CHAPTER I
INTRODUCTION

Coconut is an environmentally benign crop offering micro climate, nutrient conservation and recycling, adaptability to problem soils, control of natural weeds and source of renewable energy\(^1\). Botanically the coconut palm is ‘cocosnucifera L’ and belongs to the natural order Arecaceae (Palmate)\(^2\) an important member of monocotyledons. The word ‘cocos’ is of Spanish origin, which means monkey faced or cerie faced. Nucifera comes from Latin meaning ‘nut bearing plant’\(^3\).

Monocots include many species of economic importance. The Palmyra, date, sago, caryota and many other palms are known for their sweet neera, fruits, starch and decorative plant parts, which are of only seasonal importance. The coconut palm on the other hand is unique, as it is able to adapt to various climatic conditions and combines the virtues of food, oil, fiber, medicinal, industrial, cash and wood crops.

The palm yields tender nut, coconut kernel, copra, coconut milk powder, cream, sweet and nutritional neera, intoxicating honey, oil of special composition for consumption and producing toiletries soaps, shampoos, white and golden fibers for coir, rope, mat, floor spread, rubberized cushion pillow, shell powder, shell charcoal, wood for posts, long beams, furniture, plaited leaf for roofing and fuel regularly almost over a century without a break\(^4\). There is no comparison to this unique and wonder palm of heaven in the world. Thus the cultivation of coconut crop is unique in all respects. Cropping pattern of a particular region refers to the allocation of cultivable land among various crops. Individual farmers


\(^{4}\) Henry Louis, 1, 2005, “Coconut the wonder Palm”, Hi-tech coconut corporation, Nagercoil, p.3
decide upon the crop that has to be grown in their farms. As a result a product mix is obtained at the macro level. Assuming a constant technology, a country has to get optimum allocation of area in a given period of time. Thus cropping pattern assumes greater importance both at the micro and macro levels. At the micro level a desirable area of land should be under different crops.

1.1 Scenario of Coconut Plantation World Level

As a cash crop, coconut is cultivated in eighty countries in Asia and Pacific regions. However, Indonesia, India, Philippines and Sri Lanka contribute 76.5 percent of the world production. During 1985 to 2005 these four countries shared an upward trend in area and production. In 1995 Indonesia produced 13521 million nuts from 3.75 million hectares and Philippines 12,183 million nuts from 3.09 million hectares. India on the other hand harvested 14,925 million nuts from 1.79 million hectares and ranked first in world production. The scenario is presented in Table 1.1.

Other important world countries producing coconut is Federates Micromesia, with 40 million nuts from 17000 hectares, Fiji, 137 million nuts from 54000 hectares. In 1999, India produced 14925 million nuts from 1908000 hectares, Indonesia 13746 million nuts from 37121000 hectares; Malaysia 580 million nuts from 226000 hectares, Papua New Guinea 1020 million nuts from 260000 hectares, Philippines 10504 million nuts from 3077000 hectares, Solomon Islands produced 318 million nuts from 59000 hectares of land. In Sri Lanka the total production is 2828 million nuts from 422000 hectares. In Thailand 1108 million nuts were produced from an area of 372000 hectares. In Vanuatu 346 million nuts were produced from 96000 hectares of land. In Vietnam 1044 million nuts were produced from 173000 hectares. In Samoa 168 million nuts were produced from 92000 hectares. Palavu produced 70 million nuts from 14000 hectares of land. Other African countries, other American countries, other Asian countries and other Pacific countries produced 2294, 3687, 747, 349 million nuts from 662, 557, 96 and 72 thousand hectares of land respectively. In 2004-2005 the total world production was 54129 crore of nuts from an area of 11909000 hectares.
Table 1.1 Areas and production in different coconut growing countries

<table>
<thead>
<tr>
<th>Sl. No</th>
<th>Name of the country</th>
<th>1985</th>
<th>1995</th>
<th>2005</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area (1000nuts)</td>
<td>Production (Million nuts)</td>
<td>Area (1000nuts)</td>
<td>Production (Million nuts)</td>
</tr>
<tr>
<td>1</td>
<td>Federates Miromesia</td>
<td>17</td>
<td>60</td>
<td>17</td>
</tr>
<tr>
<td>2</td>
<td>Fiji</td>
<td>61</td>
<td>269</td>
<td>69</td>
</tr>
<tr>
<td>3</td>
<td>India</td>
<td>1183</td>
<td>6913</td>
<td>1669</td>
</tr>
<tr>
<td>4</td>
<td>Indonesia</td>
<td>3042</td>
<td>9637</td>
<td>3712</td>
</tr>
<tr>
<td>5</td>
<td>Malaysia</td>
<td>315</td>
<td>1165</td>
<td>290</td>
</tr>
<tr>
<td>6</td>
<td>Papua New Guinea</td>
<td>241</td>
<td>1356</td>
<td>260</td>
</tr>
<tr>
<td>7</td>
<td>Philippines</td>
<td>3275</td>
<td>10413</td>
<td>3164</td>
</tr>
<tr>
<td>8</td>
<td>Solomon Islands</td>
<td>63</td>
<td>209</td>
<td>59</td>
</tr>
<tr>
<td>9</td>
<td>Sri Lanka</td>
<td>419</td>
<td>2958</td>
<td>419</td>
</tr>
<tr>
<td>10</td>
<td>Thailand</td>
<td>415</td>
<td>981</td>
<td>412</td>
</tr>
<tr>
<td>11</td>
<td>Vanautu</td>
<td>93</td>
<td>402</td>
<td>96</td>
</tr>
<tr>
<td>12</td>
<td>Vietnam</td>
<td>415</td>
<td>981</td>
<td>412</td>
</tr>
<tr>
<td>13</td>
<td>Samoa</td>
<td>93</td>
<td>402</td>
<td>96</td>
</tr>
<tr>
<td>14</td>
<td>Palavu</td>
<td>303</td>
<td>79</td>
<td>186</td>
</tr>
<tr>
<td>15</td>
<td>Other African Countries</td>
<td>47</td>
<td>146</td>
<td>75</td>
</tr>
<tr>
<td>16</td>
<td>Other American Countries</td>
<td>14</td>
<td>70</td>
<td>14</td>
</tr>
<tr>
<td>17</td>
<td>Other Asian Countries</td>
<td>742</td>
<td>1990</td>
<td>460</td>
</tr>
<tr>
<td>18</td>
<td>Other Pacific countries</td>
<td>198</td>
<td>2360</td>
<td>459</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>10552</td>
<td>40820</td>
<td>1147</td>
</tr>
</tbody>
</table>

The major countries producing coconut, namely Indonesia, Philippines, India and Srilanka shared 31.7 per cent, 25.84 per cent, 16.03 per cent, 3.54 per cent while the rest of the countries contributed a total of 23.26 per cent of the total area. During the same period India continued to rank first by sharing 27.57 per cent while Indonesia with the largest area shared only 25.76 per cent of the total world nut production.

1.2 Area, Production and Productivity of Coconut in India

In India, Coconut is an important small holder’s plantation crop. It is growing in an area of 1903 Million hectares, mainly in the four southern states of Kerala, Tamil Nadu, Andhra Pradesh and Karnataka and parts of coastal Karnataka and Tamil Nadu. It is predominantly grown under rain-fed conditions and has extended from 626.5 Million hectares in 1950-51 to 19.03 lakh hectares in 2007-08. The year wise area production and productivity of coconut in India is also presented in the table 1.2

It is evident from the table that there has been an unprecedented increase in the area, production and productivity for the last 58 years. Area under coconut has increased from 626.5 million hectares in 1950-51 to 1903.19 million hectares in 2007-08, so also is the production, from 3281 million nuts to 14,743 million nuts during the same period. This accounts for 196.6 per cent increase in area and 328.6 per cent increase in production over the past 58 years. The growth rate in production was 4.27 percent during the base year 1950-51, whereas during the decade from 1985-86 to 2007-2008 the growth rate achieved in production was 8.56 per cent. This high growth rate for the last decade could be attributed to the intensive development programmes implemented by the Coconut Development Board and the State Governments. Considering productivity India has recorded an increase in percentage of 64 over the period from 1985-86 to 2007-2008.
Table 1.2 Area, production and productivity of coconut in India

<table>
<thead>
<tr>
<th>Year</th>
<th>Area (Million ha)</th>
<th>Production (Million nuts)</th>
<th>Productivity (Nuts per ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950-51</td>
<td>626.5</td>
<td>3281.7</td>
<td>5238</td>
</tr>
<tr>
<td>1960-61</td>
<td>717.4</td>
<td>4639.1</td>
<td>6466</td>
</tr>
<tr>
<td>1970-71</td>
<td>1045.5</td>
<td>6075.0</td>
<td>5811</td>
</tr>
<tr>
<td>1980-81</td>
<td>1083.3</td>
<td>5942.0</td>
<td>5485</td>
</tr>
<tr>
<td>1990-91</td>
<td>1513.9</td>
<td>9700.2</td>
<td>6407</td>
</tr>
<tr>
<td>2000-2001</td>
<td>1823.91</td>
<td>12678.4</td>
<td>6951</td>
</tr>
<tr>
<td>2001-2002</td>
<td>1932.3</td>
<td>12962.9</td>
<td>6709</td>
</tr>
<tr>
<td>2002-2003</td>
<td>1921.8</td>
<td>12535.0</td>
<td>6523</td>
</tr>
<tr>
<td>2003-2004</td>
<td>1933.7</td>
<td>12178.2</td>
<td>6298</td>
</tr>
<tr>
<td>2004-2005</td>
<td>1935.0</td>
<td>12832.9</td>
<td>6632</td>
</tr>
<tr>
<td>2005-2006</td>
<td>1946.8</td>
<td>14811.1</td>
<td>7608</td>
</tr>
<tr>
<td>2006-2007</td>
<td>1936.8</td>
<td>15840.4</td>
<td>8179</td>
</tr>
<tr>
<td>2007-2008</td>
<td>1903.19</td>
<td>14743.56</td>
<td>7747</td>
</tr>
</tbody>
</table>

Source: Directorate of Statistics, Ministry of Agriculture, Govt. of India, 2008.

1.3 Export of Coconut Products from India

India’s huge domestic market has been the main consumer of coconut and coconut products. The domestic price of coconut oil has so far been higher than the international price. Therefore, India has not had any significant role in the world trade. However, with the increase in the price of edible oils at the global level, the difference between the domestic and international price has been substantially reduced. On account of this, there has been an increase in the
quantity of export of refined coconut oil compared to previous years. The export of desiccated coconut and shell charcoal also registered a sharp increase compared to the previous year. The export of coconut products from India for the last five years is given in Table 1.3

**Table 1.3 Exports of coconut and coconut production from India**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Qty (Tonnes)</td>
<td>Value (Rs.Lakhs)</td>
<td>Qty (Tonnes)</td>
<td>Value (Rs.Lakhs)</td>
</tr>
<tr>
<td>Coconuts (Fresh)</td>
<td>935.34</td>
<td>10.73</td>
<td>1402.84</td>
<td>133.03</td>
</tr>
<tr>
<td>Coconuts (Dried)</td>
<td>583.80</td>
<td>256.28</td>
<td>608.71</td>
<td>233.25</td>
</tr>
<tr>
<td>Desiccated coconut</td>
<td>431.93</td>
<td>49.28</td>
<td>652.16</td>
<td>11.05</td>
</tr>
<tr>
<td>Other coconuts excluding fresh/dried</td>
<td>796.42</td>
<td>168.46</td>
<td>678.02</td>
<td>227.71</td>
</tr>
<tr>
<td>a) coconut oil (crude)</td>
<td>434.61</td>
<td>204.72</td>
<td>79.56</td>
<td>60.90</td>
</tr>
<tr>
<td>b) coconut oil (refined)</td>
<td>5519.75</td>
<td>2739.69</td>
<td>5298.27</td>
<td>2741.00</td>
</tr>
<tr>
<td>Other residues of coconut or copra</td>
<td>3049.76</td>
<td>210.75</td>
<td>110.11</td>
<td>6.37</td>
</tr>
<tr>
<td>Oil Cake (defatted / expellers)</td>
<td>1229.43</td>
<td>57.05</td>
<td>161.70</td>
<td>8.73</td>
</tr>
<tr>
<td>Coconut shell (raw)</td>
<td>301.61</td>
<td>75.50</td>
<td>601.84</td>
<td>192.64</td>
</tr>
<tr>
<td>Shell charcoal</td>
<td>2976.00</td>
<td>610.44</td>
<td>4869.00</td>
<td>641.38</td>
</tr>
<tr>
<td>Shell Husk</td>
<td>4.40</td>
<td>1.37</td>
<td>8.06</td>
<td>7.09</td>
</tr>
<tr>
<td>Copra</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>16263.05</td>
<td>4474.27</td>
<td>14470.27</td>
<td>4365.15</td>
</tr>
</tbody>
</table>

Source: Directorate general of commercial intelligence and statistics, Kolkata.

India has no regular export trade in coconut oil. In India, the domestic demand for oils is more than the supply. The tendency, therefore, is to consume the entire production within the country itself. In the coconut oil export trade, Philippines occupy the monopoly position accounting for 60 per cent. From India, only a small quantity of coconut oil is exported to Bangladesh and Nepal, as a part of trade agreements. The export market of coconut in India has shown an increasing trend over the five years from 2004-2005 to 2007-2008. So there is a
wide scope for improving the export of coconut from India. The Government has to take necessary steps for the improvement of coconut cultivation, maintenance, modernization and also to explore the possible opportunities of the betterment of Indian economy.

1.4 Area, Production and Productivity of Coconut in Major Coconut Growing States in India

In India coconut is grown in 17 states and 3 union territories under varying soil and climatic conditions. Coconut plant is versatile in its adaptability to a wide range of soil conditions. Originally dominating the west coast of India, it has now spread all over India, especially Bastar in Madhya Pradesh, Koshi region in Bihar, North Eastern States like Tripura, Manipur and Nagaland and many other interior areas of India. The coconut production in India in 2006-2007 was 15840 million nuts from an area of 1936.80 million hectares. In 2007-2008 the all India coconut estimate clearly indicates that 91 percent of the total area and production of coconut in the country is concentrated in the four southern states, namely Kerala, Tamil Nadu, Karnataka and Andra Pradesh. Among the four southern states Kerala accounts for the largest area and production sharing 54.7 percent of the total area and 42.3 percent of the total production. The scenario in State-Wise area production of coconut in major coconut growing states in India is expressed in Table 1.4.

Today the coconut palm is prevalent even in the regions of the non traditional tracts, like Gujarat, Madhya Pradesh, Manipur, Rajasthan and East Utter Pradesh, for which the Indian Coconut Development Board takes the credit. The total potential area under coconut in the non-traditional states and union territories of India is 503000 hectares. This area has contribution of 75000 hectares from Orissa, 25000 hectares from West Bengal, 15000 hectares from Assam, 25000 hectares from Andaman and Nicobar Islands, 20000 from Maharashtra, 5000 from Gujarat, 5000 from Bihar, 25000 from Madhya Pradesh, 15000 from Tripura, 5000 from Mizoram 2000 from Nagaland, 1500 from Arunachal Pradesh, 2000 from Manipur, 2500 from Rajasthan and 1000 hectares
from Eastern Uttar Pradesh. The total annual production in the non-traditional tracts is 972.60 million nuts.

**Table 1.4 Areas, production and productivity of coconut in major coconut growing states in India**

<table>
<thead>
<tr>
<th>Name of the state</th>
<th>2006-2007</th>
<th>2007-2008</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>States /Union Territories</strong></td>
<td>AREA ('000 Hectares)</td>
<td>Production (Million nuts)</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>101.90</td>
<td>1326.40</td>
</tr>
<tr>
<td>Assam</td>
<td>19.00</td>
<td>153.00</td>
</tr>
<tr>
<td>Goa</td>
<td>25.50</td>
<td>126.70</td>
</tr>
<tr>
<td>Gujarat</td>
<td>16.40</td>
<td>138.30</td>
</tr>
<tr>
<td>Karnataka</td>
<td>401.00</td>
<td>1625.00</td>
</tr>
<tr>
<td>Kerala</td>
<td>870.90</td>
<td>6054.00</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>21.00</td>
<td>175.10</td>
</tr>
<tr>
<td>Nagaland</td>
<td>0.90</td>
<td>0.20</td>
</tr>
<tr>
<td>Orissa</td>
<td>51.00</td>
<td>275.80</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>374.60</td>
<td>5429.90</td>
</tr>
<tr>
<td>Tripura</td>
<td>3.30</td>
<td>7.00</td>
</tr>
<tr>
<td>West Bengal</td>
<td>25.10</td>
<td>359.10</td>
</tr>
<tr>
<td>A &amp; N Islands</td>
<td>21.40</td>
<td>89.00</td>
</tr>
<tr>
<td>Lakshadweep</td>
<td>2.70</td>
<td>53.00</td>
</tr>
<tr>
<td>Pondicherry</td>
<td>2.10</td>
<td>27.90</td>
</tr>
<tr>
<td>All India</td>
<td>1936.80</td>
<td>15840.40</td>
</tr>
</tbody>
</table>

**Source:** Directorate of Statistics, Ministry of Agriculture, Govt. of India, 2008.
Among the Indian states Tamil Nadu ranks first with regards to the expression of Area and Production. The careful Planning and implementation of the schemes for establishing coconut nurseries, coconut development and reclamation and planting in the marshy and swampy areas in Ramanad district in the sixties were responsible for the expansion of area and production. Introduction and planting of quality coconut seedlings of varietal and hybrid origin with optimum depth and spacing and adoption of improved techniques in manuring irrigation and plant protection added further to the increase in area and productivity. Kerala with an estimated area of 1.02 million hectares and production of 5.9 million nuts remains almost static. Kerala is followed by Tamil Nadu, Karnataka and Andhra Pradesh in the total area under coconut crop. The Indian Coconut Development Board has succeeded in taking the crop even to the non traditional tracts like Gujarat, Madhya Pradesh, Manipur, Rajasthan and east Uttar Pradesh.

1.5 Coconut Plantations in Tamil Nadu

Among the Indian states, Tamil Nadu ranks first with regard to the expansion of area and production of coconut. The area and production of coconut in Tamil Nadu is given in Table 1.5.

From the table it is noted that total area is 345886 hectares. Among the districts, Coimbatore occupies the first place, with an area of 17377 hectares. Dindigul occupies the second place, with an area of 24277 hectares. The third place is occupied by Tanjore with an area of 23934 hectares. Kanyakumari district occupies the fourth place with an area of 22667 hectares. Total production of the state is 28607 lakh nuts in 2007 and 2008. The productivity of coconut among the different district varies. It is the highest in Thiruvarur District with 15268 nuts per hectare. The next highest productivity is seen in Kanyakumari district with 14920 nuts per hectare. All the other districts show lesser production and productivity5.

---

<table>
<thead>
<tr>
<th>DISTRICTS</th>
<th>AREA (Hectares)</th>
<th>PRODUCTION (Lakh nuts)</th>
<th>PRODUCTIVITY (Nuts per hectares )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kanchipuram</td>
<td>4564</td>
<td>144</td>
<td>3155</td>
</tr>
<tr>
<td>Thiruvallur</td>
<td>1091</td>
<td>82</td>
<td>7516</td>
</tr>
<tr>
<td>Cuddalore</td>
<td>2670</td>
<td>357</td>
<td>13371</td>
</tr>
<tr>
<td>Villupuram</td>
<td>2118</td>
<td>143</td>
<td>6752</td>
</tr>
<tr>
<td>Vellore</td>
<td>18690</td>
<td>1713</td>
<td>9165</td>
</tr>
<tr>
<td>Thiruvannamalai</td>
<td>1023</td>
<td>73</td>
<td>7136</td>
</tr>
<tr>
<td>Salem</td>
<td>11720</td>
<td>808</td>
<td>6894</td>
</tr>
<tr>
<td>Namakkal</td>
<td>2174</td>
<td>210</td>
<td>9660</td>
</tr>
<tr>
<td>Dharmapuri</td>
<td>20229</td>
<td>1559</td>
<td>7707</td>
</tr>
<tr>
<td>Erode</td>
<td>99250</td>
<td>6300</td>
<td>6348</td>
</tr>
<tr>
<td>Coimbatore</td>
<td>17377</td>
<td>1617</td>
<td>9205</td>
</tr>
<tr>
<td>Trichy</td>
<td>5991</td>
<td>842</td>
<td>14054</td>
</tr>
<tr>
<td>Karur</td>
<td>4331</td>
<td>514</td>
<td>11868</td>
</tr>
<tr>
<td>Perambalur</td>
<td>882</td>
<td>55</td>
<td>6236</td>
</tr>
<tr>
<td>Tanjore</td>
<td>23934</td>
<td>2241</td>
<td>9363</td>
</tr>
<tr>
<td>Thiruvaroor</td>
<td>4742</td>
<td>724</td>
<td>15268</td>
</tr>
<tr>
<td>Nagapattinam</td>
<td>3660</td>
<td>259</td>
<td>7077</td>
</tr>
<tr>
<td>Pudukottai</td>
<td>5105</td>
<td>256</td>
<td>5015</td>
</tr>
<tr>
<td>Madurai</td>
<td>10545</td>
<td>9081</td>
<td>9303</td>
</tr>
<tr>
<td>Theni</td>
<td>14284</td>
<td>1411</td>
<td>9878</td>
</tr>
<tr>
<td>Dindigul</td>
<td>24277</td>
<td>2115</td>
<td>8712</td>
</tr>
<tr>
<td>Ramanathapuram</td>
<td>9120</td>
<td>481</td>
<td>5274</td>
</tr>
<tr>
<td>Sivagangai</td>
<td>5861</td>
<td>361</td>
<td>6159</td>
</tr>
<tr>
<td>Virudunagar</td>
<td>8511</td>
<td>643</td>
<td>7625</td>
</tr>
<tr>
<td>Tirunelveli</td>
<td>15423</td>
<td>1963</td>
<td>6892</td>
</tr>
<tr>
<td>Tuticorin</td>
<td>5586</td>
<td>267</td>
<td>4780</td>
</tr>
<tr>
<td>Nilgiris</td>
<td>61</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Kanyakumari</td>
<td>22667</td>
<td>3382</td>
<td>14920</td>
</tr>
<tr>
<td><strong>STATE</strong></td>
<td><strong>345886</strong></td>
<td><strong>28607</strong></td>
<td><strong>8271</strong></td>
</tr>
</tbody>
</table>

1.6 Coconut Plantations in Kanyakumari district

Kanyakumari is the second smallest district in Tamil Nadu, with an area of 1,672 Sq.Km\(^6\). This district has a purely agricultural economy. Among commercial crops, rubber, coconut and cashew nut occupy the major parts of the area. Coconut alone is being raised in around 24,935 hectares. Area under coconut cultivation in the district has undergone dynamic increase from 17,492 hectares in 1988-89 to 24,935 hectares in 2008-2009.

1.7 Historical Origin of Coconut Plantations

The coconut palm is one of the most useful plants in the world. Grown in more than 80 countries of the tropics, the coconut palm is known to exist in most regions of the tropics from prehistoric times. Besides having a far widespread in the tropical low lands than many other useful crops, the coconut palm has hoary antiquity in some of the countries. But in the absence of clinching evidence it has not been possible to trace its origin to any particular country. The long drawn out debate on the subject, for well over a century has not reached a general agreement in assigning the original habitat of the palm.

There are three theories on the origin and subsequent distribution of the coconut palm. According to the first theory, the palm came from the same stock which gave rise to the American members of the genus cocas and originated in the valleys of the Andes in Colombia from where the dispersal might have been effected by the prehistoric explorers in the Pacific. The second theory assigns its origin to the coasts of Central America from where the nuts might have been carried over by the coasts of Central America by the currents to the Pacific Islands. Third theory presumes its place of origin to be somewhere in south Asia or Malaysia or in the Pacific from where coconut might have accidentally reached the coasts of America\(^7\).

\(^6\) Assistant Director of statistics, District Statistical office, Nagercoil, 2008-2009.
\(^7\) Thampan P.K, 1989, "Handbook on Coconut palm", Oxford and IBH publishing Co. private Ltd, New Delhi, p.1
Coconut palms have existed in India for 3000 years. Organized efforts to develop the crop were begun only a century ago. The history of its development and the commercial exploitation of the products have three distinct phases covering the latter half of the last century, i.e. the period from 1900 to 1945 and from 1945 to 1978 and from 1978 to 1986 and later years.\textsuperscript{8}

1.7.1 The First Phase

The first phase of coconut development coincides with the expansion of European soap and edible oil industry which required large quantities of imported copra for feeding the milling sector. The increased demand for coconut products in the European markets gave a fillip to coconut cultivation and copra trade. With the introduction of wheeled traffic and increased shipping facilities, the export trade of coconut products expanded considerably, which resulted in a renewed interest in coconut cultivation.

It was something during the period that the coconut growers in the then central Travancore area of Kerala State noticed the incidence of an unknown disease in isolated patches, which is now known as root wilt disease. In 1897, the coconut growers of the area presented a memorandum to the government describing the financial loss suffered by them due to the incidence of this disease.

The British Govt. appointed Dr. E.J. Butler, the Imperial Mycologist to investigate the problem. He could not solve the problem, but helped them to develop a modern line of approach to the problems of coconut cultivation in the country. Towards the end of the last century, agricultural departments were established in various states, thereby making coconut development a recognized work.

1.7.2 The Second Phase

The dawn of the present century found India in a formidable position in the export trade in copra and coconut oil during the years 1909 to 1914. India exported about 31,000 tonnes of copra and 9,000 tonnes of coconut oil annually. The tempo in the production front did not last long. The prices started crashing
during the First World War and the general economic crisis forced the growers to neglect the cultivation. Even after the war, the prices failed to recover and the apathy of the growers still continued. During the period, exports of copra and coconut oil started declining, while imports gained momentum. By 1924, the exports had come to a stand still.

Though export trade in the coconut products ceased to continue, the domestic demand started to pick up, which in turn necessitated government efforts for increasing the production. In 1916, with the establishment of Coconut Research Station at Nileswar and Kasargod, coconut developmental activities attained a purposeful momentum. At the same time coconut farms were cultivated by departments of agriculture in the then Cochin and Travancore regions of Kerala state also. By the early thirties government came to recognize the importance of the genetic improvement of the crop and envisaged schemes for the establishment of coconut nurseries. During the period, the coconut area in the country also recorded a small increase from 0.5 million hectares in 1920-21 to 0.57 million hectares in 1930-31.

The world trade in copra, coconut oil and other coconut products was seriously affected by the outbreak of the Second World War. The war situation in general had an adverse effect on the production and marketing of coconuts in the domestic sector. Decline in production coupled with marketing bottlenecks finally forced the Government of India to step into WTO in 1943, which initiated an enquiry into the production aspects, regulation of imports of copra and coconut oil, improvement of quality of copra and coconut oil and better utilization of shell and fiber. The enquiry commission recommended the setting up of a statutory body for coconut with powers and functions similar to those of the Ceylon Coconut Board. The Government of India accepted the recommendations to set up a statutory body with less functions. Thus the Indian Central Coconut Committee was formed in February 1945 by virtue of the Indian Coconut Committee Act of 1944. The committee continued to function till March 1966 and after that the Directorate of Coconut was established in its place, which took over the development and marketing of coconut in the country.
1.7.3. The Third Phase

The third phase which covers the period from 1986 to till has heralded the era of coconut development in the country. It was in this period during which integrated efforts for modernizing coconut culture and industry were promoted. Some of the major development programmes implemented during this period were the collection of reliable statistics in area and production, the establishment of central and regional research stations, commercial production of coconut hybrids and the establishment of hybrid seed gardens, the package programmes, establishment of nurseries, parasite breeding station, financial assistance given to the growers for expansion of area under coconut and encouragement given to growers’ co-operatives for improved marketing and processing activities. These promotional activities led to the increase in the area and production of coconut in the country.

1.8 Varieties of Coconut

There are only two distinct varieties of coconut, the tall variety and the dwarf variety. Owing to cross pollination, a wide range of variation occurs within the same variety. This is more commonly seen among the tall. The variations may relate to the height of palm, colour, shape and size of the nut as well as yield and quality of copra. For instance, among the ordinary tall variety, green and brown colour types occur. Similarly in the dwarf, three colour types, i.e. orange, yellow and green are common. More than 12 hybrid varieties have been released.

1.8.1 Tall Variety

The tall variety is extensively cultivated in all the coconut tracts of the world. It has a long and stout trunk with a swollen base called ‘bole’. This variety is characteristically tall, growing to a height of about 15 to 18 meters. The crown will have 25 to 40 fronds and the length of a fully opened frond will be about 6 meters. It is a comparatively hard type, and lives up to a ripe age of 90 to 100 years. It tolerates diverse soil and climatic conditions and bears fruit in seven to ten years. if planted under rainfall conditions. The tall variety is largely cross-
pollinating. However, slight chances for self-pollination also exist due to overlapping of spadices in the summer season. Its copra, oil and fiber are of good quality. The nuts mature within a period of 12 months after pollination. The following are the common tall varieties cultivated in different countries—West Coast Tall, Lakshadweep Ordinary, Lakshadweep Micro, Andaman Ordinary, Kappandam, Languna, San Raman, Magapuno, Spicata, Java, New Guinea, Cochin China, Philippines Ordinary, East Coast Tall, etc.

1.8.2 Hybrid Varieties

The manifestation of heterosis or hybrid vigour in a perennial crop like the coconut palm was first reported from India in 1932 in inter-varietal crosses involving the tall variety as the female and the dwarf variety as the male. The seedlings exhibited hybrid vigour which became manifest in the nursery in the vegetative characteristics such as height, girth at the collar and number of leaves. The seedlings on planting had a rapid growth rate with a higher rate of leaf productions, shorter pre-bearing period, high bearing capacity and economic nut characteristics. These findings in India led to the cultivation of hybrid vigour for the genetic improvement of the coconut palm for high yield, which has now been adopted as a wide recognized programme in the major coconut growing countries. The first coconut hybrid in the world was produced in India during 1930\textsuperscript{s} with WCT x CGD. Considerable work on the production, evolution and mass distribution of seedlings is now in progress in these countries for commercial plantings of the Tall × Dwarf and the Dwarf × Tall with different parental combinations. Besides, intra-varietal hybrids like Tall × Tall are also produced in large numbers in India and Sri Lanka.\textsuperscript{7}

1.9 Coconut Research in India

The first systematic research on coconut in the world was started in India in 1916 with the establishment of four research stations in the erst while Madras Presidency. Four centers were established for researching on different soil types. In 1931, these stations were put under oil seeds specialist, J.S. Patel in Coimbatore. The first coconut monograph titled “Coconut Monograph” by J.S.
Patel was published in 1938. In 1948, Indian Central Coconut Committee was set up for the improvement and development of the crop.

The work on coconut was further intensified, with the Kasargod station being upgraded and C.M. John was its first director in the year 1950. In 1996, Indian Central Coconut Committee was abolished and ICAR (Indian Council of Agricultural Research) took over the administrative control of coconut research station at Kayangulam and Kasargod. In 1970, ICAR established Central Plantation Crops Research Institute by merging the two stations at Kayangulam and Kasargod and the Central Arecanut Research Station at Vittal along with five Regional Stations.

In 1970, the ICAR sanctioned the All India Coordinated Coconut and Arecanut Improvement project with its headquarters at Kasargod. The first workshop was held in 1971 at Kasargod, wherein all the research programmes were finalized and the programmes were initialized in 1972. At present there are ten centers viz. Amdajipeta (Andhra Agricultural University), Kahikuchi (Assam Agricultural University), Jalalgarh (Rajendra Agricultural University), Arshihera (University of Agricultural Science, Bangalore), Retnagiri (Konkan Krishi Vidyalaya), Konarak (Orissa University of Agriculture and Technology) and Mandouri (Bidhan Chandra Krishi Viswa Vidyalaya), etc., functioning as research centers under AICRP to cater to the location specific needs of the crop.

A number of universities namely, Kerala Agricultural University, Tamil Nadu Agricultural University, Andhra Pradesh Agricultural University, Orissa University of Agriculture and Technology, Bidhan Chandra Krishi Viswa Vidyalaya, Assam Agricultural University and Konkpn Krishi Vidyapeeth, and some state farms like Aralam Farm (Kannur) and private farms are involved actively in the pursuit of research in coconut. Coconut Development Board lends financial and development support to provide impetus to research programmes.
1.10 Scope of the Study

The study aims at pinpointing the production aspects such as area, production, productivity, cost of inputs, cost of production, marketing practices, returns, problems of production, measures to improve production efficiency, the employment potential, standard of living of the producers, etc. The results thus obtained from the study would be useful in making suggestions to farmers and to overcome the constraints in the production of coconut. It would further help the farmers to rationalize their production decisions. The problems identified in the study as reported by the farmers would help the policy makers to develop right policy package to overcome the constraints faced by them. Therefore, a study has been undertaken to know various aspects of coconut production and marketing to provide vital information about the prospect of coconut production and marketing in Kanyakumari district of Tamil Nadu as well as in India.

1.11 Statement of the Problem

India is predominantly based on an agricultural economy. The prospects and development are primarily associated with the methods to increase production and productivity as well as marketing of agricultural products. The coconut palm is considered as the tree of life. It is one of the valuable gifts of nature to mankind. It serves as a veritable source of food and drink to millions of people in the tropics.

The crop is gaining significance as a fiber crop, a beverage crop and a medicinal crop. It is a traditional plantation crop grown in India for the last 3000 years, and thus possesses the longest history in the country. More than ten million people in the country depend on coconut cultivation, processing, marketing and trade related activities. In the coastal tracts, most of the people depend on coconut for their subsistence, and the sole income depends on coconut yield too much that coconut is the sole income. Its popularity can also be attributed to the fact that a coconut garden can accommodate many other fruits and vegetable crops as well as rearing of livestock. Thus the coconut based
farming system satisfies the daily needs of a family in coastal agro-eco-system especially in Kanyakumari district.

All the parts of coconut trees are used in one way or the other. The tender nut is a gift of nature, and it is a healthy soft drink. It contains a number of nutrients which are very essential for health. Desiccated coconut is used in biscuits, confectionary, bakery and other food industries. Coconut cream spray, dried coconut milk powder, preserved and packed tender coconut water and coconut water based vinegar, coco-sip, etc., are some of the coconut products of great importance.

Coir industry is an important agro-based cottage industry of great significance. Coir pith is the by product of coir industry, and coir pith compost is gaining importance all over the world. Coconut shell is used for making handicrafts; shell powder is used in bakelite plastic laminated board and mosquito mat/coil industries. Wood is used for wood work in houses and other home related activities. Thus it is a crop of varied importance.

Given this importance of coconut, it is necessary to examine the performance of coconut production, productivity and the extent and nature of success in the range of production environments and to explore the factors influencing the performance. This calls for an in-depth study covering different aspects of coconut production such as cost of cultivation, yield, profitability and marketing of coconut. In this regard a study on the determinants of yield would be useful for evaluating and identifying the constraints in realizing the yield of coconut. It helps in formulating policy package to improve the production of coconuts.

Further, the farmers are always unorganized and they do not command a strong bargaining power. They are forced to sell the produce at a very low price right after the harvest. The price of coconuts mainly depends on middleman or business man in the market. The producer depends upon the market conditions to fulfill their hopes and expectations. But forced to sales, multiplicity of market charges, malpractices of unregulated markets and
superfluous of middleman are the problems faced by the producers. Though coconut has a pride, not only for its diverse uses but also for its special preference to consumers, it is subjected to the above stated problems. The present study is viable and therefore the researcher attempts to analyze the production and marketing of coconut in the study area.

1.12 Objectives of the Study

The overall objective of this study is to evaluate the economics of coconut production and marketing with attention to assess the scope for improvement in farm efficiency and in revenue received by the coconut producers. The specific objectives are,

i. To analyse the present trend in coconut production and factors limiting coconut production.

ii. To analyse the structure of cost and resource use pattern in coconut production.

iii. To measure the efficiency in coconut cultivation in term of yield of coconut with given level of inputs.

iv. To study the channels of marketing and producer revenue and share in the ultimate consumer’s price in different channels of marketing.

1.13 Methodology of the Study

The methodology of the study includes choice of the study area, the sampling techniques, collection of data, period of study, methods of analysis, tools of analysis and the concepts used in the present study.

1.13.1 Choice of the Study Area

An Economic analysis of production and marketing of coconut in Kanyakumari district is being selected for its high scope in improving the standards of the people of this District. Kanyakumari district is one of the most important coconut producing districts in Tamil Nadu. Tall and hybrid varieties of coconut are grown in this district. The district is an important source of supply of coconuts throughout Tamil Nadu and various States all over India. This district
soil and climatic conditions are highly suitable for coconut production. Production of coconut provides nuts for domestic consumption, oil preparation and also offers employment potential to a sizeable section of the population. It solves the unemployment problem of the rural sector to a maximum possible extent. Establishment of coconut growers with intercropping and high density multi stage cropping system will enhance the employment potential of this district. These are the reasons for selecting Kanyakumari district as the study area.

1.13.2 Sampling Technique

Proportionate Random Sampling is adopted for the present study with Kanyakumari district as the universe, taluks as the primary units and the coconut producers as the ultimate units. Kanyakumari District consists of four taluks namely, Thovalai, Agasteeswaram, Kalkulam and Villvancode. 200 samples were selected at random from the four taluks, consisting of 50 samples from each taluk. These 50 samples belong to different categories of coconut producers groups. They are marginal, small, medium and large. Out of 200 sample selected from the four taluks 121(60.50 percent) are marginal producers owning less than 1.5 acres of land. 33 (16.50 percent) are small producers having less than 2.5 acres of land. 22 (11 percent) are medium producers having less than 5 acres of land. 24(12 percent) are large producers having more than 5 acres of land. Needed information is elicited from the traders also.

1.13.3 Collection of Data

The present study is based on both primary and secondary data,

1.13.3.1 Primary Data

The primary data were collected from growers, through interview schedule method. Based on physical, cultural and socio economic environment of farming in the region, interview schedule was designed, pre-tested and finalized. Detailed information was collected from the coconut growers on cropping pattern, labour utilization, age of the coconut trees, varieties of coconut trees, and number of coconut trees.
The data required for the study of marketing were also gathered by interviewing the different market functionaries using another well-structured pre-tested schedule. Information were collected from the intermediaries on marketing cost, market margin, price-spread and problems in marketing.

1.13.3.2 Secondary Data

Secondary data regarding area under coconut production, yield per hectare, world coconut producing countries, India, Tamil Nadu and Kanyakumari district were collected from various journals, books, coconut statistics, published by Coconut Board, Cochin, Statistical Year Book and the Reports of Director of Economics and Statistics, Ministry of Agriculture, New Delhi.

1.14 Period of Study

In order to estimate trend in area production and productivity of coconut, a period on 20 years from 1988 – 89 to 2007 -08 was taken up for this study. The field survey was carried out from April 2009 to July 2009 for the primary data collection.

1.15. Tools of Analysis

To study the cost and return structure of coconut varieties, direct and indirect costs were calculated on the basis of the cost concepts used in farm management studies.

i. Simple Regression Equation

To study the trends in areas of cultivation, production and productivity of coconut simple regression equation has been used.

\[
\log Y = a + bT
\]

Where

- \( Y \) = Area / Production / Productivity
- \( T \) = Time

‘a’ and ‘b’ are the parameters to be estimated
ii. Compound Growth Rate

In order to find out the growth rate in area, production and productivity of coconut, compound growth rate has been calculated using Semi-log function.

\[
\text{Compound growth rate} = \left[ \frac{\text{anti log } b - 1}{100} \right]
\]

iii. Analysis of Resources Efficiency

To evaluate resource use efficiency in coconut cultivation marginal value productivity of each of the input variables was equated with the acquisition cost.

iv. Analysis of cost

In order to study cost and return structure in coconut production, cost has been classified into cost A, Cost B and Cost C for the purpose of suitable analysis. Each of these categories contains a separate set of elements. The category and the elements are given below.

Cost A.

a. preparatory cultivation
b. cost of labour
c. cost of manure and fertilizer
d. cost of pesticides
e. interest on working capital
f. Land revenue and taxes
g. Rental value of land
h. irrigation charges

Cost B

Cost A + imputed rental value of owned land + imputed interest on owned fixed capital.

Cost C

Cost B + imputed value of family labour.

Fixed Costs = Cost C – Operational Cost
v) Multiple Linear Regression Model

A multiple linear regression model of Cobb – Douglas type is used to estimate the relation between various input factors and gross income from coconut production. This type of production function has been found to be the best fit for coconut production. In the linear regression model, one dependent variable and six independent variables are included as in the form given below.

\[
\log Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \beta_6 \log X_6 + U
\]

Where

\[Y = \text{Gross return in rupees per acre}\]
\[B_0 = \text{Constant}\]
\[X_1 = \text{Preparatory cultivation per acre}\]
\[X_2 = \text{Human labour in rupees per acre}\]
\[X_3 = \text{Cost of manure fertilizer in rupees per acre}\]
\[X_4 = \text{Cost of pesticide in rupees per acre}\]
\[X_5 = \text{Interest on working capital per acre}\]
\[X_6 = \text{Land revenue and taxes per acre}\]
\[X_7 = \text{Rental value of land per acre}\]
\[X_8 = \text{Number of coconut trees per acre and}\]
\[U = \text{Disturbance term}\]

The productivity of the capital invested in the coconut was estimated by working out the net present value (NPV), benefit cost ratio (BCR), internal rate of return (RR) and the payback period. The following formulas were used to measure the present value of capital.

(vi) Net present Value (NPV)

Net present value is found out by subtracting present value of cost from the present value of return. A project whose net present value is greater or equal to zero is considered as worthy investment.

\[
\text{Net present value} = \text{Present value of Returns} - \text{Present Value of Cost.}
\]
Symbolically,
\[ \text{NPV} = \sum_{t=1}^{n} \frac{B_t - C_t}{(1 + i)^t} \]

Where,
- NPV = Net Present Value,
- \( B_t \) = Benefits in \( t^{th} \) year,
- \( C_t \) = Costs in \( t^{th} \) year,
- \( i \) = Interest (Discount) rate

(vii) Benefit – Cost Ratio

The benefit – Cost ratio is the ratio of the sum of discounted net benefits with sum of discounted capital costs. The benefit cost ratio is mathematically expressed as,

\[ \text{Benefit – Cost ratio} = \frac{\text{Present Value of Returns}}{\text{Present Value of Costs}} \]

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

Where,
- \( n \) = Life period of the project in years
- \( B_t \) = Returns in the year ‘t’
- \( C_t \) = Costs in the year ‘t’
- \( i \) = Discount rate

(viii) Internal Rate of Return (IRRI)

Internal Rate of Return is the rate of discount at which NPV is zero. If the IRR exceeds cut-off rate (opportunity cost of capital) the investment is economically viable.
Symbolically,

\[
\text{IRR} = \frac{\sum_{t=1}^{n} \left( \frac{B_t}{C_t} \right)}{(1-i)^t} = 0
\]

Which, the symbols used are the same as in the case of benefit cost ratio.

(ix) Pay – back Period

Pay back period is an undiscounted measure of worthiness of an endeavour which measures the efficiency of cultivation by indicating the period within which returns off-set the investment.

(x) Garrett’s Ranking Technique

Garrett’s Ranking Technique was adopted to analyse the constraints in the yield of coconut. The farmers were asked to rank the factors that were limiting coconut production. The order of merit thus given by the respondents was converted into rank by using the following formula:

\[
\text{Percent position} = \frac{100 \left( R_{ij} - 0.5 \right)}{N_j}
\]

Where,

\[ R_{ij} = \text{Rank given for } i^{th} \text{ factor by } j^{th} \text{ farmer and} \]

\[ N_j = \text{Number of factor ranked by } j^{th} \text{ farmer.} \]

The per cent position of each rank there obtained was converted into scores referring to the table given by Garrett. The scores of individual respondent for each factor were added together and divided by the total number of respondents for whom the scores were added. The means scores for all the factors were analysed in ascending order, ranks assigned and the important factors identified.
(xi) Shepherd’s Method

To measure the marketing efficiency of the various channels in the marketing of coconut, Shepherd’s formula has been used.

\[
ME = \frac{V}{I} - 1
\]

\(V\) = Value of produce sold
\(I\) = Total marketing cost
\(ME\) = Marketing efficiency

1.16 Hypothesis of the Study

On the basis of the above said objectives, the following are the hypothesis of the present study.

i. Area and production of coconut have increased significantly in kanyakumari district.

ii. Coconut farms are profitable in the study area.

iii. Large farmers are benefited more by coconut farms as compared to marginal, small and medium farmers.

1.17 Limitations of the Study

The present study mainly relies on the data collected through interview using pre-tested questionnaire. Therefore some amount of recall bias is bound to exist with the collection of primary data since farmers do not normally maintain records about their expenses.

Coconut being a perennial crop, a practical difficulty exists in obtaining back-information about the expenditure made earlier to the date of collection. The cost of input also increases at a fast rate every year due to depletion of money value. Representation of costs and returns is to be made on par with the present (2007-08) money value. Home information is to be gathered on the quantities of inputs applied for planting, and the production obtained thereof for
different years and the evaluation is to be made based on the rates existing in 2007-08. The study is not taking into consideration the political, religious or similar other non-economic aspects.

1.18. Concepts and Definitions Used

i. Marginal Cultivator

A marginal cultivator is a person who is engaged either as an employer’s single worker or family worker in cultivation of land up to two acres of land owned or held from government or private persons or institutions for payment in money, kind or share.

ii. Small Farmer

Small farmer is a person who is engaged in cultivation of 2 to 4 acres of land owned or held from government or private persons or institutions for payment in money, kind or share.

iii. Large Farmers

Large farmer is a person who is engaged in cultivation of land above 4 acres of land, owned or held from government or private persons or institutions payment in money, kind or share.

iv. Salaried -Cum- Cultivator

Salaried –cum- cultivator is a person whose main occupation is salary employment and his subsidiary occupation is cultivation

v. Cultivator

A cultivator is a person who is engaged either as an employer’s single worker or family worker in cultivation of land owned or held from government or private persons or institutions for payment in money, kind or share. Cultivation also includes supervision and direction of work of cultivation.
vi. Agricultural Laborers

“A person who works in another person’s land for wages in money, kind or share should be regarded as an agricultural labourer. He or she has no risk in the cultivation, but merely works in another person’s land for wages and has no right of lease or contract on land on which he or she works”.

vii. Literate

“A person who can both read and write understanding in any language is a literate.” A person who can merely read but cannot write is not a literate. It is not necessary that a person considered as literate must have any formal educational standard.

vii. Cropping Pattern

“Cropping pattern is the nature of crop in a single agricultural season.

ix. Main Occupation

Main occupation of the household is that from which the head of the household derives the major annual income.

x. Secondary Occupation

An occupation other than the occupation is considered as secondary occupation.

xi. Copra

It refers to the coconut kernel which has been processed from raw coconut after removing the lint and the shell.

xii. Husking

It refers to the lint from the coconut. This husk is made use of for manufacturing various products of commercial importance.
xii. Hybrid Varieties

It refers to those varieties of coconut developed by inter varietal crossing.

xiv. Edible Oil

Consumption of oil for household purposes and catering establishments.

xv. Coconut Shell

It is the outer cover of coconut made up of hardened cellulose.

xvi. Edible Copra

Copra is used for various household sweet preparations and also as an ingredient in the processed betel nuts for chewing.

xvii. Milling Copra

Copra used for extracting oil.

xviii. Grading

It refers to the classification of coconut or copra according to their size, quantity, etc.

1.19 Kanyakumari district Profile

1.19.1 Physical Features

Kanyakumari district, named after the Goddess “Kanyakumari’ lies at the southern most tip of Indian Peninsula, where three seas viz., Indian Ocean, Arabian Sea and Bay of Bengal confluence. It has an area of 1672 square kilometers. The district is bounded by Tirunelveli District in the north east, Kerala state in the north-west, Indian Ocean in the south and Bay of Bengal in the east. Nagercoil is the district’s headquarters. The district consists of four taluks, nine blocks, four municipalities, 154 panchayats (66 Town Panchayats and 88 village panchayats), one township, and 1207 hamlets.
1.19.2 Soil

Soil in the district is mostly of the red loam variety. In the seacoasts, however, the sandy type of soil prevails and gravel soil is seen in the mountain regions. In the low lands there is neither white sand or sand loam while in the midlands and high lands there prevails fairly fertile soil of fine type particularly in the valleys.

1.19.3 Minerals

Ilmienite sand are seen in Leepuram and Vattakottai along the west coast for a distance of about 2.4 km. Of these, one near Manavalakurichi is world renown. A total reserve of 15,200 tonnes ilmenite, and zircon sands was estimated with a minor fraction of monazite sand. Small deposits of shell limestone occur near Kovalam, Capecomorin, Leepuram, Vattakottai, Kanagappapuram. Total reserve calculated is about 1.68 million tones. A zone of sulphite mineralization with copper ore and minor amounts of Molybdenite, Nickal and Cobalt was located in Arumanalloor. Grahite occurs in Thovalai.

19.4.4 Rainfall and Climate

This is the only district in Tamil Nadu getting both South-West (June to September) and the North-East (October to December) monsoons. Generally, October is the rainiest month followed by June and November. The average rainfall for the year 2000 is 1237 mm as against the normal rainfall of 1465 mm with a total deficiency of 15.5 percent. South-West monsoon and North-East monsoon contribute to 38.1 percent and 37.5 percent of the annual rainfall respectively. The contribution of rainfall during the pre-monsoon season that is, summer is 21.7 percent. In winter season (January and February), rain fall (2.7 percent) is quite insignificant.

The district has a typical tropical climate, May and June being the hottest months. The maximum temperature varies from 29 to 32 Celsius and minimum temperature between 25 and 23 Celsius.
1.19.5 Population

Kanyakumari district is known for its high density of population. The population of the district is 16,69,763 lakhs (Male 8,29,542, Female – 8,40,221) of people, as per 2001 census. Among the total population 5,82,761 live in rural area and 10,87,002 live in urban area. The density of population implies 992 per sq.km.

1.19.6 Agriculture

The district was once known as the granary of Travancore State. A variety of crops is raised. In the hills plantain, tea, coffee, rubber coconuts and pepper are being cultivated. In the plains, paddy, tapioca, coconut and vegetables are the main crops raised. Out of the total area 167,214 hectare, forest accounts for 54,643 hectare. The area for cultivation is 88,558 hectare. The agricultural cultivation in the district reads as: Nanjai (wet lands 19,346 ha.) Punjai (dry land 62,981 ha.) and puramboke (Govt. land 6,210 ha.). Paddy is cultivated in 23,000 hectare (single crop) tapioca in 12,000 hectare, banana in 3,000 hectare, cashew in 2,420 hectare, rubber in 13,290 hectare, arecanut in 1754 hectare, cloves in 571 hectare, mango grove in 1769 hectare, Tea in 433 hectare, and coffee in 42 hectare, pepper in 80 hectare.

1.19.7 Irrigation

Two major irrigation projects viz., the Kothaiyar and the Chittar-Pattanamkal serve the irrigation needs of the district. One medium project viz. Neyyar project across river Neyyar located in Kerala state extends the irrigation facilities to certain areas of the district. The important minor schemes viz. Aruvikkara weir system, Thirparappu weir system and Vilathurai lift irrigation scheme and 2429 irrigation tanks (618 under Panchayat unions and 1811 P.W.D.) meet the additional irrigation needs of the district. Of 54.143 hectare gross irrigated area, 53,688 hectare utilize surface water resources through canals, tanks and other sources while 684 hectare utilize ground water sources through open wells and tube wells.
Pechiparai and Perunchani dams come under Kothaiyar project located in Kalkulam taluk. Pechiparai dam is constructed across the river Kothaiyar and Perunchani across paraliyar, both dams are m{esseytype}ory and gravity type.

Chittar Pattanamkal Project consists of two earthen dams viz., Chittar I and Chittar II constructed across the river respectively.

1.19.8 Industries

Kanyakumari District is industrially backward. There are, at present only six major industries. However, there are variety of small scale and cottage industries. Tiles industry, Cashew Kernel processing industry, Fibre Industry, Bell Metal works, safety match, Rice hulding, Tapioca Flour, Foot wear are some important small scale industries.

1.19.9 Education

This district is educationally advanced. Of 881 schools, there are (408 Primary, 149 Middle, 124 High Schools and 117 Higher Secondary Schools. There are four teacher training schools, 16 Arts and Science Colleges, One Teacher Training College, Nine Polytechnic colleges, four Industrial Training Institutes and five Engineering Colleges. In literacy, this district ranks first in the state with 87.75 percent literacy rate.

4.1.10 Transport

a) Road: This district is fairly well served by a net work of roads. The National Highways No.7, connecting Varanasi (U.P.) and Kanyakumari, passes through the Agasteeswaram taluk. The National Highways No.47, connecting Kanyakumari and Trivandrum passes through the Agasteeswaram, Kalkulam and Vilavancode Taluks. The State Highways No.14 also passes through the above three taluks. There are number of major district roads, panchayat union roads and panchayat roads. The total length of roads in the district is 3107 kilometer of which 53 kilometer of cement concrete, 1135 kilometer bituminous road, 846 kilometer of National Highways, 48.9 kilometer of State Highways, NH 47
kilometer. 56 (599/0-655/0), NH 7, KM 7 (222/4 – 231/6) and the balance come under other types.

**b) Railways:** Broad gauge railway line in the district is laid to 74.01 kilometer. The line is a part of the main railway lines connecting other parts of the country.

c) **Post and Telegraphs:** This district is well served by a network of Postal and Telecommunication Department. The Gazetted Head Office Grade I & II are located at Nagercoil and Thuckalay respectively. There are 13 LSGSO, 10 classes I SO, 25 classes II, SO, 27 class III SO, 30 EDSO and 141 EDBOS.

### 1.19.11 Electrification

This district gets its power from Kothaiyar hydroelectric project I and II with installed capacity of 60 MW and 40 MW respectively. There are five substations – Nagercoil with the voltage of 110/33-11 K.V. & 110/11 KV. Thuckalay 110/11 KV and 110/66 KV, Pechiparai 110/11 KV Kuzhithurai 110/11 KV Kottaram 38 /11 KV./ Maximum power is used for domestic, commercial and other purposes, only four percent of the total power is used by the agricultural sector. All the villages and towns are electrified in this district.

### 1.19.12 Unemployment

The number of unemployed who have registered their names with the employment exchange crossed over two lakhs in 1999 itself.

### 1.19.13 Labour Force

As per the census 2001, there are 4, 64,087 main workers, 24,044 marginal workers and 11, 12,218 non workers.

### 1.20 Scheme of Study

This thesis is organized into six chapters.

The first chapter makes an attempt to introduce the coconut palm among other plants, coconut plantations at the world level, coconut plantations in India and the Indian states, coconut plantations in Kanyakumari District, Origin
and development of coconut, varieties of coconut, economic importance and uses of coconut, coconut research, scope of study, statement of problem, objectives of the study, methodology used for collection of data, sampling technique, period of study, tools of analysis, hypothesis of the study, limitations of the study, concepts used, profile of Kanyakumari district and the scheme of work.

The second chapter highlights the review of earlier studies and socio economic conditions of sample respondents.

The third chapter highlights the area production and productivity of coconut and the factors limiting coconut production.

The fourth chapter attempts to analyse the details about measurement of the cost and return and the resource use pattern in coconut production.

The fifth chapter gives the details of channels of marketing and the producers’ revenue and share in the ultimate consumer price in different channel of marketing.

The last chapter presents summary of findings, suggestions, conclusion and relevant other aspect of the study.