

I. THE TASK

I.1 Background

1. The Central Statistical Organization (CSO) is the official agency for compiling estimates of national accounts aggregates. With gradual improvement in the availability of basic data over the years the Organization makes, as much as possible, efforts to use current data available from official and non-official sources for improving the quality and coverage of macro-economic aggregates. This process is an ongoing activity. However, while changing the base year of the series, special efforts are made to study gaps and reliability of the estimates and extensive search is made to look for new sources of data.

2. In a similar exercise, in case of agriculture sector two issues were examined for improving quality and coverage of the sector and the results were presented before the Advisory Committee on National Accounts for their suggestion. The issues are listed below:

(a) *Coverage (production) of horticultural crops*: - While revising the base year of the current series to the year 1993-94, it was noted that

1. Horticulture crops included in the series refers to (a) condiments & spices (cardamoms, dry chillies, garlic, black pepper, dry ginger, turmeric, coriander and areca nut), (b) fruits & vegetables (banana, potato, sweet potato, tapioca and onion) (c) minor crops (cashew nut, indigo, papaya, mango, citrus fruits and grapes) and (d) other condiments & spices and other fruits & vegetables.
2. In the year 1990-91 the share of production of horticultural crops was only 15 per cent in total agricultural production, in which major share (more than half) was accounted by "other fruits & vegetables".
3. The area under fruits in the first plan period, (1951-55) was 1.12 m ha, as against 3.30 m ha in 1992-93
4. India is the second largest producer of vegetables next only to China, with an annual average production of 90.83 million tones from 5.99 million hectares and accounts for 14.4 percent of the total World production.

In view of these facts and looking into available sources of data it was decided to use the data made available by National Horticulture Board¹ (NHB) for estimating production of horticultural crops in the 1993-94 series. Subsequently during the course of annual discussions with states on comparable estimates of gross state domestic product (GSDP), the states which are implementing the centrally

¹ The NHB has been initiated during the VIII plan period to hold the responsibility to coordinate, stimulate and integrate development of horticulture in the country, by emphasizing the methods to reduce Post Harvest Losses. The broad objectives of this organization are,

- (i) Development of 'model horticultural farms' which in turn act as 'hubs' of horticultural development.
- (ii) Developing post harvest management infrastructure.
- (iii) Strengthening market information system and horticultural database.
- (iv) Assist R&D programmes to develop products suited for post harvest technology development.
- (v) Training & Education for processing technologies and practices.

sponsored scheme 'Crop Estimation Survey of Fruits & Vegetables (CES-F&V) of Directorate of Economics and Statistics, Ministry of Agriculture (DESAg) desired that the data collected through this scheme for specified crops may be used by the CSO in place of the data provided by the NHB. States also requested that prices of horticulture crops collected by State DES's may also be used in place of the prices provided by the NHB.

(b) Producer prices for wheat and rice: - The CSO, in the recent years has observed that the price data (average producer prices) furnished by some of the States for rice and wheat are lower than the minimum support prices (MSP). In such cases, the CSO has been using the MSP for valuing the respective crops instead of average producer prices supplied by respective State Governments. The states have been contending that there is distress sale of the crops sometime and farmers are not able to get the MSP. As a result of such sales the average producers prices are lower than the MSP. The states have been requesting the CSO to use the prices reported by them.

3. These issues were placed before the Fourth meeting of the Advisory Committee on National Accounts held on 14 – 16 December 2004. Three tables giving area and production and prices of fruits and vegetables as reported by CES-F&V and NHB and prices of paddy and wheat reported by selected states in comparison to MSP submitted to the Advisory Committee are given in tables 1.1 to 1.3 at the end of this Section. The Committee, after extensive deliberating on the agenda, recommended constitution of a Sub-committee under the Chairmanship of Shri Pratap Narain with members from the Ministry of Agriculture, Planning Commission, NHB, some State DESs and the National Accounts Division (NAD), with following terms of reference:

- To suggest suitable sources of the data for area, production and prices for estimating the value of output of horticultural crops,
- To suggest price data to be used when prices reported by States were below MSP.

4. The Office Memorandum setting up the Sub-committee is placed in Annexure I.1 and list of members and special invitees are given in Annexure I.2. The Sub-committee met on two occasions to discuss the approach and outcomes submitted by various organizations.

I.2 Structure of report and acknowledgement

5. The Sub-committee in its first meeting discussed the issues involved and approach. During the course of discussion it was recognized that the statistical data are not simply numbers. They are statistical constructs based on levels of aggregation, valuation, basic unit of count, weighting schemes, etc². Therefore, it

² There is no such thing as a level of output, prices or inter-industry flows independent of the statistical operations involved in its measurement. These are statistical constructs that are operationally meaningful through the levels of aggregation, valuation, basic units of count and the weighting schemes used which are, however, determined by some theoretical background and with some

was decided that the Sub-committee may look into such factors to understand reasons for discrepancies.

6. The Report contains an overview of Agricultural Statistical System in Section II and the recommendations of 1993 SNA on prices to be used for valuing agricultural products in Section III. A brief note on the development of horticultural statistics is included in Section IV, while estimates of area and production of horticultural crops are covered in Section V. The Sub-Group would like to express its gratitude to the Advisory Committee for giving an opportunity to go through the issues relating to horticultural crops and prices used for valuing agricultural crops and make recommendations. The Sub-Group also wishes to thank all its Members and invited experts for their contribution, as well as to the Secretariat, and in particular Mr. Sunil Jain, Director, National Accounts Division.

Table 1.1 Area and Production of fruits and vegetables through the CES-FV, vis-à-vis, NHB:
1999-2000

Items	Area ('000 Ha)			Production ('000 MT)		
	CES-FV	NHB	% under CES-FV	CES-FV	NHB	% under CES-FV
Vegetables						
(i) Cabbage	4.36	273.50	1.6	161.35	6305.40	2.6
(ii) Cauliflower	5.4	262.70	2.1	102.21	4868.28	2.1
(iii) Tomato	119.18	442.00	27.0	2068.38	6698.3	30.9
(iv) Potato	599.61	1337.5	44.8	12716.3	24677.2	51.5
(v) Onion	345.47	506.62	68.2	3708.45	5030.3	73.7
(vi) Turmeric	107.82	177.4	60.8	603.66	851.3	70.9
(vii) Dry Ginger	2.34	90.67	2.6	5.25	446.3	1.2
Fruits						
(i) Banana	233.61	476.40	49.0	9357.5	12407.8	75.4
(ii) Pineapple	0.35	76.00	0.5	15.15	1025.40	1.5
(iii) Guava	42.55	154.32	27.6	309.08	1799.10	17.2
(iv) Apple	88.70	238.3	37.2	58.61	1165.70	5.0
(v) Mango	888.57	1372.54	64.7	3666.52	7586.40	48.3
(vi) Grapes	38.01	41.55	91.5	941.26	1022.20	92.1
(vii) Citrus						
(a) Mosambi	58.79	85.90	68.4	782.3	1098.50	71.2
(b) Orange	146.75	198.30	74.0	1125.1	1652.0	68.1
(c) Lemon	63.81	149.40	42.7	228.14	881.5	25.9

analytical aim in mind. (Richter, J – Use and misuse of national accounts from a modeling perspective, The review of income and wealth, Series No. 40, No. 1, March 1994)

Table 1.2: Prices (Rupees/ metric tone), reported by NHB and State DES's for selected crops: 1999-2000

Crop	States	NHB price	State DES price	% difference
Mango	Assam	21893	21404	-2.2
	Goa	26452	12750	-51.8
	Maharashtra	26453	25461	-3.8
	Meghalaya	22600	6000	-73.5
	Nagaland	19280	18000	-6.6
Apple	J&K	15823	5000	-68.4
Guava	Haryana	8543	6038	-29.3
	Nagaland	10644	9000	-15.4
Brinjal	Haryana	6320	4334	-31.4
	Karnataka	4497	4167	-7.3
Tomato	A.P.	5938	4333	-27.0
	Bihar	5127	3349	-34.7
	Gujarat	5766	5231	-9.3
	Haryana	8479	5376	-36.6

Table 1.3: Prices (Rupees /metric tone) of paddy and wheat reported by some of the States and the MSP: 2001-02

State	Price of Paddy	State	Price of Wheat
Assam	4172	Bihar	5559
Bihar	4531	Haryana	6154
Nagaland	5050	Uttar Pradesh	5641
Orissa	4251	West Bengal	5775
Uttar Pradesh	4510	Uttaranchal	6110
West Bengal	4422		
Uttaranchal	5110		
MSP	5300	MSP	6200

II. AN OVERVIEW OF AGRICULTURAL STATISTICAL SYSTEM

II.1 The System

1. India has one of the oldest and well established and internationally acknowledged agricultural statistical system. The system is a decentralized one with the State Agricultural Statistics Authorities (SASAs) playing a predominant role in collection and compilation of agricultural statistics. The Department of Agriculture & Cooperation (DAC), Ministry of Agriculture at the Centre compiles agricultural statistics at all-India level based on the data received from the SASAs. In respect of Livestock, while the state Animal Husbandry & Dairying Departments (State AHDs) collect and compile the basic data, the Department of Animal Husbandry & Dairying (DAHD) at the Centre compiles all-India level estimates. In addition to these two organizations, the National Sample Survey Organization (NSSO), the Indian Agricultural Statistics Research Institute (IASRI) and the State Directorates of Economics and Statistics (State DESs) are involved in the system of agricultural statistics. The NSSO conducts the All-India Debt and Investment Survey (AIDIS), which gives information on debt and investment relating to the agriculture sector.

2. The Indian agriculture statistical system has been in place for a very long time. The system is aimed to generate estimates of area under different crops on census basis. The system is very elaborate. The village landholdings are mapped in the form a cadastral map, which is maintained by the village revenue official (locally called *Patwari*). With the help of this cadastral map, the area under various crops are recorded for each of these village landholdings in the basic village register (locally termed as *Khasra* register), by the village official. With the help of this register, complete data is available on census basis as far as area under crops and land records are concerned. For the yield estimates, the State revenue agencies conduct crop cutting experiments on sampling basis, which are supervised by two independent agencies, namely, the State Directorates of Economics And Statistics (State agency) and the National Sample Survey Organization (Central agency). These two important sources form the basis for the agricultural statistics in India.

II.2 Statistical Data

3. The system of agricultural statistics generates land-use statistics (LUS), area under principal crops through the Timely Reporting Scheme (TRS) and also on complete enumeration basis, yield estimates through the General Crop Estimation Surveys (GCES), cost of production through the scheme of Cost of Cultivation Studies (CCS), data on livestock products through the scheme of Integrated Sample Survey (ISS), data on wholesale/retail prices (through market intelligence schemes). Apart from this statistics on agricultural wages, irrigation statistics, rainfall and weather conditions etc. are generated by different departments. Agricultural Census and Livestock Census are conducted on quinquennial basis to collect structural data. Cross-checks on the reliability of yield estimates generated by TRS are made through the scheme of Improvement of Crop Statistics (ICS).

4. The land-use statistics are available in India almost continuously since 1884. The land-use statistics are collected according to the nine-fold classification

- 1) Forests
- 2) Area under non-agricultural uses
- 3) Barren and un-culturable land
- 4) Permanent pastures and other grazing lands
- 5) Land under Miscellaneous tree crops and groves not included in net sown area
- 6) Culturable waste Land
- 7) Fallow land other than current fallows
- 8) Current fallows
- 9) Net area sown

5. Land-use statistics are available at present for about 93% of the geographical area. While for about 86% of the reporting area (temporarily settled states or land records states), the statistics are based on complete enumeration, about 9% of the area is based on complete enumeration (permanently settled states, Kerala, Orissa and West Bengal) in 20 per cent villages each year; and the remaining 5% of the area is not based on any systematic approach. The land-use statistics are based on the basic register called the Khasra register maintained by the village revenue official commonly known as patwari, which gives information for each survey number (field), its total area, name of the owner and operator, tenure and tenancy rights, area under different land use and, in case the land is cultivated, the area under different crops, orchards, irrigated areas under crops, source of irrigation etc. A village-wise crop abstracts giving area under crops is prepared for each season using entries made in the register. A statement showing land-utilization is also prepared at the end of the year. In the States of Kerala, Orissa and West Bengal, the statistics on land use are collected through a scheme for Establishment of an Agency for Reporting of Agricultural Statistics (EARAS) under which 20% of the villages in the States are covered each year on complete enumeration basis by regular reporting agencies (all the villages in the states are covered once in a period of 5 years).

6. A statement showing horticultural crops included in land used statistics is shown in Annexure II.1. Although number of horticultural crops covered under the land use statistics differs from state to state, following crops have been recommended by DESAg for providing details in the "Tables of Agricultural statistics" to be submitted each year:

Spices: - Pepper black, Chili (Capsicum), Ginger, Turmeric, Cardamom, Betel nut (areca sativum), Coriander

Fruits: - Mango, Citrus fruits, Banana, Grapes, Pome fruits, Papaya, Apple, Cashew nut, Other fruits

Vegetables: - Potato, Tapioca, Sweet potato, Onion, Other Kharif Vegetables, Other Rabi Vegetables

7. The Sub-committee noted that statistics collected in each states/UTs are not being tabulated in many States. The Sub-committee recommends that this data may be compiled for improving quality and coverage of horticultural statistics and creating a consistent series at national and state level.

8. The crop production statistics are based on objective sampling methods. The technique of a crop cutting experiment consists of:

- (i) Location and marking of an experimental plot of specified size in a field selected on the principles of random sampling.
- (ii) Harvesting and threshing of its produce,
- (iii) Recording the weight of the produce after threshing and
- (iv) In a sub-sample of the experiments (or in some cases, for all the experiments) further processing of the harvested produce, through diriage experiments, is done for determining the percentage recovery of dry grain (i.e. the marketable form of the produce). The yields of the random plots so obtained constitute the basis for working out the yields of the crops under consideration.

9. The design adopted for the Survey is the stratified multistage random sampling. Generally tehsil/ taluks/ revenue inspector circles/ C.D.blocks/ anchals, etc. is the strata. Villages within a stratum are the primary units, fields within each selected village are the second stage units and the experimental plot of a specified shape and size is the ultimate unit of sampling. At least two fields growing the experimental crop are selected in each selected primary unit for conducting crop cutting experiments.

10. The scheme of Cost of Cultivation Studies (CCS) was initiated in 1970-71 by the DAC to obtain the estimates of costs of production of various agricultural crops. The scheme is operated through the agricultural universities and covers about 30 crops in their major producing states. The scheme envisages collection of representative data on inputs and outputs in physical and monetary terms on a comparable and comprehensive basis, following uniform methodology. At present, primary data on cost of cultivation are collected from 19 States through 16 agricultural/ general universities/ college. At present, only three horticultural crops i.e., onion, potato and tapioca are covered under this scheme. The Sub-Committee recommends that a few more important crops may be included in the scheme.

11. Agricultural Census aimed at supplementing the agricultural statistics collected through other agencies in the country, was first organized by the Ministry of Agriculture in collaboration with the State Governments in 1970-71. The Census uses the agricultural operational holding as the statistical unit. Main data that is collected in the Agricultural Censuses are size of landholdings, land use, cropping pattern, irrigation status and the sources of irrigation, tenancy and the terms of leasing. As part of the Agricultural Census, 1976-77, an Input Survey was conducted in a sample of 2 per cent of villages in all states/UTs using the household approach. The data that is collected in the Input Survey relates to agricultural machinery, use of fertilizers, pesticides and organic manures, details of multiple cropping, institutional credit and inventory of livestock.

12. The price data on agricultural commodities helps in determining the cropping pattern, cropping intensity of the producer and also determines pattern and level of consumer demand. Wholesale and retail price of agricultural commodities are collected regularly on daily/weekly/monthly basis from a large number of markets

(centers) spread all over the country. The wholesale prices³ of over 140 agricultural commodities are being collected/compiled and disseminated on weekly basis from 620 markets. The data is collected by the price reporters called Market Inspectors/Senior Market Intelligence Inspectors, etc., appointed by the State Governments/Agricultural Marketing Committee. These are received in the Directorate through postal mail as well as direct on telephone for some other selected markets. These primary data are released on Ministry of Agriculture's web site. However, a substantial work in terms of making these data uniform (definition) and taking averages is required to present this data at macro (national) or meso (state) level picture.

13. The farm harvest prices are generally being collected by the field staff of the State Revenue Departments. For the collection and compilation of farm harvest prices, representative villages have been selected at the rate of one, two or three from each tehsil depending upon the importance of the crops grown in the tehsil. At present these prices are collected from 24 States/UTs for 31 commodities and published by the Ministry of Agriculture.

14. A list publications and web sites and sources of agricultural statistics in India issued by DESAg, NHB and some of the state governments is given in Annexure II.2 and Annexure II.3. The Sub-committee noted that the Ministry of Agriculture is using the data being provided by National Horticulture Board for all policy and reporting purposes. The Ministry does not use the data collected under CES – F&V as the scheme was started as a pilot scheme and has not been reviewed since then. The Sub-committee recommends that a comprehensive review of the methodology used and results obtained may be made in selected states to decide future of the work.

³ Daily wholesale prices are being collected in respect of 12 commodities which include rice./paddy, wheat, jowar, bajra, ragi, maize, barley and also for gram, sugar, gur and khandasari from 617 markets. The information on retail prices of essential commodities is being received by the Ministry of Agriculture from 83 market centers in respect of 88 commodities – 49 food items and 39 non-food items. Whereas data on food items is collected on weekly basis as on Friday, non-food items' prices are collected on last Friday of every month. This information on weekly prices is collected by the market level agencies in the State Market Intelligence Authorities.

III. MINIMUM SUPPORT PRICES AND PRICES TO BE USED IN COMPILING NATIONAL ACCOUNTS RECOMMENDED BY SNA

III.1 Concepts

1. Prices are an important economic variable in a market economy. Prices of agricultural products and by-products have a significant influence on the formulation of production plans and policy decisions relating to demand and supply of commodities for intermediate and final consumption, monitoring of inflation, development of several macro-economic indicators, taxes levied on agricultural income and subsidies provided to farmers on agricultural inputs. In many countries type and volume of agricultural production activity very much depend on the current market prices of various products. The relative changes in prices received by the farmers for the produce and paid by them for meeting input requirements and consumer demands influence their economic activities. From the economic analysis point of view prices are the means of aggregation for providing an overview of the performance taking various products with a large number of variations in their quality. Price data for agricultural products and by-products in a country may be available in the form of retail prices, wholesale prices and farm gate prices (or producer's prices). Some countries also compile data on export and import prices. To facilitate various policy measures for the farmers' welfare some countries also have a system of declaring procurement prices and support prices. Countries may also adopt a dual price system for basic agricultural commodities by maintaining controlled prices for a group of consumers to assure their living standard. The study of price spread at different levels of transactions are useful for assessing marketing efficiency and consumers & producers margins.

2. For compilation of national accounts, SNA recommends the utilization of two kinds of output prices, i.e. basic prices and producer's prices, and purchaser's prices in case of inputs (intermediate consumption) and assets (items of fixed capital formation). The concepts of these prices and relationships with the various prices are presented in following discussion.

Farm gate prices

3. Farm gate prices are, in principal, the prices received by farmers for their produce at the farm location. These prices are of immense utility for measuring the farm economy and actual realization by the farmers for their marketed surplus. Thus the costs of transporting the output from the farm gate to the nearest market or first point of sale and market charges (if any) for selling the produce are, by definition, not included in the farm gate prices. Consequently, the prices collected from such markets may be adjusted for these costs to arrive at the farm gate prices. In a number of countries, some commodities are sold at the farm gate, while others are sold at markets or delivered to purchasers' premises. Sometimes the recorded off-farm prices are adjusted to the farm gate equivalent by allowing transport costs, but in many cases no adjustment is made. In many developing countries, agricultural marketing is not well organized and farmers use the entire range of distributive channels: farm gate, local village markets, wholesale and retail markets and sales of

export crops to marketing boards. In order to approximate farm gate prices, information on the marketing channels used and quantity sold for different crops and other products is required. Average prices should then be worked out using the output disposed of through various channels as weights. Therefore the prices that producers receive when they sell their output should be used, as the attempt to separate the trade and transport margins is usually neither practical nor useful.

Wholesale prices

4. After an agricultural product leaves the farm gate it may invariably pass through one or more wholesale markets and a chain of other intermediaries before reaching the retailer from whom the ultimate consumer buys it. Single transaction will occur only in the situation of direct marketing for intermediate or final consumption. Where two wholesale markets are involved, the first may be only an assembling market and may be called a primary wholesale market; and the subsequent may be a distributing market (called a secondary market). Sometimes, a third category of wholesale market exists, viz. a terminal wholesale market from where there is either sale for retail distribution or for intermediate consumption or sale for export. It is not necessary that the functions of assembly, distribution and export are performed by three separate wholesale markets; a single wholesale market may perform one, two or all three of these functions.

5. An assembling wholesale market, as its name implies, is where, by and large, the producers or their agents sell the output. A purchase agent's function in these markets is to assemble the produce from distant and disaggregated farm location and offer it for sale in bulk or large quantities after grading, packing and standardization. The wholesalers buy in this primary market for further sale to local or nearby retailers, to exporters or to another set of large-scale wholesalers who transport the produce to other places or markets for resale to retailers. A secondary or distributing wholesale market is where the produce is brought for sale largely by the wholesalers from the assembling markets. Small quantities are also brought by the producer-sellers. The agents buying from the secondary wholesale market are the retailers, as well as the exporters or bulk consumers.

6. A wholesale market may thus be defined as a market situated somewhere between the farm gate and the retail market, usually handling a large quantity of sales for a further stage in the distribution of the commodity. Accordingly, the wholesale price is the rate at which a relatively large transaction, generally for further sale, is effected. Depending on the extent to which the transportation charges and other expenses incidental to marketing are borne by the sellers, buyers in the wholesale market, and remembering also that the wholesalers include their profit margin in their price quotations, a wholesale price may take any of the following forms:

7. In a primary wholesale market, the wholesale price of a product may refer to the price at which the wholesale buyer makes purchases from the producer-seller or his or her agents. This price would differ from the price the producer-seller gets, depending on whether the buyer or the seller bears the incidental charges; and if both bear them the proportion borne by each will be established. In a primary

wholesale market, the wholesale price of a product may also refer to the price at which the wholesaler offers it for sale to the retailers, etc. Thus this price should normally exceed the price mentioned above by the wholesaler's margin of profit.

8. In a secondary wholesale market, the wholesale price of a product may refer to the price at which the wholesaler sells it to the retailers, etc. This price, therefore, exceeds the price in primary wholesale market by transportation charges, incidental expenses and margin of profit.

9. The effect of the above is that if the notional price received by the farmer for an agricultural product at the farm gate is to be derived from any of the above types of wholesale price, it will be essential to make arrangements for determining the magnitude of deductions on account of transportation, marketing charges, profit margin, etc. depending upon market conventions.

10. Wholesale prices of agricultural products are collected in most countries for three main reasons. First, the wholesale markets are usually well organized and consequently wholesale prices are easy to record. Second, wholesale prices are quoted throughout the year in most of cases and can, therefore, be obtained with the frequency needed, whereas farm gate prices are obtainable only for that period after the harvesting of crop over which the agricultural producer disposes of surplus produce. Last, the dealers in a wholesale market are usually well informed about the supply and demand situation of the product, so that the wholesale prices tend to reflect the sensitivity of the market to forces of supply and demand. This element of price statistics is essentially of great interest to most economists and administrators.

11. An example to illustrate the calculation of farm gate prices from wholesale prices is given in the Worksheet 3.1. Calculations in the worksheet have been divided into three parts separately dealing with the secondary wholesale market, the primary wholesale market and the farm gate market. Secondary wholesale markets are the last point for any product from where the goods are moved either to retail sale point or to the exporters. A buyer in this market generally purchases goods from primary wholesale markets and repacks the goods according to the needs of the selling market. The price collected from this market usually includes the cost of the bag and other packing charges, transportation costs, handling and trading commissions, etc., apart from the profit margin. Depending on local conditions, a list of items of expenses included in the prices can be studied through specially designed surveys or type studies covering some of the prominent markets. By subtracting all such components the prices prevailing in primary wholesale markets can be calculated. A similar exercise may be attempted to calculate the farm gate prices from the price data collected from the primary wholesale market. The worksheet provides a suggested list of items which need to be considered in calculating the farm gate prices from wholesale prices. In this illustration, it is assumed that the commodity retains the same form (raw or processed) and the same quality specifications throughout the different stages of marketing.

Retail prices

12. Retail prices are established in transactions in which quantities dealt with are relatively smaller than in wholesale transactions and in which the final consumers of the agricultural product participate as buyers. Unlike farm gate prices, these prices are also available throughout the year. Retail prices of agricultural commodities are collected in most countries for constructing consumer price indices to study the cost of living for determining cost of living allowances for wage earners. If an agricultural producer sells his or her product in the retail market directly to consumers, the notional farm gate price received by the producer is estimated by deducting transportation and marketing charges from the retail price. However, in most cases it may not be possible to adjust the prices received by the farmers for trade and transport expenses incurred by them. Depending on the types of shop selected for the collection of retail prices (e.g. retail shops in the neighborhood of farms or shops in semi-urban areas), to some extent these expenses may cancel out as the prices may not be very different from those received by a farmer normally at the first point of sale and these prices can therefore be taken to be the farm gate prices. This may be due to the fact that the first point of sale may be far away and the farmer finds it convenient to sell his or her produce in the vicinity of the farm as "retail sale", and even at lower prices than the primary market prices to save transportation costs, market charges and opportunity margins.

Other types of price available in countries

13. Apart from wholesale and retail prices which are very often available in many countries, other types of price data are sometimes available. The two main prices which are frequently quoted are export prices and prices fixed by the government. Depending on the commodity and need these prices can be adjusted to arrive at farm gate prices required by policy-makers. A brief summary of these prices is given below.

Export prices

14. Export prices are determined in export markets for products intended for delivery outside the customs boundary of the country. Export markets are also described as terminal wholesale markets, where the valuation of the product is calculated free-on-rail, or free-alongside-ship or free-on-board (denoted by f.o.b. prices). If the producer-seller sells his or her product in such markets, the notional farm gate price is worked backwards by deducting from the export price the transportation charges and all other incidental expenses incurred by the producer, as indicated in Worksheet 3.1.

Administered prices (Support Prices, Procurement Prices, etc.)

15. Prices of some of the crops at the farm gate markets are fixed by the government to pursue various economic policies relating to farmers' welfare or to obtain food grains, etc. for distribution through various plans and programmes (e.g. buffer stocking for food securities, poverty alleviation or rural development programmes) or to develop foreign trade. Normally such prices are listed annually and are applicable to the total country. The agricultural support prices have various categories

depending on price policy instruments. These can be termed: (a) guaranteed minimum prices or intervention prices in which farmers are encouraged to grow certain new crops which do not have a developed and assured market and farmers are assured that, in the case of any difficulty or an abrupt fall in the price level, the government would either procure the produce from them or provide cash subsidies. Such subsidies are generally provided through extension workers; and (b) fixed purchase prices to provide direct benefit for foreign trade or, in the case of commercial crops (e.g. sugar cane), to safeguard farmers' interests the government announces fixed prices.

Minimum support prices announced by Government of India (based on text given in Economic Survey)

16. Agricultural produce markets are inherently unstable due to their peculiarity of supply volatility. The Price Support Policy of the Government is directed at providing safeguard to agricultural producers against any sharp fall in farm prices. The minimum support prices are fixed to set a price level to avert the market to fall below that level for commodities having FAQ below which market cannot fall. The MSPs served as the floor prices and were fixed by the Government in the nature of long-term decisions of producers, with the assurance that prices of their commodities would not be allowed to fall below the level fixed by the Government, even in the case of a bumper crop production. The MSPs for major agricultural products are announced each year after taking into account the recommendations of the Commission for Agricultural Costs and Prices (CACP). The CACP while recommending prices takes into account all important factors including cost of production, changes in input prices, input/output price parity, trends in market prices, inter-crop price parity, demand and supply situation, parity between prices paid and prices received by the farmers etc. Among these multiple factors that go into the formulation of support price policy, the cost of production⁴ is the most significant.

Table 3.1: Minimum support/procurement price of wheat and paddy
(Rs/quintal)

Crop Year	Wheat		Paddy				
	MSP	per cent change	Common	per cent change	Fine	Super fine	Grade 'A'
1994-95	360	2.9	340	9.7	360	380	
1995-96	380	5.6	360	5.9	395	375	
1996-97	475	25.0	380	5.6	395	415	
1997-98*	510	7.4	415	9.2			455
1998-99	550	7.8	440	6.0			470
1999-00	580	5.5	490	11.4			520
2000-01	610	5.2	510	4.1			540
2001-02	620	1.6	530	3.9			560
2002-03	620\$		530\$				560\$
2003-04	630	1.6	550	3.8			580
2004-05	640	1.6	560	1.8			590

⁴ The High Level Committee for long term food grain policy recommended that MSP should be considered on the basis of C2 cost. C2 cost includes all actual expenses in cash and kind incurred in production by actual owner plus rent paid for leased land plus imputed value of family labour plus interest on value of own capital assets (excluding land) plus rental value of owned land (net of land revenue). However, increase in MSP in the past have been so substantial in case of paddy and wheat, that in most of the states MSPs were way above the C2 cost.

For MSP of other crops, see appendix-5.5

* Effective 1997-98, MSP is fixed for two varieties of paddy, common and grade-A.

\$ One time special drought relief of Rs.20/- per quintal for rice and Rs 10/- per quintal for wheat was given over and above the MSP.

Source: Ministry of Agriculture.

17. It can be seen from the above table that there were substantial increases in the MSPs of rice and wheat after the mid-nineties. MSP of wheat was increased by a whopping Rs 95 (including bonus) per quintal in 1996- 97 and MSP of paddy was increased by Rs 35 per quintal in 1997-98. Increase of MSP of food grains by large magnitudes continued till 2000-01 (Table 3.1). Such increases resulted in a large gap between the cost of production (C2 costs) and the MSP of wheat and rice. There were a number of inter-related developments, such as prices of food grains in the primary grain markets remaining below MSP in many parts of the country, near elimination of private trade from the grain markets in the major producing and procuring States of Punjab and Haryana.

18. The economic compulsions of aligning MSP with the cost of production have weighed heavily in recent announcements of price policy of rabi and kharif crops. The increase in the MSP of food grains during 2002-03, 2003- 04 and 2004-05 was rather moderate (Table 3.1). Keeping in view the hardships suffered by farmers in the drought year of 2002-03, a one-time special drought relief of Rs.20 per quintal was announced in the case of paddy. A one-time special drought relief of Rs.10 per quintal was also announced for wheat in 2002-03. The MSP for paddy and wheat for 2003-04 crop year was fixed by absorbing the special drought relief for rice and wheat in their respective MSPs. A marginal increase of Rs 10 per quintal in the MSPs of wheat and rice has been announced for the crop year 2004-05. As a result, there was revival of private trade of wheat and rice, reducing the intensity of Government intervention. It may need to be noted that not entire marketable surplus enjoys MSP intervention. The major part of marketable surplus is continued to be sold in the open market by the farmers at various prices depending upon their quality parameters.

III.2 Price data required for compiling national accounts

19. For the valuation of the agricultural output of a country, SNA suggests using either basic prices or producer's prices, as has already been mentioned above. However, in the case of inputs and items of assets included in gross fixed capital formation, the use of purchaser's prices is suggested. The concept of producer's prices and purchaser's prices is generally known to the various users and producers of data. In many developed and developing countries the concept of farm gate prices is not used for the collection of price data and prices are normally recorded at the first point of sale and are used as producer's prices. These prices are good proxies for farm gate prices since the farmers' transportation costs to the local sales point and market charges are often minimal. The concepts of basic, producer's and purchaser's prices are given below.

Basic price

20. The basic price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output *minus* any tax payable *plus* any subsidy receivable on that unit as a consequence of its production or sale. It

excludes any transport charges invoiced separately by the producer. Taxes and subsidies on production consist of taxes payable or subsidies receivable on goods and services produced as outputs and other taxes or subsidies on production, such as those payable for labor, machinery, buildings or other assets used in production. Taxes on production do not include any income taxes payable by the recipients of incomes accruing from production, whether employers or employees.

Producer's price

21. The producer's price is the amount receivable by the producer from the purchaser for a unit of a good or service produced as output *minus* any Value Added Tax (VAT⁵) or similar deductible tax invoiced to the purchaser. It excludes any transport charges invoiced separately by the producer. The difference between basic and producer's prices is that to obtain the basic price any other tax payable per unit of output is deducted from the producer's price while any subsidy receivable per unit of output is added. Both producer's and basic prices are actual transaction prices which can be directly observed and recorded depending on the details available in a country.

Purchaser's price

22. The purchaser's price is the price paid by the farmer, excluding any deductible VAT (i.e. VAT on purchases that a producer is permitted to deduct from his or her liability of VAT to the government) or similar deductible tax, in order to take delivery of a unit of a good or service at the time and place required by the purchaser. The purchaser price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place. The concept of prices paid by farmers is the counterpart of prices received by farmers and covers all prices paid by them as they participate in the transaction of goods and services in the capacity of producer or as the means of agricultural production. Just as the price received by farmers for their produce is the price realized by them for that produce at the farm gate, so the price paid by farmers for an agricultural production requisite is, in principle, the price paid by them for that item at the farm gate or village site. If a requisite of agricultural production is bought off-farm, say, from a factory or a government store, the expenses incurred in transporting it to the farm must be added to arrive at the estimate of the price at the farm gate. If, however, it is purchased from a local blacksmith or trader in the village, then the purchase price can be taken as the farm gate price paid by the farmer.

23. When comparing the purchaser's price with the producer's or basic price, it is important to specify whether they refer to the same transaction or two different

⁵ VAT is a tax on products collected in stages by enterprises. Producers are required to charge certain percentage rates of VAT on the goods and services they sell. VAT is shown separately on the sellers' invoices. Producers are obliged to pay only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or gross fixed capital formation hence the expression "value added tax". The terminology on VAT includes: Invoiced VAT; Deductible VAT; Non-deductible VAT; and Gross and Net VAT. For details, refer to paragraphs 6.207-6.214 of the 1993 SNA.

transactions. It is generally convenient to compare the price paid by the final purchaser of a good after it has passed through the wholesale and retail distribution chains with the producer's price received by its original producer. In this case prices refer to two different transactions taking place at quite different times and locations: they must differ at least by the amount of the wholesale and retail trade margin. When the prices refer to the same transaction, that is the purchaser buys directly from the producer, the purchaser's price may exceed the producer's price by: (a) the value of non-deductible VAT, payable by the purchaser; and (b) the value of transport charges on a good paid separately by the purchaser and not included in the producer's price. The use of basic prices is not suggested on practical considerations.

III.3 Conclusions and recommendations

24. The Advisory Committee on National Accounts has requested the Sub-committee to examine the minimum support prices (MSP) and price data (average producer prices) furnished by the States for rice and wheat and suggest appropriate prices for wheat and rice in cases where MSP are lower than average producer prices supplied by respective State Governments. In this regard the Sub-committee has noted that:

- (a) In recent years a large amount of data on prices are being released by Government. One of the most important sources is AGMARKNET (<http://agmarknet.nic.in>) where daily price data are available for 253 agricultural commodities (of which more the 150 commodities relate to horticulture). However, these price data are collected from different types of wholesale markets for different varieties. The sub-Committee recommends that this price data may be aggregated to present meso and micro picture.
- (b) The most suitable prices for compiling output of agriculture are the average producer prices which can be best estimated as the farm gate prices in India.
- (c) There were substantial increases in the MSPs of rice and wheat after the mid-nineties. MSP of wheat was increased by a whopping Rs 95 (including bonus) per quintal in 1996- 97 and MSP of paddy was increased by Rs 35 per quintal in 1997-98. Increase of MSP of food grains by large magnitudes continued till 2000-01 (Table 3.1).
- (d) The increase in the MSP of food grains during 2002-03, 2003- 04 and 2004-05 was rather moderate (Table 3.1). Keeping in view the hardships suffered by farmers in the drought year of 2002-03, a one-time special drought relief of Rs.20 per quintal was announced in the case of paddy. A one-time special drought relief of Rs.10 per quintal was also announced for wheat in 2002-03. The MSP for paddy and wheat for 2003-04 crop year was fixed by absorbing the special drought relief for rice and wheat in their respective MSPs. A marginal increase of Rs 10 per quintal in the MSPs of wheat and rice has been announced for the crop year 2004-05.
- (e) A comparison of prices (in Rs. Per Kg) derived from Consumer Price Index Numbers (Agricultural laborers and Rural laborers), used by NAD, prices provided by State Governments and MSP are given below in Table III.2. In general consumer prices are much higher than the producer prices which is generally true barring a few cases.

Table III.2: Comparison of prices derived from Consumer Price Index Numbers (AL/RL), used by NAD, prices provided by State Governments and MSP(in Rs. Per Kg)

State	1999-00					2000-01				
	CPI (AL)	CPI (RL)	NAD	State	MSP	CPI (AL)	CPI (RL)	NAD	State	MSP
Paddy										
Assam	8.10	8.11	5.54	5.54	4.9	7.84	7.86	5.10	4.7	5.1
Bihar	6.85	6.86	4.67	4.67	4.9	6.03	6.03	5.10	4.34	5.1
Haryana	6.80	6.8	6.35	6.35	5.2	6.85	6.86	6.81	6.35	5.4
Orissa	6.21	6.21	4.74	4.74	4.9	5.74	5.74	5.10	4.44	5.1
U.P.	6.55	6.57	5.62	4.84	4.9	6.28	6.25	5.10	4.47	5.1
W.B.	7.03	7.03	5.29	5.29	4.9	6.14	6.15	5.10	5.1	5.1
Wheat										
Bihar	6.79	6.79	6.31	6.31	5.8	6.46	6.46	5.76	5.6	6.1
U.P.	5.79	5.76	5.92	5.92	5.8	5.56	5.51	5.98	5.4	6.1

AL - CPI (Agricultural laborers) and RL - CPI (Rural laborers)

Table III.2: Comparison of prices derived from Consumer Price Index Numbers (Agricultural laborers and Rural laborers), used by NAD, prices provided by State Governments and MSP (in Rs. Per Kg)

State	2001-02					2002-03				
	CPI (AL)	CPI (RL)	NAD	State	MSP	AL	RL	NAD	State	MSP
Paddy										
Assam	7.10	7.12	5.3	4.17	5.3	6.85	6.8	5.3	4.79	5.3
Bihar	5.81	5.81	5.3	4.5	5.3	5.68	5.7	5.3	5.3	5.3
Haryana	6.81	6.83	8.05	8.05	5.6	6.83	6.9	8.32	8.8	5.8
Orissa	5.25	5.25	5.3	4.25	5.3	5.03	5	5.5	4.3	5.5
U.P.	6.26	6.23	5.3	4.5	5.3	6.36	6.3	5.5	5.25	5.5
W.B.	6.23	6.23	5.3	4.42	5.3	6.04	6	5.5	4.84	5.5
Wheat										
Bihar	6.52	6.52	6.2	5.56	6.2	6.97	7	6.2	6.2	6.2
U.P.	5.81	5.74	6.2	5.64	6.2	6.15	6.1	6.36	6.36	6.2

- (f) Due to lack of time, the Sub-committee could not study the raw price data collected by State Government and aggregation procedure. It is, therefore, suggested that State Government may examine their aggregation procedure (weighting pattern) and spatial and temporal distribution of price statistics to improve the quality of data.

25. In view of the above data and statement made by Economic Survey, the Sub-committee recommends that NAD may accept prices provided by the State Government to value output of Wheat and Rice. NAD may also request Indian Association for Research in National Income and Wealth (IARNIW) to encourage research workers to examine the disaggregated price data and present the results in one of the Conferences.

WORKSHEET 3.I

Example to illustrate the calculation of farm gate prices from wholesale market prices¹

	Percentage of secondary wholesale market price	Unit price
<u>Secondary wholesale market price</u>		100
Less		
Cost of bag and stitching charges paid at primary wholesale market	2.50	
Transport to railway station at primary wholesale market	1.00	
Weighing and trading charges	3.50	
Railway freight from primary to secondary wholesale market	0.75	
Unloading charges	1.00	
Transport from railway station to secondary wholesale market	0.75	
Other incidental expenses	3.00	
Secondary wholesaler's margin of profit	2.50	
Subtotal (1)	15.00	15
Secondary wholesale market price less subtotal (1) = Secondary wholesaler's purchase price at primary wholesale market		85
Less		
Market charges payable to municipality or market committee or owner for use of premises	0.50	
Commission agent's fee	1.25	
Handling and weighing charges	0.50	
Charity or festival contribution	0.25	
Other incidental expenses	1.00	
Primary wholesaler's margin of profit	1.50	
Subtotal (2)	5.00	5
Secondary wholesaler's purchase price at primary wholesale market less subtotal (2) = Prices received by farmer-seller in primary wholesale market		80
Less		
Transport from farm to primary wholesale market	1.00	
Market entry fee	0.75	
Other incidental expenses	1.25	
Subtotal (3)	3.00	3
Prices received by farmer-seller in primary wholesale market less sub-total (3) = Prices received by farmer at the farm gate		77

¹ This example is for illustration only and the numbers used in the illustration should not be taken as standard, as the expenses incurred by the farmer vary from country to country.

IV. DEVELOPMENT OF HORTICULTURAL STATISTICS IN INDIA

1. India has historically been recognized as a land of unique comparative advantage for the cultivation of a variety of horticultural crops Viz., fruits, vegetables, flowers, spices and plantation crops, concerted efforts towards the development of this set of crops, in terms of favorable policy perspective is rather recent, dating back not more than two decades. The growing economic importance of this group of crops, especially fruits and vegetables could be attributed to an increasing demand arising from domestic as well as the international quadrants.

2. Share of agriculture (including livestock) sector in the gross domestic product (GDP) of India stands at 20.3 per cent in the year 2003-04. Although its share in the gross domestic product (GDP) has progressively declined, the agriculture sector continues to play a dominant role in the Indian Economy. The total value of output of agriculture and livestock sub-sectors during 2002-03, at current prices, is estimated at Rs. 5605 billion. The following is the broad break-up of this total output.

*Table IV.1: Estimated GDP and Value of Output of Agriculture, 2002-03
(at current prices)*

Crop-group/livestock product	Value of output (Rs. billion)	Share in total output (%)	Share in agricultural output (%)
Total agriculture and livestock (A+B)	5,605	100.0	
A. Total agricultural crops	4,044	72.2	100.0
1. food grains	1,323	23.6	32.7
2. oilseeds	302	5.4	7.5
3. sugarcane	280	5.0	6.9
4. fibers	99	1.8	2.5
5. drugs & narcotics	104	1.9	2.6
6. condiments and spices	166	3.0	4.1
7. fruits and vegetables	1,286	22.9	31.8
7.1 of which vegetables	677	12.1	16.7
8. other crops incl. Kitchen garden	203	3.6	5.0
9. by products	281	5.0	6.9
B. Total livestock products	1,561	27.8	
10. milk	1,075	19.2	
11. other livestock products	485	8.7	
C. Inputs of agriculture & livestock sector	1,181		
D. GDP of agriculture & livestock sector (A+B-C)	4,424		
E. GDP of government irrigation system	136		
Total GDP of the sector	4560		

3. As seen from the Table IV.2 below, the economic importance of horticultural crops such as fruits, vegetables, flowers, plantation crops and spices has been increasing over the years, due to the increasing domestic and international demand.

Table IV.2 Trends in Area and production of horticultural crops in India

INDIAN HORTICULTURE - AT A GLANCE (1991-2002)									
YEAR	FRUITS		VEGETABLES		FLOWERS			NUTS	
	A	P	A	P	A	P (Loose)	P (Cut)	A	P
1951-52	3874	19692	6943	68532	NA	NA	NA	NA	NA
1952-53	3208	12965	5045	61804	NA	NA	NA	NA	NA
1953-54	3154	37354	4875	29787	53	233	545	NA	NA
1954-55	3246	38800	5015	67224	60	281	519	NA	NA
1955-56	3357	41507	5335	71594	82	334	537	NA	NA
1956-57	3580	45452	5515	75074	71	328	515	NA	NA
1957-58	3702	43263	5657	72683	74	385	522	NA	NA
1958-59	3737	44043	5866	87843	71	419	513	NA	NA
1959-60	3797	45496	5953	90831	85	579	581	110	191
1960-61	3862	45958	6251	91603	80	558	504	115	124
1961-62	4010	43601	6155	88522	136	528	565	117	114

YEAR	PLANTATION CROPS		SPICES		MUSHROOM	HONEY	GRAND TOTAL	
	A	P	A	P	P	P	A	P
1951-52	2286	7486	2995	1900	NA	NA	12770	36557
1952-53	2337	6317	2515	2294	NA	NA	12993	107284
1953-54	2145	6890	2472	2318	NA	0	13633	114651
1954-55	2446	8737	2215	2477	NA	NA	13930	115594
1955-56	2733	9030	2218	2410	NA	8	13723	125482
1956-57	2821	9730	2372	2803	10	0	14355	128852
1957-58	2812	9449	2524	2801	40	0	14754	128613
1958-59	2905	11063	2531	3094	40	0	15193	146280
1959-60	2755	9273	2500	3028	10	0	15247	149524
1960-61	2932	9430	2300	3023	40	0	15394	150317
1961-62	2954	9097	3229	3755	40	0	15532	145755

A = AREA IN HECTARES
P = PRODUCTION IN METRIC TONS
P (Cut): Production in Metric Tons
Figure of Production since Grand Total does not include Production Area of Out-Precess
Note: Crops - Fruits, Vegetables, Potatoes & Tuber Crops - Mushrooms, Flowers.
Plantation Crops - (Coconut, Cashewnut, Almond & Walnut, Spice and Honey, Nut - Almond & Walnut)

4. Salient features of the review of the impact of horticultural development on macro and micro level indicated that, at the macro level,

1. Horticultural sector which comprises of fruits, vegetables, mushrooms, flowers, plantation crops, medicinal and aromatic crops, spices and condiments, coconut and cashew forms the single largest sub-sector of agriculture. This sector accounts for over 7.5% of the gross cropped area (GCA) as against a level of 0.58% of the GCA during 1952-53 and 2.39% during 1984-85.
2. Fruits and vegetables form the single largest sub-sector in Horticultural crops accounting for 63.8% of the area and more than 80% of the total production of horticultural crops. The value output from this sub-sector showed a growth rate of 5.76% per annum between 1960-61 and 1992-93 in real terms.
3. Among the sub-sectors, fruits indicated a three fold increase in area and four fold increase in production over the last five decades. In case of vegetables, India is the second largest producer with 87.53 million tones contributing to 14.4% of the total world production. The area and production of flowers, spices and condiments, mushrooms, coconut and cashew also indicate a near three fold increase in the last few decades.

4. It is estimated that since 1961, area, production and productivity of fruits have increased by 3, 6.2 and 2 times respectively. India ranks first in the production of Banana and Mango, and productivity of grapes in the world. Vegetable production has tripled in the last 50 years, making India the second largest producer in the world. India occupies the first position in the production of cauliflower, second in onion and third in cabbage in the world. Area, production and productivity of potato have increased by 4.9, 12 and 2.6 times respectively since 1949-50.
5. The share of fruits and vegetables in the gross value of output from agriculture increased from 7.36 percent in 1960-61 to 12.26 percent in 1990-91. A comparison of growth rates between different sub-groups in agriculture between the periods 1972-85 and 1985-95 indicated a higher growth rate of 4.3 and 3.7 % for Fruits and vegetables, in comparison to 2.4% and 2.6% for food grains. Among the different fruits and vegetables, banana indicated a significantly higher growth of output of 7% during 1985-95 and 8.4% during 1991-96, followed by onion at 3.6 and 4.9%. In sharp contrast, mango registered a marginal decline in output growth during 1991-96 period, while the sector other vegetables register a significantly lower, negative growth of 2.93%.
6. There is also a significant increase in productivity level of almost all horticultural crops within the last three decades, which is reflective of the positive impact of technology advances made through concentrate efforts from research and development.
7. The fruit and vegetable and their processed products have been placed in the high priority sector and lot of incentives have been provided for their improvement. The share of F&V in total agricultural exports has been increasing over the years. From 3% in 1980, it has reached 5% by 1993-94. Processed F&V hold a share of 27 % to 57% in the exports of F&V products. This sector has been registering a constant increase in the last few years.
5. The Sub-committee recommends that scope and coverage of horticultural crops may be increased to cover various crops covered under the land use statistics. Periodic crop estimation surveys may be conducted to get bench mark estimates of production. A statistical cell may be created in the Horticulture Division of the Ministry of Agriculture for regular monitoring of data and the compilation methodology.

V. ESTIMATES OF AREA AND PRODUCTION OF HORTICULTURAL CROPS IN INDIA

V.1 Area and Production

1. There are three main sources that generate statistics of production of horticultural crops. The first is the Ministry of Agriculture, which operates a centrally sponsored scheme “Crop estimation survey on Fruits and Vegetables(CES-FV)” in 11 States covering 7 fruit and 7 vegetable and spice crops for estimating area and production. The fruit crops covered are mango, banana, apple, citrus, grapes, pineapple and guava. The vegetable and spice crops are potato, onion, tomato, cabbage, cauliflower, ginger and turmeric. The details of fruits and vegetables covered under the scheme are given at **Annexure - V.1**. The survey follows a stratified three stage random sampling design in the case of fruit crops, with village, orchard and fruit bearing tree as the sampling units at the successive stages. The sample size is usually 150 to 200 selected villages in each major fruit growing district, five orchards per sample village and four fruit bearing trees per orchard. The number and weight of fruits gathered from the sampled trees are observed and recorded, which form the basis for yield estimation. The survey approach in the case of vegetable crops is somewhat more complex due to the special features of cultivation of these crops especially the short duration of the crop and the numbers of pickings are required to record the harvested produce. The results of the survey are published in its “Report and database of pilot scheme on major fruits and vegetables”.

2. The second source of horticultural statistics is the State Departments of Revenue/ Agriculture/ Community Development or Statistics through crop estimation surveys. The crop coverage of the General Crop Estimation Surveys (GCES) differs from state to state and is given in Annexure V.2.

3. The National Horticulture Board (NHB) is the third source which compiles and publishes estimates of area, production and prices of all important fruit and vegetable crops. The data is collected and compiled and brought out in the form of a publication namely Indian Horticulture. The source of data in this publication is totally secondary. NHB collects the area and production data in prescribed format from the State Directorate of Horticulture/Agriculture for commercially important fruits, vegetables and flowers crops and from respective Boards with regard to plantation crops.

4. A comparison of data on area and production as well as derived productivity for four years starting 1999 – 2000 of NHB and CES-FV has been attempted to understand nature and magnitude of the issue. These sets of data are given in Tables V.1, V.2 and V.3 respectively for area, production and productivity on next page. The examination of the data indicates that the estimates of area and production generated by both the sources differ widely. It reflects that there is no coordination between both the agencies, though, they belong to the Ministry of Agriculture.

Some of the specific observations regarding problems in the data are given below:

i) **Coverage** – In general NHB series is more comprehensive in comparison with corresponding series provided by the CES-FV. The NHB series, in addition to the states covered for each crops, also provides estimated value for those states which are not exclusively included in the series.

ii) ***Inter-temporal and inter-agency consistency*** - In few cases area and production show violent year to year fluctuations. Examples of such fluctuations are:

(a) Inconsistencies in Area Estimates:

Estimates of area under Apple in Himachal Pradesh estimated by NHB and CES-FV are about. 86,000 hectare in the year 1999-00, but in the subsequent years i.e. 2000-01 and 2001-02 and 2002-03 area estimated by CES-F&V is 31,360, 23,500 and 29,160 hectares respectively, where as, NHB estimates remained in the range of 82 to 93 thousand hectares. Reduction in area of a fruit crops in the CES-F&V series during 2000-01 needs examination.

The area estimates of NHB in comparison to CES-F&V estimates of Cauliflower are 785%, 718%, 645%, 962% more in 1999-2000, 2000-01, 2001-02 and 2002-03 respectively. In case of Cabbage, NHB estimates in comparison to CES-F&V estimates are 973%, 1048%, 917% and 556% more in 1999-2000, 2000-01, 2001-02 and 2002-03 respectively.

NHB estimates of area in comparison to CES-F&V estimates, on an average are 21% more in case of Fruits and 18% more in case of vegetables during the period 1999-2003.

(b) Inconsistencies in Production Estimates:

The production estimates of NHB in comparison to CES-F&V of Mango are 104% more in 1999-00, 66% more in 2001-02 and 79% more in 2002-03. In case of Pineapple, NHB estimates in comparison to CES-F&V estimates are 122% more in 1999-00, in case of Citrus-lime, it is more than 100% during 1999-2000 to 2002-03, where as in case of cauliflower, it exceed in the range of 224% to 583%. In case of Cabbage it exceeds by 700%.

NHB estimates of production of Fruits and Vegetables in comparison to CES-F&V estimates, on an average exceed by 31% and 20% respectively, during the period 1999-2003

In most of the cases these outliers are not supported by the derived productivity indicator.

iii) ***Inconsistency between states and derived statistics like productivity*** – There are significant differences in derived statistics like productivity. These inconsistencies relates to estimates prepared by using the data of the two agencies as well as temporal discrepancies shown by the data of the same agency.

A closer look at the data indicates that a series based on NHB data (NHB data dully corrected for inconsistencies and imputing important gaps) could be used for compiling national accounts aggregates.

Table V.1 Comparison area under selected horticultural crops as provided by NHB and State Governments

STATES	Area (000' Hec.)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Mango								
Andhra pr.	298	306	341	370	297	306	287	319
Gujrat	63	61	65	70	50	49	52	52
Haryana	7	7	8	8	7	7	8	8
Karnataka	124	134	115	117	72	81	96	98
Maharashtra	147	147	164	181	59	59	63	195
Orissa	96	104	107	113	54	51	50	54
Punjab	5	6	6	6	5	6	6	6
Tamilnadu	108	112	111	112	104	108	111	112
Uttar pradesh	243	249	253	248	241	252	253	235
Total	1091	1126	1171	1225	889	918	925	1079
CES-NHB					-203	-208	-246	-146
(CES-NHB)/CES*100					-23	-23	-27	-14
Apple								
Himachal pr.	89	89	93	82	86	31	24	29
Total					-3	-57	-69	-52
CES- NHB					-3	-57	-69	-52
(CES-NHB)/CES*100					-3	-183	-295	-180
Banana								
Andhra pr.	49	33	51	47	36	33	34	37
Gujarat	34	29	33	35	17	23	24	22
Karnataka	61	59	54	53	30	35	40	40
Maharashtra	72	72	60	57	61	67	60	57
Orissa	16	18	18	20	4	4	4	4
Tamilnadu	92	96	85	77	85	83	85	77
Total	325	307	300	289	234	245	247	238
CES- NHB					-91	-62	-53	-51
(CES-NHB)/CES*100					-39	-25	-22	-21
Grapes								
Haryana	1	1	1	1	1	1	1	1
Karnataka	8	8	10	10	5	6	8	10
Maharashtra	30	30	33	35	30	31	32	32
Tamilnadu	2	2	2	2	2	2	2	2
Total	41	42	46	48	38	41	44	45
CES- NHB					-3	-1	-2	-3
(CES-NHB)/CES*100					-8	-2	-4	-6
Guava								
Gujarat	6	7	7	8	4	4	4	4
Karnataka	13	13	9	8	5	5	5	5

Table V.1 Comparison area under selected horticultural crops as provided by NHB and State Governments

STATES	Area (000' Hec.)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Uttar pr.	18	19	17	17	17	17	17	16
Haryana	5	6	6	6	5	6	6	6
Rajasthan	2	2	2	2	2	2	2	2
Tamilnadu	9	10	10	10	9	10	10	9
Total	53	55	51	51	43	43	44	43
CES- NHB					-10	-12	-6	-8
(CES-NHB)/CES*100					-24	-29	-14	-19
Pineapple								
Tamilnadu	1	1	1	1	0	0	0	1
Total	1	1	1	1	0	0	0	1
CES- NHB					0	0	0	0
(CES-NHB)/CES*100					-71	-36	-6	3
Citrus-lime								
Andhra prd.	39	41	41	50	28	31	33	42
Karnataka		14	13	11	6	7	8	8
Rajasthan	3	3	3	3	3	3	3	3
Tamilnadu	6	7	8	8	7	8	8	8
Himachal pr	20				20	N.A	1	3
Punjab	1					N.A	1	1
Total	69	65	64	71	64	49	54	65
CES- NHB					-5	-16	-10	-6
(CES-NHB)/CES*100					-8	-32	-19	-10
Orange								
Maharashtra	126	93	124	98	126	128	124	123
Rajasthan	4	5	5	6	4	4	5	6
Tamilnadu	3				3	3	3	3
Himachal pr					14	N.A	1	3
Total	133	97	129	104	147	135	133	134
CES- NHB					14	37	4	31
(CES-NHB)/CES*100					10	28	3	23
Mosmbai								
Andhra prd.	39	42	85	105	39	42	38	51
Maharashtra	20	32	35	37	20	32	35	35
Total	59	74	120	142	59	74	73	85
CES- NHB					0	1	-47	-56
(CES-NHB)/CES*100					0	1	-65	-66
Cauliflower								
Orissa	45	44	52	45	2	3	4	NA
Punjab	3	3	4	5	3	3	4	5
Total	48	47	55	50	5	6	7	5
CES- NHB					-42	-42	-48	-45
(CES-NHB)/CES*100					-785	-718	-645	-962
Potato								
Haryana	17	17	14	17	17	17	14	17
Karnataka	32	38	40	51	32	38	40	51

Table V.1 Comparison area under selected horticultural crops as provided by NHB and State Governments

STATES	Area (000' Hec.)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Punjab	76	59	71	67	75	59	57	67
Uttar pr.	463	399	390	443	448	394	390	443
Himachal prd.	11	13	12	13	13	14	14	10
Orissa	9	8	8	7	9	8	8	7
Tamilnadu	4	6	5	5	6	6	6	4
Total	611	540	538	602	600	536	528	599
CES- NHB					-11	-4	-11	-4
(CES-NHB)/CES*100					-2	-1	-2	-1
Onion								
Andhra prd.	35	28	32	27	35	30	32	15
Gujarat	20	10	24	25	20	6	24	25
Haryana	4	12	15	16	13	12	15	16
Karnataka	126	120	124	115	124	120	124	115
Maharashtra	113	118	108	110	113	118	108	121
Orissa	46	27	27	4	4	4	4	4
Tamilnadu	38	30	32	24	35	31	29	23
Punjab	1	6	7	1	1	6	1	7
Total	383	351	368	321	345	328	337	326
CES- NHB					-38	-23	-31	4
(CES-NHB)/CES*100					-11	-7	-9	1
Tomato								
Karnataka	42	40	40	36	26	30	29	26
Maharashtra	36	38	36	31	36	35	36	31
Orissa	57	55	56	100	12	11	12	11
Tamilnadu	29	29	27	23	30	31	27	23
Haryana	9	9	12	13	9	9	12	13
Punjab	7	7	7	7	6	7	7	7
Total	179	178	178	210	119	122	123	112
CES- NHB					-60	-56	-55	-99
(CES-NHB)/CES*100					-50	-46	-45	-88
Cabbage								
Orissa	45	44	45	33	2	2	3	NA
Tamilnadu	2	2	2	2	2	2	2	2
Total	47	46	47	36	4	4	5	2
CES- NHB					-42	-42	-42	-33
(CES-NHB)/CES*100					-973	-1048	-917	-1556
Fruits Total	1859	1855	1974	2012	1558	1537	1544	1719
CES-NHB					-301	-318	-430	-292
(CES-NHB)/NHB*100					-16	-17	-22	-15
(CES-NHB)/CES*100					-19	-21	-28	-17
Vegetables Total	1267	1162	1186	1219	1074	996	999	1043
CES-NHB					-193	-166	-187	-176
(CES-NHB)/NHB*100					-15	-14	-16	-14
(CES-NHB)/CES*100					-18	-17	-19	-17

Table V.2 Comparison of production of selected horticultural crops as provided by NHB and State Governments

STATES	Production (000' Tonne)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Mango								
Andhra pr.	2380	2450	2446	2962	665	2235	1102	1979
Gujarat	382	364	458	495	281	268	339	269
Haryana	34	43	45	41	31	43	45	41
Karnataka	1180	1291	1131	1098	287	335	255	415
Maharashtra	501	501	559	616	85	128	102	368
Orissa	344	363	402	403	44	705	221	430
Punjab	48	56	58	60	48	11	60	12
Tamilnadu	701	737	439	757	314	556	439	757
Uttar pradesh	1915	2250	1950	4031	1912	3162	1950	1559
Total	7484	8055	7488	10464	3667	7444	4513	5830
CES- NHB					-3817	-611	-2975	-4634
(CES-HB)/CES*100					-104	-8	-66	-79
Apple								
Himachal pr.	49	377	181	348	59	422	298	412
Total	49	377	181	348	59	422	298	412
CES- NHB					10	45	117	64
(CES-HB)/CES*100					16	11	39	15
Banana								
Andhra pr.	1213	820	1111	1097	778	820	761	975
Gujarat	1109	1000	1154	1403	1046	1279	1476	1515
Karnataka	2015	1238	1278	1286	712	650	650	682
Maharashtra	4331	4331	3924	3608	3678	3892	3924	3608
Orissa	194	204	209	235	12	37	31	25
Tamilnadu	4856	5099	3544	2837	3132	3070	3544	2837
Total	13717	12693	11220	10465	9358	9747	10386	9642
CES- NHB					-4359	-2946	-835	-824
(CES-HB)/CES*100					-47	-30	-8	-9
Grapes								
Haryana	8	8	6	8	10	8	6	8
Karnataka	228	144	170	142	112	149	202	295
Maharashtra	779	779	912	989	779	760	911	1030
Tamilnadu	52	55	52	36	41	47	52	36
Total	1067	986	1139	1174	941	964	1172	1369
CES- NHB					-126	-22	32	195
(CES-HB)/CES*100					-13	-2	3	14
Guava								
Gujarat	91	96	95	110	45	36	59	53
Karnataka	158	150	153	151	33	23	36	31
Uttar pr.	185	136	136	138	146	126	136	128
Haryana	44	40	41	55	44	40	41	55
Rajasthan	26	26	23	26	9	10	12	6
Tamilnadu	65	68	44	50	32	61	44	50

Table V.2 Comparison of production of selected horticultural crops as provided by NHB and State Governments

STATES	Production (000' Tonne)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Total	568	515	492	529	309	297	329	324
CES- NHB					-259	-218	-163	-205
(CES-HB)/CES*100					-84	-74	-50	-63
Pineapple								
Tamilnadu	25	27	17	38	11	17	17	38
Total	25	27	17	38	11	17	17	38
CES- NHB					-14	-10	0	0
(CES-HB)/CES*100					-122	-59	0	0
Citrus-lime								
Andhra prd.	583	489	488	598	140	161	228	192
Karnataka		194	283	246	65	79	145	144
Rajasthan	35	35	18	18	9	7	8	5
Tamilnadu	13	14	12	9	12	11	10	9
Himachal pr	1				3	N.A	5	11
Punjab	4					N.A	5	5
Total	636	731	801	870	228	258	401	365
CES- NHB					-408	-473	-400	-505
(CES-HB)/CES*100					-179	-183	-100	-138
Orange								
Maharashtra	1078	833	1118	882	1060	1187	1071	1176
Rajasthan	104	84	34	50	39	54	76	9
Tamilnadu	16				10	9	2	4
Himachal pr					16	N.A	19	27
Total	1197	916	1152	932	1125	1251	1167	1216
CES- NHB					-72	334	16	284
(CES-HB)/CES*100					-6	27	1	23
Mosmbai								
Andhra prd.	583	625	648	157	484	487	556	731
Maharashtra	298	482	518	554	298	324	417	258
Total	881	1108	1166	711	782	811	973	989
CES- NHB					-99	-297	-193	278
(CES-HB)/CES*100					-13	-37	-20	28
Cauliflower								
Orissa	632	620	636	240	30	28	64	NA
Punjab	67	78	85	107	73	78	85	107
Total	699	698	721	347	102	106	149	107
CES- NHB					-596	-592	-572	-240
(CES-HB)/CES*100					-583	-557	-383	-224
Potato								
Haryana	260	358	305	321	260	258	305	321
Karnataka	460	443	489	157	460	452	489	157
Punjab	1563	1187	1414	1387	1563	1187	1171	1387
Uttar pr.	10455	8497	9570	10163	10109	8398	9570	10163

Table V.2 Comparison of production of selected horticultural crops as provided by NHB and State Governments

STATES	Production (000' Tonne)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Himachal prd.	141	155	145	143	136	183	108	81
Orissa	85	86	78	70	91	86	78	70
Tamilnadu	72	103	89	80	97	103	101	63
Total	13036	10828	12091	12321	12716	10667	11823	12241
CES- NHB					-320	-161	-268	-80
(CES-HB)/CES*100					-3	-2	-2	-1
Onion								
Andhra prd.	523	514	560	413	523	537	557	172
Gujrat	451	213	640	717	451	131	640	717
Haryana	60	154	237	226	180	154	237	226
Karnataka	595	672	693	445	792	645	693	444
Maharashtra	1393	1687	1307	1224	1393	1687	1306	1427
Orissa	368	213	213	23	28	24	37	30
Tamilnadu	316	266	282	210	315	303	279	198
Punjab	18	13	15	13	26	129	21	151
Total	3723	3732	3946	3271	3708	3611	3771	3365
CES- NHB					-15	-121	-175	94
(CES-HB)/CES*100					0	-3	-5	3
Tomato								
Karnataka	1051	835	1144	954	323	314	237	218
Maharashtra	1008	1058	1183	835	1011	693	1183	835
Orissa	692	665	670	1323	55	54	97	63
Tamilnadu	343	360	258	285	342	325	258	285
Haryana	200	199	165	159	200	199	165	159
Punjab	164	165	176	175	138	165	176	175
Total	3458	3282	3596	3731	2068	1750	2116	1734
CES- NHB					-1389	-1532	-1479	-1996
(CES-HB)/CES*100					-67	-88	-70	-115
Cabbage								
Orissa	1227	1199	1239	914	35	26	58	NA
Tamilnadu	189	198	92	126	126	88	92	126
Total	1416	1397	1331	1040	161	114	150	126
CES- NHB					-1255	-1283	-1181	-914
(CES-HB)/CES*100					-778	-1127	-788	-724
Fruits Total	25625	25407	23656	25532	16480	21208	19256	20186
CES-NHB					-9145	-4199	-4400	-5346
(CES-HB)/NHB*100					-36	-17	-19	-21
(CES-HB)/CES*100					-55	-20	-23	-26
Vegetables Total	22332	19938	21685	20709	18757	16249	18010	17574
CES-NHB					-3575	-3689	-3675	-3135
(CES-HB)/NHB*100					-16	-19	-17	-15
(CES-HB)/CES*100					-19	-23	-20	-18

Table V.3 Comparison of productivity of selected horticultural crops derived from the data provided by NHB and State Governments

STATES	Productivity (Tonnes/Hectare)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Mango								
Andhra pr.	8	8	7	8	2	7	4	6
Gujrat	6	6	7	7	6	6	7	5
Haryana	5	6	6	5	5	6	6	5
Karnataka	10	10	10	9	4	4	3	4
Maharashtra	3	3	3	3	1	2	2	2
Orissa	4	4	4	4	1	14	4	8
Punjab	10	10	10	10	10	2	10	2
Tamilnadu	7	7	4	7	3	5	4	7
Uttar pradesh	8	9	8	16	8	13	8	7
Average	7	7	7	8	4	7	5	5
CES- NHB					-2	0	-1	-3
(CES-HB)/CES*100					-50	-6	-25	-51
Apple								
Himachal pr.	1	4	2	4	1	13	13	14
Average	1	4	2	4	1	13	13	14
CES- NHB					0	9	11	10
(CES-HB)/CES*100					19	68	85	70
Banana								
Andhra pr.	25	25	22	23	22	25	22	26
Gujarat	32	34	35	40	62	56	62	68
Karnataka	33	21	24	24	23	18	16	17
Maharashtra	60	60	66	63	60	58	66	63
Orissa	12	11	11	12	3	8	8	6
Tamilnadu	53	53	42	37	37	37	42	37
Average	36	34	33	33	34	34	36	36
CES- NHB					-1	0	3	3
(CES-HB)/CES*100					-4	-1	7	8
Grapes								
Haryana	7	6	6	9	8	7	6	9
Karnataka	30	18	17	15	23	25	24	30
Maharashtra	26	26	28	28	26	24	28	32
Tamilnadu	22	23	22	15	19	21	22	15
Average	21	18	18	17	19	19	20	21
CES- NHB					-2	1	2	5
(CES-HB)/CES*100					-12	4	10	22
Guava								
Gujarat	14	14	13	14	11	9	15	14
Karnataka	13	12	18	19	7	5	7	6
Uttar pr.	10	7	8	8	8	7	8	8
Haryana	8	7	7	9	8	7	7	9
Rajasthan	16	16	12	14	6	6	7	3
Tamilnadu	7	7	5	5	3	6	5	5

Table V.3 Comparison of productivity of selected horticultural crops derived from the data provided by NHB and State Governments

STATES	Productivity (Tonnes/Hectare)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Average	11	10	10	11	7	7	8	8
CES- NHB (CES-HB)/CES*100					-4	-4	-3	-4
					-57	-55	-32	-50
Pineapple								
Tamilnadu	42	45	35	32	33	39	37	31
Average	42	45	35	32	33	39	37	31
CES- NHB (CES-HB)/CES*100					-10	-6	2	-1
					-29	-17	6	-3
Citrus-lime								
Andhra prd.	15	12	12	12	5	5	7	5
Karnataka		14	22	23	11	11	18	17
Rajasthan	12	12	6	6	3	2	3	2
Tamilnadu	2	2	2	1	2	2	1	1
Himachal pr	0				0	N.A	5	3
Punjab	7					N.A	7	7
Average	9	10	11	11	5	5	7	6
CES- NHB (CES-HB)/CES*100					-4	-5	-4	-5
					-72	-100	-53	-79
Orange								
Maharashtra	9	9	9	9	8	9	9	10
Rajasthan	27	17	7	9	10	13	15	2
Tamilnadu	5				3	3	1	2
Himachal pr					1	N.A	14	10
Average	13	13	8	9	6	8	10	6
CES- NHB (CES-HB)/CES*100					-8	-5	2	-3
					-136	-54	19	-59
Mosmbai								
Andhra prd.	15	15	8	1	12	12	15	14
Maharashtra	15	15	15	15	15	10	12	7
Average	15	15	11	8	14	11	13	11
CES- NHB (CES-HB)/CES*100					-1	-4	2	3
					-9	-39	15	25
Cauliflower								
Orissa	14	14	12	5	12	11	17	NA
Punjab	24	24	23	23	24	24	23	23
Average	19	19	18	14	18	18	20	11
CES- NHB (CES-HB)/CES*100					-1	-2	2	-3
					-3	-9	12	-23
Potato								
Haryana	16	21	22	19	16	15	22	19
Karnataka	14	12	12	3	14	12	12	3
Punjab	21	20	20	21	21	20	20	21

Table V.3 Comparison of productivity of selected horticultural crops derived from the data provided by NHB and State Governments

STATES	Productivity (Tonnes/Hectare)							
	NHB				CES-FV			
	1999-00	2000-01	2001-02	2002-03	1999-00	2000-01	2001-02	2002-03
Uttar pr.	23	21	25	23	23	21	25	23
Himachal prd.	13	12	12	11	10	13	8	8
Orissa	10	10	10	10	10	10	10	10
Tamilnadu	19	18	19	18	17	19	18	17
Average	16	16	17	15	16	16	17	14
CES- NHB					-1	-1	-1	-1
(CES-HB)/CES*100					-4	-4	-4	-4
Onion								
Andhra prd.	15	18	18	15	15	18	17	11
Gujrat	23	22	27	29	23	22	27	29
Haryana	15	13	16	14	14	13	16	14
Karnataka	5	6	6	4	6	5	6	4
Maharashtra	12	14	12	11	12	14	12	12
Orissa	8	8	8	6	7	6	8	7
Tamilnadu	8	9	9	9	9	10	10	9
Punjab	23	2	2	22	21	22	22	22
Average	14	11	12	14	13	14	15	13
CES- NHB					0	2	3	0
(CES-HB)/CES*100					-1	16	18	-2
Tomato								
Karnataka	25	21	28	27	12	11	8	8
Maharashtra	28	28	33	27	28	20	33	27
Orissa	12	12	12	13	5	5	8	6
Tamilnadu	12	12	10	12	12	11	10	12
Haryana	22	22	14	12	22	22	14	12
Punjab	25	24	24	24	22	24	24	24
Average	21	20	20	19	17	15	16	15
CES- NHB					-4	-4	-4	-4
(CES-HB)/CES*100					-23	-29	-24	-29
Cabbage								
Orissa	27	27	28	27	17	14	21	NA
Tamilnadu	90	90	49	57	56	41	48	59
Average	59	59	38	42	36	28	35	29
CES- NHB					-22	-31	-3	-13
(CES-HB)/CES*100					-61	-114	-9	-44

V.2 Price of horticultural products

5. Data on prices are available from NHB as well as State Government. The data provided by the NAD shows considerable differences in the two sets. NHB has established 35 centers all over the country (mainly in State Capitals) to collect the wholesale prices and arrivals data of commercially important fruits and vegetables under Market Information Service Scheme. The fruits and vegetables covered under the scheme are:

Fruits: Apple, banana, grapes, citrus, litchi, mango, guava, pineapple, papaya, sapota and others.

Vegetables: Brinjal, cabbage, cauliflower, okra, peas, tomato, onion, potato, sweet-potato, tapioca and others

6. The source of data, so collected, is primary as well as secondary. The officials of NHB posted at respective locations visit the wholesale markets to collect the prices and arrivals details. Whenever, the APMC's are organized and the reliable compiled/computerized data is available, the same is taken by the NHB officials from APMC and whenever it is not available, officials of NHB collect the same from the wholesale trading markets. Even in the case of APMC data, NHB officials cross check the same from the wholesale trading prevailing in the market. In those cities, where wholesale markets are located at more than one place, efforts are made to collect the price and arrivals from all the wholesale markets. In order to arrive at a model price, the sale price on which the maximum produce of Fair Average Quality (FAQ) is sold is taken at model price. The prices are taken for commercially important varieties of a particular produce e.g. in the case of Apple (Royal Delicious) and in the case of Mango (Safeda, Totapari, Desheri). With regard to arrivals, the arrivals for all the varieties sold in all the wholesale of a city are given. NHB is of the view that the prices and arrivals data collected and compiled by NHB may be taken as the data compiled by the State Governments are not very specific to horticulture commodities/varieties as also they very greatly in format to be followed at national level.

7. The data provided by State Governments are assumed to be producer (or farm gate) prices. However, no details were available. Limited data presented by NAD for selected crops (please see Table I.2) reveals that the state prices are lower by 2 to 68 per cent as compared to the NHB prices.

V.3 Conclusions and recommendations

8. This situation revealed by the existing databases being released by NHB and State Governments calls for a closer examination of concepts adopted for collection of data as well as the sampling design. Annexure V.3 presents a detail note on existing system recommended by DESAg to the State Government and the method adopted by Government of Karnataka and Tamil Nadu. In this connection the sub-committee also noted that at present Indian Agricultural Statistics Research Institute (IASRI) is engaged in preparing a methodology for estimating area and production of horticultural crops. The Sub-committee recommends that:

1. The proposed sampling design being prepared by IASRI should be simpler and may include a section on concepts and definitions for use of field workers and for producing uniform data among states.
2. To the extent possible, finer concepts like bearing and non-bearing trees may not be included for reducing investigator bias.
3. The suggested methodology may also include method for accounting area and production of scattered crops. Similarly, issues like land under orchards leased (or used) for growing temporary crops may also be included.

9. For the present purpose, the Sub-committee recommends that a closer examination of the existing data may be made by a central team of experts consisting of members from NAD, NHB, Horticulture Division and the DESAg to work out a consistent series of area, production and productivity of horticultural crops for use of Central Ministries. The team may use all the information being provided by different sources and may consult State Governments to accomplish the task.

10. In case of prices of horticultural production, recognizing the fact that (a) NHB prices relates to wholesale prices, (b) in general, fruits and vegetables have a much higher wastage rates, and (c) the trade and transport margins can be substantial, the Sub-committee recommends that the State Government prices may be used for compiling the national accounts aggregates. In the long-term more systematic efforts may be made for collection of price statistics.

VI GENERAL REMARKS - National Statistical Commission

Despite the progress made in this sector, authentic basic data on horticultural crops is yet to be developed. District-wise and taluk wise data on extent of adoption of technologies or their impact is not available. Realizing this lapse, efforts have been initiated by ICAR to collect and compile data on horticultural crops, variety wise production up to taluk level. Efforts at systematic documentation of data starting from the village panchayat level needs to be strengthened.

The National Statistical Commission (NSC) constituted by the Government of India has made recommendations for improving the quality and coverage of the data. Selected recommendations pertaining to horticultural crops are given in Annexure VI.1. The recommendations made by the Sub-committee may also be considered while implementing recommendations made by NSC.

Annexure I.1

Office Memorandum setting up the Sub-committee

No. U-11014/4/2005-NAD-3
Ministry of Statistics & Programme Implementation
Central Statistical Organisation
(National Accounts Division)

Sardar Patel Bhawan, Sansad Marg,
New Delhi-1, dated : February 4, 2005

OFFICE MEMORANDUM

Subject: Constitution of Sub-Committee for suggesting suitable source of data for area, production and prices for estimating the value of output of horticulture crops.

It has been decided with the approval of the Competent Authority to constitute the Sub-Committee for suggesting suitable source of data for area, production and prices for estimating the value of output of horticulture crops.

2.1 The composition of Sub-Committee is as follows :

(i)	Shri Pratap Narain FAO Consultant	Chairman
(ii)	Economic & Statistical Advisor, DES, Department of Agriculture and Co-operation, Ministry of Agriculture	Member
(iii)	Member Secretary, CACP, Ministry of Agriculture	Member
(iv)	Advisor, Agriculture Division, Planning Commission	Member
(v)	Deputy Director General (National Accounts Division)	Member
(vi)	Horticulture Commissioner, Ministry of Agriculture	Member
(vii)	Director, Dte. of Economics & Statistics, Govt. of Andhra Pradesh	Member
(viii)	Economic Advisor, Dte. of Economics and Statistics Himachal Pradesh	Member
(ix)	Director, Dte. of Economics and Statistics, Govt. of Bihar	Member
(x)	Representative of National Horticulture Board	Member
(xi)	Director, NAD, In-charge of Agriculture Sector	Member Secretary

2.2 The Terms of Reference of the Sub-Committee are the followings :-

- (i) To suggest suitable sources of data for area, production and prices for estimating the value of output of horticulture crops.
- (ii) To suggest price data to be used when prices reported by States are below the Minimum Support Price (MSP).

2.3 The tenure of the Sub-Committee is upto 30.6.2005.

2.4 The Sub-Committee may co-opt experts from Central and State Governments, reputed Research Organisations/Institutions/Agencies as and when necessary. The official members will be entitled to draw TA/DA from their respective Organisation for attending the meeting of the Committee. The Chairman of the Sub-Committee, being a non-official, will get TA/DA from the Ministry of Statistics and Programme Implementation as per existing rules.

(S.C. Das)
Senior Analyst

Copy forwarded to:

All Members of the Sub-Committee.

Copy for information to :

1. All Members of Advisory Committee
2. PPS to Secretary, MOS&PI
3. PPS to ADG (NAD)

Annexure I.2
List of the members of the Sub-Committee

Sl. No.	Name & Designation	Address
1.	Shri Pratap Narain	B-286, Yojana Vihar, Delhi -92.
2.	Shri Rajiv Mehta, Member Secretary, CACP	Ministry of Agriculture, Deptt. of Agriculture & Cooperation, Krishi Bhawan.
3.	Shri S.K. Roy, Advisor	Agriculture Division, Planning Commission, Yojana Bhawan.
4.	Dr. Sunil Sharma, Addl. Commissioner (Hort.)	Ministry of Agriculture, Deptt. of Agriculture & Cooperation, Horticulture Division, Krishi Bhawan.
5.	Smt. Saroja Rama Rao, Director	Dte. Of Economics and Statistics, Govt. of Andhra Pradesh, Khairatabad, Hyderabad.
6.	Smt. M. Malhotra, Economic Adviser	Dte. Of Economics & Statistics, Govt. of HP, Kusumpti, Shimla
7.	Shri Bijoy Pratap Singh, Director	Dte. Of Statistics & Evaluation, Govt. of Bihar, Old Sectt. Patna
8.	Shri M.M. Nampoothiry, Economic and Statistical Adviser.	Dte. Of Economic and Statistics, Deptt. of Agriculture & Coop. Krishi Bhawan, ND
9.	The Managing Director,	National Horticulture Board, 85, Institutional Area, Sector 18, Gurgaon.
10.	Shri Vishnu Kumar, ADG	NAD
11.	Sh. Ramesh Kolli, DDG	NAD
12.	Sh. Sunil Jain, Director	NAD

Other special invitee

Sl. No.	Name & Designation	Address
1.	Shri R. P. Katyal	Member, Advisory Committee
2.	Shri Vijay Kumar, Adviser	Dte. Of Economic and Statistics, Deptt. of Agriculture & Coop. Krishi Bhawan
	Dr. Lily Mitra, Deputy Commissioner (Horticulture)	Department of Agriculture and Cooperation, Krishi Bhawan
3.	Shri C.P. Gandhi, Technical Officer	National Horticulture Board, 85, Institutional Area, Sector 18, Gurgaon.
4.	Dr. Savita Sharma, Director	NAD
5.	Shri S.K. Gandhi, Director	NAD
6.	Dr. Sunita Chitkara, JD	NAD

Annexure II.1

Availability of Data on Horticulture Crops in Land Use Statistical data (Table 3.3 of LUS-DES) - 1998-99

Sl. No	Crop Description	Andhra Pr	Arunachal	Assam	Bihar	Goa	Gujarat	Haryana	Himachal	J & K	Karnataka	Kerala	M.P.	Maharashtra
1	Pepper-Black (Piper nigrum)										✓	✓		
2	Chilies (Capsicum)	✓	✓	✓	✓				✓	✓	✓	✓	✓	✓
3	Ginger(Zingiber officinale)	✓	✓	✓	✓		✓		✓	✓	✓	✓	✓	✓
4	Turmeric (Curcuma longa)	✓	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓
5	Cardamon (Amomum subulatum)				✓		✓		✓		✓			
6	Betel nut (areca catechu)					✓						✓		✓
7	Garlic (Allium sativum)	✓			✓		✓		✓	✓	✓		✓	✓
8	Coriander(Coriandrum sativum)	✓			✓		✓		✓	✓	✓		✓	✓
9	Others*	✓		✓		✓	✓	✓	✓	✓	✓		✓	✓
10	Total spices	✓	✓	✓	✓	✓	✓		✓	✓	✓		✓	✓
11	Mango(Mangifera)	✓		✓	✓	✓	✓	✓	✓		✓	✓	✓	✓
12	Citrus fruits	✓		✓			✓	✓			✓	✓	✓	✓
13	Banana(Musa spientum)	✓		✓	✓	✓	✓	✓			✓	✓	✓	✓
14	Grapes (Vitis vinifera)	✓									✓			✓
15	Pome fruits			✓	✓						✓		✓	✓
16	Papaya(carricapapaya)	✓		✓			✓				✓	✓	✓	✓
17	Apple								✓	✓				
18	Others*	✓		✓	✓	✓	✓	✓	✓		✓		✓	✓
19	Total fruits	✓		✓	✓	✓	✓		✓	✓	✓		✓	✓
20	Cashew nut(Anacardium occidentale)	✓		✓		✓					✓	✓		✓
21	others*	✓		✓	✓	✓				✓				
22	Potato(solanum tuberosum)	✓	✓	✓	✓		✓	✓	✓	✓	✓		✓	✓
23	Tapioca (Miniht utilissima)	✓		✓							✓	✓		✓
24	Sweet potato(Ipomoeabatatas)	✓		✓	✓		✓	✓	✓		✓	✓	✓	✓
25	Onion (Allium cepa)	✓		✓	✓		✓	✓	✓	✓	✓		✓	✓
26	Other Kharif*	✓	✓	✓		✓	✓	✓		✓	✓		✓	✓
27	Other Rabi*	✓					✓	✓		✓	✓		✓	✓
28	Total Vegetables	✓	✓	✓		✓	✓		✓	✓	✓		✓	✓
29	Total fruits and vegetables	✓	✓	✓		✓	✓	✓	✓	✓			✓	✓
30	Other Food Crops	✓		✓				✓		✓			✓	

Sl. No.	Crop Description	Manipur	Meghalaya	Mizoram	Nagaland	Orissa	Punjab	Rajasthan	T.N.	Tripura	U.P.	W.B.	Chandigarh	D&N Haveli	Delhi	Lakshadweep	Pondicherry
1	Pepper-Black (Piper nigrum)																
2	Chilies (Capsicum)	v	v														
3	Ginger (Zingiber officinale)	v	v		v				v								v
4	Turmeric (Curcuma longa)	v	v		v	v	v	v	v		v	v		v	v	v	v
5	Cardamon (Amomum subulatum)				v	v		v	v		v	v					
6	Betel nut(areca catechu)		v			v	v	v	v		v	v					v
7	Garlic (Allium sativum)				v				v								
8	Coriander(Coriandrum sativum)								v			v					v
9	Others*	v			v	v		v	v								
10	Total spices	v	v		v	v		v	v					v			v
11	Mango(Mangifera)						v		v		v						v
12	Citrus fruits	v	v		v		v		v		v	v	v	v	v	v	v
13	Banana(Musa spientum)	v	v		v	v					v			v			v
14	Grapes (Vitis vinifera)					v	v	v	v		v						v
15	Pome fruits				v	v		v			v			v		v	v
16	Papaya(carricapapaya)	v	v				v		v								
17	Apple				v			v									
18	Others*	v			v	v		v			v					v	
19	Total fruits	v	v		v												
20	Cashew nut (Anacardium occidentale)				v		v		v		v			v	v	v	v
21	others*				v	v	v		v		v			v	v	v	v
22	Potato(solanum tuberosum)	v	v	v		v			v								v
23	Tapioca (Miniht utilissima) Sweet	v	v	v					v								
24	potato(Ipomoeabatatas)	v	v		v	v	v	v	v		v				v		
25	Onion (Allium cepa)	v			v				v			v				v	v
26	Other Kharif*	v		v	v	v	v	v	v		v					v	
27	Other Rabi*			v	v	v	v	v	v		v				v		v
28	Total Vegetables	v	v	v	v	v	v	v			v			v	v	v	v
29	Total fruits and vegetables	v	v		v	v	v	v			v	v		v	v	v	v
30	Other Food Crops				v	v	v	v	v		v			v	v	v	v
	* Comments				v		v	v	v		v	v		v	v	v	v

Annexure II.2

List publications and web sites giving sources of agricultural statistics in India issued by DESAg, NHB and some of the state governments

Important Publications	Important Websites
<p>A. Journal Agricultural Situation in India(Monthly)</p> <p>B. Periodicals</p> <ol style="list-style-type: none"> 1. Agricultural Prices in India 2. Index of Agricultural Production, area and Yield 3. Agricultural Wages in India 4. Cost of Cultivation of Principal Crops 5. District-wise Area and Production of Crops in India 6. Year Book of Agro-Economic Research Studies 7. Land Use Statistics at a Glance 8. Bulletin on Food Statistics 9. Farm Harvest Prices of Principal Crops in India 10. Indian Agriculture in Brief 11. Report and Data Base of Pilot Schemes on Major Fruits and Vegetables 12. Indian Livestock Census Vol.I (Summary Tables) 13. Indian Livestock Census Vol.II (Parts I, II and III) 14. Indian Agriculture Ready Reckoner 15. Agricultural Statistics at a Glance 16. All-India Index Numbers of Area, Production and Yield of Principal Crops 	<p>National Horticulture Board mnb@hortibizindia.org.</p> <p>Department of Agriculture & Cooperation http://www.Agri.coop.nic.in</p> <p>Indian Council of Agricultural Research ICAR.org.in.</p> <p>Commission for Agricultural Costs and Prices doenet.nic.in</p> <p>Agricultural Statistics at a Glance 2004 agricoop.nic.in</p> <p>AGMARKNET agmarket.nic.in</p> <p>Agriculture Market Division Directorate of Marketing Inspection agmark.nic.in/dmiwelcom</p> <p>Food and Agriculture Organisation of United Nations www.fao.org</p> <p>Ministry of Statistics & PI Government of India mospi.nic.in</p>

ANNEX-II.3
STATEWISE SOURES OF DATA FOR HORTICULTURE CROPS

State/UT	Area and Production	Prices	Remarks
Haryana	Director Land Records (DLR)	DES	Weekly prices are collected. NHB obtains from Dte. of Horticulture
Andhra Pradesh	State Horticulture Department (Other than CES crops)	DES	Peak Market Prices are collected.
Sikkim	Horticulture and Cash Crops Development Department	DES retail prices	(Retail price-40%)
Punjab	DLR and Dte. Of Horticulture	DES	
West Bengal	Horticulture Deptt.	Horticulture Deptt.	
Jammu & Kashmir	Horticulture Production Deptt, Horticulture and Planning Division	Horticulture Planning & Marketing (Average Prices) and DES	No peak market season concept, average prices are collected. NHB obtains from Dte. of Floriculture
Gujarat	Directorate of Horticulture. Data on chiku , banana and mango are obtained from cooperatives	APMC (all other crops)	State weighted average price during peak marketing season
Delhi	Dte. of Agriculture Marketing (9 AMPC) State Horticulture Board (Floriculture)	DES	
Himachal Pradesh	Dte. of Horticulture (Area and Production)	DES	Peak market season of all horticulture crops are collected. (80% sold in Delhi, 20% in Himachal Pradesh)
Bihar	Dte. of Horticulture(all crops) and DES (mango, banana, litchi, guava, jackfruit, onion, potato, brinjal, tomato and cauliflower)	Bihar Agriculture Marketing Board	Weight average price
Uttar Pradesh	Department of Horticulture & Food Processing (Area, production and productivity)	Mandi Parishad, Agriculture Marketing	
Tripura	Dte. of Horticulture	Department of Agriculture	
Goa	Directorate of Agriculture	Dte. of Agriculture	(No data is made available by Horticulture Department)
Maharashtra	Horticulture Division, Commissionerate of Agriculture	Horticulture Division	Peak market season wholesale prices are collected, district wise weighted average of all horticulture crops. Area and production data of NHB are used for Papaya, Litchi, Guava etc.)
Chandigarh	DLR	Prices from Punjab Govt.	NHB obtains from District Agriculture office.
Karnataka	CES & Agriculture Marketing Division	Agriculture Marketing Division, State Marketing	(150 items, peak market period prices are collected) NHB obtains from Dte. of Horticulture

ANNEX-II.3
STATEWISE SOURES OF DATA FOR HORTICULTURE CROPS

State/UT	Area and Production	Prices	Remarks
		Department	
Tamil Nadu	DES	DES	96 items are covered, peak marketing season prices are collected and Transportation charges (7%) are deducted. NHB obtains from Dte. of Horticulture and plantation crops.
Kerala	EARAS(Dte. of Agriculture) for all crops	Horticulture Co-operation	
Orissa	Dte. of Horticulture	DES	(except cashew nut) Peak market seasons
Uttaranchal	Horticulture Department, Dte. of Horticulture	NHB for 2002-03	
Madhya Pradesh (MP)	LUS, State Horticulture Board	Land Records	Collects data of potato, sweet potato, onion, green peas, tomato, lady finger, brinjal, cauliflower and cabbage, rest are categorized as others
Jharkhand			System followed in Bihar is yet to be setup
Chattisgarh	State Horticulture Board, Directorate of Land Records	Agriculture Marketing (Mandi Prices), Land Records	System of MP is being followed.
Rajasthan	Board of Revenue	Dte. of Agriculture Marketing	Crop cutting experiments being conducted for lime, orange, kinnow, mosambi and guava. NHB obtains from Dte. of Horticulture.
Nagaland	Deptt. Of Horticulture	DES	whole prices collected from Dimapur
Pondy cherry	Deptt. Of Agriculture	DES	
Arunachal Pradesh	Dte. Of Horticulture	DES	DES is collecting prices from DSO'S
Mizoram	Deptt. Of Horticulture	DES	FMS is collected from 4-5 villages of each district.
Assam	Horticulture Deptt., Dte .of Agriculture	DES	Weekly prices are collected, weighted peak marketing season price is used.
Punjab	Deptt. Of Horticulture	DES	
Meghalaya	Deptt. Of Horticulture	Deptt. Of Horticulture	Price bulletin of horticulture board is used
Manipur	Crop estimation survey of fruits and vegetables	DES	Peak market prices are used NHB obtains from Dte. of Horticulture.
Andaman & Nicobar land, Daman and Diu, Lakshdweep	Dte. of Agriculture		

ANNEXURE V.1

CROPS COVERED IN DIFFERENT STATES IN PILOT SCHEME OF CES-F&V

CROPS	STATES
Mango	Andhra-Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Orissa, Punjab, Uttar Pradesh
Apple	Himachal Pradesh
Banana	Andhra Pradesh, Gujarat, Karnataka, Maharashtra, Orissa, Tamil Nadu
Grapes	Haryana, Maharashtra, Tamil Nadu, Karnataka
Guava	Gujarat, Haryana, Karnataka, Rajasthan, Tamil Nadu, Uttar Pradesh
Citrus	Andhra Pradesh, Himachal Pradesh, Karnataka,, Maharashtra, Punjab, Rajasthan, Tamil Nadu
Pineapple	Tamil Nadu
Cauliflower	Orissa, Punjab
Potato	Haryana, Himachal Pradesh, Karnataka, Orissa, Punjab, Tamil Nadu, Uttar Pradesh
Onion	Andhra Pradesh, Gujarat, Haryana, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu
Tomato	Haryana, Karnataka, Maharashtra, Orissa, Punjab, Tamil Nadu
Cabbage	Orissa, Tamil Nadu
Ginger	Rajasthan
Turmeric	Andhra Pradesh, Karnataka, Orissa, Rajasthan, Tamil Nadu

ANNEXURE V.2

LIST OF FRUITS & VEGETABLES UNDER GCES

1.	Litchi	Bihar
2.	Banana	Bihar, Kerala and Madhya Pradesh
3.	Mango	Bihar
4.	Guava	Bihar
5.	Jackfruit	Bihar and Kerala
6.	Cashew nut	Kerala and Maharashtra
7.	Tapioca	Kerala and Tamil Nadu
8.	Potato	Assam, Bihar, Chhattisgarh, Gujarat, Jharkhand, Karnataka, Madhya Pradesh, Meghalaya, Orissa, Tamil Nadu and Uttar Pradesh
9.	Onion	Bihar, Chhattisgarh, Gujarat (on Pilot basis), Karnataka, Madhya Pradesh, Tamil Nadu and Uttar Pradesh
10.	Brinjal	Bihar and Jharkhand
11.	Tomato	Bihar and Jharkhand
12.	Cauliflower	Bihar
13.	Papaya	Madhya Pradesh
14.	Plantain	Kerala

Annexure V.3

Sampling methodology for estimation of area and production of fruit crops

This section contains the detailed procedure of estimating the area and production of horticultural crops in India, which was developed by the Indian Agricultural Statistics Research Institute (IASRI) and is being adopted by several States in the country, under the technical supervision and sponsorship of the Ministry of Agriculture.

In view of the special features of fruit crops, estimation of extent of cultivation and production of fruit crops is somewhat different than other crops. Some of the features are:

- As against seasonal nature of field crops, fruits are perennial crops.
- Fruit trees, besides being grown in regular orchards, are also extensively grown on canal banks, field bunds, road-sides, back yards of houses and even as stray trees.
- Different fruits are frequently grown in the same orchard.
- Fruit trees take quite a few years before they start bearing fruit
- All the trees in an orchard may not be of the same age, i.e. an orchard may contain both bearing and young trees.
- Harvesting of fruit trees is done in a number of pickings extending over several weeks.
- Several fruits like citrus, guava, etc., have two harvesting seasons in a year.

All these points are carefully considered while planning a sample survey to estimate the extent of cultivation and yield of fruits.

Unlike other crops, extent of cultivation of a fruit is measured in terms of area under the crop or by the number of trees, both bearing as well as young. However, only bearing trees contribute towards the production of the fruit. The number of young trees on the other hand provides an idea of the extent of cultivation of the crops in the future.

The choice of sampling design would depend upon whether only one fruit is of interest or more than one fruits are being studied. Normally the survey is planned to cover for some specified area, say the district, on the basis of importance of the crop. Accordingly, the sampling design for single fruit in a district and for several fruit crops at the state level are separately described below:

(i) Sampling Plan for surveys to estimate the area and production of a single fruit crop in a district

Each village in the district is identified as “reporting” or “non-reporting” for the crop on the basis whether the fruit is grown in the village or not. A list of “reporting” as well as “non-reporting” villages are prepared along with area under the fruit. This information is obtained from revenue records or from past years’ data.

The sampling design is broadly defined as stratified three stage random sampling. The tehsils/taluks/blocks or groups thereof, in the district are taken as strata, villages as primary sampling units, orchards as second stage units and clusters of trees as the ultimate units of sampling. The sample size of villages, i.e. the number of villages to be selected in the district are allocated to different strata in proportion to the area under the fruit in the strata. The “reporting” villages in a stratum are regarded as psu’s and selection of allocated or the desired number of villages are done by pps with replacement, taking area under the fruit as the size measure. Orchards in the selected villages and clusters of trees in the orchards are then selected with SRSWOR. Also, since there are errors in the reporting/recording of fruit cultivation or some fruit cultivation are taken up in the “non-reporting” villages, a sample of villages are also selected from the “non-reporting” group of villages in each stratum. For determining the extent of cultivation, the selected villages are completely enumerated to obtain information on the area under fruit orchards and the number of trees both in the orchards as well as stray trees. The trees are also enumerated with respect to the varieties as well as status about bearing or non-bearing fruits. Apart from estimation of extent of cultivation of fruit, complete enumeration would also provide a frame of orchards for further selection of orchards and trees for estimation of yield.

For estimation of yield of fruit, five orchards are selected by SRSWOR to record information regarding cultivation practices such as irrigation, manuring, intercropping and other practices followed by the orchardists throughout the year. From each of the selected orchards, three clusters of four trees each of bearing age are selected at random for recording data on yield of a fruit throughout the harvesting season.

A total of 150-200 reporting villages (psu's) are selected in the district. As described above, this number is allocated to different strata (tehsils) in proportion to area under orchards and the allocated number of villages in a stratum are selected with pps with replacement. At the second stage of sampling 5 orchards are selected at random from each selected village, three clusters of 4 bearing trees are selected at the ultimate stage of sampling. Earlier surveys have shown that with this type of design and sample size, the average yield at the district level is likely to be estimated with a standard error of about 5% and the area and total production with a SE between 5-10 %. However, the efficiencies of various estimators would depend upon the amount of variability in different characters. Surveys conducted during initial years will provide an idea about these variability and, accordingly, the number of villages and orchards selected are modified to achieve the desired degree of precision.

(ii) Sampling plan for estimation of area and production of more than one fruit crops in a State.

The important fruit crops whose production is to be estimated are first identified. Normally, the previous years' area figures under different fruit crops are available at the tehsil/taluk level and these are used to determine the important fruits in the State. Since the cultivation of fruits is usually not so evenly spread and may in fact be concentrated in a few districts/regions, the first steps in the planning of fruit survey is to identify and delimit the important growing regions or areas for different fruits. A district is considered too large a unit of area for this purpose. However taluks or sub-divisions or equivalent areas in a district are considered appropriate. Thus, taluks which are important at least for one of the fruit crops, are identified as important fruit growing taluks. It may be mentioned that importance of a taluk with respect to a fruit is determined on the basis of area under that fruit and thus a taluk important for a given fruit may not be important for other fruits. As a broad guideline, for a given fruit, the important taluks are those which taken together cover 40-50% of the total area under that fruit in the entire state.

All taluks/sub-divisions, considered important fruit growing areas as described above, are taken as strata. The remaining area of taluks are further classified or grouped into 4 to 5 strata with respect to importance of individual fruit crops taking into account the geographical contiguity. In these strata, taluks are considered as primary sampling units. Thus survey would then cover all important fruit growing taluks, i.e. taluks in which fruit cultivation is concentrated, as well as the selected taluks out of the rest.

In the selected taluks also, all the villages may not be growing all the fruits. A frame of villages growing different fruit in a stratum is, therefore, prepared. Accordingly, villages in a stratum are classified into two categories (i) growing atleast one fruit, and (ii) growing no fruit at all. In category (i) on the basis of village-wise area under fruits, villages are identified as "reporting" or "non-reporting" for individual fruits. If the reported areas are considered reliable, efforts are concentrated only in the reporting villages for each fruit. However, experience shows that faulty reporting is not uncommon and, therefore, adequate representation is given to non-reporting group. From the reporting group of villages for a given fruit crop four villages are selected with replacement and with probability proportional to area reported under the fruit crop. From the non-reporting group of villages (in which other fruits are grown), a sample of two villages are selected in each stratum with SRSWOR. From the villages in category (ii) where no cultivation of fruits is reported, a sample of two villages is selected with SRSWOR. The selected villages are completely enumerated for the extent of cultivation and number of trees in orchards as also the stray trees.

For yield estimation, a sub-sample of two villages out of four reporting villages are retained in all the major fruit growing taluks/strata and from each village, 5 orchards and 3 clusters of 4 trees each of bearing age are selected for this purpose. The selected clusters of trees are observed for entire harvest period both with respect to weight as well as number of fruit. However, exceptions to this procedure are made for certain crops like banana and grapes.

(iii) Sampling methodology for estimation of area and production of vegetable crops

The survey approach for estimation of area and production of vegetable crops is somewhat more complex due to special features of cultivation of these crops. Some of these features are:

- The vegetables are short duration crops and their duration varies considerably from one vegetable to the other
- Harvesting of vegetables involves a number of pickings
- Vegetable cultivation is more or less a continuous process with various operations like sowing, harvesting, etc., being done simultaneously in different fields of a village.
- Vegetables are highly sensitive crops and is normally added to the variability in the yield rates of the crops.

It is also realized that due to perishable nature of the vegetable crops, production depends on availability of marketing facilities in the area. This is why cultivation of vegetables is normally concentrated around bigger town and cities. Accordingly, data on vegetable crops has been developed at the district level in different surveys conducted so far in various states. The sampling design for surveys for estimation of area and production of vegetables is described below.

The sampling design is a stratified multistage random sampling. Taluks or equivalent areas are taken as main strata. Further, since area under vegetables may vary considerably from one village to another in a taluk, sub-stratification are done on the basis of village-wise area under vegetables. For this purpose, 3 to 4 substrata with equal area under vegetables are formed. The data are available in revenue records. If not available, then a preliminary survey is conducted to obtain village wise area under vegetables. Within the strata, clusters of three villages are taken as primary sampling units. For determining the extent of cultivation, a sampling fraction of about 20% is used for selection of clusters of villages. The allocations of clusters of villages to different strata are done in proportion to area under vegetables. The allocated number of clusters in different strata is selected with SRSWOR. For yield study, 50 per cent of the clusters selected for area are retained and fields growing vegetables are selected in these clusters.

The selected clusters of villages are completely enumerated for area under vegetables. Vegetables being short duration crops, one time enumeration in a year may not be meaningful. To account for the short duration of crops and early and late varieties, a year is divided into four periods three months each. The area enumeration is done in the beginning of each period. This will also provide a frame of vegetable fields for estimation of yield rates. For estimation of production, 6-8 fields of each important vegetables are selected in each of the clusters selected for yield study. In each of the selected fields, a randomly located plot of 5mX5m are demarcated and observed for all the pickings in the respective periods. The yield of a vegetable for a selected field is obtained as the aggregate of all pickings in the period obtained from the C.C. plot. The average yield of the vegetable for the village is obtained as a simple mean of field-wise yield and when multiplied by the area under vegetable in the village gives the vegetable production in the village. In this way, the production for each period is estimated separately. The average yield is then obtained from the estimated production and the area under a vegetable. This sampling design is likely to provide estimates of average yield with less than 5% standard error and the area and production with less than 10% standard error for important vegetables crops at the district level.

Sampling Design Adopted in the State Of Tamil Nadu

The sampling technique adopted for the survey is a multistage stratified random sampling. Taluk within a district constitutes the stratum. The three stages of sampling are:

- The selected village is the first stage sampling unit (villages are selected in proportion to the area under each crop in the taluk covered under the survey).
- The field/orchard within the selected village is the second stage unit (in each selected village, two experimental plots are chosen for the crop)
- The experimental plot within the selected field is the third and ultimate sampling unit

In case of fruit tree crops, viz., mango, guava, jack, lemon and orange, the revenue villages growing the tree crops constitute the sampling unit. In each of the selected village, two gardens growing the specified tree crop are selected randomly for tree enumeration. For yield estimation, yield recording is done for all the bearing trees in the selected garden. During the year 2002-03, 550 villages were selected randomly from the villages reported as growing the specified crops

The experimental plot size for the conduct of crop cutting experiments for each of the fruits and vegetable crops (excluding tree crops) is given below:

Crop	Plot size
Banana	5m X 5m
Grapes	5m X 5m
Pineapple	5m X 1m
Brinjal	5m X 5m
Ladyfinger	5m X 5m
Tomato	5m X 5m
Cabbage	10m X 2m
Sweet potato	2m X 2m

The period of the survey is one full year starting from July to June. The field work is entrusted to the Assistant Statistical Investigators numbering 20, spread over 18 districts of the State. The Village Administrative Officers of the selected villages render necessary assistance in collecting the information from the cultivator. The field work such as selection of garden, tree enumeration and yield recording etc., in the case of fruit tree crops and the selection of the field, plot, yield recording in the conduct of the crop cutting experiments with regard to other crops are carried out by the Assistant Statistical Investigators. In order to ensure accuracy at every stage, the field work is supervised by the concerned Division Statistical Officer, Assistant Director of Statistics and Regional Deputy Director. The Division Statistical Officers are expected to carryout inspection in atleast 10% of the villages selected.

Estimation procedure of fruit tree crops (Mango, Jack, Guava and citrus fruits)

(a) Estimation of number of trees

$$\begin{aligned}
 N_{ij} &= \text{total number of villages growing the crop in the } i^{\text{th}} \text{ stratum} \\
 n_i &= \text{number of villages selected for tree enumeration in the } i^{\text{th}} \text{ stratum} \\
 A_i &= \text{total area under the crop in the } i^{\text{th}} \text{ stratum} \\
 a_{ij} &= \text{area under the crop in the } j^{\text{th}} \text{ selected village of } i^{\text{th}} \text{ stratum} \\
 t_{ij} &= \text{number of trees enumerated in the } j^{\text{th}} \text{ selected village of } i^{\text{th}} \text{ stratum} \\
 b_{ij} &= \text{number of bearing trees enumerated in the } j^{\text{th}} \text{ selected village of } i^{\text{th}} \text{ stratum} \\
 R_{ni} &= \text{average number of trees per hectare in the } i^{\text{th}} \text{ stratum} \\
 &= \frac{\sum_{j=1}^{n_i} t_{ij}}{\sum_{j=1}^{n_i} a_{ij}}
 \end{aligned}$$

Estimated total number of trees for the i^{th} stratum (T_g) = $R_{ni} \cdot A_i$

$$\text{Ratio of bearing trees in the } i^{\text{th}} \text{ stratum} = \frac{\sum_{j=1}^{n_i} b_{ij}}{\sum_{j=1}^{n_i} t_{ij}}$$

Estimated total number of bearing trees in the i^{th} stratum (B_g)

$$= \frac{\sum_{j=1}^{n_i} b_{ij}}{\sum_{j=1}^{n_i} t_{ij}} \times T_g$$

(b) Estimation of average yield per bearing tree

$$\begin{aligned}
 M_{gi} &= \text{number of villages selected for yield estimation} \\
 B_{gi} &= \text{total number of bearing trees in the } j^{\text{th}} \text{ selected village of } i^{\text{th}} \text{ stratum} \\
 Y_{gij} &= \text{total yield of all trees in the } j^{\text{th}} \text{ selected village of } i^{\text{th}} \text{ stratum}
 \end{aligned}$$

Estimated average yield per bearing tree for the i^{th} stratum (R_{mgi})

$$= \frac{\sum_{j=1}^{m_{gi}} Y_{gij}}{\sum_{j=1}^{m_{gi}} B_{gij}}$$

$$j=1 \quad j=1$$

(c) Estimation procedure of average yield of vegetables and other food crops

n_{ij}	=	number of plots selected in the j^{th} village of i^{th} stratum
m_i	=	number of villages selected in the i^{th} stratum
a_i	=	area under the crop as per revenue record in the i^{th} stratum
n_i	=	total number of plots selected in the i^{th} stratum and considered for analysis
Y_{ijk}	=	yield of k^{th} plot of j^{th} village in the i^{th} stratum
L	=	number of districts selected

$$\text{Average yield per plot for } i^{\text{th}} \text{ stratum is } Y_i = \frac{\sum_{k=1}^{n_{ij}} Y_{ijk}}{\sum_{j=1}^{m_i} n_{ij}}$$

Estimation of average yield per plot for all the stratum covered =

$$Y = \sum_{i=1}^L W_i \cdot Y_i, \text{ where } W_i = \frac{a_i}{\sum_{i=1}^L a_i}$$

Sampling Design Adopted in the State of Karnataka

(i) Fruits

The sampling design adopted for area enumeration is stratified two stage random sampling with taluks as strata, villages within the selected taluks as primary units of sampling and orchards/survey/sub-survey numbers as the second stage sampling units. The sampling design adopted for yield estimation is the stratified three stage random sampling. The taluks in the district formed strata. Villages within the taluk constituted primary sampling units, orchards/survey/sub-survey numbers are the second stage sampling units and the clusters of trees/plants within the selected orchards or experimental plot within the survey/sub-survey number are the ultimate sampling unit. Based on the parameters, viz., precision level of the estimates desired and the availability of manpower and financial costs, the sample size of the survey is determined.

In view of the special features of cultivation of fruit crops, the usual sampling methodology of field crops under GCES does not hold good for fruit crops. Hence the concepts of major, minor and unrepresented taluks are adopted for sampling methodology.

Based on area figures of Annual Season and Crop Report (ASCR), a frequency table of all taluks is prepared with suitable class intervals of area in ascending order. The number of class interval of area thus prepared is neither too small nor too large. In each class interval, the number of taluks reporting survey crop falling within the appropriate class interval is compiled to form the frequency table. The area in each class interval is computed using the frequency of each class interval and the mid-point of area class. The percentage share to total area under survey crop for each class interval area is calculated. From the highest area class interval the cumulative area percentages are worked out from bottom to top. The area class interval with cumulative area percentage of 60 or above determined are identified as the "major taluks". Similar frequency table for the "minor taluks" is prepared and the cut off area determined at the cumulated percentage is around 35%. Those taluks below this cut off area limit and contributing less than 5% of area are classified as "unrepresented category". Thus, taluks coming under major category are grouped to form the "major stratum". And taluks coming under minor category as "minor stratum" and the rest of the taluks as "unrepresented stratum". For the purpose of adequate representation of minor taluks in the sample selection, the group of taluks forming the minor stratum is further sub-divided to form four sub-strata, so that the distribution of taluks in the substrata is representative. For each survey crop, all the taluks in the major stratum are selected. In the minor strata, the sampling fraction adopted varied from 50 % to 25% in relation to the sample size required and from the unrepresented stratum two taluks are selected to meet the determined sample size. Estimation was done for 2 parameters, area and yield, of the crops covered under the survey based on the field data.

Area estimation

To arrive at the estimated area of the survey crop at district level, estimation was done at three levels, namely, at village level, taluk level and at **district level**.

In each of the sample village, the area under the selected crop arrived at as per observation and as per RTC (Record of Rights, Tenancy and crop inspection report written by the Village Accountant for each village in the State) in the selected 20 survey numbers and also the total area under the crop in the village as per RTC were considered for estimating the area of village by ratio method.

For fruit crop, all major taluks are selected. In each of the major taluk, three villages are selected by the method of probability proportion to size (PPS) with replacement. In order to provide proper representation to the minor taluks, all the minor taluks are classified into four sub-strata, considering the area under the survey crop. From each of the four sub-strata, taluks are selected by SRSWOR, to an extent of 25 to 50% of the taluks in each stratum depending upon the number of taluks in each stratum and the sample size requirement. In each of these selected taluks, 2 villages are selected by PPS method with replacement. Similarly, from the group of unrepresented taluks, two taluks are selected by SRS and in each selected taluk, 2 villages are selected as in the case of minor taluks depending upon the sample size fixed. Totally 549 villages are selected for area enumeration on fruit crops and 519 villages are enumerated.

For vegetable and minor crops (dry chillies, tomato, beans, brinjal, cabbage and turmeric) all the taluks growing experimental crop are considered and simple random sampling method is used for selection of clusters (taluks). A cluster of 8 villages is considered as primary sampling unit. These 8 villages within cluster are again selected by SRS method. 3680 villages are enumerated. In each selected village, 20 survey numbers growing the selected crop were chosen following SRS method and in each of these selected survey numbers, area under the crop is cross checked with the RTC records for the 20 survey numbers selected and both sets of figures were recorded in the prescribed schedules.

Yield estimation

All the taluks selected for area enumeration are considered for the purpose of yield estimation also, for all the fruits, vegetables and minor crops covered in the survey. Regarding selection of villages, a sample of two villages out of three villages selected from area enumeration on fruit crops and a sample of 3 villages among the 8 villages selected on vegetable, minor crops was considered for yield estimation by way of SRS. In respect of fruit crops, in each selected village, 2 orchards are selected by SRS and in each of the selected orchard again 2 clusters of 4 fruit bearing trees/plants each are selected by SRS. At the time of harvest, the number of fruits as well as weight of the fruits harvested from the selected cluster trees/plants are noted and recorded.

In respect of beans, grapes, tomato, chillies, brinjal, cabbage and turmeric crops in each of the selected villages, 2 survey/sub-survey numbers growing the crops are selected by SRS and in each of the selected survey/sub-survey numbers, an experimental plot of 5mts X 5mts size is located by following the method of GCES. At the time of the harvest of the experimental plot, the weight of the yield obtained from the experimental plot is noted and recorded. In the case of multiple harvest of some of the crops, data is recorded in respect of all the pickings. Totally 8092 plots/trees were selected for estimating the yield and 7371 plots/trees were considered for analysis, in one year.

Estimation procedure

Estimation is done for two parameters, one for area and another for yield of the crops covered under the survey based on the field data:

Area Estimation:

To estimate the area of a crop at district level, estimation is done at village, taluk and district levels. Village level estimation: In each sample village, the area under the selected crop obtained as per observation by visiting the spot and as per entries made in the records in the selected 20 survey numbers and also the total area under the crop in the village as per village records are considered for estimating the area of village by ratio method.

The estimated area of the selected crop in the i^{th} village is given by

$$\sum_{i=1}^{20} b_{ij}$$

$$\overline{V_i} = \frac{\sum_{i=1}^{20} a_{ij}}{20} \times A_{ic}$$

Where

a_{ij} = area as recorded in RTC for j^{th} survey number in the i^{th} village.

b_{ij} = area as per observation in j^{th} survey number in the i^{th} village.

A_{ic} = total area under the crop in the i^{th} village as recorded in village records during the current year.

Taluk Level Estimate: The unbiased estimate of area of taluk "r" for the current year is given by

$$T_{rc} = \frac{1}{n} \left(\sum_{i=1}^n (\overline{V_i} / P_i) \right)$$

Where

$\overline{V_i}$ = area estimate of i^{th} village in the taluk

n = number of villages selected in the taluk

P_i = Probability value of the i^{th} village which is given by

$$P_i = \frac{A_{ip}}{\sum_{i=1}^m A_{ip}}$$

Where A_{ip} = area under the crop during the previous year in the i^{th} selected village.

m = Total number of villages growing the crop in the taluk during the previous year.

District Level Estimate: The unbiased estimated area of a district is given by

$$\Lambda D = \sum_{r=1}^g T_{rc} + \left(\sum_{r=1}^g T_{rc} / \sum_{r=1}^g T_{rp} \right) \times \sum_{r=1}^h T_{rp}$$

Where

T_{rc} = estimated area of the selected taluk r during the current year

T_{rp} = area under the crop in taluk r during the previous year as per Annual Season and Crop Report

g = number of taluks selected in the district

h = number of taluks not selected in the district.

The unbiased estimate of variance of taluk r is given by

$$v(T_r) = \frac{1}{n(n-1)} \left\{ \sum_{i=1}^n \left(\frac{V_i}{P_i} \right) - n V_i \right\}$$

Since the experimental unit for fruit crops is an orchard of two cluster of four trees each and for grapes, turmeric, onion and potato and other vegetables, it is a plot of 5 mts.X 5 mts. Size, two different procedures are adopted for estimation of yield of these two crops.

To estimate the yield per hectare of fruit crops, the yield per tree is first estimated and then the average number of bearing trees per hectare is estimated. Based on the above two factors, the average yield of the crop per hectare is estimated.

Estimation of yield per tree:

Notation used :

N = Number of villages growing the selected crop in a taluk

MI = number of orchards in the i^{th} selected village

L_{ij} = number of bearing trees in the j^{th} orchard of the village

n = number of villages selected in the taluk

M_i = number of selected orchards out of MI orchards in the i^{th} village : ($M_i = 2$)

l_{ij} = number of selected bearing trees out of L_{ij} in the j^{th} orchard of the i^{th} village : ($l_{ij} = 8$)

y_{ljk} = yield of K^{th} tree of j^{th} orchard in the i^{th} village.

$\overline{Y_{ij}}$ = mean yield per tree of j^{th} orchard in the i^{th} village

$\overline{\overline{Y_i}}$ = mean yield per tree in the i^{th} village.

Λ

y = mean yield per tree in the taluk

The unbiased estimate of yield of a tree in j^{th} orchard is given by

$$\overline{Y_{ij}} = \sum_{l_{ij}}^{l_{ij}} (Y_{ijk} / l_{ij}) \quad (l_{ij} = 8)$$

The unbiased estimate of yield of a tree in i^{th} village is given by

$$\overline{y_i} = \sum_{j=1}^{m_i} (y_{ij} / m_i) \quad (m_i = 2)$$

The unbiased estimate of yield per tree in a taluk is given by

$$\overline{y} = \sum_{i=1}^n \overline{y_i} / n \quad (n=2)$$

Estimation of average number of bearing trees per hectare:

Notations used:

P_{ijk} = number of bearing trees in k^{th} orchard of j^{th} village in the i^{th} taluk.

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P_i = average number bearing trees per hectare in the i^{th} taluk.

a_{ijk} = area of k^{th} orchard of j^{th} village in i^{th} taluk.

r_{ij} = number of orchards in j^{th} village in i^{th} taluk

n_i = number of villages selected in the taluk.

Then the average number of bearing trees per hectare in the i^{th} taluk is given by

$$\overline{P_i} = \sum_{j=1}^{n_i} \sum_{k=1}^{r_{ij}} P_{ijk} / \sum_{j=1}^{n_i} \sum_{k=1}^{r_{ij}} a_{ijk}$$

The mean yield per hectare in the i^{th} taluk is given by

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$$\overline{y_i} = \overline{P_i} \times \overline{y_i}$$

Pooled Estimates for district:

The mean yield per hectare in a district is given by

$$\overline{Y} = \sum_{h=1}^k A_h y_h / \sum_{h=1}^k A_h$$

Where \bar{y}^{Λ} is the mean yield per taluk in the h^{th} stratum (taluk)

A_h is the area under the selected crop in the h^{th} stratum (taluk).

K is the number of taluk selected in the district.

Estimation procedure for vegetable crops viz. turmeric, chillies, tomato, beans, brinjal and grapes:

A simple average yield is worked out for each stratum (taluk). The average yield thus obtained for all the selected taluks are pooled by using the area figures of the corresponding taluks as weights to arrive at the weighted average yield for the district.

Notations used:

n_{ij} = number of plots in the j^{th} village in the i^{th} taluk

$n_i = \sum n_{ij}$ = number of plots in the i^{th} taluk.

m_i = number of villages in the i^{th} taluk.

a_i = area under the crop in the i^{th} taluk.

Y_{ijk} = plot yield of k^{th} plot in j^{th} village of i^{th} taluk

$y_{ij} = \sum_{k=1}^{n_i} Y_{ijk} / n_{ij}$ is average yield per plot in the j^{th} village in the i^{th} taluk.

The estimated yield of crop per plot in the i^{th} taluk is given by

$$\bar{y}_i = \sum_{j=1}^{m_i} \sum_{k=1}^{n_i} Y_{ijk} / n_i$$

The estimated yield of crop per plot in a district is given by

$$\bar{Y}_p = \sum_{i=1}^t \bar{y}_i a_i / \sum_{i=1}^t a_i$$

Where t is the number of taluks selected in the district.

The estimated yield per hectare is given by

$$Y_h^{\Lambda} = \bar{Y}_p \times 400 \text{ Kgs/ Hect.}$$

The variance of estimated yield at taluk level is given by

$$v(y_i) = \frac{1}{(n-1)} \left\{ \sum y_{ij}^2 - \left(\sum_{j=1}^{n_i} y_{ij} / n_i \right) \right\}$$

The pooled variance for the district is given by

$$V(Y_D) = \left\{ \sum_{i=1}^t A_i^2 V(\bar{Y}_i) \right\} / \left(\sum_{i=1}^t A_i \right)^2$$

Where “t” is the number of taluks selected in the district

$$\text{The \% SE} = \left(\sqrt{V(y_D) / Y_D} \right) \times 100$$

Annexure VI.1
RECOMMENDATIONS OF NATIONAL STATISTICAL COMMISSION PERTINENT TO STATISTICS
OF AGRICULTURAL PRICES AND HORTICULTURAL CROPS
Agricultural Statistics

Production of Horticultural Crops (Para 4.5.7)

- The methodology adopted in the pilot scheme of “Crop Estimation Survey on Fruits and Vegetables” should be reviewed and an alternative methodology for estimating the production of horticultural crops should be developed taking into account information flowing from all sources including market arrivals, exports and growers associations. Special studies required to establish the feasibility of such a methodology should be taken up by a team comprising representatives from Indian Agricultural Statistics Research Institute (IASRI), Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA), Field Operations Division of National Sample Survey Organisation (NSSO, FOD) and from one or two major States growing horticultural crops. The alternative methodology should be tried out on a pilot basis before actually implementing it on a large scale.
- A suitable methodology for estimating the production of crops such as mushroom, herbs and floriculture needs to be developed and this should be entrusted to the expert team comprising representatives from Indian Agricultural Statistics Research Institute (IASRI), Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA), Field Operations Division of National Sample Survey Organisation (NSSO (FOD)) and from one or two major States growing these crops.

Agricultural Prices (Para 4.10.10)

- The Ministry of Agriculture should prepare a well-documented manual of instructions on collection of wholesale prices of agricultural commodities.
- The agricultural price collectors should be given thorough training in the concepts, definitions and the methods of data collection, and the training courses should be repeated periodically.
- Workshops and training courses should be made an integral part of quality improvement. The quality of data should be determined on the basis of systematic analysis of the price data of agricultural commodities both by the Centre and the States.
- Latest tools of communication technology like email should be availed of to ensure timely data flow of agricultural prices.
- A system should be developed to secure a simultaneous data flow of agricultural prices from lower levels to the State as well as the Centre.
- The State agencies at the district level and below should follow up cases of chronic non-response relating to collection of data on agricultural prices.
- The number of essential commodities for which agricultural prices are collected should be reduced to an absolute minimum, especially the non-food crops, in consultation with Ministry of Consumer Affairs and Cabinet Committee on Prices.
- The centres of agricultural price collection should, as far as possible, be the same for the essential commodities as those for wholesale prices.

Agricultural Market Intelligence (Para 4.11.4)

- The functions, activities and the staff requirements of the Agricultural Market Intelligence Units should be re-evaluated and appropriate measures taken to streamline the units.

Cost of Cultivation of Principal Crops (Para 4.12.6)

- Focused attention should be paid to the proper organisation and management of the Cost of Cultivation Studies.
- A review of the number of centres, methodology, sample size, the existing schedule and questionnaire, etc. of the Cost of Cultivation Studies should be undertaken.

Marketable Surplus and Post-Harvest Losses (Para 4.18.4)

- The existing methodology in conducting the surveys on marketable surplus and post-harvest losses of food grains should continue in future surveys of this type.
- The agencies designated for the collection of information on marketable surplus and post-harvest losses of food grains should be provided additional manpower, wherever necessary, for the conduct of these surveys.

Market Research Surveys (Para 4.19.4)

- The Directorate of Marketing and Inspection (DMI) should establish a Statistical Cell either independently or within Market Research and Planning Cell (MRPC) with sufficiently trained statistical personnel to undertake comprehensive analysis of survey data and aid the decision-making process.
- The Statistical Cell of Directorate of Marketing and Inspection (DMI) should identify the problems and deficiencies in the market research surveys carried out by different institutions and develop a standard methodology for uniform adoption.
- Index Numbers in Agriculture (Para 4.20.8)
- A review of the item basket for the construction of Index Numbers of Area, Production and Yield should be undertaken immediately.
- The item basket for the construction of Index Numbers of Area, Production and Yield should be different for different States.

Recording of Area under Mixed Crops (Para 4.21.5)

- The rates used to apportion the areas of constituent crops of major crop mixtures should be fixed for the recognised mixtures at sub-district and district levels and updated periodically.
- Data available from surveys conducted under schemes like Improvement of Crop Statistics (ICS) over the years should be used for deciding the crop mixtures and their ratios.