONSHIP

In order to examine the farm size and the productivity relationship, the following form of the regression model has been fitted

\[
\log Q = \log C + B \log A
\]

Where,

\[
Q = \text{Gross value of inputs in rupees,} \\
A = \text{Size of the operational holding in acres, and} \\
C \text{ and } B \text{ are the parameters to be estimated.}
\]

In order to examine as to whether the co-efficient has been statistically different from unity, the t-test has been used. If the t-test had show that the
co-efficient are significantly different from unity it would confirm the existence of an inverse or direct relationship between the farm size and its productivity. If the co-efficient ‘B’ is found to be less than or greater than unity, it would indicate the existence of an inverse or direct relationship between the farm size and its productivity.

1.13 MEASUREMENTS OF RETURNS ON INVESTMENT

Among the methods available for measuring the productivity of investments made, four of them, namely, the Net Present Value (NPV), the Benefit–Cost Ratio (B-CR), Internal Rate of Return (IRR) and Payback Period have been used in the present study.

1.13.1 Net Present Value (NPV)

\[
\text{NPV} = \sum_{t=1}^{n} \frac{B_t - C_t}{(1 + i)^t}
\]

\[\ldots \ldots (1.5)\]

Where,

\[
\begin{align*}
\text{NPV} & = \text{Net present value}, \\
B_t & = \text{Benefits in the } t^{\text{th}} \text{ year}, \\
C_t & = \text{Costs in the } t^{\text{th}} \text{ year}, \\
t & = \text{Number of years, and} \\
i & = \text{Interest (discount) rate.}
\end{align*}
\]
1.13.2 Benefit – Cost Ratio (B-CR)

\[
\text{B-C} = \frac{\sum_{t=1}^{n} B_t}{\sum_{t=1}^{50} \frac{C_t}{(1 + i)^t}}
\]

…… (1.6)

1.13.3 Internal Rate of Return (IRR)

\[
\text{IRR} = \frac{\sum_{t=1}^{50} \frac{B_t - C_t}{(1 + i)^t}}
\]

…… (1.7)

1.13.4 Payback Period

The Payback Period is the length of time required to pay itself out. The Payback Period is calculated by the process of taking into account the cumulative cash flows till the time when the cumulative cash flows become equal to the original investment outlay.

1.13.5 Marketing Efficiency

In order to measure the Marketing Efficiency (M.E.), the Shepherd’s formula of the following form has been used:

\[
\text{M.E.} = \frac{V}{I} - I
\]

…… (1.8)
Where,

\[ \text{M.E} = \text{Marketing Efficiency} \]
\[ I = \text{Total cost of marketing} \]
\[ V = \text{Value of the produce sold (consumer’s price)} \]

1.13.6 Effects of Variation

To study the effects of variation in the consumer’s price on the shares of the producer, the seller and the retailer, two separate functions for each of the taluks are fitted as follows:

\[
\begin{align*}
\log Y_1 &= \alpha_1 + \beta_1 \log X + U_1 \quad \text{…. (1.9)} \\
\log Y_2 &= \alpha_2 + \beta_2 \log X + U_2 \quad \text{…. (1.10)}
\end{align*}
\]

Where,

\[ Y_1 = \text{Percentage of producer’s share in the consumer’s price,} \]
\[ Y_2 = \text{Percentage of retailer’s share in the consumer’s price,} \]
\[ X = \text{Consumer’s price; and} \]
\[ U_1 \text{ and } U_2 \text{ are the disturbance terms.} \]

1.13.7 Garrett’s Ranking Technique

The Garrett’s Ranking Technique is adopted to analyse the problems faced in the production of mango and its marketing problems. The owners of orchards are asked to rank the factors that have limited mango production and also the various marketing problems faced by them. The order of merit given by the
respondents is converted into ranks using the following formula separately for both the production and the marketing problems.

\[
\text{Percentage position} = \frac{100 (R_{ij} - 0.50)}{N_j} \quad \ldots \ldots (1.11)
\]

Where,

- \( R_{ij} \) = Rank given for the \( i^{th} \) factor by the \( j^{th} \) respondent; and
- \( N_j \) = Number of factors ranked by the \( j^{th} \) respondent.

The percentage position of each of the ranks obtained is converted into scores by referring to the table given by Garrett\(^{10}\). Then, for each factor, the scores of the individual respondents are added together and then divided by the total number of respondents, for whom the scores are added. These mean scores for all the factors have been analysed in an ascending order, ranks have been assigned and the important factors have been identified.

1.13.8 Measurement of the Variables

(i) Human Labour

The prevailing wage rates are considered for working out the value of human labour for all categories of workers. For the present study, the permanent labour, the family labour and the hired labour have been considered alike.

(ii) **Bullock Labour**

The owned bullock labour is valued at the rate of the hire charges that has prevailed in the study area at that time.

(iii) **Planting Materials**

In the case of planting materials, it has been valued at the cost of purchase.

(iv) **Manures and Fertilizers and Plant Protection Measures**

Manures and fertilizers and plant protection measures have been valued at purchase prices plus other incidentals expenses that have been incurred. In the case of owned manure, the market value has been imputed for the manures applied.

(v) **Irrigation**

The actual charges incurred have been calculated based on the consumption of electricity for the motor pump sets used and the fuel charges incurred for the diesel engines.
(vi) **Depreciation**

In the present study, the depreciation rates adopted by the directorate of economics and statistics\(^\text{11}\) in their farm management studies have been adopted.

- (a) Terraced buildings and irrigation structures : 2 per cent
- (b) Tools – major items : 25 per cent
- (c) Implements and machinery : 10 per cent

(vii) **Interest on Fixed Capital**

The interest on the fixed capital has been worked out at the rate of 11 per cent per annum, since that is the interest rate given for fixed deposits by the commercial banks. For the present study the investments on buildings, machinery, farm implements and such other non-recurring items of capital has been considered as fixed capital.

(viii) **Interest on Working Capital**

The Interest on working capitals has been worked out at the rate of 12 per cent per annum, since that is the interest rate at which the farmers use to get their short term credit from the co-operative societies.

(ix) **Land Revenue, Cess and Other Taxes**

The actual payments made have been taken into consideration.

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1.14 LIMITATIONS OF THE STUDY

The data and information on mango production and the marketing changes have been collected through a sample survey by holding personal interviews with the sample farmers. They do not maintain any accurate records of their cultivation expenses, and their expenses on the application of various inputs and their total returns. Therefore, some amount of recall bias is found to be associated with the collected data. To minimise the recall bias, cross checks have been made by the researcher in the field itself. Though the generalization of the results has been made with much caution, as their study has been confined to a particular area with a particular agro-climatic region, the results obtained may not become applicable to all the areas and to all the various agro climate regions.

1.15 CHAPTER SCHEME

The present study entitled “An Economic Analysis of Mango Cultivation in Dindigul district, Tamil Nadu” has been presented in seven chapters.

The first chapter introduces the subject and has deals with characteristic features of mango, statement of the problem, objectives of the present study, methodology, collection of data, period of study, tools of analysis, limitations of the study and the presentation scheme of the various chapters.

The second chapter has deals with a description of the study area.
The third chapter has presented a review of the past studies conducted so far and has made some observations on production, cost of cultivation, marketing, net income and on such other details.

The fourth chapter has focused its attention on the mango area production and productivity of mango in the Global level and in India, and in Tamil Nadu and in the Dindigul district.

The fifth chapter has analysed the socio economic characteristics of the sample farmers, costs and returns structure, and the resource use efficiency of the mango cultivation prevailing in this chapter.

The sixth chapter has determined that the marketing factors like marketing channels, marketing efficiency and problems faced by the farmers with regard to the mango cultivation.

The seventh chapter has presented a summary of the findings along with suggestions and conclusions based on the findings of the study.