CHAPTER III

METHODOLOGY AND PROFILE OF THE STUDY AREA

This chapter attempts to present the methodology adopted for the study. Further it describes the profile of the study area.

3.1 METHODOLOGY

In order to draw meaningful results from the analyses of data, an appropriate sampling design has to be followed. The selection of tools of analysis has to be done with care for substantiating the results empirically and also to arrive at appropriate policy options of the study. In sum, a proper research design is inevitable to conduct the research in the desired direction. Therefore, this chapter describes the sampling design, data collection procedures, econometric models and other analytical tools employed in the study.

3.1.1. Selection of the Study Area

Tirunelveli district was selected for the present study, as it is one of the most important banana producing districts in Tamil Nadu. The robusta banana of Cavendish variety is widely grown in this district. Further, this district, as mentioned earlier, is an important source of the supply of robusta banana to
Bangalore city of Karnataka state and various markets in Kerala, Andhra Pradesh and Tamil Nadu.

In Tirunelveli district, Sankarankoil, Ambasamudram and Radhapuram blocks had more than 70 per cent of area under banana and hence these blocks have been purposively chosen for the present study. Since the present study revolves round production and marketing of banana, three blocks of Sankarankoil, Ambasamudram and Radhapuram which had more area under banana were selected for the study.

3.1.2. Sampling Technique

The multi-stage random sampling technique has been adopted taking Tirunelveli district as the universe, the taluk and block as the stratum, the village as the primary unit of sampling and the banana cultivators as the ultimate unit.

Tirunelveli district comprises of 11 blocks, among them Sankarankoil, Ambasamudram and Radhapuram blocks which accounts more than 70 per cent of the area under banana in the district has been selected for the study. Five villages in each block which account for higher area under banana cultivation have been selected to select 300 banana cultivators from these 15 villages by adopting proportionate probability sampling technique.
3.1.3 Selection of Middlemen

In the study area, marketing of banana is done through different channels of distribution. Majority of the sample growers prefer the sale to pre – harvest contractors who make advance payment a few months before the harvest of banana on the condition that the entire produce should be sold to them at the price prevailing at the time of harvest and they bear the cost of cutting, loading, transporting, unloading, commission paid to the agents or whole sale merchants.

Besides the pre–harvest contractors, the banana farmers sell their produce directly to the wholesalers who are prepared to buy banana at the orchards of the growers. The growers resort to the cutting, packing and loading and transporting banana at their own cost and the wholesaler pays the full price of the produce. In all 25 pre-harvest contractors and 15 wholesalers and 10 retailers were selected randomly from the two blocks for the study.

3.1.4. Study Period

A pre survey was conducted in the study area during April 2010 in order to test the interview schedule and the data related to the agricultural year 2010-11 were collected.
3.1.5 Method of Analysis

In order to achieve the objectives of the study, 300 sample banana cultivators were stratified into categories, namely Robusta and Nadu varieties of banana. Out of 300 sample cultivators, 134 sample cultivators are under the category of Robusta and remaining 166 sample cultivators come under Nadu variety. In each variety, the sample cultivators can be divided into two groups namely small and large farm cultivators based on area under banana. For that, frequency tables were formed in each variety on the basis of area and its cumulative total was also worked out. The farms less than 5 acre were grouped on small size and farms more than or equal to 5 acre are grouped as large farms. In the Robusta variety, out of 134 sample cultivators, 85 belong to small size and remaining 49 belong to large size. In the Nadu variety, out of 166, 104 belong to small size and remaining 62 belong to large size.

3.1.6 Collection of Data

In order to get an insight into physical and economic environments of the blocks, a reconnaissance survey of the district and the blocks were undertaken. The primary data required for the study were collected through personal interview with the help of pre–tested and comprehensive interview schedule. Two separate schedules were prepared, one for the farmers and the other for the functionaries. The schedule for the farmers covered aspects such as family size, educational
status, assets position, cropping pattern, availability of land, labour, machine and animal power, cost of cultivation of banana, input - output relationships, net return from the crops, problems in production and method of marketing, problems encountered in marketing. In the marketing schedule, operation of the merchants, expenses incurred in marketing and problems in marketing were collected from the market functionaries. Besides information about the cost incurred and profit realized by the different market functionaries were also collected for working out the marketing cost and price spread. The data collected were tabulated, processed and subjected to statistical analysis.

To understand the basic agricultural system in the study area, data on soil condition, land utilization, cropping pattern, agro – climatic features and other available facilities were collected from published and unpublished records available at various government and quasi government departments

3.1.7 Measurement of Variables

The methods of measurement and valuation of variables are presented below:

i. Suckers

The cost of suckers was the values arrived at the market price, namely the quantity of suckers used by the sample farmers multiplied by the market prices prevailed.
ii. Machine Labour

The cost of machine labour was computed at the prevailing hire charges of Rs.250 per hour in the study area.

iii. Human Labour

Human labour is measured in terms of mandays equivalents. The permanent labour and the hired labour were treated alike and converted into common physical unit in terms of mandays equivalent. For hired labour, wages paid to the labour, both men and women, for the cultivation of banana were taken into account.

iv. Manures, Fertilizers and Plant Protection Chemicals

Fertilizers and plant protection chemicals were valued at actual price paid and farm produced manure was valued at the prevailing market rates.

v. Land

The cost of land was computed based on the prevalent rent if it was leased. In the case of owned land, the rental value equivalent prevailed in the area for the similar type of land was considered.
vi. Depreciation

It was worked out by straight-line method at the rate of five per cent for farm buildings and ten per cent for farm equipments and implements.

vii. Interest on Working Capital

The working capital was charged at the interest rate of 12.5 per cent per annum, since this is the interest rate charged by commercial banks for short term credit.

3.1.8. Tools of Analysis

3.1.8.1. Conventional Analysis

Statistical methods like simple percentages and averages were used to examine age, educational status, size of operational holdings, marketing cost, income distribution and returns.

3.1.8.2. Functional analysis

Production Function Analysis

Different methods were used to estimate the economic efficiency in agriculture, of which the production function approach is one. Generally, the efficiency of input use in any economic activity is evaluated by comparing the marginal productivity of factors of production with their prevailing market prices. To achieve optimum allocation of resources, therefore, it is necessary to know the
marginal and not the average productivity. Marginal productivity can be known only if the entire technical relationship between output and inputs are known.

The following form of log linear regression model was computed to identify the determinants of yield of banana of Robusta and Nadu varieties and of the small and large farms producing these varieties.

$$\log Y = \beta_0 + \beta_1 \log X_1 + \beta_2 \log X_2 + \beta_3 \log X_3 + \beta_4 \log X_4 + \beta_5 \log X_5 + \beta_6 \log X_6 + u$$

where,

- $Y =$ Per acre yield in kgs.
- $X_1 =$ Human labour per acre (in Rs.)
- $X_2 =$ Suckers per acre (in Rs.)
- $X_3 =$ Fertilizers per acre (in Rs.)
- $X_4 =$ Pesticides per acre (in Rs.)
- $X_5 =$ Irrigation cost per acre (in Rs.)
- $X_6 =$ Capital flow per acre (in Rs.)
- $u =$ Disturbance term,
- $\beta_0 =$ Intercept
- $\beta_i =$ Regression (slope) coefficient, $i = 1,2,\ldots,6$.

The above model was estimated by the method of least squares.
The structural differences between the two group of farms, that is variety-wise and size-wise, were tested by using Chow’s\textsuperscript{1} test. The formula used was:

\[
F = \frac{\sum e^2 - (\sum e^2_1 + \sum e^2_2)/k}{(\sum e^2_1 + \sum e^2_2)/n + n_2 - 2k}
\]

where,

\[
\sum e^2 = \text{Unexplained or Residual sum of squares of the pooled sample of both the varieties/both the small and large farms.}
\]

\[
\sum e^2_1 = \text{Unexplained or Residual sum of square of the sample corresponding to the variety Robusta/Small farms.}
\]

\[
\sum e^2_2 = \text{Unexplained or Residual sum of squares of the sample corresponding to the variety Nadu/large farms.}
\]

\[
k = \text{The number of parameters included in the regression model,}
\]

\[
n_1 = \text{Number of observations of variety Robusta/small farms,}
\]

\[
n_2 = \text{Number of observations of variety Nadu/large farms.}
\]

In the ‘F’ test carried out, if the computed value of ‘F’ is less than the table value at 5 per cent level of significance at (k, n_1+n_2-2K) degrees of freedom, the null hypothesis, that there is no structural difference between the two samples either variety-wise or size-wise is accepted. In case of structural differences were found to exist between two farm groups dummy variables were introduced in the

regression model both at the intercept and the scope levels to find out whether the difference occurred at the intercept level or at the slope level or both.\(^2\)

The structural difference between the two farm groups is tested by using the regression model of the following form

\[
\log Y = \beta_0 + \beta_1 D + \sum_{i=1}^{6} \beta_i \log X + \sum_{j=1}^{6} \tau_j \log X_j + u
\]

In the above model, D is the dummy variable. The dummy variable represents 0 and 1 for Robusta and Nadu variety respectively in variety-wise analysis and for small and large farms respectively in size-wise analysis.

### 3.1.9. Cost concepts

All the cost concepts used in farm management studies, namely Cost A\(_1\), Cost A\(_2\), Cost B\(_1\), Cost B\(_2\), Cost C\(_1\) and Cost C\(_2\) were used in the present study.

The details of cost concepts are as under

**Cost A\(_1\)**

1. Value of human labour
2. Value of manures and fertilizers
3. Cost of suckers
4. Irrigation charges
5. Value of plant protection charges
6. Land revenue, cess and other taxes

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7. Depreciation on implements, machinery, buildings, irrigation structures etc.

8. Interest on working capital and

9. Miscellaneous expenses

Cost $A_2$ : Cost $A_1$ plus rent paid for leased in land

Cost $B_1$ : Cost $A_2$ plus imputed rental value of owned land plus interest on fixed capital (excluding land)

Cost $B_2$ : Cost $B_1$ plus rental value of owned land

Cost $C_1$ : Cost $B_1$ plus imputed value of family labour

Cost $C_2$ : Cost $B_2$ plus imputed value of family labour

3.1.10. Income Measures

1. Gross income : Value of main product plus value of by product

2. Net income : Gross income – Cost $C_2$

3. Farm business income : Gross income – Cost $A_2$

4. Owned farm business income : Gross income – Cost $A_2$

5. Family labour income : Gross income – Cost $B_2$

6. Family investment income : Net income plus rental value of owned land plus interest on fixed capital