CHAPTER I

METHODOLOGY OF CROP ESTIMATION

1.1 Introduction :

The Directorate of Economics and Statistics (DES) releases estimates of area, production and yield in respect of principal crops of foodgrains, oilseeds, sugarcane, fibers and important commercial and horticulture crops. These crops together account for nearly 87% of agriculture output. The estimates of crop production are obtained by multiplication of area estimates by corresponding yield estimates. The estimates of area and yield rates assume prime importance in the entire gamut of agricultural statistics.

1.2 Area Statistics:

From the point of view of collection of area statistics, the States in the country are divided into three broad categories:

i. The first category covers States and UTs which have been cadastrally surveyed and where area and land use statistics are built up as a part of the land records maintained by the revenue agencies (referred to as "Land Record States" or temporarily settled states). The system of land records is followed in 17 major states of Andhra Pradesh, Assam (excluding hilly districts), Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Jharkhand, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and Uttaranchal and 4 UTs of Chandigarh, Delhi, Dadra & Nagar Haveli and Pondicherry. These states/UTs account for about 86% of reporting area and are covered under Timely Reporting Scheme (TRS) under which 20% villages are selected at random for complete area remuneration.

ii. The second category covers States where area statistics are collected on the basis of sample surveys. A scheme for Establishment of an Agency for Reporting of Agricultural Statistics (EARAS) has been introduced in these states, viz., Kerala, Orissa and West Bengal, and later extended to Arunachal Pradesh, Nagaland, Sikkim and Tripura. The scheme envisages, inter-alia, estimation of area through sample surveys in a sufficiently large sample of 20% villages/ investigator zones. These states account for about 9% of reporting area.

iii. In the hilly districts of Assam, rest of the states in North-Eastern Region (Other than Arunachal Pradesh, Nagaland, Tripura and Sikkim), Goa, UTs of Andman & Nicobar Islands, Daman & Diu and Lakshwadeep where no reporting agency had been functioning, the work of collection of Agricultural Statistics is entrusted with the village headmen. The area statistics in these states are based on impressionistic approach. These areas/states account for 5% of the reporting area.

1.3 Yield Estimates:

The second most important component of production statistics is yield rates. The yield estimates of major crops are obtained through analysis of Crop Cutting Experiments (CCE) conducted under scientifically designed General Crop Estimation Surveys (GCES). At present over 95% of the production of foodgrains is estimated on the basis of yield rates obtained from the CCEs. Field Operations Divisions (FOD) of the National Sample Survey Organization (NSSO) has been providing technical guidance to the States and Union territories for organizing and conducting Crop Estimation Surveys for estimating yield rates of principal crops. In addition, NSSO in collaboration with States/Union Territories implements sample check programmes on area enumeration work, area aggregation and conduct of crop cutting experiments under the Scheme for Improvement of Crop Statistics (ICS). While

executing the programme of sample checks on crop cutting experiments, the FOD associates itself with the operational aspects of the conduct of crop cutting experiments right from selection of sample villages, training of field staff to the supervision of field work, and in the process, gathers micro level information relating to conduct of crop cutting experiments for estimation of crop yield. The results of Crop Estimation Surveys are analyzed and annual publication entitled “Consolidated Results of Crop Estimation Surveys on Principal Crops” is brought out by the NSSO regularly.

The primary objective of GCES is to obtain fairly reliable estimates of average yield of principal food and non-food crops for States and UTs which are important from the point of view of crop production. The estimates of yield rates thus arrived at are generally adopted for the purposes of planning, policy formulation and implementation. The CCEs consist of identification and marking of experimental plots of a specified size and shape in a selected field on the principle of random sampling, harvesting and threshing the produce and recording of the harvested produce for determining the percentage recovery of dry grains or the marketable form of the produce.

1.4 Coverage:

The crop-wise details of number of experiments planned under GCES during 2004-05 are given in table 1.1:

Table 1.1 : No. of Experiments Planned under GCES During 2004-2005

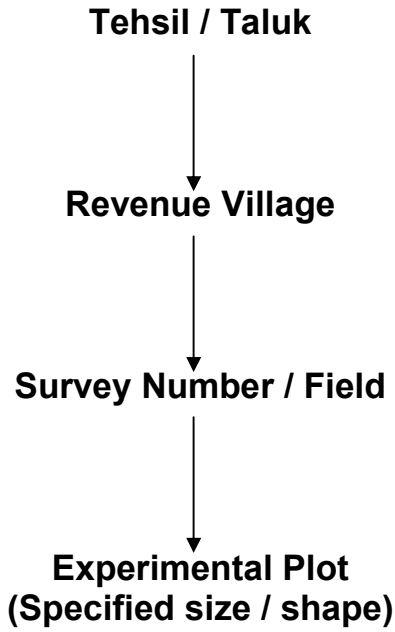
CropsType/Crop	No.of Experiments Planned		
1. FOOD CROPS	**KHARIF**	**RABI**	**TOTAL**
Paddy	188271	33308	221579
Wheat	0	148101	148101
Jowar	23734	12424	36158
Bajra	29106	0	29106
Maize	38277	2360	40637
Ragi	6545	0	6545
Barley	0	3438	3438
Gram	0	27647	27647
Sugarcane	21333	0	21333
Total	**307266**	**227278**	**534544**
2. NON FOOD CROPS			
Groundnut	21340	5527	26867
Sesamum	11051	5061	16112
Castor	1940	0	1940
Rapeseed& Mustard	0	31230	31230
Linseed	0	5749	5749
Cotton	19486	0	19486
Jute	4313	0	4313
Mesta	761	0	761
Total	**58891**	**47567**	**106458**
Total (1+2)	**260291**	**172141**	**432432**
Other Food Crops	93957	56865	150822
Other Non-Food Crops	14904	8578	23482
TOTAL ALL CROPS	**475018**	**340288**	**815306**
Total Number of Experiments planned under GCES for 2004-05			**815306**

Source : FOD, NSSO

1.5 Sampling Design :

Stratified multi-stage random sampling design is generally adopted for carrying out GCES with tehsils/ taluks/ revenue inspector circles/ CD blocks/anchals etc. as strata, revenue villages within a stratum as first stage unit of sampling, survey numbers/ fields within each selected village as sampling unit at the second stage and experimental plot of a specified shape and size as the ultimate unit of sampling as depicted in figure 1.1.

Figure 1.1: SAMPLING DESIGN for GCES



In each selected primary unit, generally 2 survey numbers/fields growing the experimental crop are selected for conducting CCE. Generally, 80-120 experiments are selected in a major crop growing district, where a district is considered as major for a given crop if the area under the crop in the district exceeds 80,000 hectares or lies between 40,000 and 80,000 hectares but exceeds the average area per district in the State. Otherwise, district is considered a minor for a given crop. Experiments in minor districts are so adjusted that the precision of the estimates is fairly high and the workload on the field staff is manageable. On an average, about 44 or 46 experiments are planned in a minor district. The number of experiments allotted to a district is distributed among the strata within the district roughly in proportion to the area under the crop in the stratum.

1.6 Advance Estimates of Area and Production:

The period of an agricultural crop year is from July to June, during which various farm operations from preparation of seed bed, nursery, sowing, transplanting various inter-culture operations, harvesting, threshing etc. are carried out. Different crops are grown during the agricultural seasons in the crop year.

Final estimates of production based on complete enumeration of area and yield through crop cutting experiments become available much after the crops are actually harvested. However, the Government requires advance estimates of production for taking various policy decisions relating to pricing, marketing, export/import, distribution, etc. Considering the genuine requirement of crop estimates much before the crops are harvested for various policy purposes, a time schedule of releasing the advance estimates has been evolved. These estimates of crops are prepared and released at four points of time during a year as enumerated below:

1.7 First Advance Estimates:

The first official estimate of area and production of kharif crops is prepared in September every year, when south-west monsoon season is about to be over and kharif crops are at an advanced stage of maturity. This coincides with the holding of the National Conference of Agriculture for Rabi Campaign, where the State Governments give rough assessment of their respective kharif crops. The assessment, is made by the State Governments based on the reports from the field offices of the State Department of Agriculture. They are mainly guided by visual observations. These are validated on the basis of inputs from the proceedings of Crop Weather Watch Group (CWWG) meetings, and other feedback such as relevant availability of water in major reservoirs, availability/supply of important inputs including credit to farmers, rainfall, temperature, irrigation etc.

1.8 Second Advance Estimates:

The second advance estimate is made in the month of January every year when the advance estimates of kharif crops prepared during the National Conference of Agriculture for Rabi Campaign may undergo a revision in the light of flow of more precise information from the State Governments. Around this time, the first advance estimates of rabi crops are also prepared. The Second Advance Estimates then cover the second assessment in respect of Kharif Crops and the first assessment in respect of Rabi Crops.

1.9 Third Advance Estimates:

The third advance estimates are prepared towards the end of March/ beginning of April every year, when the National Conference on Agriculture for Kharif campaign is convened and the State Governments come up with their assessments for both kharif and rabi crops. The earlier advance estimates of both kharif and rabi seasons are firmed up/ validated with the information available with State Agricultural Statistical Authorities (SASAs), remote sensing data, available with Space Application Centre, Ahmedabad as well as the proceedings of CWWG.

1.10 Fourth Advance Estimates:

The fourth advance estimates are prepared in the month of June/July every year, when the National Workshop on Improvement of Agricultural Statistics is held. Since most of the rabi crops get harvested by the end of May, SASAs are in a position to supply the estimates of both kharif and rabi seasons as well as likely assessment of summer crops during the National Workshop. Like the third advance estimates, the fourth advance estimates are duly validated with the information available from other sources.

1.11 Final Estimates

Under the existing system of crop estimation, the fourth advance estimate is followed by final estimates in December / January of the following agricultural year. The main factors contributing to the relatively large number of crop estimates are the large variations in crop seasons across the country and the resulting delay in the compilation of yield estimates based on crop cutting experiments. As agriculture is a State subject, Central Government depends upon State Governments for accuracy of these estimates. For this purpose, State Governments have setup High Level Coordination Committees (HLCC) comprising, inter-alia, senior officers from their departments of Agriculture, Economics & Statistics, Land Records and NSSO (FOD), IASRI, DES from Central Government for sorting out problems in preparation of these estimates in a timely and orderly manner.

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