Concept Note on use of technology and improved methodology for Organization of 11th Agriculture Census 2020-21

1. Background

The Department of Agriculture Cooperation and Farmers Welfare, Government of India organizes quinquennial Agriculture Censuses in the country using census–cum-sample survey approach in collaboration with States/UTs.Periodic agriculture censuses are important as they are the main source of information on basic characteristics of operational holdings such as land use, cropping pattern, irrigation status, tenancy particulars etc. The information on these aspects is tabulated by different size classes and social groups at national, state, district and tehsil level to meet requirements of planners and policy makers and establish national priorities for agriculture sector. First Agriculture Census in India was conducted in 1970-71. Since then 10 agriculture censuses have been conducted regularly at 5 year interval with latest census pertaining to reference year 2015-16.

Based upon its experience of implementing Agriculture Census in the country since 1970-71, Agriculture Census Division has been improving the methodology on a continuous basis. Agriculture Census 2015-16 is almost near completion and issues faced during this round necessitates further fine-tuning the methodology to ensure that agriculture census data meets the requirements and aspirations of the various stakeholders and data users. Some of the important issues arising in the last census are:

- Delay in processing and release of Agriculture Census results.
- Time lag in data collection and reference period leading to recall lapse.
- Inconsistent data compared to other sources due to lack of proper training for data collection.
- High Cases of error mismatch in data of Phase-I & II due to inadequate training on concepts and definitions used in census programme.

- Data quality not up to the mark due to inadequate field inspections.
- Inadequacy of sample size at size class level in Input Survey.

2. Main objectives of Agriculture Census

The main objectives of the Agriculture Census are:

i) To describe agricultural structure and related characteristics of agriculture by providing statistical data on operational holdings including land utilization, agricultural machinery and implements, use of fertilizers etc.

ii) To provide benchmark data needed for formulating new agricultural development programmes and for evaluating their progress

iii) To provide basic frames of households and operational holdings for carrying out future agricultural surveys and

iv) To lay a basis for developing an integrated programme for current agricultural statistics.

3. Methodology for data collection

The basic unit for collecting data in Agriculture Census is the operational holding. An Operational Holding is defined as *"all land which is wholly or partly used for agriculture production and is operated as one technical unit by one person alone or with others without regard to title, legal form, size or location."* The data for entire land operated by the actual cultivator is collected by pooling of all parcels of land of the operational holding located within a tehsil for land record states and within the state for non-land record states. In land record states, the data on operational holdings is collected and compiled on complete enumeration basis through re-tabulation of information available in village land records. In non-land record states, the required data on operational holdings are collected through sample surveys of households by adopting direct enquiry method. In Agriculture Census, operational holdings are classified in the five size groups viz., Marginal (< 1.0 ha.), Small (1.0 to < 2.0 ha.), Semi-Medium (2.0 to < 4.0 ha.), Medium (4.0 to < 10.0 ha.) and Large (10.0 ha. and above). Phase-wise details of data collected in Agriculture Census are detailed below:

- **In Phase-I**, data on primary characteristics like number of operational holdings and area operated by different size class (marginal, small, semi-medium, medium and large), social groups (SC, ST, Others), gender (male/female), types of holding (individual, joint and institutional), etc. is collected. This operation covers all villages in land record States and 20 per cent of the villages in non-land record States. The data is collected/compiled by the primary worker at the village level and is aggregated to generate statements at Tehsil, District, State and National level.
- **During Phase-II**, holding schedule is canvassed in selected 20 per cent villages in each tehsil for collecting detailed data on tenancy particulars, land use, irrigation status and cropping pattern etc. The estimates of agricultural characteristics of operational holdings are prepared at Tehsil/District/State/National levels. The reference year for data collection is the same as in Phase-I.
- **The Phase-III** of Agriculture Census, (referred as Input Survey) is conducted as a follow up survey to the Agriculture Census (with reference year as the year next to that of the Agriculture Census). Input Survey collects data on pattern of input use (fertilizer, irrigation, seed, pest management, agriculture credit, size of the household, age and educational level of the holders, multiple cropping across various crops, States and size group of holders. This survey is conducted in 7 percent of villages selected in each tehsil and estimates for Input characteristics are prepared at District, State and National level. During Input Survey, institutional holdings and holdings operated by persons not residing in the village are excluded from the purview of the survey.

4. Agriculture Census 2020-21: The Proposal

Broad areas for improving the agriculture census scheme are identified as under:

A. Extraction of data from computerized land records in land Record States (LR).

B. Digitization of data collection stage through introduction of tablets at the primary worker level.

C. Improvements in the Census Methodology for better and timely processing and dissemination of data.

A. Extraction of data from computerized land records in land Record States (LR)

At present, about 23 States/UTs have already computerized their land records and remaining States/UTs are also progressing well in this direction. Extraction of data electronically will substantially reduce the workload of primary workers. During Agriculture Census 2015-16, States of Andhra Pradesh, Telangana, Gujarat, Jharkhand and Maharashtra extracted data from computerized land records with the help of NIC which was made available to the primary workers for confirmation and recording/ updating of additional items not available in land records. Experience of these States provides good evidence of improved efficiency in data collection and processing. During coming census it is proposed to extract data from computerized land records for all the States /UTs where land records have been fully computerized using common platform and uniform methodology.

B. Digitization of data collection stage through introduction of tablets at the primary worker level

Although use of extracted land records in some States significantly improved the data collection, the process of data collection in itself remained manual. The extracted data was manually printed for use of primary workers. The physical copy of the updated data collection schedules still required data entry in the computers for further processing.

Agriculture census 2020-21 proposes to collect data using Smart phones/Tablets in all the three phases. In phase -I data is proposed to be collected by the Primary worker using Smart phone/Tablets already made available by States/UTs. The data extracted from land records will be supplied to primary workers,the primary worker will update the data including the missing information and submit the updated data to his supervisor at Tehsil level (electronic transmission). The officers at the Tehsil level would check/verify the quality of data and generate village level T-1, make comparison with data available at Tehsil level and approve village level T-1 if found Ok. In case of discrepancies the data will be sent back to Primary Worker for rectification/correction. After finalization of T-1 for all villages in the Tehsil, Tehsil T-1 would be generated and submitted at District Hqs. District officials would aggregate the data of all tehsils and compile district level estimates. The same process (i.e. sum of all Tehsils / Districts in the state) would be undertaken at State Hqs to compile the State level data for onward submission to DAC&FW for inclusion in national level database.

Similarly for phase-II & III, the primary worker will collect the village level data on operational holdings directly in tablets and transmit the data to his supervisor for scrutiny/verification. After approval of supervisor, the data will be transmitted to the authorized data processing agency in the State/UT.

Digitization at data collection stage as suggested above will completely eliminate the transcription errors in the data entry stage as well as reduce the delay in processing the data. We can inculcate certain validation check also at the time of data entry through tablets which will reduce other type of conceptual errors. Thus, the existing approach of data collection using Pen and Paper Interview (PAPI) method will be replaced by Computer Assisted Personal Interviewing (CAPI) technique for data collection at the field level. In Agriculture Census 2015-16, about (164500) primary workers and supervisors from 36 States/UTs were involved in data collection activities.

To operationalize this, the following are the prerequisites

i. Development of software for extraction of land records at village level and digitization of manual schedules for collection of Phase I, II & III data in the tablets
ii. Provision of tablets at the level of primary workers and of computers at the level of supervisors.
iii. Training to primary workers and supervisors in use of tablets and software

C. Improvements in the Census Methodology

(i) Separate Reference year for all the three phases

The reference year for Agriculture Census is Agricultural Year and data for phase-I & II of census programme is collected for a common reference year and for phase-III ,the reference year is one year after the phase-I & II.For Agriculture Census 2015-16, although as per instruction phase-I data was to be collected during July-Sept 2016, operationally data collection time taken by the primary workers varied from 4-9 months. Similarly data collection for Phase-II which was expected to be completed by June 2017, the actual time taken by the State varied from 6-12 months ie., almost a gap of one and half years from the reference period. In land record states, the impact of delayed data collection may not be much for Phase I&II but in non-land record states and for input survey, problem of recall lapse adversely impacts the quality of data.

Considering these issues, during Agriculture Census 2020-21, a differentreference period for all three phases is being proposed to overcome the problem of recall lapse in data collection.On the lines of input survey which has a reference period independent of Phase-I & II, it is proposed that from Agriculture Census 2020-21, Phase-I, II and III may be conducted with separate reference periods in the form of an integrated Census and Follow-up Survey Programme as indicated below:

Phase	Reference Year	Data collection period	Processing time	Dissemination
I	2020-21	July 2021-Oct 2021	Nov 2021-June 2022	July 2022
II	2021-22	July 2022-Oct 2022	Nov 2022-June 2023	July 2023
III	2022-23	July 2023-Oct 2023	Nov 2023-June 2024	July 2024

(ii) Village-wise land use statistics as per 9 fold classification

Statistics of land use are compiled from the village land records maintained by the patwari. State Governments compile land use statistics on an annual basis and also furnish it to the Ministry of Agriculture and Farmers Welfare. The information is recorded under nine categories: (a) Forests, (b) Area under Non-Agricultural use, (c) Barren and Uncultured Land, (d) Permanent Pastures and other Grazing Land, (e) Miscellaneous Tree Crops, (f) Culturable Waste Land, (g) Fallow Land other than Current Fallows, (h) Current Fallows, and (i) Net Area Sown.

To obtain operated area at the village level, agriculture census methodology also provides for collection of broad land use data in schedule L-3 (village summary). The purpose of the village summary schedule was to ensure that entire land area is accounted for compiling the operated area in the village.

It has been observed that Land Use Statistics compiled by State Governments and those estimated through Agriculture Census vary considerably in many States. While in some States, these variations are due to separate agencies reporting the land use information, in others, even the same reporting agency is furnishing differing sets of data to Ministry of Agriculture and other agencies. To avoid multiplicity of data and improve its quality, land use statistics based on complete enumeration every five years through agriculture census can become an important source of quality data which can be updated annually by the States/UTs for their use. It is proposed that during coming census L3 schedule on collection of village summary land use data may use nine-fold classification at village level for generating land use statistics at tehsil, district, State

and national level which may also become the baseline information for State Governments to update their annual land use data.

(iii) Generation of Advance Estimates of number of Operational holdings and Operated Area for next 5 years

At present, the population parameters (number and area of operational holdings for SCs/STs/ Others) are used as multipliers for estimation of holding characteristics in Phase-II. In the backdrop of different reference periods for Phase-I, II & III, estimation of Phase-II parameters would be done based on the sample design adopted. In order to meet the requirement of other users, it is proposed to forecast the number & area in different size classes for the next 5 year and the same will be published along with main report. A proper methodology/estimation procedure will be worked out for the purpose. These estimates may also be used as an input by programme divisions for implementation of various schemes.

(iv) Collection of data on Tenant operational holders during Phase-III

Tenant farming is an agricultural production system in which landowners contribute their land and often a measure of operating capital and management, while tenant farmers contribute their labour along with varying amounts of capital and management at times. At present tenancy status of farmers is captured in Agriculture Census based on entries in Khasra Register. The information in the register generally captures the owners as the cultivators due to legal and administrative issues concerning record of rights and absence of tenancy laws in land record states. A comparison of data on tenancy in the land record and non-land record states indicates significant under-estimation of number of tenants in the land record states. To overcome this, it is proposed to collect the information on tenant farmers on a sample basis from the actual cultivators rather than from land records. An Input Survey being a direct enquiry method for data collection is more suitable for this item. It is therefore proposed that

while reviewing the schedules for Phase-I, II & III for the next census, this item would be incorporated for data collection in Phase III.

(v) Improving Data quality through inspection/ review by external agency

As per the existing procedure, the data collection at each stage is expected to be supervised by the Supervisors of the primary workers in the States. However, experience of the earlier census reveals that data quality is generally on the decline due to excessive work load on the primary worker as well as inadequate supervision by the supervisory staff. To ensure better quality, it is proposed to involve external agencies such as NSSO/ NIELIT etc to do concurrent checking of data from a sample of about 10-15% villages and provide on the spot guidance to the primary workers wherever necessary. The agency for the purpose would be hired following standard official guidelines.

(vi) Vetting of selection of villages/ Sample Selection done by State/UTs by DAC&FW

During field visitsand inspection of agriculture census work, procedural lapses were detected in the sample selection for phase II& III in some of the states. In some cases, representativeness due to absence or presence of a big village in the sample was cited as a reason for huge variation in estimates. In some cases huge delay occurred in obtaining TRS list of villages for use by the data processing agency for generating multipliers. To avoid such situations, it is proposed to the list of villages selected for phase-II & III by the States/UTs will be finally verified and vetted by Agriculture Census Division before the same is used for data collection.

(vii) Estimation procedure for Phase-III

At present estimates of Area are obtained by pooling the operational holdings at District level and using multiplier of area at that level. Number of holdings are not estimated but maintained at Phase-I & II level as the reference year for both the phases is same. In view of proposed changes in reference years of phase-I &II , the estimation methodology both for number and area of operational holdings would need to be revised appropriately.

(viii) Frame at National Level

One of the main objectives of Agriculture Census is to provide a basic frame of house-holds and operational holdings for carrying out future agricultural suveys. Frame is a complete list of all units in a population which can be sampled for detailed study. After the data collection on number & and area operated by different size class (marginal, small, semi-medium, medium and large) during phase-I is completed, a sampling frame of farmers containing the following information will be compiled for use in subsequent phases of census:

- An unique numerical identifier (i.e. from 1 to 1000) will be given to all the Farmers to avoid duplication in the frame;
- Name & area operated by Farmers would be recorded in second column;
- Third column will contain the contact information like mobile number of the farmer.
- Fourth column will contain information like Irrigated and un-irrigated area

5. Physical and Financial Requirement to implement proposed changes

Agriculture Census Scheme is a regular component of the ongoing scheme "Integrated Scheme on Agriculture Census, Economics and Statistics (ISACES)" with an approved outlay ofabout 153.07 crorefor implementation of Agriculture Census 2015-16

for 3 years. The scheme provides for some nucleus staff in the State Agriculture Census unit and for payment of honorarium to the field staff to implement the scheme at the ground level.

The proposed changes in the data collection methods would require provision of Tablets, Computers and printers etc. at the Tehsil/District and StateHqs.About 1,64,000 primary workers and supervisors are required to be deployed for conduct of phase-I of Agriculture Census.

In phase –I data is proposed to be collected by the Primary worker using Smart phone/Tablets already made available by States/UTs. Since data during Phase-II & Phase-III is collected in a sample of villages, about 45000 tablets would be required for field workers. However, final requirement of Tablets/ Smart phones/Computers etc. will be assessed in consultation with States /UTs and after a pilot study.

6. Pilot Study

A pilot study, which is a small scale preliminary study conducted to firm up the operational process on use of smart Phones/Tablets and financial, technological and equipment requirements to implement the next Agriculture Census. The study will be conducted with help of specialised Agency in a few selected villages in 4-5 states.

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