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MANUAL

ON

COST OF CULTIVATION SURVEYS

Preface

One of the mandates of the Central Statistical Organisation (CSO) is laying down norms and standards and evolving concepts, definitions, methodology and classification in relation to statistics. Even though CSO has been performing this mandate in many fields of statistics, the absence of proper documentation in this regard led to a decision to prepare statistical manuals in respect of 24 subjects detailing concepts, definition, classifications, data collection procedures, compilation of data, estimation procedures, dissemination and other relevant explanatory notes, including methodological framework in the statistical indicators/ statistics to make the manual a comprehensive reference book comparable to the manuals being produced by the UNSD from time to time.

This manual on 'Cost of Cultivation Surveys' is aimed at putting all the materials on these Surveys, being carried out in India as well as in some other countries at one place so that it may be possible to grasp the technical and other related aspects of the surveys. The manual has been prepared in the Indian Agricultural Statistical Research Institute(IASRI) under the guidance of a Steering Committee headed by Director General, CSO, constituted for preparation of the manuals. I am thankful to Dr.S.D.Sharma, Director, IASRI and his team of officers, namely Dr. U. C. Sud, Principal Scientist and Dr. Ashok Kumar, Senior Scientist , for their hard work in preparing the manual. Thanks are also due to Dr. S. M. Jharwal, the then Principal Adviser, Directorate of Economics and Statistics, Ministry of Agriculture, Government of India and his team of officers for their expert suggestions/comments on the draft which have been duly considered in its finalization.

I hope that the manual will serve as a useful reference document on the subject. Any suggestion to further improve its contents is most welcome.

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DG, CSO

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List of Acronyms

1	AAEA	American Agricultural Economics Association
2	APCAS	Asia-Pacific Commission on Statistics
3	ARMS	Agricultural Resources Management Study
4	CAU	Central Analytical Unit
5	COP	Cost of Production
6	DESMOA	Directorate of Economics and Statistics in the Ministry of Agriculture
7	ERS	Economic Research Service
8	FAO	Food and Agriculture Organization
9	FARMAP	Farm Analysis Package
10	FARMAP	Farm Management Analysis Program
11	FASYDB	Family System Data Base
12	GDP	Gross Domestic Product
13	HYV	High Yielding Variety
14	ICA	International Cotton Advisory
15	MSP	Minimum Support Prices
16	NASS	National Agricultural Statistics Service
17	OAE	Office of Agricultural Economics

CHAPTER - I

Introduction

Cost of cultivation surveys are an important mechanism for data generation on cost structure of crops. These are very intensive surveys wherein data are collected on the various inputs which are used for the cultivation of crop. The data collection approach in these surveys is inquiry based which implies that the information on the input use is obtained by inquiry from the farmer. Use of input is a continuous process which goes on from beginning to end. In order that no information on input use is missed, data collection under these surveys is generally carried out in multiple rounds. Thus the farmer is visited repeatedly during the growth stage of the crop and during the time of harvest so that the information on input use is correctly and properly recorded. As a result a huge volume of data is generated through these surveys. The data so collected is generally used to work out cost per unit area or cost per unit weight.

The administrators and policy planners are the prime users of cost of cultivation data for policy formation. Many other organizations use this data for micro level decision making while the individuals use the data for research purpose. In view of the utility of this data it is desirable that the cost of cultivation survey is statistically well planned so that the required information can be obtained efficiently and precisely. It is appropriate to mention that due to the changes taking place at the global level the importance of cost of cultivation data has increased manifold. This is attributable to the phenomenon of global competitiveness which implies that those who are efficient and can produce at competitive prices will survive. In this changing scenario cross country comparison of cost of production data is a practical necessity. The cross country comparisons are meaningful only if the system of data collection is based on uniform methodology. This particular aspect of cost of cultivation surveys is a problem area. Despite the fact that these surveys have been carried out for long across countries there is still no uniform methodology followed in carrying out these surveys. The details on cost of cultivation surveys and some of the issues are discussed in this manual.

1.1 Development of statistical system of the sector in India

India has a long history of conducting studies on economic and financial aspects of farm enterprises. Before independence such studies were seen as important data source for affecting improvement in agriculture. Immediately after independence, farm management studies were initiated on a large scale with the purpose of making policies in the agriculture sector. A scheme entitled "Studies in the Economics of Farm Management in India" was started by the Directorate of Economics and Statistics, Ministry of Agriculture in six region of the country i.e. Bombay (Maharashtra), Madras, Punjab, Uttar Pradesh and West Bengal in 1954-55. Madhya Pradesh was subsequently included in 1955-56.

The scheme was started primarily with the objectives of collecting farm management data in the six regions and to formulate a design for a future programme of studies including making a choice between the two methods of data collection viz. farm survey method and the cost accounting method. A multi-stage random sampling design was followed for the collection of data. The districts and the villages under the scheme formed the first and second stage unit of sampling while the ultimate unit of sampling was household. The districts and villages were selected in such a manner so as to cover the major crops identified for the study. Although a common schedule was canvassed for data collection for the regions, the incharge of the region was given some degree of freedom for including or excluding certain items in the schedule depending upon the conditions specific to region. Six regions/states viz., Bombay (Maharshtra), Madhya Pradesh, Madras, Punjab, West Bengal and Uttar Pradesh were selected covering two districts from each regions/states. Ahmedabad and Nasik from Bombay covering wheat, jowar and bajra; Akola and Amravati from Madhya Pradesh covering jowar, cotton & groundnut; Salem and Coimbatore from Madras covering paddy, jowar & cotton; Ferozepur and Amritsar from Punjab covering wheat & cotton; Meerut and Muzaffernagar from Uttar Pradesh covering wheat & sugarcane; 24 Pargana and Hoogly form West Bengal covering paddy & jute.

Three states namely Orissa, Bihar and Karnataka were included in the scheme in the year 1959-60 to 61-62. Other states like Haryana, Rajasthan, Gujarat, Andhra Pradesh and Assam were also included in the subsequent years.

Farm management studies continued in the first six states so to cover some more districts and in some cases the studies were repeated. These studies were carried out in block of three years.

Although a wealth of data was generated out of the scheme, the collected data lacked consistency and uniformity in terms of concepts and definitions, data availability at regular time interval. Due to these weaknesses the data was found inadequate for policy formation at the National level. As a result these studies were discontinued.

In the light of the experiences gained in planning and organization of the scheme on Farm Management Studies a scheme entitled "Comprehensive scheme for cost of cultivation of principal crops" was launched in the year 1970-71. This scheme was meant to collect continuous and representative data on cost structure of crops. A uniform set of schedule were devised for the collection of data so that the data belonging to different regions can be compared.

The scheme began in the modest way covering two crops namely wheat and Bajra. With time more crops were added. Currently twenty nine crops are being covered under the scheme. The working of this scheme was reviewed two time. The first review was made in the year 1980-81 by a committee constituted by the Government of India headed by Prof. S. R. Sen the then Economic and Statistical advisor while the second review was made in the year 1990 by another committee headed by Prof. C.H. Hanumantha Rao. The details of the scheme and the reviews made are covered in the fourth chapter.

1.2 Need for statistical standards

Cost of cultivation surveys are an important data source for decision making at the macro as well as micro level. Accuracy of information generated out of these surveys is, therefore, of paramount importance. This can be ensured by proper planning of the survey, so that the sampling as well as non-sampling errors are minimized. Of equal importance is the question of how efficiently the cost of cultivation data can be collected. Proper designing of the survey by judiciously making use of the information available from other surveys and censuses will go a long way in collecting the data needed in an efficient manner.

Cost of production studies are undertaken with a view to get information for a class of cultivators belonging to a particular region or an area called as the population.

The number of such cultivators is expected to be very large. The cost and time involved in collecting information on every cultivator belonging to a region will be prohibitive. At best, the information can be obtained from a sample of cultivators. This sample-based information can be used to draw inferences about the population. The inferences about the population in the context of cost of cultivation surveys may be in the form of framing estimators of parameter of interest like cost of production per unit area or per unit weight. The inferences drawn about a population from the sample will be valid if the sample is representative as well as it is selected by random sampling mechanism. In this context availability of the frame of sampling units is a prerequisite for selection of random samples. However, if the frame of sampling units is not available there are ways to tackle this problem. While random selection can be implemented with the use of random number tables, representative ness of the sample can be ensured depending upon the structure of the population. In what follows we give some of the examples of selection of representative samples. If the population under study is homogeneous then the sample can be selected by simple random sampling, but if the population is very heterogeneous it can be divided into homogenous groups called “strata”. Samples can then be selected from every stratum in proportion to the size of strata such that the sum of selected samples from the strata is equal to the desired sample size.

As mentioned earlier, generally inferences about the population are to be drawn on the basis of a selected sample. Thus, there will always be a difference between a sample based estimator and the parameter to be estimated. This difference between the estimator and the parameter is called sampling error. Thus the sampling errors arise out of the phenomenon of observing only part of the population and framing estimates about the parameter of population on the basis of observed part. The performance of an estimator is generally judged by the magnitude of sampling errors of an estimate. The assessment of the extent of sampling errors is made in terms of standard error of the estimator. The standard error as a criterion of the performance of an estimator is invoked when the estimator under consideration is unbiased. However, in case the estimator is biased, the criterion of root mean square error is used for judging the performance of the estimator. The greater the standard error or the root mean squared error, the poor is the performance of the estimator. The standard error of an estimator can be decreased by increasing the sample size. But

this implies corresponding increase in the cost. Thus, in deciding about the sample size a balance is required to be made between cost and precision.

The performance of an estimator is also affected by non-sampling errors. These errors arise during data collection and data processing stage. Unlike sampling errors, non-sampling errors may be common to both complete enumeration surveys and the surveys conducted on the basis of a sample. Non-sampling errors may be controlled by carefully devising schedules for data collection, by giving proper training to the enumerators employed for data collection, adequate supervision of data collection work of the enumerators and some other measures like proper scrutiny of the collected data, taking necessary care at the tabulation of data and analysis stage.

Major issues involved in cost of cultivation / production studies like methodology to be adopted; proper designing of such studies at the planning stage are items of debate at the international level. The need for a uniforms methodology for cost of production surveys has arisen due to the changes taking place at global level. The cost of production / farm income studies are being increasingly planned at the global level. Food and Agriculture Organization (FAO) is promoting organizations of cost of production studies in many developing countries by arranging consultants who are providing the necessary expertise. As a result country level cost of production data is available now more than ever before. However, due to lack of adoption of uniform methodology in the process of data collection, inter country comparison of cost data is still a constraint.

In the present scenario, due to advancement in computer technology and IT sector, analysis of cost of production data is not a issue any more. The FAO has developed a computer software package called FARMAP which makes cost data validation and subsequent analysis possible. More or less on same lines a computer software, also named FARMAP, for cost data validation and analysis, has been developed in India with the assistance of FAO.

In this back drop, it has become imperative to devise a statistically standardized information generating system to obtain accurate data at the primary stage of data collection through well designed survey methodology. For this there is a need to develop a statistically sound methodology to standardize the information generating system at primary level of data collection to generate accurate estimates comparable at country and inter-country levels.

1.3 Purpose of the manual

The purpose of writing this manual is to put all the material on cost of cultivation surreys as are being carried out, the world over in general and in India in particular, at one place so that the reader of the manual can grasp the technical and other related aspects of cost of cultivation surveys. Although the perspective of the manual is global, the thrust of the manual is on technical aspects of cost of cultivation surveys as are being carried out in India and work carried out by the FAO, Rome because of the ready availability of all the details. Thus, the manual will cover importance of the sector, concepts and definitions commonly used in cost of cultivation surveys, different indicators on which data are collected, sampling methodology followed in these surveys in general and in India in particular, data collection in the cost of cultivation surveys, important agencies in India and in some other countries involved in data collection, frequency and method of data collection, statistical standards adopted in implementing the cost of cultivation surveys.

1.4 Organization of the manual

The first Chapter of the manual on Cost of Cultivation Surveys besides highlighting the importance of the topic dwell upon development of statistical system of the sector in India. In view of the importance of cost of cultivation surveys in generating valuable data, it is essential that such surveys are statistically designed so that the required information can be obtained in a precise manner. Thus, Chapter-I elaborates on the need for statistical standards in organizing cost of cultivation surveys so that the sampling as well as non-sampling errors are within controllable limits. Chapter-I of the manual also provides in brief the purpose of the manual.

Chapter-II of the manual provide concepts and definitions which have been given by some of the International Organizations like the Food and Agricultural Organization (FAO). It also gives an account of classification of various items of cost which are used in cost of cultivation surveys.

Significance of the sector and various indicators used in cost of cultivation surveys form the main theme of the Chapter-III. A very important consideration in estimating the cost of cultivation of a commodity is identification of various inputs which are to be accounted for in estimating the cost. Cost incurred in respect of some of the inputs can be directly measured while for some other inputs the cost needs to be imputed. Correct assessment of cost of cultivation will directly depend on objectively assessing the inputs and imputation procedure to be included in the cost. Accordingly, various methods used in measurement of different items of cost are discussed in detail.

Chapter-IV of the manual covers the comprehensive scheme for cost of cultivation of principal crops as is being implemented in India. Technical details of the scheme, reviews made in the comprehensive scheme from time to time and the current status of the scheme are covered. Some aspects of data analysis under the comprehensive scheme, estimation procedure used in the scheme for the purpose of generation of cost estimates are also covered in this chapter.

Chapter-V of the manual provide an account of cost of cultivation surveys as are being carried out in countries other than India. In this context the role of FAO in improving the Farm Management Decision Support System is outlined in detail. Also provided in this chapter are recent modifications suggested by the American Agricultural Economics Association as are some of the methodological issues of current interest. This chapter is concluded by debating some of the issues related to cost of cultivation data dissemination.

CHAPTER - II

Concepts, Definitions and Classifications

In order to avoid any ambiguity in survey methodology of data collection for cost of cultivation of crops or livestock it would be necessary to have a clear understanding of certain basic concepts. The conceptual framework of various indicators include definitions and classifications. These indicators are important for cost of cultivation surveys particularly in view of the fact that the assessment of cost of cultivation is made on the basis of several components, which are added together.

2.1 Concepts and definitions

Concepts and definitions which are commonly used in cost of cultivation are discussed in this Chapter.

Farm Household

In this section we elaborate on various concepts and definitions given by International Organizations like the FAO in the methodology of cost of cultivation surveys.

A household can be defined as a group of people who share food regularly, and usually live in the same house or group of houses. A household is classified as farm/farmer household if it possess some land and if at least one of its member is engaged in agricultural activities.

For the purpose of economic analysis, the farm household is the sum of all the productive activities of its members, remunerated and unremunerated. Farm includes plant, animal, fish and forestry production, but also artisan production at house, such as weaving, handicrafts, small rural industry as well as intermittent local off farm employment. Non-farm includes long-term off farm employment such as service, remittances from farmer household members living in other places and off farm investments such as taxi. Capital formation is work and investment made to increase production in future years. It is important to report farm household expenditure income separately from agriculture and non-agricultural farm activities.

Activities and components

An activity is a process using a given technology, which combine inputs to generate particular outputs for sale, barter or home consumption. A farm household can be subdivided into various activities.

An activity, in turn, may be composed of a group of associated processes called components. A component is a process that combine inputs shared with other processes to produce an output, or that, with other processes, produces a joint output. Individual component in an activity are so closely associated with the other components that it is difficult to define it separately in an economically meaningful manner. For example, maize in inter-cropped maize-beans.

Mixed activities

Mixed activities have several components and there is no limit to the number of components in a mixed activity. For example, in maize-beans inter cropping, the components are (i) maize (ii) beans and (iii) whole mixture (for data, such as ploughing in land preparation, that cannot be separated for each component).

Special Activities

In addition to plant and animal production, many other type of activities exist on farms like processing of agricultural products, grading, fishing, carpentry, herbal plant collection, handicraft and off farm work. Table-1 shows some examples of the activities.

Table-1: Some examples of each type of activities

Activity	**Characteristics**	**Example**
Plant	Plants	Wheat, Rice, nursery etc.
Mixed	All mixes of animal Plant, special activities	Cattle-coconuts, Maize-beans, weaving, handicraft
Animal	Large and small animals and birds	Poultry, buffalo
Special	Non-animal non-plant production including off farm	Handicraft, food processing, fishing
Domestic	Family welfare	Child care, household work
General	Not allocated to a particular activity	Fence repair, guarding
Non –farm	Not related to management of farm resources	Permanent farm employment
Capital formation	Contribution to capital	Well digging, terracing

These diverse activities merit attention since they are an important source of income and they absorb scarce resources. This concept of special activities also allows the analysis of machine use, irrigation water use efficiency and efficiency of storage.

Parcel, plot and season

A farm can be divided into various parcels of land. A parcel is one piece of land with identical tenure and physical characteristics. If one part of a piece of land differs from the rest in one of these respects, the piece of land should be considered to be two parcels. A parcel, in turn, can be divided into plots. A plot is a part of a parcel devoted to one activity. For parcels planted to seasonal crops like maize but the boundaries of the plots in a parcel may change in different seasons. Here the season needs to be defined clearly. A plot-season is a part of parcel devoted to one activity in a particular season. Therefore, a parcel includes different plots referring to a particular season.

Stocks and flows

The stock of a resource or product is the amount (measured either in physical quantity or value) of that resource or product actually held at a given time. A flow of resources or product is the amount (measured either in physical quantity or value) of that resource used or that product produced during a particular period of time. The direction of the flow depends on the measurement method used. Resources flowing into a production process are called inputs and flowing out of production process are called output if measured in physical quantities.

Table-2: Financial and Economic Measures based on Stock and Flows

Assets	Total stock of resources and products on a given date.
Liabilities	Total stock of debts on a given date
Net worth	Assets minus Liabilities on a given date. It represents a measure of potential income.
Gross Income	Inflow of value of products during a given period.
Cost	Outflow of value of resources used during a given period
Net Income	Gross income minus cost during a given period of time represents current benefits.
Net cash flow	Inflow of all cash minus outflow of all cash during a given period. It shows the need for cash during a period. Generally calculated on month-to-month basis to assess the cash needs during the year.
Net kind flow	In flow of all non-cash value during a given period. It shows need for kinds during a period. It is important in substance farming.

The value of products flowing into the farm household is the income, while values of resources flowing out of the farm household are the costs, if resources are measured in terms of value. The financial and economic measures based on stock and flows are presented in Table-2.

Labour Units

Labour units are standard units for the measurement of the stock of labour in the household. They are calculated by assigning the appropriate labour unit equivalent to each household member and multiplying that by the percentage of time the member was available for work in the farm household during the previous year. Farm Management and Production Economics, FAO recommended labour unit equivalents are given in Table-3.

Table-3: Labour unit Equivalents

Age group	Age	Unit Equivalents
Child	0-9	0.0
Youth	10-15	0.5
Adult	16-59	1.0
Old	60 and above	0.5

Different labour unit equivalents are assigned to men and women in some countries justifying the lower pays to women. It is observed that men and women doing the same work do not show any significant difference in work efficiency, therefore labour flow (inputs) should not be weighted by labour units equivalents. If actual hours are measured, and not days, the lower productivity of youth and old people will be reflected in the shorter hour worked.

Consumer units

Consumer units are standard units for the measurement of the stock of consumers in the household. Consumer units are calculated by assigning the appropriate consumer unit equivalent to each household member, and multiplying that by percentage of time the member was living in the farm household during the year. Consumer unit equivalents recommended by FAO's Nutrition Service are given in Table-4.

Table-4: Consumer Unit Equivalents

Age-sex	Age	Consumer unit equivalent
Male		
Child	0-9	0.50
Youth	10-15	0.75
Adult	16-59	1.00
Old	60 and above	0.90
Female		
Child	0-9	0.50
Youth	10-15	0.75
Adult	16-59	0.80
Adult*	16-59	1.00
Old	60 and above	0.70

*Pregnant and Lactating adult women.

Animal Units

Animal units are standard units for the measurement of the stock of animals managed by the household. Animal units are calculated by multiplying the number of each type of animal in each age group by the appropriate animal unit equivalent. Animal unit equivalent developed by John de Boer of Winrock International for the FAO are given in Table-5.

Table-5: Animal Unit Equivalents

Animal	Animal Unit Equivalent		
	Young	**Immature**	**Adult, old**
Cattle	0.260	0.600	0.300
Buffaloes, camels	0.366	0.825	1.100
Sheeps, goats	0.033	0.075	0.100
Horses, donkeys, mules	0.330	0.750	1.000
Pig	0.066	0.150	0.200
Poultry and other small animals	None	None	None

2.2 Classification of items of cost

Cost of production of any crop/ livestock product is the sum total of several components of cost. Accurate measurements of all the components of costs is thus of crucial importance for correct assessment of cost of production of any commodity.

Costs incurred on a farm can be classified as cash cost or non-cash cost. Cash Costs are the costs for which farmer spends money for acquisition of material inputs like seeds, fertilizer, chemicals or labour inputs like hired labour etc. On the other hand, non-cash costs are attributable to items of cost, which do not require spending money. These may be items of cost like family labour, payments made in kind, home grown seeds, manure etc, exchange labour, depreciation, interest on operating capital etc.

The distinction between cash and non-cash costs is of significance particularly in the context of developing countries where majority of farmers are small farmers. They generally lack resources for investment and thus are under compulsion to barrow at the start of the season. Higher the amount borrowed, greater is the risk attached. Non-cash costs account for a substantial portion of the total cost in developing countries.

Another way of classifying costs are treating them as variable or fixed costs, although some of the costs may be treated as fixed or variable depending on the time at which they are incurred. This is due to the fact that in short term some of the costs are variable while others are fixed. However, in the long run all costs are variable. Thus labour employed on a daily basis is variable while a permanent farm labour is to be considered fixed for a short period of time.

Variable costs vary directly with the production. The greater the production, greater are the variable costs. Variable costs may be either cash costs or non cash costs. Examples of variable cash costs are seeds, fertilizers, hired labour etc. On the other hand payments made in kind are the variable non-cash costs. Care need to be taken that the payments made in kind are accounting for only once.

Unpaid family labour is considered as a variable cost only if there are alternative employment opportunities. In case alternative employment opportunities do not exist the unpaid family labour cost need not be included. Again whether or not to include the unpaid family labour cost will depend on the objective of the study. Thus, if

farms of different labour sources are to be compared, ignoring the unpaid family labour cost will underestimate the cost.

Fixed costs are the costs incurred whether or not the production takes place. These could be cash or non-cash. Thus, land rent paid is an example of fixed cash cost. Land rent paid in kind, depreciation of farm machinery, tools and equipments, farm buildings and the cost of maintaining farm work animals are the examples of fixed non-cash costs.

CHAPTER - III

Significance of the Sector and Indicators

Cost of cultivation surveys are an important data source for decision making on sectors of national importance. Cost of cultivation of a commodity is the sum total of cost incurred on various inputs that are used in the produce of the commodity. Correct identification of these inputs and their measurement is crucial for realistic assessment of cost incurred in the produce of the commodity. These issues are discussed in this chapter.

3.1 Significance of the sector

Agriculture is a source of livelihood for large part of population in developing countries. Agricultural sector in these countries contribute a sizeable portion of the Gross Domestic Product (GDP). In India, agriculture sector contributes as much as approximately 18.5% of the total GDP.

In view of the importance of agriculture in the overall economy, accurate and up to date information / knowledge of cost structure of crops is crucial for policy formulation in this sector. Crop-wise information on costs and returns is utilized by the farmers in allocating their scarce resources in an efficient way. Such information is also very useful to organizations which are closely related to agricultural sector. The financial sector uses such information to make provisions of credit and crop insurance packages to farm sector. It has immense importance for administrators and policy planners in terms of decision making for fixation of Minimum Support Prices (MSP), selecting production strategies and identifying regional comparative advantages in crop production with a view to enhance the productivity and income of the farmers.

Farm income is an important yard stick of farmers' welfare and overall rural development which in turn improves terms of trade between agriculture and industrial sector of the economy resulting in development of secondary as well as tertiary sectors of the economy.

The information on costs and returns of different crops in different agro-climatic and crop-complex conditions can be useful to assess the economic condition of farming community in terms of employment and wage structure to assess the quality of life of agricultural laborers. Farm level input output data is immensely useful to

perform production function analysis to assess the technical, allocative and economic efficiency of different category of farmers to frame the future strategies for improving the farming efficiency. Cost of Cultivation / production data has the potential of being used in the improvement of the System of National Accounts (SNA) by updating the various technical coefficients used in compilation of product based production accounts. Such information is the only powerful device for monitoring developmental changes in the farm sector over time and space. Time-series and spatial analysis can provide useful information to policy makers and administrators. Cost of production survey data can also be valuable to individual research workers for in depth analysis of the available data. Such data has the potential to fill the gap in the existing data and to study the trends of the economy.

3.2 Indicators

Although there are no standard indicators on which cost of production data are collected, the commonly used indicators are:

i) Physical inputs: This may include value of seed (purchased or home grown), value of insecticide and pesticide, value of manure (owned and purchased), value of fertilizers, irrigation charges, value of own or hired machinery

ii) Human labour

iii) Animal labour: This may be hired or own

iv) Family labour

v) Machine labour, both owned and hired

vi) Land revenue

vii) Rent paid for leased in land or rental value of own land

viii) Other costs: Interest on working capital, land revenue, depreciation of machinery

ix) Miscellaneous expenses

It may be noted that the animal labour are generally not used in the developed countries for cultivation of crops.

3.3 Methods of measurement of cost items

Method of measurement of cost items will depend on the item on which cost is measured. Given below are some of the methods of valuation of items of cost.

Purchased price

This is a method of valuation of item of cost on the basis of current price as actual purchase price. It is used for those items of cost which have both short life span and whose values do not change substantially during short time periods. For example, inputs like fertilizers, chemicals, feeds, seeds, containers, and veterinary medicines can be evaluated on the basis of purchase price. Normal market value or average selling price are used for items whose value does not change in a year. Thus land value can be evaluated by this method.

Present market value

Items, which are not purchased regularly but are traded in the market, are evaluated on present market value. Thus this method may be suitable for items like home grown seeds, manures, value of animals and man labour, products not sold but given away as gifts etc. Depending on the age, livestock in the farm can be evaluated on market value. Crops grown in the field could be valued depending on the plant stage growth.

Net selling price

It is the selling price minus cost of marketing. Used for farm products sold.

Imputed value

There are certain items for which no money is actually spent but they do contribute towards the growth of a crop. Proper evaluation of such items in terms of money equivalent is important for correct assessment of cost production. Thus family labour is an important input in the enterprise, but no money is paid by the farmer to his family members for the work done on the farm. Cost assessment in respect of such items is made by using imputed value of cost. Family labour cost is generally imputed on the basis of prevailing wage rate in the locality. It may be noted that the family of a farmer may comprise male, female or young children all of which may be doing some work on the farm. Although some operations like plucking of leaves can be carried out more efficiently by the women, it is generally the case that the adult males can perform agricultural operation more efficiently than the females or the young ones. Thus the method of imputation of family labour cost would depend upon the particular member of family involved in the farm operation. A general rule may be framed whereby the work performed by women and young ones can be converted into male equivalents.

Replacement cost less depreciation

It is generally used for property whose value changes appreciably from year to year.

Income capitalization

This concept is based on the premise that purchase of property is in real terms a income for the future. Thus the present value of an asset is judged in terms of income it is likely to generate in the future. It is computed as

$$ICV = PV_0 + \frac{R_n}{(1+i)^n} ,$$

where

ICV = Income Capitalization Value.

PV_0 = Present value of the property

R = Expected income per year.

i = Interest rate

n = Number of years income is expected

Original cost less depreciation

This method is appropriate for items which are purchased to be used for a long period of time and for which there is practically no market for resale. Thus this method of valuation is most useful for items like farm buildings, farm machineries, tools and equipments. Present value of each item is worked out by subtracting the depreciation successively from the original value. Depreciation can be worked out on the basis of any of the three methods given below:

(i) Straight line method

(ii) Declining balance method

(iii) Sum of the year digits method

Straight-line method

Using this method the yearly depreciation is computed by dividing the purchased value of an item with its expected life span.

Thus,

Annual depreciation = Acquisition cost / Life span

If any item has a scrap value after its usefulness has expired then the annual depreciation is given by

(Purchased value – Scrap value)/ Life span

Declining balance method

It supposes that the depreciation value decreases as the age of an item increases. Depreciation under this method is calculated as

Annual depreciation = Book value x depreciation rate.

Sum of the years digits method

Depreciation using this method is calculated on the assumption that the depreciation in the initial years is more than it is in the later years. Annual depreciation thus is calculated on the basis of the formula

$$\text{Annual depreciation} = \frac{(\text{purchased value} - \text{scrap value}) \text{ x Remaining years of life}}{\text{Sum of the years digits of life span}}$$

It may be seen that under the straight line method equal amounts are subtracted every year while in the sum of years digit method the depreciation is faster during earlier years than during the later years. The declining balance method presupposes that there is a scrap value for every commodity. The declining balance and sum of years digit methods are to be used when the farmer expects bigger return to his investment during the first few years.

Allocation of joint costs

In case more than one crop is grown on a farm it is very important to determine cost incurred on various items as are used on individual crops. While correct assessment of crop specific costs are impossible, reasonably good estimates of costs can be obtained by following the standard procedures of allocation of joint costs as given below:

Depreciation of farm buildings

Can be charged to the individual enterprise in proportion to the total area under a enterprise in case the building is used for different enterprises. However, if the building is used for single enterprise, the entire depreciation can be charged to that particular enterprise.

Depreciation of farm machinery, tools and implements

As in case of farm buildings here also the depreciation or minor repairs can be charged to individual enterprise in proportion to the area under a given enterprise. Alternatively, time spent on individual enterprise by a given machine / tool and implement can form the basis for charging depreciation.

Taxes and rental for land

These can be allocated to the different enterprises in proportion to the land occupied by the individual enterprise.

Maintenance of farm animal costs

These would be allocated on the basis of proportion of time the animal labour is used for the respective enterprise.

Crops grown in a mixture

Many a times, crops are grown in a mixture. Due to this, it is not possible to determine the cost on various items attributable to individual crops. In such cases the expenditure, which is common to the farm as a whole, are apportioned to individual crops. Thus the cost on maintenance of bullock can be allocated in proportion to the number of hour the bullocks are used for individual crop. Depreciation, land revenue etc. can be apportioned in proportion to the area under each crop. Cost of cultivation of main product can be obtained by deducting from the total cost of cultivation the value of the by-product.

Family Labour

Evaluation of cost incurred on account of family labour is bit cumbersome. This is due to the fact that family labour may comprise people of different age groups and sex. Then, there is a custom dimension attached to this item of cost. Further, there may be a particular kind of work, which can be done better by men than women and must in fact be done by men or women. A possible solution may lie in converting all work done by men and women into men equivalent. Specifically, work done by a youth below 15 years of age can be taken as equivalent to half the adult. Similarly, work performed by a woman can be taken as equivalent to 0.8 men equivalent. It may be noted that these are general guidelines. The exact calculations will vary from situation to situation. For instance, there are certain items of work like plucking of tea, harvesting and planting rice which can be better performed by women than men.

Thus in this particular case there is no justification for evaluating the work performed by women as equal to 0.8 men equivalent.

Different components of variable costs may be evaluated as follows:

Animal Labour

The animal labour may be evaluated as sum of

(a) (i) Fodder and feed

(ii) Wages of the cattle attendant

(iii) Interest

(iv) Depreciation

(v) Other general charges

Minus, cost of veterinary charges, cost of ropes, chains etc.

(b) (i) Value of manure

(ii) Work done outside the farm

(iii) Appreciation or profit due to sale of animals

Then the daily cost of animal labour is obtained as

$$\frac{(a)-(b)}{\text{number of days worked in the year}}$$

Cost of farm produced seed, fodder and feed

The cost on account of farm-produced commodities can be obtained as per the prevailing locality prices of these commodities.

Farmyard manure

Farm produced manure can be evaluated as per the prevailing locality rates. In case it is purchased, then the evaluation is to be done on the basis of purchase price.

Chemical fertilizer

It can be evaluated at the purchase price including the transport charges.

Cost of insecticides and pesticides

It can be evaluated at the purchase price.

Owned/hired, bullock and tractor labour

It may be evaluated at the rate of hire charges for bullock / tractor. The own/bullock / tractor labour can be charged on the basis of operational expenditure per hour.

Hired and permanent labour charges

These may be evaluated on the basis of hours worked on the field and wages paid for such work.

Cost of owned/hired irrigation

It may be evaluated on the basis of actual amount paid. In case of own irrigation the cost estimates can be based on operational cost per hour.

Interest on working capital

The paid out cost constitutes the working capital. The prevailing bank rate of interest can be taken to work out the interest on working capital for the duration of the crop.

Different components of fixed costs may be evaluated as follows:

Family labour

The value of family labour can be imputed on the basis of wages of attached farm labour and number of men hours used.

Interest on fixed capital

The present value of assets, equipments form the fixed capital. Interest on this can be calculated in the same way as in case of interest on working capital.

Owned machine charges

Calculated on the basis of cost of maintenance of farm machinery, which may include

a) Diesel
b) Power
c) Lubricants
d) Depreciation
e) Repair and
f) Other expenses, if any

Rent on lease-in land

It can be calculated on the basis of actual rent paid.

Rental value of own land

It can be evaluated on the basis of interest on the value of land for the period of the crop. Or else, it can be taken as rent paid for a similar land in a given area.

Management cost

The management cost can be taken as a certain percentage of the total paid out cost.

CHAPTER-IV

Comprehensive Scheme for Cost of Cultivation of Principal Crops

The focus of this chapter is on the comprehensive scheme for cost of cultivation of principal crops as is being implemented in India. Technical details of the scheme, the reviews made in the scheme and the present status of the scheme are provided in detail. Other details like data analysis and estimation procedure being followed in the scheme for generation of cost estimates are also covered.

4.1 The comprehensive scheme as planned in the beginning

In India, the Directorate of Economics and Statistics in the Ministry of Agriculture (DESMOA) is the main organization responsible for collection of data on cost of production of crops. Some of the State Directorate of Economics and Statistics also independently collect cost of production data.

The DESMOA operates a scheme entitled Comprehensive Scheme for Studying Cost of Cultivation / Production of Principal Crops. The scheme was launched in the year 1970-71. It was meant to collect representative data on inputs and output in physical and monetary terms which could then be used for estimation of cost of cultivation per hectare and cost of production per quintal of principal crops. The data under this scheme was collected on a continuous basis in the form of a detailed survey in respect of principal crops to be covered for one year which was to be subsequently studied on a sub-sample. The size of the sub-sample was generally one fourth of the size of the main sample. Table-7 provides the list of crops currently covered under the comprehensive scheme.

The sampling design proposed for the collection of representative data was one of three stage stratified random sampling wherein the tehsils formed the first stage sampling units, a cluster of villages as the second stage sampling units and an operational holding within a cluster as the third and ultimate stage sampling unit. For the purpose of providing representation to all the areas in the states, the states were divided into homogenous zones depending on the cropping patterns, soil type, rainfall, irrigation etc.

The first stage sampling units, in this case tehsils, were allocated to the different zones in proportion to the area under principal crop in the zones concerned to the total

area under the crop in the state. Within a zone the allocated number of tehsils were selected with probability proportional to area under principal crop with replacement. The second stage sampling units i.e. clusters of villages were also selected by probability proportional to area under principal crop in the tehsil and with replacement. For selecting cluster of villages, a nucleus villages was first selected and nearby villages were added to it so that the first added village was the village which was the nearby village to the south of nucleus village while the second village was the one near to the nucleus village in the west.

Table-7: Crops Covered under the Comprehensive Scheme in India.

(Block Period 1999-2002 and 2002-2005)

Crop Group	Crops Covered for 1999-2002	Crops Covered for 2002-2005
Cereals	Paddy, Jowar, Bajra, Maize, Wheat, Ragi and Barley	Paddy, Jowar, Bajra, Maize, Wheat, Ragi and Barley
Pulses	Bengal Gram, Arhar (Red Gram), Moong (Green Gram) Urad (Black Gram) and Masure (Lentil)	Bengal Gram, Arhar (Red Gram), Moong (Green Gram), Urad (Black Gram) and Masure (Lentil)
Oilseeds	Groundnut, Rapeseed and Mustard, Soya bean, Sunflower, Safflower, Sesamum and Niger seed	Groundnut, Rapeseed and Mustard, Soya bean, Sunflower, Safflower, Sesamum and Niger seed
Fibers	Cotton and Jute	Cotton and Jute
Sugar	Sugarcane	Sugarcane
Fruits and Vegetables	Onion and Potato, Tapioca and coconut	Onion and Potato, Tapioca and coconut
Spices and Condiments crops	Areca nut and Black pepper	Areca nut and Black pepper
Miscellaneous	VFC Tobacco	VFC Tobacco

The holdings in the selected villages were listed in ascending order of their size and stratified into five size classes such that the total operational area in each of the size class was equal. The holdings were then selected randomly from each of the size class for collecting detailed input output data.

The field work for the scheme was entrusted to State Agricultural Universities while the Directorate of Tobacco Development was given the responsibility of field work for VFC Tobacco.

A Central Analytical Unit (CAU) was created in the DESMOA to coordinate the field work of implementing agencies and for processing and analysis of data collected at the field level using the uniform concepts and procedures and for generating cost estimates as well as the report of the scheme.

In view of the importance of the scheme and its implications on the programmes and policies formulation, the cost accounting method of data collection approach was adopted for collecting field data as opposed to the field survey method. One field man was assigned to each cluster of village for the collection of data. He was required to visit a household every alternate day so that data on actual inputs used by the farmer can be collected in a realistic manner.

Adequate provisions were made for supervision of the field work. Thus a field supervisor was assigned the responsibility of supervision of the field work of 10 fieldsmen. A field officer overlook all the field work carried out in a state. The officer in charge of the scheme in the state was usually the Professor and Head in the Department of Economics and Statistics of the State Agricultural University. The over all administrative control of the scheme in the state was vested under him. He was also expected to provide guidance on technical matters relating to the scheme.

Under the scheme, two sets of schedules were designed for the collection of data. First set of schedule was meant for collection of farmer level field data. The second set of schedule was basically a compilation schedule which was filled up at the State Headquarters on the basis of data collected in the first schedule in a form so that the required data can be sent to the Central Analytical Unit in the DESMOA for the analysis and subsequent generation of the cost estimates.

The indicators on which data were collected and their method of evaluation was as follows:

Cost A_1 – It includes all actual expenses in cash and kind in production by the owner farmer given below:

i) Value of hired human labour

ii) Value of hired bullock labour

iii) Value of machine labour, owned and hired

iv) Value of owned bullock labour

v) Value of owned machinery

vi) Value of hired machinery

vii) Value of seed (a) farm produced & (b) purchased

viii) Value of insecticides and pesticides

ix) Value of manure (owned and purchased)

x) Value of fertilizers

xi) Depreciation of implements and machinery

xii) Irrigation charges

xiii) Land revenue

xiv) Interest on working capital

xv) Misc. expenses (artisans etc.)

Cost A_2: Cost A_1 + rent paid for leased-in land.

Cost B: Cost A_2 + rental value of owned land (net of land revenue) & interest on owned fixed capital excluding land.

Cost C: Cost B + imputed value of family labour.

Procedures for Imputation of Costs

Where as the valuation of purchased inputs could be made on the basis of expenditure incurred, there were problems with respect to some of the inputs used in the production of crops supplied by the farm family itself. The procedures adopted for evaluation of imputed cost of these inputs were as under:

Family Labour: Charged on the basis of wages paid to attached farm labours.

***Owned Animal Labour*:** Evaluated on the basis of cost of maintenance which included the following:

(a) Cost of green and dry fodder

(b) Cost of concentrates

(c) Cost of labour for upkeep of livestock

(d) Depreciation on animals and cattle sheds

(e) Other miscellaneous expenses like salt, drugs etc.

***Owned Machinery Charges*:** Also charged on the basis of cost of maintenance. The maintenance cost comprised:

(a) Diesel

(b) Power

(c) Lubricants

(d) Depreciation

(e) Repair

(f) Other expenses, if any

***Implements*:** Cost on implements was imputed on the basis of depreciation and repairs.

***Farm Produced Manure*:** Evaluated on the basis of prevailing prices in the village.

Owned Land: Estimated on the basis of prevailing rents in the village for identical type of land, or on the basis of farmers' response subject to the ceiling on fair rents in the land legislation of the concerned state.

***Interest on owned fixed capital*:** Charged at the rate of 10 per cent on the present value of fixed assets.

***Interest on working capital*:** Charged at the rate of 12.5 per cent on the working capital for half the duration of the crop

Kind payments: Evaluated on the basis of prevailing rates in the village at the time such payments were made

***Main produce by products*:** Imputed on the basis of post-harvest prices prevailing in the sampled villages.

***Allocation and Apportionment of Joint Costs*:** Some of the items of cost were applicable to the entire farm. Costs on such items were apportioned to the individual enterprise by using following methods:

a) ***Maintenance of the bullocks*:** The total cost under this was apportioned in proportion to the number of bullock pair hours used for each of the enterprise.

b) ***Depreciation, land revenue etc.:*** Allocated in proportion to the area under different enterprises.

***Cost of production of main product*:** This was worked out by subtracting from the total cost of cultivation the value of the by-product. The net cost of cultivation was divided by the yield of main product to get unit cost of production.

Some of the drawbacks of the scheme

Following the procedure prescribed in the scheme it was possible to get precise estimates of cost of production for the principal crops, but the estimates framed on the basis of sub-sample were not likely to be very precise. It was also not possible to perform disaggregated analysis from the sub-sample as the number of observations falling in various categories were expected to be very small so as to be of much use. The procedure of formation of size classes under the scheme was arbitrary. Due to this, the size classes varied from region to region. It was, therefore, not possible to draw meaningful inferences from the data pertaining to different size classes. It was well known that a wealth of data was generated from the scheme which could be analyzed in many different ways to draw meaningful conclusions of varied interest. However, the data generated under the scheme was used only to frame estimates of cost of production. It was a general feeling that the three village cluster approach was very demanding in terms of supervision of data collection process.

Some other aspects of the scheme which were debated were as follows:

On the issue of computation of interest on fixed and working capital, there was a general feeling that the interest rates used in the scheme were not realistic as these rates did not take into account, non-institutional rates which were usually on the higher side. Although the institutional structure in India was well established, the farmers in many parts of the country still depended on non-institutional sector for making investments in the enterprise.

The method of imputing family labour on the basis of attached farm labour was also being questioned as the cost of attached farm labour was very low. This was far below considering the type of work performed by the family labour. The practice of imputing rental value of own land on the basis of market rates subject to the ceiling laid down in the land tenancy legislation was also being disputed. In this context some other alternatives like i) market rent ii) interest on capitalized value of land or iii) a fixed proportion of gross value of output were advocated.

4.2 First review of the comprehensive scheme

Although the comprehensive scheme remained in operation, some of the issues related to the scheme continued to be debated. Opinions were divided on the merits and demerits of the technical procedures devised in the scheme. A decision was, therefore, made by the Government to constitute a review of the functioning of the scheme. The first review of the comprehensive scheme was made in the year 1979 by a committee constituted by the Govt. of India under the chairmanship of Shri S.R. Sen, the then Economic and Statistical Advisor to the Govt. of India. Some of the important modifications suggested by the committee were as follows:

Crop complex approach

One of the important recommendations made by the committee was the use of crop complex approach under the comprehensive scheme rather than a single crop approach as was the practice earlier. Although the sampling design of the scheme continued to be stratified three stage random sampling, the approach was to be one of crop complex rather than a single crop. Thus the sample selected under the scheme was to be representative of the important crops grown in the concerned State rather than a single crop. The important crops grown in the state were to be identified on the basis of importance of each crop in the state and the relative contribution of each state to the total production of particular crop for the country. As earlier, the tehsils formed the first stage sampling units, village/cluster of villages as the second stage unit, and operational holding as the third and ultimate stage unit.

Hired human labour

The committee recommended that the hired human labour be valued on the basis of actual payments made rather than at the administered rates viz. the statutory minimum wage rate

Family labour

The committee observed that the family labour performed almost the same type of work as the attached farm labour. Also the extent of work performed was more or less similar due to which it was logical to evaluate the family labour on the basis of wages paid to attached farm labourers.

Interest on fixed capital

The committee felt that although the share of institutional credit as a means of acquiring resources was on the rise, the non-institutional credit still continued to be the dominant source for the farmer. It therefore recommended that a weighted average interest rate from various sources viz. institutional and non institutional from the survey data be used for working out the interest on fixed capital.

Interest on working capital

The interest on working capital in the scheme was evaluated for half the duration of the crop. The rationale behind this was that the working capital expenditure was evenly spread between the initial stage of the crop to the harvest. But in reality the expenditure on seeds and fertilizer during the initial stage of the crop far exceeded the expenditure incurred during the harvesting stage. A view was accordingly taken that the interest on working capital items actually paid out should be taken. The interest on working capital was recommended to be accounted for by taking weighted average rate based on the short term loan taken by the sample farmers. As for the period for which the interest was to be charged, it was suggested that a weighted average period taking values of inputs used during different months as weight, be computed from the survey data itself for each crop separately.

Rental value of owned land

In respect of this item of cost the committee debated upon the various alternatives like

i) An appropriate rate of interest on the value of land

ii) Market rent

iii) Fair rent as defined in the state legislation

iv) A fixed proportion of output valued at harvest price

Weighing the Pros and cons of the various alternatives the committee recommended that the land rent be evaluated on the basis of market rents. Where renting was not common, data on actual rents paid by other cultivators in the sample villages / clusters be used. The committee recommended that the schedules used in the scheme may be modified to collect this information, if necessary. If this was still not workable, a five years average of the actual rents may be taken.

Apportionment of cost between the main product and by-products

The apportionment of the cost between the main product and the by-product under the scheme used to be carried out by the residual method which implied that the

by-product was to be evaluated at the time of harvest on the basis of prevailing market rate and its value was to be subtracted from the total cost of cultivation. There were some problems with this method. It was, therefore, suggested that the apportionment be carried out on the basis of percentage of receipt from the main product and the by-product.

Some important changes suggested by the committee in respect of data collection mechanism were the following:

a) Supervisor will supervise the work of 5 fieldsmen instead of 10 as earlier. This way the supervisor could spend more time with the field men and could also visit them more frequently for the scrutiny of schedules. The idea was that the increased supervision will lead to improvement in the quality of data.

b) For speedier analysis of data the committee recommended one Computer per 50 farmers as against 100 farmers earlier.

c) The committee suggested retention of the same sample for three years. The committee observed that the aspect of timely release of cost estimates was very important to the administrators and policy planners. To reduce delay in the release of cost estimates following measures were suggested:

There should be a concurrent tabulation and analysis of data with monthly dispatch of the data to the Central Analytical Unit. It also suggested a mechanism of framing advance estimates of cost of production.

A recommendation was also made for the construction and publication of index number for

a. Index numbers of physical quantities of inputs
b. Index numbers of physical quantities of output
c. Index numbers of prices for materials and labour used
d. Index numbers of prices received
e. Index number of gross value of output
f. Index numbers of Cost A_1 and C_2
g. Index number of Farm Business Income

The recommendations of the committee were accepted by and large by the Govt. of India. Some of the recommendations which were yet to be accepted related to evaluation of weighted rate of interest for fixed as well as working capital, surveys on

rental value of land, generation of advance estimates, construction of index number etc.

4.3 Second review of the comprehensive scheme

The second review of the scheme was made by a committee headed by Prof. C.H. Hanumantha Rao in the year 1990.

The Rao committee reiterated the crop complex approach for sample selection. However, it also suggested an individual crop approach in respect of minor crops. It highlighted the importance of criterion of precision of an estimator which was directly linked with the sample size. Thus it felt the need to monitor sample sizes for the various zones. In view of the importance of the precision associated with an estimator, the committee recommended that the standard errors needed to be worked out on a regular basis.

The committee looked in detail the procedure of valuation of some of the items of cost. As regards the method of valuation of hired labour, the committee's views were same as that of the earlier committee i.e. the hired labour should continue to be evaluated on the basis of actual wages paid for different operations. These could be either market wages or statutory minimum wages.

In respect of method of valuation of family labour the committee observed that in many cases, more specifically in respect of small and marginal farmers, the family labour worked as casual labourers in other farms. Thus, a family labour in one farm was a casual labour in other farm due to which it was appropriate to evaluate the family labour on the basis of wage rate for the casual labour.

The issue of inclusion of management as an item of cost was debated by the committee in great length. The committee members were of the view that procurement and allocation of inputs, decision making on what crops to be grown were all matters that fell under the preview of managerial function and that these had great bearing on the output of a farm. Thus management should be included as an item of cost. Since it was difficult to quantify management as an item of cost, the committee recommended that this be taken as 10 per cent of the paid out cost.

Imputation of rental value of own land

In this case the committee was of the view that under the Indian conditions the only objective method of assessment of rental value of own land was contract / market rent for similar land. It, therefore, suggested a procedure to be based on survey of market rents in the selected villages in the first year when the new sample was to be drawn for three years for assessment of rental value of own land.

Transport cost

The present system did not take into account the transport cost in the cost of production. Thus, the cost of production was actually the cost at the farm level. The committee held the view that the transport cost became relevant only when the farm produce was sold outside the village. Accordingly, the transport cost was to be taken into account only when the farm produce was sold outside the village.

The Hanumantha Rao committee reiterated the views of the earlier committee in respect of working out weighted interest rates and construction of series of indices.

As earlier, the Govt. of India accepted major portion of the recommendation of Haunmantha Rao committee. However, some of the recommendations were modified viz. in respect of the casual labour, the Govt. took the view that in case the actual wages paid to the casual labour were less than the statutory wage limits the casual labour was to be evaluated on the basis of statutory wage limits.

Although the committee recommended that the management cost be worked out as 10 per cent of paid out cost it was modified by the Government as 10 per cent of cost C_2.

4.4 Current status of the comprehensive scheme

The sampling design of the scheme continues to be three-stage stratified random sampling with tehsils as the first/primary stage units, village/cluster of villages as the second stage unit and operational holding as the third and ultimate stage unit. Each state was divided into homogeneous agro-climatic zones of the Union of India. The primary stage sampling units were allocated to different zones in proportion to the total area of all crops which are to be covered in the study under crop complex approach. The primary units in a zone are selected with replacement and with probability proportional to total area under the selected crops. The villages within a tehsil are also selected using the same procedure.

The villages once selected for data collection under the scheme are retained for three years. It may be mentioned that although there was provision of selecting three villages but the second or third village is to be selected if the nucleus village has less than 200 holdings. If second or third village was to be selected then all the holdings in the village are to be covered i.e. the listing would not end at the 200th holding. Within a selected village the holdings are divided into 5 classes. Currently the five classes are operational holdings with area less than 1 hectare; operational holdings having area between 1 and 2 hectares, between 2 and 4 hectares, between 4 and 6 hectares and above 6 hectares. Two holdings are selected from each class. If in any village/cluster, a particular size class does not have even two holdings, more holdings are selected from adjacent size-classes and finally two holdings are selected from these.

For selecting a sub sample, predetermined number of clusters are allocated to each zone in proportion to the total area under the identified crops. The sub-sample clusters are selected from the main sample by simple random sampling without replacement. The sub sample clusters are changed after a period of three years. While following this procedure there was a possibility that the sample size for the minor crops may not be sufficient for framing reliable estimates. The sample size could accordingly, be enhanced in such cases. The agencies implementing the Comprehensive Scheme for studying the Cost of Cultivation of Principal Crops in India are listed in Table-15.

Table-15: Agencies Implementing the Comprehensive Scheme for studying the Cost of Cultivation of Principal Crops in India.

S. No.	Name of the Implementing Agency	State Covered
1.	Acharya N.G.Ranga Agricultural University, Rajendranagar, Hyderabad.	Andhra Pradesh
2.	Assam Agricultural University , Jorhat	Assam
3.	Rajendra Agriculture University, Pusa, Samastipur	Bihar
4.	Sardar Patel University, Vallabh Vidya Nagar	Gujarat
5.	Haryana Agriculture University, Hissar	Haryana
6.	Himachal Pradesh University, Shimla	Himachal Pradesh
7.	University of Agricultural Sciences, Hebbal, Bangalore	Karnataka
8.	University of Kerala, Thiruvananthapuram	Kerala
9.	Jawarhar Lal Nehru Krishi Viswavidhyalaya, Jabalpur	Madhya Pradesh
10.	Mahatma Phule Agriculture University, Rahuri	Maharashtra
11.	Orissa University of Agriculture& Technology, Bhubaneswar	Orissa
12.	Punjab Agricultural University, Ludhiana	Punjab
13.	Maharana Pratap University of Agriculture & Technology, Udaipur,	Rajasthan
14.	Tamil Nadu Agriculture University, Coimbatore	Tamil Nadu
15.	R.B.S. College, Bichpur, Agra	Uttar Pradesh
16.	Bidhan Chandra Krishi Vishwa Vidyalaya, Kalyani, Nadia	West Bengal
17.	Directorate of Tobacco Development, M/o Agriculture, Chennai.	Special study (VFC Tobacco in Andhra Pradesh

Items of cost

The items of cost currently considered in the scheme are given in the Table-16.

Table-16: Paid out items of costs considered in the comprehensive scheme.

1.	Hired labour	(i) Human (ii) Animal (iii) Machinery
2.	Maintenance Expenses	(i) Owned Animal (ii) Owned Machinery
3.	Material inputs	(i) Seed (both home grown and purchased) (ii) Fertilizers (iii) Manure (owned and purchased) (iv) Pesticides, and (v) Irrigation
4.	Depreciation	(i) Implements (ii) Farm buildings
5.	Land Revenue	
6.	Interest on borrowed/working capital	
7.	Rent paid for leased-in-land	

Cost A_1 – includes

(i) Value of hired human labour

(ii) Value of hired bullock labour

(iii) Value of owned bullock labour

(iv) Value of owned machine labour

(v) Value of hired machine labour

(vi) Hired machinery charges

(vii) Value of seed (both farm produced & purchased)

(viii) Value of insecticides and pesticides

(ix) Value of manure (owned and purchased)

(x) Value of fertilizers

(xi) Irrigation charges

(xii) Depreciation of implements and farm buildings

(xiii) Land revenue cesses and other taxes

(xiv) Interest on working capital

(xv) Misc. expenses (artisans etc.)

Table-17: The structure of different costs and their components

Cost A_2	=	Cost A_1 + Rent Paid for leased in-land
Cost B_1	=	Cost A_1 + Interest on value of owned fixed capital assets (excluding land)
Cost B_2	=	Cost B_1 + Rental value of owned land (net of land revenue) and rent paid for leased-in land
Cost C_1	=	Cost B_1 + imputed value of family labour
Cost C_2	=	Cost B_2 + Imputed value of family labour
Cost C_2*	=	Cost C_2 + Additional value of human labour based on use of higher wage rate in consideration of statutory minimum wage rate. (This is an intermediate concept).
Cost C_3	=	Cost C_2* + 10 percent of cost C_2* to account for managerial input of the farmer

Imputation procedure being currently used in the scheme

***Family labour*:** It is charged on the basis of wage rate for casual labour in case the market rate is lower than the statutory wage rate. The market rate and statutory wage rate are worked out on the basis of a formula. The higher of these two values is taken as the family labour rate. The amount to be paid per day is based on the number of man hours used.

***Owned animal labour*:** Own bullock / animal labour is evaluated on the basis of its cost of maintenance which include cost of green and dry fodder b) cost of feed / concentrates, c) cost of drugs, salt etc. d) depreciation on animals and cattle sheds e) cost on labour for upkeep of animals and g) miscellaneous expenses.

***Owned machinery*:** Charged on the basis of cost of maintenance of farm machinery which includes diesel, electricity, lubricants, depreciation, repairs, interest and other charges.

***Implements*:** Evaluated on the basis of depreciation and expenses incurred on repairs.

***Home grown seed*:** Charged at the prevailing market prices in the village at the time of sowing.

Farm Yard manure: Evaluated on the basis of prevailing rates in the village.

Land rent: Evaluated on the basis of prevailing rates in the village for identical type of land or on the basis of responses obtained from the village farmers, subject to any ceiling on fair rents under the land legislation of the state concerned.

***Interest on working capital*:** Charged at the rate of 12.5% per annum for half the period of the crop.

***Interest on owned fixed capital*:** Charged at the rate of 10% per annum on the present value of fixed assets.

***Kind payment*:** All kind payments are evaluated at prices prevalent in the village at the time such payments are made.

a) Imputation procedures

The imputation procedures for items of cost like rental value of owned land, interest on owned animal labour, owned fixed capital are the same as was the case earlier. However, the family labour is evaluated on the basis of actual wage rate paid to the casual labour. In case the market rate was lower than the statutory wage rate the family labour is to be evaluated following a procedure prescribed for such cases.

Allocation of joint costs

The procedure for allocation of joint cost in respect of bullock labour cost remains the same as was the case earlier. Depreciation on implements is allocated on the basis of number of bullocks hours used. Cost of maintenance of machinery is also allocated on the basis of number of machine hours used for individual enterprises. The total land rent / revenue is allocated to individual enterprise in proportion to the area occupied by the individual enterprises.

The apportionment of cost between the main product and the by product is to be carried out on the basis of value of output of main product and by product.

4.5 Data analysis under the comprehensive scheme

The initial sample size in the scheme, distributed over 16 centers and one special centre on tobacco, was 5400. Out of this one state had sample size of 500, 8 states had 400, 300 in three states and 200 in other three states as well as the one special centre on tobacco. Currently there are 8400 operational holdings on which data are collected.

A variety of field level data is collected under the scheme. This includes data related to inventory of land , family members, annual servants, buildings, wells and tanks, livestock, machines, record of daily operations, wages, crop production, distribution of family labour, bullock as well as machine labour, changes in inventory, land improvement work, animal and machine expenses, weekly income and expenditure, stock position, loans, utilization of milk, marketing expenses. etc (The schedules being used in the comprehensive scheme for the purpose of data collection are given in Annexure I).

The field data are transferred on 28 holdings farms. The holding wise data are transferred on compilation forms which are 29 in number. Till 1993-94 compilation and tabulation used to be carried out manually. In the year 1992-93 the Directorate acquired a computer package called Farm Analysis Package (FARMAP) developed more or less on similar lines as the FAO's FARMAP. It is basically a database package which makes collection of data possible in a uniform format as also analysis and retrieval of the collected data.

From the year 1993-94 a system of Record Types (RT) has been introduced so that the collected data can be converted into computer compatible format. Each Record Type has 40 data fields some of which are in fixed format while some other are in variable format. The list of 40 record types on which data are collected are given in Table-18.

Due to the introduction of FARMAP it is now possible to perform variety of analysis of the available data then was the case earlier. Given below is the type of analysis that is possible out of the available data.

Farm asset structure

- Private sector capital formation in agriculture
- Farm land use pattern

- Cropping pattern
- Farm Energy sources, availability, use and economics
- Cost of cultivation/production of major crops
- Economics of crop farming
- Cost of milk production-species wise
- Economics of livestock farming
- Economics of various non-crop activities
- Facets of Farm employment pattern
- Size and composition of household income of farm families
- Cost, profit and production function analysis in crop farming
- Cost, profit and production function analysis in livestock farming
- Agricultural credit and repayment studies
- Estimation of marginal values and elasticity in crop livestock and other production activities
- Marketed surplus and marketing pattern of various commodities
- Occupational pattern in farm households
- Impact of various macro policies at micro level.

Since the data is in electronic form it is now much easier to locate errors in the data. Also the data stored in electronic form is easily transferable from one place to another. Moreover this kind of information stored in electronic form can easily be made a part of the Central Data Warehouse which in turn will increase the accessibility of data from the Comprehensive Scheme to other user organization like the Planning Commission, Central Statistical Organization and even individual users. Currently the FARMAP is operational on the Disk Operating system. It can be made user friendly if a corresponding window based version can be developed.

Table-18: List of Record Types used in New FARMAP for data collection, computerization and validation under cost study survey

S. No.	No. of RT	Name of RT (Periodicity of Data Collection
1.	RT 110:	Household Members (yearly)
2.	RT 111:	Household Changes (Monthly)
3.	RT 120:	Attached Farm Servants (Beginning of the year)
4.	RT 121:	Attached Farm Servants Changes (Monthly)
5.	RT 210:	Land Inventory (Yearly)
6.	RT 111:	Changes in Land (Seasonal)
7.	RT 230:	Annual Crops Record (Beginning and End of Season)
8.	RT 231:	Annual Crops Record (Beginning and End of Season)
9.	RT 310:	Animal Inventory (Yearly)
10.	RT 311:	Animal Changes (Monthly)
11.	RT 410:	Building Inventory (Yearly)
12.	RT 411:	Building Changes (Monthly)
13.	RT 440:	Irrigation structures Inventory (Yearly)
14.	RT 441:	Irrigation structures Changes (Monthly)
15.	RT 450:	Machinery and Implement Inventory (Yearly)
16.	RT 451:	Machinery and Implement Changes (Monthly)
17.	RT 510:	Credit Outstanding (Yearly)
18.	RT 511:	New Loans Taken Out (Monthly)
19.	RT 512:	Loan Repayments (Monthly)
20.	RT 610:	Receipts and Disposal of Important Crop Products (Annuals)
21.	RT 710:	Crop Operations Hours (Daily)
22.	RT 711:	Crop Operations Labour Payments (Daily)
23.	RT 712:	Crop Physical Inputs and Other Payments (Daily)

24.	RT 713:	Crop Outputs (Daily)
25.	RT 714:	Crop Transport and Marketing Operations Hours
26.	RT 715:	Crop Transport and Marketing Operations Payments
27.	RT 716:	Crop Marketing Carts Incurred
28.	RT 720:	Animal Upkeep Operations Hours (Daily)
29.	RT 721:	Animal Upkeep Operations Casual Payments (Daily)
30.	RT 722:	Animal Upkeep Physical Inputs and Other Payments (Daily)
31.	RT 723:	Animal Non-Milk and Outputs (Daily)
32.	RT 724:	Animal Milk and Milk Products (Daily)
33.	RT 730:	Special Activity Operations Hours (Daily)
34.	RT 731:	Special Operations Payments (Daily)
35.	RT 732:	Special Activity Physical Inputs and Payments (Daily)
36.	RT 733:	Special Activity Outputs (Daily)
37.	RT 740:	Machine Upkeep Operations Hours (Daily)
38.	RT 741:	Machine Upkeep Operations Payments (Daily)
39.	RT 742:	Machine Upkeep Physical Inputs and Payments (Daily)
40	RT 743:	Machine Power Provided Outside Farm (Daily)

4.6 Estimation procedure - Cost of cultivation of agricultural crops

Estimation Procedure

(i) Let T be the number of tehsils in a zone out of which t tehsils are selected with probabilities P_i (i=1,…….T) proportional to the total area under selected crops in a tehsil and with replacement. Here $P_i=A_i/A$ where A_i is area under crop complex in i^{th} tehsil and A is similar area in the zone.

(ii) Let N_i (i=1,2,……..t) be the number of villages in ith selected tehsil out of which n_i (=1) villages are selected with probability P_{ij} (j=1,2,…….N_i) proportional

to the total area under selected crop complex in a village. Here $P_{ij}=A_{ij}/Ai$ where A_{ij} is the area under crop complex in j^{th} village of i^{th} selected tehsil.

(iii) In each selected village/ cluster let all the holdings be classified into L(=5) size classes and let M_{ijk} be the number of holdings growing the particular crop in the k^{th} size class of j^{th} village/ cluster of i^{th} tehsil.

Let $M_{ij}=\sum_{k=1}^{5} M_{ijk}$ be the total number of holdings in the j^{th} village/ cluster of i^{th} tehsil. Let m_{ijk} be the number of holdings selected out of M_{ijk} by simple random sampling without replacement.

(iv) Let Y_{ijkl} be the cost incurred by the l^{th} holding in the k^{th} size-class of j^{th} village/ cluster of i^{th} tehsil. Then,

$$\bar{Y}_{ijk} = \frac{1}{m_{ijk}} \sum_{l=1}^{m_{ijk}} Y_{ijkl}$$

is an unbiased estimate of cost per holding in the k^{th} size-class. Hence,

$$\hat{Y}_{ij} = \sum_{k=1}^{L} M_{ijk} \times \bar{Y}_{ijk}$$

will be an unbiased estimate of total cost incurred by all holdings growing the crop in that village/ cluster.

(v) Let X_{ijkl} represent similarly the area under the crop in the l^{th} holding of the k^{th} size class of the j^{th} village/ cluster of i^{th} tehsil.

Then,

$$\bar{X}_{ijk} = \frac{1}{m_{ijk}} \sum_{l=1}^{m_{ijk}} X_{ijkl}$$

will represent the average area under the crop per holding in the k^{th} size-class and

$$\hat{X}_{ij} = \sum_{k=1}^{L} M_{ijk} \times X_{ijk}$$

will be an unbiased estimate of total area under the crop in the village/ cluster.

Define

$$\hat{Z}_{ij} = \frac{\hat{Y}_{ij}}{N_i P_{ij}}$$

and

$$\hat{V}_{ij} = \frac{\hat{X}_{ij}}{N_i P_{ij}}$$

and calculate

$$\bar{Z}_i = \frac{1}{n_i} \sum_{j=1}^{n_i} \hat{Z}_{ij}$$

$$\bar{V}_i = \frac{1}{n_i} \sum_{j=1}^{n_i} \hat{V}_{ij}$$

However, since $n_i = 1$ in the present case

$$\bar{Z}_i = \hat{Z}_{il} \quad \text{and} \quad \bar{V}_i = \hat{V}_{il}$$

Further let $Z_i = \frac{\bar{Z}_i}{TP_i}$

and $V_i = \frac{\bar{V}_i}{TP_i}$

and $\bar{Z}_h = \frac{1}{t} \sum_{i=1}^{t} Z_i$

and $\bar{V}_h = \frac{1}{t} \sum_{i=1}^{t} V_i$

Then $\bar{R}_h = \frac{Z_h}{\bar{V}_h}$

gives the estimate of cost per hectare for the h^{th} zone. An approximately unbiased variance estimator of $\hat{\bar{R}}_h$ is given as,

$$Est. \quad V(\hat{R}_h) = \frac{1}{t(t-1)\bar{V}_h^2} \sum_{i=1}^{t} (Z_i - \hat{R}_h V_i)^2$$

It should be noted that all holdings in a particular size-class may not grow the crop for which the cost per hectare is to be estimated. In that case M_{ijk} will represent the number of holdings growing the crop in that particular size-class and m_{ijk} the number of sample holdings growing the crop. If in an exceptional case m_{ijk} is zero but M_{ijk} is not, then M_{ijk} may be added to the adjoining class as an approximation.

The estimate of cost per quintal for the zone may be obtained similarly by taking X_{ijkl} to represent the production of the crop in the holding instead of area.

For special crops the estimates of cost based on additional sample will be obtained with selection probabilities P_i and P_{ij} corresponding to P_i and P_{ij} where P_i and P_{ij} are based on area under specific special crop. Let $R_h(1)$ and $R_h(2)$ be the estimates of cost per hectare in h^{th} zone based on addition sample and that obtained from crop complex approach, respectively. Then a pooled estimator of cost is

$$\hat{R}_h = W\,\hat{R}_h(1) + (1-W)\,\hat{R}_h(2)$$

where W may be approximately taken as

$$W = \frac{n_1}{n_1 + n_2}$$

where n_1 and n_2 are the number of ultimate stage units (holdings) having the special crop in the two samples, respectively. The estimate of variance of the combined estimate for the special crop will be calculated as follows

$$\text{Est } V(\hat{R}_h) = W^{2*} \text{ Est } V(\hat{R}_h(1)) + (1-W)^{2*} \text{ Est } V(\hat{R}_h(2))$$

Estimates of Cost for States or Groups of States

The estimates of cost per hectare and cost per quintal for individual states or groups of states will be calculated as weighted averages of the zonal estimates. The weight will be proportional to -

(i) the area under the crop in respective zones for calculating the combined estimate of cost per hectare, and

(ii) the production in the respective zones for calculating the combined estimate of cost per quintal.

Thus, if the combined estimate over H zones is to be calculated then

$$\hat{R} = \sum_{h=1}^{H} W_h \times \hat{R}_h$$

Where R_h are the zonal estimates and W_h are the zonal weights. The weights W_h to be used for framing cost per hectare estimates are given by

$$W_h = \frac{A_h}{\sum_{h=1}^{H} A_h}$$

Where A_h is the crop area in the h^{th} zone. The weights to be used for framing estimates of cost per quintal are given by

$$W_h = \frac{Q_h}{\sum_{h=1}^{H} Q_h}$$

Where Q_h is the production of the crop in the h^{th} zone

The estimate of variance of $\hat{R}$ is given by

$$\text{Est } V(\hat{R}) = \sum_{h=1}^{H} W_h^{2} * V(\hat{R}_h)$$

CHAPTER - V

Cost of Cultivation Surveys in Other Countries

This chapter covers details related to cost of cultivation as are carried out in other countries. The focus in this chapter is on cost of cultivation surveys as are carried out in Asian as well as African countries and United States of America. Some of the issues related to cost of cultivation data dissemination are also debated.

5.1 Cost of cultivation surveys in other countries

Cost of cultivation / production estimates are very important input for policy formulation in India. The methodology of estimating cost of cultivation of various crops has been reviewed from time to time and changes made so that realistic and reliable estimates are obtainable. Due to the phenomena of globalization and opening up of international trade in agriculture, the need of readily available cost of cultivation estimates and how well they compare vis-a-vis other countries is important for competing in the international market. In this regard, a comparison of existing methodology of cost of cultivation of various crops in India and other developing and developed countries become important. However, indiscriminate comparison of the available cost of production (COP) data without going into details of methodology may have adverse fall outs. Unfortunately, unlike in some other areas of agricultural statistics, cross country details on methodology being used in framing COP estimates are not available to the extent it is desirable. Some sketchy details which are available are presented below:

In United States the primary data source for cost of production estimates is the Agricultural Resources Management Study (ARMS). The design of the survey is multiple frames stratified random sampling. The two frames used are list and area frames. List frame comprise farms which produced a commodity in the previous year. List frame is stratified by size. Similarly, the area frame is made up of land segments stratified by land use. The cost of production surveys are conducted by the Economic Research Service (ERS) and the National Agricultural Statistics Service (NASS). Data on cost of production are obtained from two different sources i.e. from the farms and from the market. Information on the input use, field operations is obtained by direct contact with the farmer. The ARMS takes place during fall for costs of production data and questions are asked in the spring about whole farm costs

like overhead, interest, taxes etc. The data so obtained is supplemented with price and production data from other sources, mainly NASS' Agricultural Prices and Crop production. Seed, fertilizer and machinery operating costs are evaluated on the basis of responses obtained from producers, field operations and machinery used on a particular commodity. Information on livestock is obtained from the producers while that on buildings from the annual building cost guidelines.

Cost of production estimates are obtained by taking into account cash expenditure and non-cash costs. Cash expenditure include seed, fertilizer, chemical, hiring charges, hired labour, fuel, repairs, purchased irrigation water and technical services. Non-cash items comprise taxes and insurance, general farm overhead electricity, non irrigation water, telephone, farm shop, office equipment, water drainage, fence maintenance etc. and interest paid on operating loans and real estate loans.

5.2 FAO initiatives

To improve the Farm management decision support system the FAO has taken initiative on standardization of methodology of data collection and analysis of COP data. One of the important contributions of FAO has been the development of an Electronic Data Processing facility for analysis, storage and retrieval of farm management related information. Accordingly, computer softwares on Farm Management Analysis Program (FARMAP) and Family System Data Base (FASYDB) have been developed.

With the specific objective of standardization of Methodology on COP, a regional expert consultation meeting was organized by the FAO in 1996 at FAO – RAP Bangkok, Thailand.

Due to the efforts made by the FAO farm data system studies were initiated in Africa in the year 1999.

Like in Africa, studies on Farm data System of which COP was an important component were initiated in eight countries of Asia i.e. Bangladesh, India, Indonesia, Malaysia, Nepal, Philippines, Thailand and Vietnam to strengthen the Farm Data information system

Some of the important publications brought out by the FAO are:

- Farm record keeping and accounts – case study reviews in India, Thailand.
- Update of cost of production data on main crops in Asia.

- Farm data information network – Central Europe.
- Development of budget and accounting modules for Farmer Field Schools in West Africa.
- Updated guidelines of farm data handbooks.
- Update of 1975 AGS bulletin.
- Development of the In-Farm website.

Some of the important field programmes launched were:

- Farm household resource monitoring system – Agrarian reform project.
- Data analysis and utilization project – Farm record keeping project in the Philippines.
- Field site demonstration data analysis for Special Program on Food Security (SPFS) in Solomon Islands.

More recently, the FAO organized an Expert Technical Group meeting in the year 2004 on methodology for COP of crops and livestock. Subsequently, a handbook entitled "Uses and design of cost of production surveys in agriculture – A new approach" was also prepared.

Cost of Production Surveys in Afro-Asian countries

Sampling for COP surveys in Asian countries like Philippines, Nepal, Indonesia, Malaysia, Thailand, and Vietnam is generally carried out randomly. Representativeness of the sample is ensured by the technique of stratified sampling which implies that homogeneous groups are formed out of survey areas and samples are selected from each of the group. In Indonesia sampling is done in three stages wherein area is the first stage unit of selection, households as the second stage unit and crops within household as the third stage of sampling. In Malaysia the purpose of collecting cost of production data is to determine the profitability of the enterprise on commercial basis. Thus the sample is selected purposively from among commercial farmers. In Nepal, districts are selected purposively on a rotation basis from among those which have considerably significant cropped area. Every time 80 units are selected from a district and 20 household for each agro-ecological condition i.e. irrigated, improved, un-irrigated local and un-irrigated improved varieties.

A three stage sampling mechanism is adopted wherein provinces, municipalities and the villages form the first, second and third stage of sampling.

In Thailand sampling is carried out from different agro-climatic zones which may be selected randomly or purposively on a voluntary basis. In Vietnam samples are selected from important economic regions which lie in 4 provinces. From the provinces 4 communes are selected from which villages are selected. In each of the selected village households are selected randomly. COP surveys started in China in the year 1975 for some of the selected crops. These were discontinued in the year 1967 but started again in 1980 by the State Bureau for statistics The Bureau for price took over these surveys for rice, wheat, maize, soybeans etc. in the year 1994. Data under these surveys are collected on inputs like seeds, fertilizer, and chemicals, hired labour and indirect labour cost which include selling costs, allocation costs and management fees. Non-cash outlays such as unpaid labour, interest on operating capital and depreciation are not included. Indonesia carried out COP surveys on a quarterly basis every year on crops such as maize, cassava, sweet potato, groundnut, etc. As in case of China, survey on the items of cost like unpaid labour, imputed value of land, interest on operating capital and depreciation are not accounted for in the COP estimates.

Although COP surveys in Nepal started much earlier, since 1976/77 these are being carried out on a regular basis. COP estimates in Nepal are framed by following normal procedure.

In Philippines the Bureau of Agricultural Statistics conducts COP surveys for major crops like rice, corn etc. using the well defined procedures. Due to lack of funds COP estimates are currently derived from the index of cost of production by substituting the current prices of input and output. COP estimates in Thailand are also derived from the index of cost of production.

In Malaysia COP surveys are conducted every year for seasonal crops while for perennial crops these are conducted after a gap of three to five years. The primary objective of these surveys is to determine the relative profitability of the various crops and to determine the changes over time in the cost per unit. The items considered for determining cost of production are seeds, fertilizers, chemicals and intercultural operations like weed control. Other items like labour cost, irrigation charges and non-cash costs are not considered.

In Sri Lanka collection of cost of production data is vested with the Department of Agriculture. Surveys on rice and some of the major crops are carried out twice a year.

In Thailand the Office of Agricultural Economics (OAE) in the Ministry of Agriculture collects COP data. However, there are many agencies which collect farm data. The method of working out estimates is same as in case of Philippines.

It may be seen that there are wide variations in methodology used for Cost of Production surveys in the Asian countries. The 13th Asia-Pacific Commission on Statistics (APCAS in 1990) also reported lack of uniform concept used in COP surveys due to which inter country comparison of COP data was not of much utility. As a consequence an expert consultation on methodologies for standardizing collection, analysis of cost of production data was conducted in Bangkok, Thailand in 1996 in which expert from 12 countries participated. The experts were asked to prepare a country paper on cost of production and return for rice as well as method of collection and analysis of COP data.

A report entitled "Cost of production of selected crops in the Asia-Pacific region, 1995" was prepared on the basis of papers submitted by the participating countries.
In all the participating countries, COP data for paddy were based on a given specific place at a given agro ecological zones, for certain class of rice say HYV as in the case of Nepal, *aman* rice in Bangladesh, *yala* rice in Sri Lanka, for all seasons national average in the case of Philippines, irrigated HYV rice in Central Plains of Thailand, etc. The summary of COP results for the participating countries are presented in Table-6.

Table-6: Cost of Production of Rice Per Ha in Selected Countries in Asia, 1992-93

Country	Cash $/ha	Percent of Total Cost	Non-cash $/Ha	Per Cent of Total Cost	Total Cost
South Asia					
Bangladesh	173	57	128	43	301
India	201	59	137	41	338
Nepal	69	26	200	74	270
Sri Lanka	259	65	142	36	400
Southeast Asia					
Indonesia	185	98	3	2	188
Malaysia	298	100	0	0	298
Myanmar	30	67	15	33	45
Philippines	252	71	103	29	355

Thailand	204	95	10	5	215
Vietnam	236	82	53	18	289

Source: Cost of Production per Hectare of Rice in Asia- Pacific Region, FAO Publication, FAO-RAP, 1995

It can be seen from Table-6 that there are wide variations in COP of rice for the different countries. Whereas highest per hectare cost of production was reported by Sri Lanka (400 $), the lowest was reported from Myanmar (45$). Some of the probable reasons for the variations in cost could be attributed to differences in locations, varieties, year of data collection etc. Apart from this the method of valuation of cost items could have contributed to the differences in cost. The differences in valuation were observed in respect of unpaid costs. Thus, no country treated unpaid family labour as non-cash cost and depreciation expenses as a fixed non-cash cost. Similarly, irrigation cost was not taken into account by many countries though the farms were irrigated.

In the light of these experiences a standard format for computing COP estimates was devised in the expert consultation meeting held in the year 1995. All the 12 countries which submitted country paper earlier were asked to conduct case studies on major corps including rice in their respective countries so that estimates on COP can be obtained on a uniform basis. Cost of production studies for some of the crops including rice were thus conducted again. The results of these studies for the rice crop are presented in the Table-7.

Table-7: Cost of producing Rice in Selected Countries in Asia, 1997-98 (per hectare)

Countries	**Cash**	**% of Total**	**Non-cash**	**% of Total**	**Total Costs**
	US$		US$		US$
South Asia					
Bangladesh	126	66	66	34	192
India	257	55	212	45	468
Sri Lanka	660	42	906	57	1583
Nepal	96	30	220	69	320
South-east Asia					
Indonesia	306	57	101	19	538

Malaysia	278	49	282	49	573
Myanmar	100	64	57	37	156
Philippines	249	52	227	48	476
Thailand	110	42	151	57	264
Vietnam	321	70	139	30	460

Source: Cost of Production of Selected Crops in the Asia-Pacific Region, 2000, Unpublished, RAP, Bangkok, Thailand.

Contribution of unpaid human and animal labour to non-cash cost of rice in selected countries of Asia is presented in Table-8.

Table-8: Contribution of unpaid human and animal labour to non-cash cost of rice in selected countries in Asia, 1997-98

Country	Human Labour	Animal Labour	Total	% of non- Cash cost
South Asia				
Bangladesh	67	33	99	100
India	29		29	15
Nepal	59	19	78	48
South-east Asia				
Indonesia	87	3	90	90
Malaysia	97	0		33
Myanmar	38	12	50	88
Philippines	77	5	82	36
Thailand	70	6	67	50
Vietnam	96	17	113	80

It may be observed from Table-7 that the cost of production of rice varies from as high as 1583$ in case of Sri Lanka to 192$ for Bangladesh. It is worthwhile to note from Table-8 that the non-cash costs average account for about 40% of which 55-75% are unpaid family labour for all countries. Bangladesh has not included other costs other than unpaid family labour.

This exercise created awareness among the participating countries the utility of following uniform concepts and definition and inclusions of all relevant costs in framing COP estimates.

As in case of Asian countries, more or less the same situation prevails in African countries Apart from lack of uniformity of concepts and definitions the method of collection of data is a problem area. Clearly, greater interaction is required between experts of countries handling COP data so that a uniform approach can be adopted for implementation.

The Directorate of Research, Statistics and Information of the Ministry of Agriculture, Costa Suvanna, in the year 2003 prepared COP of several commodities including rice. Though full methodological details of the study are not known, the available data for the rice crop are presented in Table-9.

Table-9: Cost of Production of Rice in Costa Suvanna, Africa, 2003

Cost Items	**Cost/Ha in US dollar**	**Percentage**
Cash cost		
Hired labor	89.1	57.04
Transportation	0.36	*
Land rent	1.79	1.14
improved seed, 40kg	5	3.20
fertilizer, 50kg:		
NPK	13	8.58
SOA	4	2.86
Water Charges	22	14.30
Sub -Total	**136.82**	**83.93**
Non-cash		
Depreciation of		
hoe, dep. over 2 seasons		
sacks, dep. over 2 seasons	5.70	3.65
Interest on operating capital*	23.71	15.18
Contingency	12.32	7.88
Sub-total	**41.72**	**26.71**
Grand Total	**156.20**	100.00

*Bank rate, 35% p.a. (for 6 months)

Source: Statistics, Research and Information Directorate, Ministry of Agriculture,Ghana, 2003

Table-10: Labor cost per ha of growing rice in Costa Suvanna, Ghana, Africa

Farm operation	**Value US $**	**Percentage**
Field cleaning	10	11.28
Ploughing	6	4.80
Seed nursing	3	3.51
Transplanting	13	14.04
Weeding	19	21.05
Fertilizer application	4	4.21

Birdscaring	7	7.52
Harvesting/carting to threshing point	16	17.54
Threshing/carting to barn	5	3.50
Drying/Bagging	4	4.21
Winnowing	3	3.50
Total	89	100.00

Source: Statistics, Research and Information Directorate, Ministry of Agriculture, Ghana, 2003

It may be seen from the Table-9 that the family labour is not accounted for in compiling COP estimates. The non-cash costs account for only 26 per cent of the total cost. It may also be seen that the contribution of hired labour cost is highest i.e. about 57 per cent. Table-10 presents the activity wise break-up of labour cost in Costa-Suvanna which indicates that labour cost is an important component of COP.

The FAO also compiled data on cost of cultivation of Paddy and published the Economics and Social Development paper 101 entitled "A comparison of cost of producing rice in selected countries" in 1991. This publication provides information about cost of cultivation data of different countries at one place. The percentage data presented in Table-11 provides a comparison of pattern of cash expenditure in cultivation of irrigated rice (Paddy) in selected countries for 1987-89. It includes percent cash expenditure on items of cost like, seed, fertilizers, chemicals, draught animals, feed and lubricants, electricity, maintenance and repairs, drying, purchased irrigation water, hired labour, farm over head expenditures, taxes and levies, interest / insurance etc.

Table-11 shows that hired labour is most important factor of cash expanses in number of countries except in Japan, Burkina Faso and USA probability due to high rate of mechanization of agriculture in these countries. The other important items of cash expenses are fertilizers followed by chemicals (pesticides and insecticides) and seed. It is interesting to observe that share of chemicals in the total cost expenses in India is only 4.7 percent in irrigated paddy whereas in developed countries this share varies between 12 to 18 percent. Even in Republic of Korea, Philippines and Thailand it was 7.6, 11.2 and 8.5 percent of total cost of cultivation.

The breakdown of cash, imputed and capital replacement of cost of both irrigated and rain fed paddy are presented in Table–12 which also does not show any definite trend / pattern.

Table-11: Percentage Cash Expenditure in Cultivation of Irrigation Paddy in Selected Countries (1987-89)

Countries	Seed	Fertilizers	Chemicals	Draught Animals	Fuel Lub.	Electricity	Repairs	Drying	Purchase Irrigation	Hired Labour	Farm O. Head	Taxes	Interest	Total Cash
Australia	5.4	27.0	18.3	5.9	-	4.3	-	39.1	-	-	-	-	-	100.00
Italy	6.9	10.0	13.4	-	3.1	1.4	3.5	8.3	14.2	21.7	5.7	7.5	3.7	100.00
Japan	6.5	22.0	17.5	-	5.3	1.5	9.9	-	14.5	2.2		20.4		100.00
USA	6.3	9.8	11.3	-	13.5	-	6.8	11.4	2.3	11.4	16.8	3.4	7.0	100.00
Egypt	7.1	8.4	1.1	3.7			30.01		-	43.4		6.2		100.00
Burkina Faso	6.4	45.0	7.8	10.7	-	-	3.0	-	-	5.2	1.0	17.4	3.5	100.00
Indonesia	2.7	12.7	7.5	11.2	-	-	-	-	-	59.9	1.4	3.6	1.0	100.00
Kenya	7.4	84.9	7.7	-	--	-	-	-	-	-	-	-	-	100.00
Korea Rep.	3.3	11.3	7.6	0.80		0.09	16.6	-	-	12.2	45.8	1.5	0	100.00
Phillipnes	16.8	19.5	11.2	-	2.3	-	-	-	4.0	37.3	2.9	1.9	4.1	100.00
Thailand	2.5	31.1	8.5	0.1	3.8	-	0.4	-	1.7	23.0	22.0	2.8	3.9	100.00
Mauritius	2.1	8.2	3.1	-	1.50	0.1	0.9	-	1.2	76.9	1.0	-	4.9	100.00
Mexico	14,1	13.0	4.7	-	5.9	-	4.6	-	5.6	22.3	-	7.7	22.1	100.00
India**	4.3	21.2	4.7	2.8	2.8	-	9.7*	-	11.1	34.3	-	6.3	2.8	100.00

*Relate to custom hiring of machine of labour and hired bullock labour with implements.

**Relate to 1995-96 average of Haryana, Punjab and Andhra Pradesh where 97% crop area is irrigated.

Source: FAO Economic and Social Development Paper 101, A comparison of the cost of producing rice in selected countries, 1991

Table-12: Breakdown of Cash, Imputed and Capital Replacement of Cost of Paddy in 1987-89 (Per cent)

Countries	Cash Expenses	Capital Replace-ment	Owned Working Capital	Owned Fixed Capital	Owned Land	Unpaid Labour	Total
Australia	N.C.-	-	-	-	-	-	-
Italy	50.00	12.2	6.4	15.5	15.9	-	100
Japan	24.2	25.0	1.1	3.6	17.7	28.4	100
USA	72.2 (61.8)	9.4 (9.9)	1.4 (1.6)	2.1 (3.5)	10.0 (18.9)	4.9 (4.3)	100
Egypt	N.C.	-	-	-	-	-	100
Burkina Faso	17.9	1.6	1.3	3.9	-	75.3	100
Indonesia	55.2	-	-	-	32.2	12.6	100
Kenya	N.C.	-	-	-	-	-	100
Korea Rep.	42.0	3.1	-	4.3	33.7	16.9	100
Philippines	40.4	-	5.0	6.9	28.9	28.8	100
Thailand	48.7	0.8	4.6	18.5	8.5	18.9	100
Mauritius	88.1	-	-	-	2.2	9.9	100
Mexico	91.6	5.7	1.7	1.0	-	-	100
India	**54.6**	**0.7**	**1.5**	**3.5**	**30.4**	**10.3**	100
Rain fed crop							
Burkina Faso	29.1	-	4.0	-	-	66.9	100
Columbia	48.9	37.4	7.4	-	6.0	-	100
Indonesia	66.1	-	-	-	21.7	14.7	100
Zambia	57.0	10.7	15.8	1.8	-	14.7	100
Mexico	89.0	4.8	5.4	3.9	-	-	100
India	**49.4**	**2.3**	**1.2**	**4.3**	**24.2**	**18.6**	100

Source: State of Indian Farmer: Cost of Cultivation and Farm Income- Abhijit Sen and M.S. Bhatia, MOA, GOI, 2004.

The percentage share of cash expenses in total cost of cultivation of irrigated paddy in India is 54.6 percent which is quite comparable with 48.7 percent in Thailand, 50 percent in Italy, 55.2 percent in Indonesia and 61.8 percent in U.S.A.. The percentage share of cash expenses in total cost of cultivation of irrigated paddy in Mexico and Mauritius is quite high i.e. 91.6 and 88.1 percent while in Japan, Philippines, Republic of Korea and Burkina Faso it is 24.2, 40.4, 42.0 and 17.9 percent, respectively. It also shows that there is no significant difference in share of cash and non-cash expenses in total cost of cultivation of irrigated and rain fed paddy.

It is quite obvious that there are various factors responsible for wide variations in cost of cultivation in different countries like, climate, topography, endowments of natural resources, type of soils, managerial capabilities and culture practices etc. Besides above factors, another important source of variation may be in the adoption of methodology and use of items of cost of cultivation considered in estimation of cost of cultivation in different countries. In the light of these observations, it becomes important to standardize the procedures so that variation in cost of cultivation attributable to above mentioned factors can be avoided.

The cost of cultivation per unit of land or per unit of quantity of irrigated paddy in selected countries for 1987-88 are presented in Table-13.

It may be observed that there is a large variation in cost of cultivation per tonne of paddy mainly due to difference in treatment of costs, which shows that cost of cultivation in Japan and Republic of Korea is quite high i.e. $ 305.22 per tonne and $ 202.80 per tonne respectively as compared to countries like Indonesia, Thailand and Maxico i.e. $ 14.24, $ 25.93 and $ 26.50 per tonne respectively. This wide variation in cost of cultivation per tonne may be due to incomplete coverage of cost items in the estimation procedure. The table also shows a quite low cost of production of paddy in USA, which is quite at variance with the details available. In this backdrop, such a data set has very limited utility for comparison purpose and for benchmarking performance of any country in comparison to other.

Table-13: Variations in Cost of Cultivation of Irrigated Paddy in Selected Countries 1987-89. (US $ / Hect.)

Countries	Total cost Per Hect.	Cash Expenditure per Hect.	Yield per Hect. Tonne	Cost of production/Tonne	
Italy	543	272	5.87	92.50	46.33
Japan	1987	481	6.51	305.22	73.88
USA	195	141	6.27	31.10	22.50
Burkina Faso	361	65	4.73	76.32	10.36
Indonesia	82	45	5.76	14.24	7.81
Kenya	-	28	6.10	-	4.59
Korea Rep.	939	394	4.63	1202.80	85.09
Philippines	124	38	2.58	48.63	14.78
Thailand	98	48	3.78	25.93	12.70
Mauritius	483	426	6.95	69.49	61.29
Mexico	141	129	5.32	26.50	24.25
India*	**506**	**276**	**4.45**	**113.70**	**62.02**

* Relate to 1995

International Cotton Advisory (ICA) Committee in the year 1995, conducted a survey on cost of production of raw cotton. Accordingly data was collected on cost of cultivation on different operations. The data on per unit area cost of cultivation of cotton in selected countries in terms of expenses on different operations (in U.S. dollars) are presented in Table-14.

The data presented in the table shows that the system of cultivation of cotton and the operations used in cotton production are quite different in selected countries. It would not be advisable to compare cost of cultivation in different countries on the basis of this kind of data. It may be observed that there are differences in valuation and leasing of land. Canal water and seed are highly subsidised in some countries. Differences are also attributable to system of selling the cottonseed or cotton lint, exclusion /inclusion of cost of ginning and variation in economic and fixed costs.

able-14: Cost of Cultivation of Cotton in Selected Countries for 1994-95. (US $ Hectare)

o.	Operation/Items	Australia Queensland Irrigated	China main land National	India North Irrigated	USA National Average	Iran National Average	Israel Drip Irrigated	Pakistan (Punjab) Region	Philippines Luzon Irrigated	Sudan Gezira Shambat
	Pre-sowing	15.04	50.71	104.76	93.97	326.92	240.10	235.91	303.24	38.22
	Sowing	167.93	112.46	84.44	35.36	66.50	242.68	145.13	164.00	38.25
	Seed	27.01	16.72	19.05	-	8.55	62.68	16.44	12.00	14.54
	Others	140.92	95.74	-	-	-	-	-	-	-
	Growing	607.67	399.87	222.54	510.43	225.00	1425.13	381.64	266.60	330.14
	Fertilisers	-	113.67	66.67	89.65	14.43	136.67	64.41	30.18	83.04
	Irrigation	135.03	38.33	19.37	13.34	115.38	560.67	88.57	54.72	43.08
	Insecticides	291.82	142.86	87.30	122.64	38.46	476.27	193.24	108.11	116.26
	Others	180.82	105.01	49.20	284.80	56.81	251.52	35.42	83.59	87.76
	Harvesting	194.30	86.89	150.79	-	129.23	210.57	136.88	76.20	116.95
	Ginning	411.44	21.66	-	126.74	52.38	376.24	249.33	190.01	19.27
	Economic Costs	59.52	32.71	101.05	280.16	116.92	1167.33	133.45	88.75	11.07
	Management & Admn.	-	-	-	-	-	86.00	-	-	-
	Intt. on Capital Invest.	-	-	-	-	-	79.67	-	-	-
	Repairs	-	-	-	-	-	93.32	-	-	-
	Farm overhead	-	-	-	-	-	978.34	-	-	-
	Fixed Costs	30.01	9.04	-	43.09	-	791.00	-	12.00	-
	Total Cost	1485.90	713.32	663.58	1089.75	916.96	4455.05	1282.23	1100.81	553.91
	Value of Seed Cotton	2685.90	1535.42	904.76	805.81	1171.15	4076.80	1308.87	1524.00	NG
	Yield (Seed Cotton) kg.	4634	2400	1500	2100	2100	4800	2500	1905	NG

Source: Survey of the cost of production of raw cotton, Oct 1995, International Cotton Advisory Committee.

Notwithstanding this some of the individual cost items / operations in various countries are comparable.

On examining the cost of cultivation of some of the individual items it was observed that per hectare cost of growing cotton is lowest in India i.e. $222.5 against $ 510.43 in USA, $400 in China, $607.67 in Australia and the maximum $1425.1 in Israel. The cost of insecticides and irrigation was very low in India**.** Comparison of cost per unit area does not reveal the real benefits on costs. It would be more justified to assess the cost of return on per unit of quantity. The table shows that the yield of seed cotton in India is lowest among the countries studied. Israel and Australia have yield level almost three times to that of India, however, taking into consideration the total cost of cultivation excluding ginning cost per hectare the cost of production per quintal of seed cotton was estimated to be $44.2 in India against $45.86 in USA , $41.17 in Iran , $84.97 in Israel, $41.32 in Pakistan and $47.81 in Philippines, though the cost of production on the basis of some selected cost items and operations is much lower in Australia and China i.e. $23.1 and $28.82 respectively. However, cost of production of seed cotton per quintal are quite comparable to other major cotton producing countries Therefore, it would be more appropriate to compare cost of production on per unit of quantity rather than per unit of area.

From the above exercise, it can be appreciated that due to variation in cost items, accounting methods and estimation procedures followed by various countries, the cost of cultivation and their break-up are not comparable. In addition, there are large variations in systems and types of farming due to variations in socio-economic and agro –climatic conditions including soil types, topography, land fertility and agricultural practices. Results of this study further highlight the need for adoption of a uniform methodology so that cross country COP comparison becomes meaningful.

5.3 Recent modifications

The American Agricultural Economics Association (AAEA) in the year 1992 constituted a task force to look into the standards on costs and return and to suggest modifications, if any. The Task Force released its final recommendations after six years in 1999. It recommended new standards on Cost and Returns. Due to this, US Cost and Returns have under gone revision after 1999. The Economic Resources Services of US is now publishing estimates using new methodology based on recommendations of the Task force. The major revision is in the treatment of capital costs. At the same time the

reporting format no longer distinguishes between variable and fixed cost. These are replaced by “operational cost” and “allocated overheads”.

In India, the state wise estimates of cost of cultivation are combined using area of the state as weight to arrive at estimates of the cost of cultivation at the All India level. The pre-revised cost of cultivation in USA and India are strictly not comparable on account of differences in cost except a few specific items like seed, fertilizers, chemical, hired labour, unpaid family labour, custom hiring of hired machine labour. Many other items of cost are not comparable. As a matter of fact many cost items are combined with one another. Draught animals, bullock labour are not used in USA but it is an important item of cost of cultivation in Indian Agriculture. Amongst the fixed cost, expenses like electricity, non- irrigation water, telephone, farm shop, office equipment, water drainage, fence maintenance etc. and taxes and insurance are major items of cost in USA which are not relevant at present in Indian conditions

5.4 Major methodological issues

A close examination of cost structure of two countries, i.e. India and USA revealed some of the following issues for consideration in cost accounting procedures.

1. In USA, capital replacement (depreciation) is included in the estimation of full economic cost of cultivation of a commodity but it is not included in either operational, variable or fixed cash expenses while in our system it is included in cash expenses. It may be appreciated that it is an amount, which is set aside with the farmer for capital investment and not paid out side. It is considered as a part of farm income. Moreover in the new methodology suggested by AAEA estimates of fixed costs have undergone revisions so that the unrecovered capital is accounted for which is an additional imputed entry.

In India, under comprehensive scheme, interest on working capital and fixed capital is calculated but no breakdown of interest on owned and borrowed capital is available separately while in most other systems of accounting, including US, separate estimates are made for owned and borrowed working and fixed capital.

In the US, all human and bullock labour are treated as overheads while in India these are considered as operational costs. But, conceptually hired bullock labour is variable operational cost and maintenance cost of bullock labour is an item of fixed cost. Also while casual labour is clearly a variable operational cost, family labour cost may be taken as overheads.

Under comprehensive scheme in India, breakup of cost on machine labour like fuel cost, lubricants cost and electricity cost are not available separately, such costs may be treated as variable operational cost. These may be separated from depreciation and interest on machinery as these are overheads.

Breakup of cost of irrigation in terms of cost of purchased irrigation water and cost of irrigation from owned resources is standard practice in other countries, while in India under comprehensive scheme it is analysed as total estimates of cost of irrigation. Thus there is no distinction made between irrigation from owned resources and purchased resources.

It is thus very clear that there are methodological differences in evaluation of different components of Cost of Production in as much as some of the items are either not included or are clubbed with other items which result in variations in cost of production. Therefore, it would be desirable that a standardized format of items of cost of cultivation should be followed in different countries to have more accurate estimates and also to have the estimates comparable at country level.

5.5 Data dissemination

Effective dissemination of the data collected through cost of production survey is a very important aspect. Published data though easily reachable to users is generally available in condensed farm. On the other hand data stored in electronic farm is generally raw. It has the advantage that it is easily accessible. But in many developing countries the computer availability and usage is limited to people belonging to urban areas which limits the reach of the data to the user. In these countries data are generally disseminated through reports, published documents which may be newsletters, pamphlets, bulletins, workshop papers and radio broadcasts. However, these are instances in some of the countries where in the concerned departments have developed their own websites. But such instances are few and far between. The overall scenario particularly in developing countries is far from satisfactory. The internet users in these countries are limited in number. This coupled with poor institutionalization and lack of networking, are the major constraints in the flow of data in electronic form. High cost of data dissemination and inadequate dissemination channels further complicates matters.

Some of the major factors which affect smooth data dissemination are lack of consistency in publication of reports, inadequate funds for publication, poor distribution of the compiled material, under utilization of the available communication facilities

particularly mass media and electronics media, lack of proper mechanism of flow of data between farmers particularly small farmers and producers of data. Many a times it is seen that the reports are highly technical for the farmer to understand. Farmers usually understand only the vernacular languages. This is an aspect which needed to be looked into.

In this overall scenario measures like strengthening of extension facilities and reorienting their functioning to meet the needs of all categories of farmers, development of effective farm level communication systems, decentralization and establishment of branches, Agricultural Information Centres and networking will help in better data dissemination. Full utilization of already developed infrastructure such as farmer organizations, co-operatives and other user groups are also expected to improve data dissemination. Extensive use of internet will also bring desired results for some of the categories of persons by linking Headquarter with other organizations.

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ANNEXURE-I

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS

Farmer's Name		Farmer Code	
Village Name		Village Code	
Tehsil Name		Tehsil Code	
Month		Size Group	
Calendar Year		Zero No.	
Crop Year		State	

Discrepancies Observed

NUMBER OF RECORD TYPE (RT) FORMS ATTACHED

RT	110	111	120	121	210	211	230	231	310	311
NO.										
RT	410	411	440	441	450	451	510	511	512	610
NO.										
RT	710	711	712	713	714	715	716	720	721	722
NO.										
RT	723	724	730	731	732	733	740	741	742	743
NO.										

Signature of ARO/RA_____
Date_____

Signature of Agricuculture Supervisor _____

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-110- HOUSEHOLD MEMBERS (Yearly)

INVENTORY DATE…….

Farmer No..... Village No..... Tehsil ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State Size Group..... Zone.....

HOUSEHOLD MEMBERS		Relation-ship	Martial Status	Age (Yrs.)	Sex	Education	Dependent Status	% of year Live at Home	% of time work on Farm	OCCUPATION			
										Major		Minor	
No.	Name									Code	Name	Code	Name

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-111- HOUSEHOLD CHANGES (Monthly)

Farmer No..... Village No..... Tehsil No. ..... **Crop Year .....** **State.....**

Name ..... Name ..... Name..... ..... **Size Group.....** **Zone.....**

HOUSEHOLD MEMBERS		Relationship	Martial Status	Age (Yrs)	Sex	Education	Dependent Status	% of time work on farm	OCCUPATION				Type of change	Date of Change	
									Major		Minor				
No.	Name								Code	Name	Code	Name		Month	Calendar year

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-120- ATTACHED FARM SERVANTS (Beginning of the year)

Inventory Date ----------

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State Size Group..... Zone.....

SERVANT		Reside with cultivator Yes=2 No=1	Age Yrs.	Sex	Date of engagement			Type of work	Contract Pried Mos	Remuneration for Contract Period					Payment frequency	Holidays No.
											Kind		Perquisites			
No	Name				Day	Month	Cal-ender year			Cash (Rs,)	Type	Value (Rs.)	Type	Value (Rs.)		

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-121- ATTACHED FARM SERVANTS CHANGES (Monthly)

Farmer No..... Village No..... Tehsil No ..... Month ..... Crop Year.....

Name ..... Name ..... Name..... Size Group..... Zone..... State..... .....

Servant		Reside with cultivator Yes=2 No=1	Age (Yrs)	Sex	Date of Engagement			Type of work	Con-tract period (Mos)	Remuneration for contract period					Payment frequency	Holiday	Type of change	Date of change	
											Kind		Perquisites						
No.	Name				Day	Month	Calendar year			Cash (Rs.)	Type	Value (Rs.)	Type	Value(Rs.)				Month	Calendar year

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-210- LAND INVENTORY (Yearly)

Inventory Date ……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State ……. Size Group..... Zone.....

Par-cel No.	Tenure	Land use	Area (hectares)		Value (Rs.)	Irrigation	Topography	SOIL				Govt. charges		Rental Value for owned mortgaged, giffted in lands (Rs.)
			Total	Under border, paths etc.				Texture	Colour	Drain-age	Erosion	Land Revenue	Cesses and Taxes	

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-211- CHANGES IN LAND (Monthly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State……..Size Group..... Zone.....

Parcel No.	Tenure	Land use	Area affected by change (Hect.)		Value of area affected by change (Rs.)	Irrigation	Topography	SOIL				Govt. charges		Rental value for portion of the (brought.. Mortgaged / gift in land use) (Rs.)	Type of change	Month	Cash kind C=5 K=1
			Total	Under border path etc				Texture	Colour	Drainage	Erosion	Land revenue (Rs.)	Cesses and taxes (Rs.)				

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-230- ANNUAL CROP RECORD (Beginning and end of Season)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State …… Size Group..... Zone.....

Parcel	Plot	Season	Survey number	Tenure	Mixture		Area under crop (ha.)	Crop		Area under crop (ha,)	Variety	Purpose	Harvested %	Problem	Mon. Planted	Mon. Harvested	Land rent paid					
																		Kind: Fixed value			Crop share	
					Code	Name		Code	Name								Cash (Rs.)	Type	Qty. Qtl.	Value (Rs.)	Qty. Qtl.	Value (Rs.)

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-231- PERENNIAL CROP INVENTORY (Beginning and end of Season)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State ……. Size Group..... Zone.....

Parcel	Plot	Survey No.	Tenure	Mixture		Crop		Area under Trees (ha.)	Age group	Trees No.	Variety	Purpose	Harvested %	Problem	Re-main-ing (Yrs)	Value of Trees	
				Code	Name	Code	Name									Pre-sent (Rs)	Salvage (Rs.)

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-310-ANIMAL INVENTORY (Yearly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year ..... Crop Year.....

Name ..... Name ..... Name..... State…….Size Group..... Zone.....

ANIMAL		Sex	AGE		Age Group	Re-maining (Yrs)	Animals No.	Home-breed/ Purchased H=2 P=2	Breed	Management	Purpose	Condition	Owner-ship	Value (Rs.)	
Code	Name		Yrs	Month										Percent	Cull.

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-311-ANIMAL CHANGES (Monthly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Crop Year.....

Name ..... Name ..... Name..... State…… Size Group..... Zone.....

ANIMAL		Sex	Age		Age Group	Remaining life	Animals No.	Home breed Purchased H = 1 P = 2	Breed	Management	Purpose	Condition	Owner-ship	Value (Rs.)		Change type	Month	Cash kind C=5 K=1
Code	Name		Yrs.	Mos.										Percent	Cull			

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-410-BUILDING INVENTORY (Yearly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year..... Crop Year.....

Name ..... Name ..... Name..... State……..Size Group..... Zone.....

ITEM		Total Area m^2	BLDG Type	Cost purchase Yr.	Age Yrs	Remaining Life Yrs.	Owner-ship %	Value (Rupees)		
Code	Name							Const/Purchase	Present	Salvage

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-411-BUILDING CHANGES (Monthly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Crop Year.....

Name ..... Name ..... Name..... State……. Size Group..... Zone.....

ITEM		Total Area m^2	Building Type	Construction Yr.	Age Yrs.	Remaining life Yrs.	Owners Ship %	Value (Rupees)			Type of Change	Month	Cash /kind C=5 K=1
Code	Name							Construction	Present	Salvage			

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-440-IRRIGATION STRUCTURE INVENTORY (Yearly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year..... Crop Year.....
Name ..... Name ..... Name..... State…….Size Group..... Zone.....

ITEM		Number	Capacity HP	Area Commanded	Owner Ship %	Const./ Purchase Yrs.	Age Yrs.	Remaining life Yrs.	Value (Rupees)		
Code	Name								Const./Purchase	Present	Salvage

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-441-IRRIGATION STRUCTURES CHANGES (Monthly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Crop Year..... State .....

Name ..... Name ..... Name..... Size Group..... Zone.....

Item		Number	Capacity (HP.)	Area Commanded (ha.)	Owner ship %	Const/ Purchase Yrs.	Age Yrs	Remaining Life Yrs.	Value (Rupees)			Type of changes	Month	Cash/Kind C=5 K=1
Code	Name								Const Purchase	Present	Salvage			

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-450-MACHINERY AND IMPLIMENT INVENTORY (Yearly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year..... Crop Year.....

Name ..... Name ..... Name..... State……Size Group..... Zone.....

ITEM		Number	Capacity (HP)	Area Commanded (ha)	Owner-ship %	Purchase Year	Age (Yrs)	Remaining Life Yrs.	Value (Rupees)		
Code	Name								Purchase	Present	Salvage

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-451-MACHINERY AND IMPLIMENTCHANGES (Monthly)

Farmer No..... Village No..... Tehsil No ..... Crop Year..... State .....

Name ..... Name ..... Name..... Size Group..... Zone.....

Item		Number	Capacity (HP)	Area Commanded (ha)	Owner-ship %	Purchase Yrs.	Age Yrs.	Remaining Life Yrs.	Value (Rupees)			Type of changes	Month	Cash/kind C=5 K=1
Code	Name								Purchase	Pre-sent	Salvage			

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-510-CREDIT OUTSTANDING (Yearly)

Inventory Date……..

Farmer No..... Village No..... Tehsil No ..... Month ..... Calendar Year..... Crop Year.....

Name ..... Name ..... Name..... State……. Size Group..... Zone.....

Date of loan was taken		Source	Type of credit	Mode of payment	Input bought on credit		Expected duration		Category	Interest Rate ann. %	Security	Purpose of loan		Difficulty	Principal (Rs.)		Interest	
Month	Year				Code	Name	Years	Months				Stated	Actual		Original	Out-standing	Total owned for whole period loan	Still owned on date of inventory

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-511-NEW LOAN TAKEN OUT (Monthly)

Farmer No..... Village No..... Tehsil No ..... Crop Year..... State .....

Name ..... Name ..... Name..... Size Group..... Zone.....

Source	Type of credit	Mode of payment	Input brought on credit		Expected duration		Category	Integrity Rate ann. %	Repayment schedule	Security	Purpose for Loan		Difficulty	Principal (Rs,)	Interest & other charges (Rs)	Date of loan		
			Code	Name	Year	Months					Stated	Actual			Owned in period of loan	D	M	Y

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-512-LOAN REPAYMENTS (Monthly)

Farmer No..... Village No..... Tehsil No ..... Crop Year..... State .....

Name ..... Name ..... Name..... Size Group..... Zone.....

Date of Loan Taken		Source	Type of credit	Mode of Payment	Input bought on Credit		Expected Duration		Category	Interest rate ann.%	Re-payment schedule	Security	Purpose of laon		Principal (Rs.)		Interest and other charges (Rs.)		Payment Date			Actual/ Waiver A=1 W=2
Mon.	Year				Code	Name	Yrs.	Month					Stated	Actual	Original AMT	Repayment	Original TOT	Payment	D	M	Y	

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-610-RECEIPT AND DISPOSALS OF IMPORTANT CROP PRODUCTS (Monthly)

Farmer No..... Village No..... Tehsil No ..... Month.....Product Vode.....

Name ..... Name ..... Name..... Plant Code.....Name..... .....

Size Group..... Zone..... .....State .... Name..... Crop Year..... .....

Stocks, Receipts, disposals (Inventory of Change)		Storage Type	Purpose	Quantity	Unit	Value (Rupees)	Pest Protection	If Change	
Code	Name							Source of Destination	Cash/kind Cash=5, Kind = 1
2	Stock: Begin Month								
12	Receipts: Form Production								
22	Received Free								
45	Bought								
46	Received on credit								
47	Received as wages								
49	Other Receipts								
	DISPOSAL								
52	Destroyed								
53	Stolen								
62	Given Free								
65	Consumed								
66	Fed to Animals								
67	Use as Seed								
85	Sold								
87	Loan & Other Rerpayment								
89	Other Disposal								
3	Stocks: End Month								

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-710-CROP OPERATIONS HOURS (Collect daily record weekly)

Farmer No..... Village No..... Tehsil No ..... Month.....Parcel ..... Plot..... Season.....

Name ..... Name ..... Name..... Crop Yea r ..... Mixture Code ..... Size Group ..... State .....

Mixtute Name ..... Crop Code .... Crop Name ..... Crop Varieties.....Area Under Crop ..... Ha.

Week	Operation		Work Hours																						
			Family				Servant			Exchange			Casual			Animal					Machine				
	Code	Name	F	M	W	C	M	W	C	M	W	C	M	W	C	Code	Name	Farm	Exch.	Hired	Code	Name	Farm	Exch.	Hired
I																									
II																									
III																									
IV																									
Total																									

F= Farmer, M=Man, W=Woman, C=Child **Note : Please See Codes in the Code Book**

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-711-CROP OPERATIONS PAYMENTS (Collect daily record Monthly)

Farmer No..... Village No..... Tehsil No ..... Month.....Parcel ..... Plot..... Season.....

Name ..... Name ..... Name..... Crop Yea r ..... Mixture Code ..... Size Group ..... State .....

Mixture Name ..... Crop Code .... Crop Name ..... Crop Varieties.....Area Under Crop ..... Ha.

Month	OPERATION		CASUAL LABOUR PAYMENTS (Rupees)									ANIMAL HIRE			MACHINE HIRE		
			Cash Pay			Pay in Kind			Perquisites								
	Code	Name	Men	Women	Child	Men	Women	Child	Men	Women	Child	Code	Name	Rs.	Code	Name	Rs.

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-712-CROPS PHYSICAL INPUTS AND PAYMENTS (Collect daily record weekly)

Farmer No..... Village No..... Tehsil No ..... Month.....Parcel ..... Plot..... Season.....

Name ..... Name ..... Name..... Crop Year ..... Mixture Code ..... Mixture Name .....

Size Group ..... Zone……..State ..... Crop Code ..... Crop Name ..... Crop Varieties.....Area Under Crop ..... Ha.

Week	PHYSICAL INPUTS OR PAYMENT ITEM		COMPOSITION			Quantity	Unit	Value Rupees	Source or Payee	Cash=5 Kind=1
	Code	Name	N %	P %	K %					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-713-CROP OUTPUTS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .....Size Group -------- Zone --------Month.....

Name ..... Name ..... Name..... State ---------- Crop Year .....

Month	Parcel	Plot	Season	Mixture Code	Mixture Name	Crop Code	Crop Name	OUTPUTS		Quantity	Unit	Value Rupees	Destination	Cash=5 Kind=1
								Code	Name					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-714-CROP TRANSPORT AND MARKETING OPERATION HOURS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .....-Month.....Crop Year--------- Crop Code.----------

Name ..... Name ..... Name..... Size Group -------- State ----------

MONTH	Crop Code	Crop Name	Qty. Transported	Unit	Distance		Operations		WORK HOURS																					
									Family				Servant			Exchange			Casual			Animal					Machine, other Transport mode				
					Km Kuccha	Km. Pucca	Code	Name	F	M	W	C	M	W	C	M	W	C	M	W	C	Code	Name	Farm	Exch.	Hired	Code	Name	Farm	Exch.	Hired

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-715-CROP TRANSPORT AND MARKETING OPERATION PAYMENTS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No ..... Size Group --------Zone----------Month.....

Name ..... Name ..... Name..... State ---------- Crop Year----------

MONTH	Crop Code	Crop Name	Qty. Transported	Unit	Distance		Operations		Casual Labour payments (Rupees)									Animal Hire			Machine, other Transport mode		
									Cash Pay			Pay in Kind			Prequistes								
					Km. Kuccha	Km. Pucca	Code	Name	M	W	C	M	W	C	M	W	C	Code	Name	Rs.	Code	Name	Rs.

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-716-CROP MARKETING COST INCURRED (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No ..... Size Group --------Zone----------Month.....

Name ..... Name ..... Name..... State ---------- Crop Year----------

MONTH	Crop Code	Crop Name	Qty. Transported	Unit	Marketing Cost Item		Cost Rupees	Source or Payee	Cash=5 Kind=1
					Code	Name			

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-720-ANIMAL UPKEEP OPERATIONS HOURS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Month	Animal Code	Animal Name	OPERATION		WORK HOURS												
					Family				Servant			Exchange			Casual		
			Code	Name	F	M	W	C	M	W	C	M	W	C	M	W	C

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-721-ANIMAL UPKEEP OPERATIONS PAYMENTS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Month	Animal Code	Animal Name	OPERATION		Value of Pay and Benefits (Rupees)								
					Cash Pay			Pay in Kind			Perquisites		
			Code	Name	Men	Women	Child	Men	Women	Child	Men	Women	Child

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-722-ANIMAL UPKEEP PHYSICAL INPUTS AND PAYMENTS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Month	Animal Code	Animal Name	PHYSICAL INPUT OR PAYMENT ITEM		Quantity	Unit	Value Rupees	Source or Payee	Cash = 5 Kind = 1
			Code	Name					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-723-ANIMAL NON MILK OUTPUTS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Month	Animal Code	Animal Name	OUTPUT		Quantity	Unit	Value Rupees	Destination	Cash = 5 Kind = 1
			Code	Name					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-724-ANIMAL MILK PRODUCTION (Collect daily record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Animal Code.....Animal Name..... No. In Milch Animal.....

Week	MILK		Quantity	Unit	Value	Destination	Cash = 5 Kind = 1
	Code	Name					
I	-----	Total milk (liters)					
	301	Milk consumed (Liters)					
	301	Milk Sold (Liters)					
	301	Milk Converted (Liters)					
II	-----	Total Milk					
	301	Milk consumed (Liters)					
		Milk Sold (Liters)					
		Milk Converted (Liters)					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-730-SPECIAL ACTIVITY OPERATIONS HOURS (Collect daily record Monthly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Month	ACTIVITY		Family				Servant			Exchange			Casual			Animal					Machine or Implements				
	Code	Name	F	M	W	C	M	W	C	M	W	C	M	W	C	Code	Name	Farm	Exch.	Hired	Code	Name	Farm	Exch.	Hired

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-731-SPECIAL ACTIVITY OPERATIONS PAYMENTS (Collect daily record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	ACTIVITY		CASUAL LABOUR PAYMENTS (Rupees)									ANIMAL HIRE			Machine or Implements Hired		
	Code	Name	Cash Pay			Pay in Kind			Perquisites			Code	Name	Rupee	Code	Name	Rupee
			Men	Women	Child	Men	Women	Child	Men	Women	Child						

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-732-SPECIAL ACTIVITY PHYSICAL INPUTS AND PAYMENTS (Collect daily record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	Activity	PHYSICAL INPUT /PAYMENT ITEM		Quantity	Unit	Value Rupees	Destination	Cash = 5 Kind = 1
	Code	Code	Name					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-733-SPECIAL ACTIVITY OUTPUTS (Collect daily record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	Activity	OUTPUTS, INCOME		Quantity	Unit	Value Rupees	Destination	Cash = 5 Kind = 1
	Code	Code	Name					

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-740-MACHINE UPKEEP / OPERATIONS HOURS (Collect daily record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	MACHINE		WORK HOURS ON UP KEEP OF THIS MACHINE																						
			Family				Servant			Exchange			Casual			Animal used in upkeep					Mach. / Imple. used in upkeep				
	Code	Name	F	M	W	C	M	W	C	M	W	C	M	W	C	Code	Name	Farm	Exch.	Hired	Code	Name	Farm	Exch.	Hired

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-741-MACHINE UPKEEP / OPERATIONS PAYMENTS (Collect daily, record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	ACTIVITY		Casual Labour Payments For Upkeep of this Machine (Rs)									Animal Hire for Upkeep of the Machine			Machine or Imple. Hired for Upkeep		
	Code	Name	Cash Pay			Pay in Kind			Perquisites			Code	Name	Rupee	Code	Name	Rupee
			Men	Women	Child	Men	Women	Child	Men	Women	Child						

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-742-MACHINE UPKEEP PHYSICAL INPUTS AND PAYMENTS (Collect daily, record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	Machine	PHYSICAL INPUT/PAYMENT		Quantity	Unit	Value Rupees	Score or	Cash = 5
	Code	Code	Name				Payee	Kind = 1

Note : Please See Codes in the Code Book

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-743-MACHINE POWER PROVIDED OUTSIDE FARM (Collect daily, record weekly)

Farmer No.....Village No..... Tehsil No .... Month..... Crop Year----------

Name ..... Name ..... Name..... Size Group..... State ---------- Zone .....

Week	MACHINE		Machine Hours Hired out	Value Rupees	Destination	Cash = 5 Kind = 1
	Code	Name				

Note : Please See Codes in the Code Book

CODE BOOK

COMPREHENSIVE SCHEME TO STUDY THE COST OF CULTIVATION OF PRINCIPAL CROPS
RT-750-MONTHLY INPUT PRICES

TEHSIL NUMBER MONTH

TEHSIL NAME CALENDAR YEAR

ZONE CODE SEASON

STATE CODE CROP YEAR

STATE

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN ITEM
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	I	**HIRED LABOUR**							
	III	HIRED LABOUR CASUAL LABOUR	HUMAN PLOUGHING			HOUR 0			
	III	4313 CASUAL MAN	119 SOWING			HOUR 0			
	III	4313 CASUAL MAN	211 WEEDING			HOUR 0			
	III	4313 CASUAL MAN	471 HARVESTING			HOUR 0			
	III	4313 CASUAL MAN	619 HERDING			HOUR 0			
	III	4313 CASUAL WOMAN	2199 SOWING			HOUR 0			
	III	4323 CASUAL WOMAN	211 WEEDING			HOUR 0			
	III	4323 CASUAL WOMAN	47 HARVESTING			HOUR 0			
	III	4323	619			HOUR 0			

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN ITEM
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	121 121	**HIRED LABOUR** BULLOCK 5019	ANIMAL			HOUR 0			
	131	**HIRED LABOUR** TRACTOR	MACHINE PLOUGHING			HECT			
	131	6099 OIL ENGINE	199 IRRIGATION			21 HECT			
	131	6506 THRESHER	599 THRESHING		 WHEAT	21 QTL			
	131	6799 THRESHER	641 THRESHING		10 JOWAR	2 QTL			
	131	6799 THRESHER	641 THRESHING		130 BAJRA	2 QTL			
	131	6799	641		140	2			

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN QUALITY %
		1.	2,	3,	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	2	**PHYSICAL INPUTS**	**CROPS**						
	211	SEED 1011	JOWAR 130	LOCAL 10	KG 1				
	211	SEED 1011	JOWAR 130	HYV 50	KG 1				
	211	SEED 1011	BAJRA 140	LOCAL 10	KG 1				
	211	SEED 1011	BAJRA 140	HYV 50	KG 1				
	211	SEED 1011	PADDY 10	LOCAL 10	KG 1				
	211	SEED 1011	PADDY 10	HYV 50	KG 1				
	211	SEED 1011	GROUNDNUT 650	LOCAL 10	KG 1				
	211	SEED 1011	GROUNDNUT 650	HYV 50	KG 1				
	211	SEED 1011	WHEAT 10	LOCAL 10	KG 1				
	211	SEED 1011	WHEAT 10	HYV 50	KG 1				
	211	SEED 1011	RAGI 150		KG 1				
	211	SEED 1011	COTTON LS 914		KG 1				
	211	SEED 1011	COTTON MS 913		KG 1				
	211	SEED 1011	COTTON SS 912		KG 1				
	211	SEED 1011	ONION 1450		KG 1				
	211	SEED 1011	URAD 520		KG 1				
	211	SEED 1011	MOONG 510		KG 1				
	211	SEED 1011	TUR 470		KG 1				
	211	SEED 1011	SUNFLOWER 680		KG 1				
	211	SEED 1011	GRAM 440		KG 1				
	211	SEED 1011	SAFFLOWER 730		KG 1				
	211	SEED 1011	SUGARCANE 610		QTL 2				

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN QUALITY %
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
		MANURES AND FERTILIZER							
	212	FARM Y. MANURE 1109				QTL 2			
	212	AMM. SULPHATE 1219	N%	P%	K%	KG 1			
	212	UREA 1209	N%	P%	K%	KG 1			
	212	SUPER PHOSPHATE 1309	N%	P%	K%	KG 1			
	212	MURATE OF POTASH 1409	N%	P%	K%	KG 1			
	212	SUPHALA 1549	N% 15	P% 15	K% 15	KG 1			
	212	SUPHALA 1549	N% 15	P% 5	K% 5	KG 1			
	212	SUPHALA 1549	N% 20	P% 20	K% 0	KG 1			
	212	MIXED 1549	N% 18	P% 18	K% 10	KG 1			
	212	MIXED 1549	N% 19	P% 19	K% 19	KG 1			
	212	MIXED 1549	N% 10	P% 26	K% 26	KG 1			
	212	D.A.P.	N% 18	P% 46	K%	KG 1			
		INSECTICIDES AND PESTICIDES							
	214	BHC 1638	10% PURITY 10	P%	K%	KG 1			
	214	DDT	50% PURITY 50	P%	K%	KG 1			
	214	MALATHION POW. 1634				KG 1			
	214	MALATHOIN LIQ. 1635				LR 11			
	214	CARBARYL 1631	10% PURITY		KG 1				
	214	CARBARYL 1631	50% PURITY		KG 1				

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN QUALITY %
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	215	**CANAL CHARGES**							
	215	CANAL CHARGES 1799	PADDY 20			HECT 21			
	215	CANAL CHARGES 1799	SUGARCANE 630			HECT 21			
	215	CANAL CHARGES 1799	ONION 1450			HECT 21			
	215	CANAL CHARGES 1799	GROUNDNUT 650			HECT 21			
	215	CANAL CHARGES 1799	SUNFLOWER 680			HECT 21			
	215	CANAL CHARGES 1799	WHEAT 10			HECT 21			
	215	CANAL CHARGES 1799	JOWAR 130			HECT 21			
	215	CANAL CHARGES 1799	BAJRA 140			HECT 21			
	215	CANAL CHARGES 1799	GRAM 110			HECT 21			
	215	CANAL CHARGES 1799	COTTON 911			HECT 21			
	216	**LIFT IRR. CH.**							
	216	LIFT IRR. CH. 1792	PADDY 20			HECT 21			
	216	LIFT IRR. CH. 1792	SUGARCANE 630			HECT 21			
	216	LIFT IRR. CH. 1792	ONION 1450			HECT 21			
	216	LIFT IRR. CH. 1792	GROUNDNUT 650			HECT 21			
	216	LIFT IRR. CH. 1792	SUNFLOWER 680			HECT 21			
	216	LIFT IRR. CH. 1792	WHEAT 10			HECT 21			
	216	LIFT IRR. CH. 1792	JOWAR 130			HECT 21			
	216	LIFT IRR. CH. 1792	BAJRA 140			HECT 21			
	216	LIFT IRR. CH. 1792	GRAM 110			HECT 21			
	216	LIFT IRR. CH. 1792	COTTON 911			HECT 21			

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN QUALITY %
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	22	**PHYSICAL INPUTS – ANIMAL**							
	221	DRY FODDER 2113	JOWAR 130	LOCAL 10		QTL 2			
	221	DRY FODDER 2113	JOWAR 130	HYV 58		QTL 2			
	221	DRY FODDER 2113	BAJRA 140	LOCAL 10		QTL 2			
	221	DRY FODDER 2113	BAJRA 140	HYV 50		QTL 2			
	221	CROP BY PROD 2151	PADDY 20			QTL 2			
	221	CROP BY PROD 2151	SUGARCANE 610			QTL 2			
	221	OIL CAKE 2442	GROUNDNUT 650			KG 1			
	221	OIL CAKE 2442	COTTON 912			KG 1			
	221	OIL CAKE 2442	SAFFLOWER			KG 1			
	23	**PHYSICAL INPUTS – MACHINES**							
	231	ELECTRICITY 3301				KWH 41			
	232	DIESEL 3001				LTR 11			
	233	OIL 3002				LTR 11			
	591	**CAPITAL ITEM – LAND**							
	214	LAND 9509	IRRIGATED 1	EXCELLENT 1		HECT 21			
	214	LAND 9509	IRRIGATED 1	POOR 5		HECT 21			
	214	LAND 9509	UNIRRIGATED 1	EXCELLENT 1		HECT 21			
	214	LAND 9509	UNIRRIGATED 1	POOR 5		HECT 21			
	592	**CAPITAL ITEM – ANIMAL**							
	592	BULLOCK 5019	YOUNG 2	BREED 101		ONE 22			
	592	BULLOCK 5019	MATURE 3	BREED 101		ONE 22			

Sl. No.	TYPE OF INPUT	INPUT SPECIFICATIONS				UNIT	PRICE (RS.)	SOURCE	CHANGE IN QUALITY %
		1.	2.	3.	4.				
1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
	593	**CAPITAL - ITEMS**	**MACHINE AND IMPLEMENTS**			ONE 22			
	593	TRACTOR 6099				ONE 22			
	593	OIL ENGINE 6506				ONE 22			
	593	THRESHER 6799				ONE 22			
	593	ELEC MOTOR WITH PUMP 6507				ONE 22			
	593	PLOUGH-WOOD 7019				ONE 22			
	593	PLOUGH-DISC 7039				ONE 22			
	593	SEEDER 7299				ONE 22			
	593	POWER SPRAY 6499				ONE 22			
	593	SPRAYER 7329				ONE 22			
	593	ANIMAL CART 7701				ONE 22			
	593	DUSTER 7399				ONE 22			