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## DATA BASE IN AGRICULTURE

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Agriculture is the most important activity in India as in many developing countries. The need for comprehensive and reliable system of agricultural statistics has, therefore, great importance to our country. In the past statistical systems, particularly in regard to agriculture, were developed largely as by-products of administration which was set up by the former colonial power with limited policy needs in mind. Apart from other users like the primary producer, trade and industry, the government itself was directly interested in the compilation of detailed agricultural statistics for its use in day to day administration of land revenue. This special feature of Indian agricultural statistics has both favourable and adverse effects on their accuracy and comprehensiveness.

The reorientation of the development strategy from 'top down' to 'bottom up' planning involves the identification of main concentrations of the rural poor, careful examination of the available resources in relation to the felt needs of these people and more precise framing of policies and action programmes which will help their condition. The existing data base in agriculture has to be viewed in this perspective.

The State Governments are primarily responsible for compilation of agricultural statistics in the country. The Government at the Centre functions only in an advisory capacity and is concerned with co-ordination, consolidation, and timely publication of statistics furnished by the State Governments. Within the States the collection of basic agricultural statistics is entrusted principally to the staff of the land records. The States can be broadly divided into two classes: (1) temporarily settled, and (2) permanently settled. An elaborate revenue agency extending to the remotest villages exists in the temporarily settled area. In every group of three or four villages, depending upon their size, there is a primary reporter who resides locally and is well informed of the agricultural and economic conditions in the area under his jurisdiction. There are revenue inspectors in charge of a circle consisting of about hundred villages and above them are supervising officers at the tehsils/sub-divisions and districts which form the principal administrative units of the States. There is no such elaborate official agency available in the permanently settled States. The responsibility of co-ordinating agricultural statistics within most of the States rests with the Bureau of Economics and Statistics. In some other States it is either with the Director of Land Records or the Director of Agriculture.

### *Land Use Statistics*

Out of a total geographical area of 328 million hectares, land use statistics are available for about 306 million hectares. For about 6.7 per cent of the

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geographical area, therefore, such data are not available. Of the 22 million hectares for which land use data are not available, 17.7 million hectares are located in Jammu & Kashmir. The non-reporting area in other States largely consists of hill tracts in Arunachal Pradesh, Nagaland, Manipur and Tripura. Besides, there are small tracts in some States covered either by forests or barren mountains which are not accessible.

### *Acreage Statistics*

The reliability of area statistics is dependent on its method of reporting. The available data are not of uniform standard of accuracy and reliability in different States, mainly due to differences in the systems of land revenue settlement. From the standpoint of collection of area statistics the country can be divided into four categories: (a) cadastrally surveyed and possessing primary reporting agency, (b) cadastrally surveyed and not possessing primary reporting agency, (c) unsurveyed but possessing primary agency and (d) unsurveyed and without any agency.

Broadly speaking, most of the temporarily settled States in Uttar Pradesh, Tamil Nadu, Madhya Pradesh, Maharashtra, Punjab, Haryana, Karnataka, Gujarat, Rajasthan, Bihar and Assam fall within category (a), while permanently settled areas like West Bengal, Orissa and Kerala belong to category (b). The areas under category (c) are mostly situated within the temporarily settled parts belonging to the earlier zamindari system of tenure. The category (d) mainly consist of earlier *jagir* areas, areas with a privileged system of tenure exempt wholly or partly from tax on land or uncultivated tracts like forests and hills where it was not feasible to have a cadastral survey or a primary reporting agency.

Statistics of areas for the States under category (a) are obtained with a fairly high degree of accuracy. For areas under category (b) statistics are available by sample surveys. In the case of areas under category (c) and (d) the figures are reported by eye estimates based on personal knowledge of revenue officials. The estimates for unsurveyed areas in temporarily settled States supplied by land revenue agencies are slightly more reliable than the figures reported for unsurveyed areas of permanently settled States by the chowkidars.

### *Field Statistics*

The statistics of crop yields are obtained in respect of principal crops by two methods. One is the traditional method and the other is the method of random sampling crop cutting survey. Under the traditional method the yield per hectare is obtained either in terms of a direct estimate in quintals per hectare by eye appraisal or as the product of "normal or standard yield" and the "condition factor". Under the method of random sampling the yield per hectare is obtained objectively on the basis of crop cutting experiments conducted in randomly selected plots located in randomly selected fields. This method has been adopted in almost all the States.

*Irrigation Statistics*

Data relating to the area irrigated from different sources, gross and net areas of crops irrigated by those sources are collected in almost all the States by a method similar to that employed for collection of statistics of land use and area under crops. Gross irrigated area is the total irrigated area under various crops during a year, counting the area irrigated under more than one crop during the same year as many times as the number of crops grown, crops sown mixed being taken as one crop. The net irrigated area is the area irrigated during an agricultural year, counting the area only once even if two or more crops are irrigated in different seasons on the same land. The sources of irrigation along with the area under the crop irrigated are available from *khasra* registers. In addition, a census of sources of irrigation is also taken annually or once in five years in some States.

*Livestock Statistics*

The basic statistics of livestock including poultry are the number of different categories of livestock and their composition according to age and use, and their products. Statistics of livestock numbers are obtained every five years by census conducted on an all-India basis. However, statistics of livestock products are available on a limited scale through sample surveys conducted by the Indian Agricultural Statistics Research Institute (IASRI) and the States. Till the beginning of the sixties the only information available regarding livestock products, *viz.*, milk, wool, eggs and meat was from the marketing surveys carried out by the Directorate of Marketing and Inspection at different points of time. These surveys were not based on any objective method of estimation. The National Sample Survey Organisation (NSSO) also collected information on the quantity and value of livestock products in some of their socio-economic rounds. Information regarding the slaughter of animals in recognized slaughter houses, inter-State movement of animals by rail and imports and exports of livestock and livestock products is being collected regularly.

The Indian Agricultural Statistics Research Institute carried out methodological studies at various times for determining sampling techniques to be adopted for estimation of livestock production. Satisfactory techniques for estimation of livestock products have been evolved by the Institute. Using the methodology large scale sample surveys were carried out in several States and on the basis of these surveys objective estimates of production of milk, wool, and eggs were obtained in 1966 at the all-India level. These surveys however, were not carried out on a regular basis in all the States and not at a particular point of time for any product, and as such, it has not been possible to build up reliable all-India estimates for any of these livestock products.

*Fisheries Statistics*

The potentialities for development of fisheries in the country both marine and inland are immense. There is no precise estimate of potential resources of marine, inland and estuarine fisheries. With regard to inland and estua-

rine fisheries reliable estimates of annual catches are not available. All-India estimates of production with their Statewise break-up are collected by the Central Marine Fisheries Research Institute (CMFRI) through sample surveys in regard to marine fisheries. Some of the States also conduct sample surveys to estimate marine fish catches. At present the CMFRI collects data on marine fisheries following sampling designs similar to those developed by the IASRI. The estimates on marine fish production furnished by CMFRI are regarded as official for all purposes.

Inland fisheries can be divided into two broad groups, *viz.*, fresh water and brackish water fisheries. Fresh water fisheries exist in rivers, canals and irrigation channels, large fresh water lakes, numerous small lakes, reservoirs, ponds and tanks. The brackish water fisheries consist of the fisheries in typical estuaries of river mouths, brackish water lakes, lagoons, and swamps lying along the coast line.

The collection of inland fisheries statistics is far from satisfactory. The Indian Council of Agricultural Research launched a scheme in 1955-56 for conducting pilot studies in two districts of Andhra Pradesh for estimating inland fish catch. This was subsequently transferred to the National Sample Survey (NSS) in April 1956. In 1962-63, the NSS conducted pilot surveys in three districts of Orissa for estimation of the number and areas of ponds, tanks, swamps, and total catch of fish from these sources. Based on the experience gained in that survey, the NSSO initiated integrated pilot studies in one district each of West Bengal, Andhra Pradesh and Tamil Nadu. The Central Inland Fisheries Research Institute (CIFRI), Calcutta also conducts surveys for the estimation of inland fish covering mainly selected rivers, estuaries, lagoons such as the estuarine areas of the river Ganges, Chilka lake, etc. However, no satisfactory technique for estimation of inland fish catch has so far been evolved. The State departments of fisheries are furnishing estimates of inland fish production largely based on factors like lease amount, issue of licences, departmental exploitation, market arrivals, transaction by co-operative societies, etc.

There are various items which are covered under fisheries statistics. Basic data required are (1) fishermen population, (2) fishing crafts and gears, (3) inland water sources and (4) marine and inland fish catch (specieswise and gearwise). Other ancillary statistics are prices, market arrivals, sources of supply, utilization of fish catch, household consumption, trade and mechanization of boats. Data on fishing crafts, tackle and nets are being collected at the time of quinquennial livestock census. Similarly data on the number of fishermen are being collected through the population census once in ten years. In summary, although estimation of marine fish catch is somewhat satisfactory, much is desired as far as inland fishery is concerned.

#### *Forestry Statistics*

The principal forest statistics relate to area under forest, volume of timber and firewood, other minor forest produce, employment in forestry and forest industries, and data on revenue and expenditure. Some data are collected

through the State departments of forests and compiled and published at the Centre by the Directorate of Economics and Statistics. The Central Forestry Commission set up in 1965 also collects data on certain aspects of forestry. The principal forest statistics compiled by the Directorate of Economics and Statistics on the basis of annual reports received from the forest departments of States and Union Territories relate to the area under forest, volume of standing timber and firewood, quantity and value of out-turn of timber, firewood and minor forest produce, employment in forestry and forest industries, forest trade and data on revenue and expenditure. Miscellaneous information on the progress of working plans, breaches of forest rules and grazing of cattle in Government forests is also collected. The scope of forest statistics has been expanded since 1958-59 to include data on area afforested and deforested, area surveyed, classification of forests by management status, silvi-cultural system and density, out-turn of logs and sleepers and wholesale prices of forest produce. Data on area under forest are being collected for 'coniferous' and 'non-coniferous' categories separately by the State forest departments. Some of the data, particularly out-turn, are available according to species of trees. Statistics of out-turn of major forest produce are at present available for timber, fuel logs, sleepers, etc., both in terms of quantity and value. Separate data are also available for swan timber, roundwood and fuel wood including charcoal wood and wood for distillation. In regard to minor forest produce, only statistics of value of production are available for bamboos and canes, drugs, fibres and flosses, fodder and grazing, grass other than fodder, lac, gums and resins, dyestuffs, tanning materials, bidi leaves, vegetable oils and seeds, charcoal, ivory, honey and bee-vax. Data on annual average wholesale prices of various species of timber, sleepers, fuel wood, pulpwood, and ply-wood are reported for important assembling and marketing centres in different States. The forest departments also report at present the number of persons employed annually in management, extraction and primary and secondary industries under various categories.

#### *Other Agricultural Statistics*

Statistics of prices of agricultural commodities and wages of agricultural labourers are available for major parts of the country. Information on some items are collected regularly and some periodically by both the Centre and States.

Regular collection of data of prices of agricultural commodities is needed by the Government for policy decisions and by trade organizations for sale and purchase business. Farm prices are collected in respect of important crops grown in the States. These cover all the crops for which forecast is issued by the Ministry. About ten villages are selected in each district for collection of farm price data. In each district a particular variety of the crop which is grown to a large extent is selected for quoting the farm price. In some cases, however, the prices for more than one variety are collected when the price difference between the varieties is large. The harvest period of a crop differs depending upon the variety and the nature of cultivation. For



most of the commodities the farmers are generally expected to dispose off their produce after six to eight weeks after commencement of the harvest. The harvest period for each crop is generally fixed by the State Government to facilitate proper reporting by the primary reporters. During the harvest period the price data are filled in specified forms every Friday. If no sales take place on the day the price at which the commodity was sold last during the week is recorded. The price data are collected in some States by the primary revenue agency. In some other States this work is entrusted to senior officers like Kanungo, supervisor and Revenue Inspector. In some States primary school teachers are also utilized for this purpose. In important markets wholetime price reporters have been appointed under the scheme for improvement of market intelligence. There are about 500 such reporters in different markets of the country.

The average price of the commodity for a State as a whole is worked out by the method of weighted average with the district production figures for the current year as weights. The average prices of the district for each week are obtained as a simple arithmetic average of the tehsil prices, which are in turn simple averages of village prices. The average price of the season is the simple average of the district prices for each week. The average prices of the district are computed at the district headquarters while the average prices for the State as a whole are worked out at the State headquarters.

#### *Wholesale Prices*

Wholesale prices are collected on Friday every week. Where the markets are held on specific days of the week the prices reported relate to the market day preceding Friday. If the day fixed for the price reporting happens to be a holiday the prices quoted relate to the previous working day.

The variety and quality of the commodity to which the price relates are specified for each market. Prices of both old and new crops are quoted for four to six weeks since the arrival of the new crops on occasions where the price difference between old and new crops is significant. Generally, the opening, closing, maximum and minimum quotations are observed. Based on the recommendations of the Agricultural Prices Enquiry Committee model price (the price at which most of the transactions take place during the peak period of marketing) is taken as the wholesale price for the commodity concerned. The Agricultural Prices Enquiry Committee suggested in consultation with the State Governments a list of centres from which the price data should be collected. The prices regarding cereals and pulses are being obtained regularly by the Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation and also by the States. The Directorate obtains telegraphically daily wholesale prices of foodgrains in respect of 140 markets covering primary, secondary and terminal markets. Weekly wholesale prices are collected from about 530 markets in respect of 130 agricultural commodities. The price data of cereals are also obtained from different centres spread throughout the country for the purpose of building the price index.



In India there are about 4,145 regular wholesale markets, besides over 22,000 periodical markets or mandies held bi-weekly or fortnightly in the rural areas. Of the total number of wholesale markets 2,936 have already been regulated.

Daily retail prices of foodgrains are collected from over 90 centres and weekly retail prices of agricultural commodities from 215 centres.

#### *Agricultural Census*

The Government of India participated in the World Agricultural Census during the year 1954-55 by conducting a sample survey. The survey was conducted by the NSSO as part of its 8th Round. In 1960 also a similar agricultural census was conducted by the NSS as part of the 16th and 17th Rounds. In 1970 and 1971 the census was conducted under the overall guidance of a Central Committee of Co-ordination of Agricultural Census which consisted of the representatives of the States and concerned central organizations.

The States and Union Territories, as mentioned earlier, are broadly classified as those which maintain comprehensive land records and those who do not maintain such records. For taking census in the States falling in the first category, data were retabulated from existing land records. In other States the enquiry approach was adopted. In the States and Union Territories, *viz.*, Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, Delhi, Pondicherry, Andaman and Nicobar Islands, Chandigarh, and Dadra and Nagar Haveli where a village level agency exists and undertake crop inspection on field to field enquiries, the land records constituted the base for the main items of agricultural census data.

In the States of Kerala, Orissa and West Bengal and Union Territories of Meghalaya, Manipur, Nagaland and Tripura, Sikkim, Arunachal Pradesh, Goa, Daman and Diu, Lakshadweep and Mizoram, the census was conducted on sampling basis.

As recommended by the National Commission on Agriculture and Planning Commission, a mid-term Agricultural Census on sampling basis with agricultural year as 1975-76 as the reference year has also been carried out. In this census, information which was not collected during the main census, with the operational holding as the primary unit was collected for the following six principal characteristics: (1) number of parcels, (2) multiple cropping, (3) area waterlogged and saline land, (4) application of chemical fertilizers, manures, pesticides, (5) livestock and (6) agricultural machinery and implements.

These were in addition to the number of operational holdings and its principal characteristics, *viz.*, area of operational holdings according to different sizes, land utilization, cropping pattern, cropwise and sourcewise irrigated area and tenancy particulars, etc. Preliminary results of the sample census

conducted during 1976-77 have been made available by the Ministry of Agriculture and Irrigation.

*Major Shortcomings in Existing Data Base*

Inadequacies of the data base of the country's economy have been reviewed and identified by a number of committees, commissions and seminars from time to time. The National Commission on Agriculture (1970) set up to examine the current progress of agriculture to make recommendations for its improvement and modernization attached great importance to the need for improving the agricultural data base for the formulation and implementation of agricultural policies and programmes. The Commission has made a number of recommendations in this regard. The Data Improvement Committee set up by the Ministry of Finance, Department of Economic Affairs of the Government of India in 1970 looked into the problems of improving the data base for forecasting and short-term management of the economy. Since 1972, a number of seminars were organized in the country by the Indian Econometric Society in collaboration with other research agencies, with a view to discussing the gaps and shortcomings in data base of the Indian economy in different sectors. The area of agriculture was discussed in the first seminar held in 1972 during 19th to 21st May, in New Delhi.

*The System of Agricultural Statistics and Steps Taken for Improving the Same*

Considerable attention for improving agricultural statistics was given ever since the ushering in of the planning era in India. Schemes were taken up to improve the reliability and coverage of agricultural statistics, in particular, area and yield of principal crops. The coverage is, however, not still complete and schemes are being launched to cover the remaining areas and cover crops such as oilseeds, fruits and vegetables. Major gaps also exist in the area of livestock, fishery, forestry and irrigation statistics. Information on livestock products, forest products, farm input-outputs and cost of cultivation is still lacking. A lot of attention is required to be given for improving the quality of the information collected. A number of important schemes have been launched for the improvement of agricultural statistics in the country. These are the timely reporting scheme and a scheme for the improvement of crop statistics and investigations for estimating cost of cultivation.