CHAPTER – I

INTRODUCTION

Agriculture forms the backbone of the Indian “Economy”. Being the largest sector in India, agriculture is the source of livelihood for over 60 per cent population in the country. A farmer produces many products in his farm.

He also uses many inputs to produce his products. Some of the products like cotton, jute and sugarcane are useful to industries as raw materials. Sugarcane is an important crop useful to sugar industries as raw material. The sugar industries process them into value added products like sugar, sucrose, glucose and even ethanol. Ethanol is considered to be an essential item to the masses. So, the Government takes various measures to control sugar prices within certain limits. In consideration of the economic and social importance of sugar industries, the study is taken for the analysis.

Importance of Sugarcane

Sugar production in India depends upon sugarcane production. Thus, Sugarcane occupies a prominent position as a cash and commercial crop. Sugarcane is also used for making juice. In the early days, sugarcane was
used for making gur for the consumption of common people. In India, sugarcane is the third largest crop of the country, in terms of value next to rice and wheat.

**TABLE 1.1**

**WORLD SUGAR BALANCE**

<table>
<thead>
<tr>
<th>Particulars</th>
<th>Season 2008 – 09</th>
<th>Season 2009 – 10</th>
<th>Change Million Tons</th>
<th>Change %</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>146.076</td>
<td>143.784</td>
<td>(+) 2.292</td>
<td>1.6</td>
</tr>
<tr>
<td>Consumption</td>
<td>147.892</td>
<td>144.859</td>
<td>(+) 3.033</td>
<td>2.09</td>
</tr>
<tr>
<td>Surplus / Deficit</td>
<td>(-) 1.816</td>
<td>(-) 1.075</td>
<td>(-) 0.741</td>
<td>68.9</td>
</tr>
<tr>
<td>Import demand</td>
<td>42.882</td>
<td>40.758</td>
<td>(+) 2.124</td>
<td>5.2</td>
</tr>
<tr>
<td>Export Availability</td>
<td>43.643</td>
<td>41.607</td>
<td>(+) 2.036</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Source: ISO Quarterly Market Outlook, November 2010

Sugarcane is an important commercial crop in the country occupying about 4.36 million hectares with an annual production of 281.6 million tons (2007-08). Sugarcane occupies about 3.0% of the total cultivated area and it is one of the most important cash crops, contributing about 7.5% of the gross value of agricultural production in the country. About 50 million farmers depend on sugarcane cultivation for their livelihood and equal numbers of agricultural labourers earn their living by working in sugarcane farms.
Sugarcane is the primary raw material for all major sweeteners produced in the country. It also supports two important cottage industries; viz. Gur (Jiggery) and khandisari industries, which together produce about 10 million tons of sweeteners (gur and khandisari sugar) consuming about 28-35% of the sugarcane produced in the country.

**Availability of sugarcane**

At present, sugarcane is being cultivated throughout the country except in certain hilly tracts in Kashmir, Himachal Pradesh etc. The sugarcane growing areas may be broadly classified into two agro-climatic regions viz. sub-tropical and tropical. Major portion of sugarcane cultivation in India lies in the sub-tropical belt. U.P., Uttarakhand, Bihar, Chattisgarh, Punjab, Haryana are the important sugarcane growing States in this region. Sugarcane is also grown in a few pockets in Madhya Pradesh, West Bengal, Rajasthan and Assam, but the productivity in these States is very low.

Sugarcane is grown extensively in the tropical belt including States of Maharashtra, Andhra Pradesh, Tamil Nadu and Gujarat. As sugar cane, is a tropical crop, it has favourable agro climatic conditions for its growth in these States. The yields are substantially higher in the tropical belt as compared to the sub-tropical regions.
Details of areas and production of sugarcane in major sugarcane producing States during 2008-09 (peak) and during 2009-10 as per table 1.2.

**TABLE 1.2**

**AREA & PRODUCTION OF SUGARCANE IN MAJOR STATES**

<table>
<thead>
<tr>
<th>States</th>
<th>2008-09</th>
<th>2009-10</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area under cultivation (‘000 ha)</td>
<td>Production (000 Tons)</td>
</tr>
<tr>
<td>Andhra Pradesh</td>
<td>231</td>
<td>18508</td>
</tr>
<tr>
<td>Bihar</td>
<td>97</td>
<td>4.89</td>
</tr>
<tr>
<td>Gujarat</td>
<td>201</td>
<td>14066</td>
</tr>
<tr>
<td>Haryana</td>
<td>137</td>
<td>7640</td>
</tr>
<tr>
<td>Karnataka</td>
<td>373</td>
<td>37567</td>
</tr>
<tr>
<td>Maharashtra</td>
<td>590</td>
<td>53143</td>
</tr>
<tr>
<td>Punjab</td>
<td>108</td>
<td>6770</td>
</tr>
<tr>
<td>Tamil Nadu</td>
<td>316</td>
<td>34285</td>
</tr>
<tr>
<td>Uttar Pradesh</td>
<td>2011</td>
<td>115419</td>
</tr>
<tr>
<td>Others</td>
<td>11</td>
<td>482</td>
</tr>
</tbody>
</table>


The availability of sufficient quantity of good quality sugarcane in the mill area is an important pre-requisite for the factory to be economically viable. Further, the cost of transportation and deterioration in quality
increase significantly with the distance of the areas from where sugarcane is procured.

It is, therefore, necessary that suitable steps have been taken by the various stake holders (including State Governments) to ensure that sufficient sugarcane is developed and grown in the mill area for the purpose. Therefore scientific rationalisation of cane area will have a direct impact on the economy of the sugar industry to enable it to compete globally.

**Utilisation of Sugarcane**

Almost 35% of the 300 million tons of sugarcane produced in India are utilised to manufacture Gur and Khandsari and for chewing purposes. The manufacturing of Gur and Khandsari is predominant in Karnataka, Tamil Nadu and Uttar Pradesh but large quantities of Gur and Khandsari are also produced in Andhra Pradesh, Haryana and Punjab. The utilisations of sugarcane for production of sugar, gur and khandsari in these States during the period 2005 to 2010 are an increasing trend.

**World level Production**

During 2010, in terms of area under sugarcane production, India (3.75 million ha.) stood next to Brazil (5.77 million ha) and in terms of production of sugarcane also, India (232.32 million tonnes) stood next to Brazil (420.12
million tonnes). However, in terms of productivity per hectare of sugarcane, India (61.95 tonnes) stood tenth, the first nine countries being Colombia (92.29 tonnes), Australia (91.06 tonnes), Philippines (81.58 tonnes), Indonesia (72.86 tonnes), Brazil (72.85 tonnes), Mexico (70.61 tonnes), South Africa (69.63 tonnes), United States of America (66.63 tonnes) and China (65.16 tonnes). Lower productivity of sugarcane in India could be attributed to rising of sugarcane under diverse growing conditions by millions of farmers. This thing points out the need for taking suitable steps towards increasing the productivity of sugarcane in India.¹

In India, during 2008-09, the gross area under rice production was the maximum (45.6 million ha.), followed by wheat (27.7 million ha.), cotton (9.5 million ha.), bajra (8.7 million ha.), gram (8.2 million ha.), maize (8.0 million ha.), jowar (7.7 million ha.), groundnut (6.2 million ha.), and sugarcane (4.4 million ha.). Thus, in terms of cropped area, sugarcane stands ninth in the country.²

Importance of sugarcane production in India

The sugar industry in India plays a vital role towards socio-economic development in the rural areas by mobilising rural resources and generating higher income and employment opportunities. About 7.5 per cent of the rural population, covering about 45 million sugarcane farmers, their dependents and a large number of agricultural labourers are involved in sugarcane cultivation, harvesting and ancillary activities. About half a million skilled and semi-skilled workers, mostly from the rural areas are also engaged in the sugar industry\(^3\).

In India, the sugar industry is the second largest agro-based industry, next to that textile and contributes about Rs.1650 crore to the central exchequer as excise duty and taxes annually. Besides, the state governments realise about Rs.600 crore annually through purchase taxes, cess, etc. The total value of sugarcane produced in the country is estimated at Rs.24000 crore per year.

\(^3\) Directorate of Sugar, Revitalisation of Sugar Industry, Department of Food and Public Distribution, Ministry of Food, Consumer Affairs and Public Distribution, GOI, Krishi Bhavan, New Delhi, 14 July 2006
In 1980-81, utilisation of sugarcane output was maximum for the production of gur and kHANDSARI (55 per cent), followed by white sugar (33 per cent) and seed, feed and chewing (12 per cent). However, utilisation of sugarcane for white sugar production increased from 61 per cent in 2001-02 to 73 per cent in 2007-08, and that for gur and kHANDSARI decreased from 28 per cent to **15 per cent** during the same period. Thus, utilisation of sugarcane for white sugar production has been rising and for gur and kHANDSARI production, falling. For seed, feed and chewing, utilisation of sugarcane has been stable at about 12 per cent.

The production of sugar in India increased substantially from 164.53 lakh tonnes in sugar year (SY) 1995-96 to 201.45 lakh tones in SY 2002-03 and decreased to 135.46 lakh tones in SY 2003-04 and to 126.91 lakh tonnes in SY 2004-05. Particularly due to the onslaught of drought and white woolly aphid in major sugar producing states like Maharashtra, Tamil Nadu and Karnataka resulted fall in sugarcane production. That was because of the delayed payment of cane price and closure of some sugar mills. However,

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5 Sugar-year refers to the period from 01 October to 30 September.
considering the increasing price of sugar in the international market, the Indian sugar industry encouraged the sugarcane farmers to plant more sugarcane. Accordingly, there was substantial diversion of area from other crops to sugarcane in anticipation of higher return. The area under sugarcane cultivation from 3.662 million hectares in 2004-05 increased to 4.201 million hectares and 5.134 million hectares in 2005-06 and 2006-07 respectively. Sugar production increased substantially from 19.267 million tonnes in SY 2005-06 to 28.364 million tonnes in Sugar cane in year (SY) 2006-07 against domestic consumption of 18.945 million tonnes and 20.160 million tonnes in Sugar cane in year (SY) 2005-06 and Sugar cane in year (SY) 2006-07 respectively. Due to maximum sugar production in Sugar cane in year (SY) 2006-07, sugar exports increased substantially from 1.661 million tonnes in Sugar cane in year (SY) 2006-07 to 4.957 million tonnes in Sugar cane in year (SY) 2007-08.

The production of gur (including khandsari) in India substantially decreased from 98.62 lakh tonnes in 1992-93 to 56.94 lakh tonnes in 2002-03. This could be attributed to diversion of utilisation of sugarcane to manufacture white sugar on account of changed demand pattern. The

6 National Federation of Co-operative Sugar Factories Ltd., New Delhi, Co-operative Sugar, Vol. 40, No.10, June 2009
number of sugar factories in operation in India increased from 416 in 1995-96 to 455 in 2005-06. However, due to maximum production of sugarcane, in 2006-07 followed by 2007-08, this number increased to 504 and 516 in 2006-07 and 2007-08 respectively. As against the installed sugar production capacity of 189.85 lakh tonnes in 2004-05, utilisation of capacity was only 67 per cent. The lower utilisation of sugar production capacity during 2004-05 could be attributed to lower sugarcane production and higher installed sugar production capacity. However, in 2006-07, as against the installed sugar production capacity of 213.91 lakh tonnes, utilisation of capacity was of the order of about 133 per cent. The higher utilisation of sugar production capacity during 2006-07 could be attributed to maximum sugarcane production.

**Economic Significance of Sugar and its Exports**

The sugar export from India increased substantially from 8.87 lakh tonnes in SY 1995-96 to 49.57 lakh tonnes in SY 2007-08. The sugar import into India increased substantially from 0.42 lakh tonnes in SY 1995-96 to 1.24 lakh tonnes, 5.53 lakh tonnes and 16.00 lakh tonnes in SY 2002-03, 2003-04 and 2004-05 respectively. Thus, during the SY 1995-96 to SY 2007-08, the quantity of sugar exported was substantially higher than what was imported.
Sugar exported from India increased from 2000 tonnes (valued at Rs.0.91 crore) in the financial year 1990-91 to 16,62,370 tonnes (valued at Rs.1769.49 crore) in the financial year 2002-03 and decreased to 12,00,600 tonnes and 1004317 tonnes in the financial years 2003-04 and 2006-07 respectively, whereas sugar imported into India decreased from 17,65440 tonnes (valued at Rs.2245.85 crore) in the financial year 1994-95 to 320 tonnes (valued at Rs.1.11 crore) in the financial year 2006-07.

During the decade ended 2008, sugar export from India was maximum to United Arab Emirates (UAE) (5.40 lakh tonnes), followed by Bangladesh (3.74 lakh tonnes), Pakistan (3.50 lakh tonnes), Sri Lanka (1.62 lakh tonnes), Malaysia (1.32 lakh tonnes) and Yemen (1.17 lakh tonnes)\(^7\).

*The Government of India*, vide its notification dated July 04, 2006 had banned export of sugar purportedly to check inflation caused by rising sugar prices. International Sugar Organization (ISO) assessed the increase in sugar prices of different countries during October 2005 to April 2006 and stated that the increase in domestic price of sugar in India is "a mere tepid 10 per cent in aggregate terms over the past six months" compared to 58 per cent in

Brazil, 50 per cent in Russia and 27 per cent in China. The Indian sugarcane farmers and the sugar industry which had suffered major losses during 2003-04 and 2004-05 could recoup the losses incurred, by exporting sugar. Higher world market prices make sugar export a viable proposition, particularly when excess stocks are available beyond local needs.

In India, sugar is a prime requirement in every household. Almost 75 per cent of the sugar available is consumed by sugar based bulk consumers like bakeries, candy makers, sweet makers and soft drink and ice cream manufacturers. Industrial consumption of sugar is growing rapidly particularly from the food processing sector and sugar-based bulk consumers. A rising trend in usage of sugar could be attributed to greater urbanisation, increase in standard of living and change in food habit. While domestic consumption of sugar accounts for 98 per cent of sugar production in India, export accounts for the rest (long-run average).

India is the world's largest sugar consumer. On the basis of existing trend of sugar consumption and population growth rate of 1.6 per cent per annum, the estimated requirement of sugar by 2010 would be 24.3 million tonnes and the corresponding area required under cultivation would be around 5.5 million ha. The increase in area under sugarcane cultivation from
of 4.41 million ha. in 2008-09 to 5.5 million ha. only by 2010. This was not possible due to other competing crops, constant land area and water shrinkage and hence will necessitate improvement in productivity of sugarcane and sugar recovery, for which, research institutions have to play a very important role.

Khandsari sugar is less refined and is typically consumed by sweet makers. Gur is an unrefined form of lumpy brown sugar. It is mostly consumed in rural areas. Some quantity of gur is illegally diverted for alcohol production. The per capita consumption of white sugar in India increased substantially from 4.80 kg in 1960-61 to 19.10 kg in 2007-08 and that of gur and khandsari decreased substantially from 15.20 kg to 4.50 kg during the same period.

Molasses is the chief by-product of sugar industry and is the main raw material for alcohol production and alcohol-based industries in India. The production of molasses in the country increased from 6.5 million tonnes in 1994-95 to 13.11 million tonnes in 2006-07 and decreased to 11.31 million tonnes in 2007-08.

The second by-product of sugar industry is bagasse, which is the fibrous material left over after crushing. Sugarcane bagasse is the chief
source of power in the sugar mills. This is also being used as a raw material in the paper industry. In most sugar mills, co-generation of power, using bagasse as fuel is considered feasible. It has been estimated that about 3500 MW power can be generated annually without extra fuel and with investment much less than that required for generating the same through thermal power plants.⁸

The third by-product of sugar industry is press mud, which contains many plant nutrients and could be an important source of organic matter, major and micro-nutrients. By making use of by-products, many sugar factories have been establishing facilities to produce power, alcohol, ethanol, bio-compost, etc.

**Significance and Scope of the study**

Sugarcane is the raw material for the production of white sugar, jaggery [gur] and khandlsari. Utilisation of sugarcane for white sugar production increased from 61 per cent in 2001-02 to 73 per cent in 2007-08 and that for gur and khandlsari decreased from 28 per cent to 15 per cent during the same period. This could be attributed to diversion of utilisation of

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sugarcane to manufacture white sugar on account of changed demand pattern.

The sugar industry in India, finds itself entangled in a complex web of problems leading to "declining profitability to the cane growers as well as sugar industry". The reasons for the same are to be traced and suitably addressed to give a boost to this sector in the country. Unlike many western or major sugarcane growing countries, sugarcane is the only source of sugar in our country and therefore, any mismatch between demand and supply of sugar in the country assumes significance at the national level and influences the economics of sugarcane cultivation to a great extent. Often, the initiatives by the state governments in the form of fixing a remunerative sugarcane price on one end and pressurising mills to make payments within a reasonable time on the other end encouraged farmers to put in more area under the sugarcane crop. The initiatives of research institutions particularly of those directly involved with sugarcane crop are required to be listed in order to study the growth in productivity of sugarcane crop. The globalisation of the Indian economy started in early nineties is bound to direct the trade of agricultural commodities in the years to come. Keeping these aspects in view, the present study was undertaken in the three selected states viz., Karnataka, Uttar Pradesh and Haryana with the overall objectives
of studying production, marketing and other related aspects of sugarcane, sugar, jaggery and khandasari, including their price behaviour.

Even though the yield per hectare of sugarcane in India increased substantially from 30.9 tonnes in 1930-31 to 66.8 tonnes in 2008-09, the productivity of sugarcane in India is still lower when compared with that in several other countries. There is a need on the part of extension agencies to educate the farmers to follow the recommended cultivation practices to reap higher productivity gains in sugarcane.

Statement of the problem

Sugarcane production in India in recent times has undergone radical changes. After the introduction of New Economic policy in 1991 and its important packages like liberalization and globalization have affected our agriculture in a larger extent. Our farmers are forced to follow new and latest technologies so as to avoid inconvenience in our own traditional agriculture. More specifically commercial crop like sugarcane is also affected by the GMO (Genetically Modified Organism methods). These types of new agricultural practices hinge our production. The present research elaborately deals “Economic analysis of sugarcane cultivation in Karur District” and a detailed analysis is made to access real significance and
importance of this crop and also suggest certain ways and means of improving its productivity.

Objectives

The present study has been undertaken with the overall objective of studying production, marketing and other related aspects of sugarcane, sugar, jaggery including their price behaviour. The specific objectives of the study are as follows.

(1) To study the changes in area, production of organic and inorganic variety, productivity and prices of sugarcane sugar, jaggery, domestically and globally in Karur District.

(2) To estimate the cost and returns from production of planted and ratoon sugarcane, jaggery, sugar and analyse the profitability of production of these items in Karur District.

(3) To deal the input expenses incurred for organic and inorganic varieties of sugarcane production in this area.

(4) To study the constraints faced by sugarcane growers, jaggery producers, khandsari producers and sugar producers in production and marketing of sugarcane and suggest possible ways of evolving an efficient supply chain for sugarcane.
Hypotheses

Having the broad objectives in mind the researcher formulated the following hypotheses.

1. There is no significant differences of cost of production between planted and ratoon sugar cane in the study area.

2. There is larger variation of gross income of two types of sugarcane among the blocks in this district.

3. Production of sugarcane shows an increasing trend in the study years and its future production is also an increasing path.

4. Input – output of the planted and ratoon crops differ significantly in the district

Methodology and Selection of sample

The following methods and materials have been used by the researcher for the study purpose. Karur District was purposely selected for the study and purposive sampling technique was followed for the selection of sample sizes. In Karur District there are 4 taluks and 8 blocks. Kulithalai taluk and Karur taluk were selected and then blocks namely Kulithalai and Krishnarayapuram in Kulithalai taluk were selected. Similarly in Karur taluk blocks like K. Paramathi and Velayutham palayam are selected.
According to the Government revenue records there are only 1420 sugarcane growers’ cultivated sugarcane crop. Among 1420 growers 10% growers were selected as sample i.e.142 were taken into account for the study purpose. In the selection of samples the following criterion is followed.

The total number of sugarcane growers in this district was observed as 1420. This figure clearly states that these farmers are the only group cultivating sugarcane only and no other crops like paddy and groundnut growers, vermicultural crops like Sanappai and Thakkai Poondu, Crops like Betal leaves and paddy are grouped under different headings.

In this district among the 8 Blocks, 4 blocks are selected at random the names of blocks and villages selected for the study purpose is presented in the following table 1.3.

**Selection of Taluks**

In the selected area, the study is conducted in four taluks, having comparatively larger area under sugarcane crop and accounting for a major share of sugarcane production. Thus, the blocks which were purposively selected for the study were Krishmarayapuram, Kulithalai, K. Paramathi, and Velayutham palayam.
Selection of Blocks / Taluks, Villages, Sugarcane Growers and Other Sample Units

A total of 142 sample units were drawn for the purpose of the study from the study area in the 2 selected taluks among 4 blocks.

**TABLE – 1.3**

**PURPOSIVE SAMPLING TECHNIQUE FOR SELECTION OF SAMPLE SIZE**

<table>
<thead>
<tr>
<th>Name of the Taluks</th>
<th>Name of the Blocks</th>
<th>Villages covered</th>
<th>No. of samples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kulithalai taluk</td>
<td>Kulithalai Block</td>
<td>Vathiyam 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mettumaruthur 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mahathanapuram 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Krishnarayapuram</td>
<td>Kovakulam 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mayanur 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pichampatti 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vedichipalayam 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Koyampalli 20</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Minnampalli 10</td>
<td></td>
</tr>
<tr>
<td>Karur taluk</td>
<td>K. Paramathi</td>
<td>Nanniyur 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thennilai 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Velayutham palayam</td>
<td>Kasipalayam 10</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Najaipugalur 5</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Thotlakurichi 7</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vangal 5</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>4 Blocks</td>
<td>15 Villages</td>
<td>142 Samples</td>
</tr>
</tbody>
</table>

The details of sample units drawn in each Blocks are as follows.
The selection of sample \( n = 142 \) which includes both sugarcane growers, Jaggery producers Khandasari producers, commission agents and others involved in this agricultural operation.

In Karur District there are 4 Taluks and 8 Blocks are under the administrative control of District Collector among the 4 taluks, 2 taluks namely Kulithalai and Karur taluks are selected at random. In Karur taluk, blocks like K. Paramathi, and Velayutham Palayam and in Kulithalai taluk, Krishnarayapuram and Kulithalai Blocks are taken into the account for the study purpose. In the selection of blocks and village due consideration is given to the gross cropped area under sugar cane. The area under sugarcane cultivation is largely found in Velayutham palayam, Karur, and K. Paramathi rather than Kulithali and Krishnarayapuram, most of the farmers are showing keen interest in cultivating sugarcane in Karur taluks because of the existence of Pugalur sugar mills which would reduce the Transportation costs in sending their farm product to the crushing unit. In contrary, Kulithalai taluk farmers are not showing been interest in cultivating sugar cane, because of the inadequate water transportation costs and others. They are very eagerly cultivating Betal leaves, (Betal virus) Banana and Paddy.
Period of study

The period of study to be mentioned the agricultural year 2005-06 to 2009-10 and the valuation of inputs and outputs were done at the reference year prices.

Collection of Data

The data for the study was collected from both primary and secondary sources. Primary data from the selected sugarcane growers on production and marketing aspects of sugarcane covering, inter alia, operational holding, costs and returns for the area put under sugarcane, availability of inputs, credit, extension services, marketing facilities, etc. were collected by survey method, using the schedules designed for the study. Data on costs and returns from production of two types of sugar namely organic and inorganic, jaggery and khandsari are also collected, from producers of sugar, jaggery and khandsari respectively using the schedules designed for the purpose.

Secondary data collected from different published sources from Governments offices like Deputy Director of Agriculture, E.I.D Parry sugar factory, B.D.O taluk office and other offices production and productivity of sugarcane, production, consumption marketing of sugar and other products, etc.
Analysis of Data

Tabular analysis was adopted for analysing the data. The costs and returns from production of “planted” and “ratoon” sugarcane of 2 varieties group were estimated on “per acre” basis. Net income from sugarcane production with and without the imputed value of family labour was calculated by deducting the cost of sugarcane production with and without the value of family labour from the gross income. The costs and returns from production of sugar and jaggery (gur) were estimated on "per quintal" basis.

The sample sugarcane growers in Karur District was categorised into small and large farmers (possessing holdings of less than or equal to and more than five acres) respectively and costs and returns from sugarcane production were worked out for each category.

Statistical tools

Prominent statistical tools like ARIMA Autoregressive Integrated Moving Average, Auto – correlation, Partial Auto correlation function (PACF) and Partial Auto – Correlation of Residuals are used to prove the formulated hypotheses. Besides, simple graphs, diagrams, pictograms and charts were also used wherever it was necessary.
Cobb-Douglas type of production function was applied for studying the relationship between the output of sugarcane and the various input variables. The following type of equation was used:

\[ Y = aX_1^{b_1}X_2^{b_2}X_3^{b_3}X_4^{b_4}X_5^{b_5}X_6^{b_6}X_7^{b_7}X_8^{b_8}e^u \]

where \( Y \) = apple production in rupees, \( X_1 \) = number of trees, \( X_2 \) = human labour in man-days, \( X_3 \) = expenditure on manure and fertilisers (Rs.), \( X_4 \) = expenditure on plant protection measures (Rs.), \( X_5 \) = expenditure on fixed capital (Rs.), \( X_6 \) = dummy variable, \( X_7 \) = management index, \( X_8 \) = establishment and maintenance cost (Rs.), \( e^u \) = the error term, \( a \) is the intercept and \( b_1 \) to \( b_8 \) are the elasticity coefficients.

Limitations of the Study

This research exclusively deals the Economics of Sugarcane cultivation in Karur District over a period of 5 years say 2005-06 to 2009-2010 only, hence the data pertaining to the cost of cultivation and yield are only from the memory of the growers and they have not been maintained any systematic accounts. There may be the possibility of exclusion of some marketing costs. The selection of sample is only from 2 taluks and from 4 Blocks alone because of time constraint. The findings of the study cover the four selected major sugarcane growing blocks. However, since they are
based on a relatively small sample, generalisation of the findings at macro level must be done carefully.

**Chapter Scheme**

This thesis is arranged in the following chapter headings

Chapter - I  Deals with introduction, Importance and statement of the problem, Scope - Objectives - Hypotheses — Methodology - Limitations and Chapterisation

Chapter - II  Concepts and Review of Literature

Chapter - III  Profile of the Study Area

Chapter - IV  Sugar cane production in India

Chapter - V  Economic aspects of sugar cane in India

Chapter - VI  Analysis and Interpretation

Chapter – VII  Findings, Problems, Policy recommendations, and Conclusion