GOVERNMENT OF KERALA

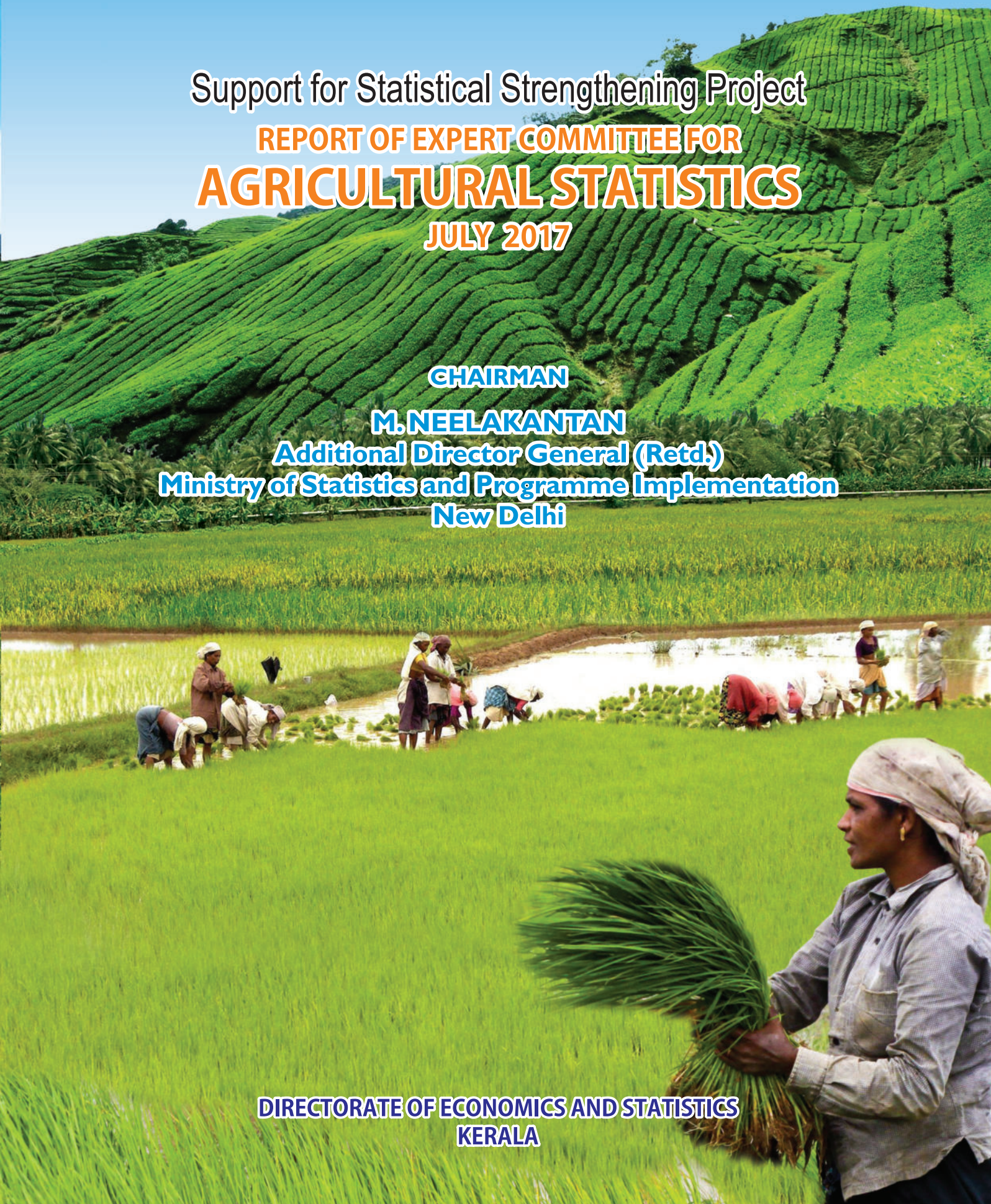
Support for Statistical Strengthening Project

REPORT OF EXPERT COMMITTEE FOR
AGRICULTURAL STATISTICS

JULY 2017

CHAIRMAN

M. NEELAKANTAN
Additional Director General (Retd.)
Ministry of Statistics and Programme Implementation
New Delhi



DIRECTORATE OF ECONOMICS AND STATISTICS
KERALA

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PREFACE

The India Statistical Strengthening Project (ISSP) launched by the Govt. of India as a follow up measure of the National Statistical Commission (NSC) chaired by the Dr.C.Rangarajan is a very important project as far as the State Statistical System is concerned. The object of the project is to strengthen the State Statistical System on the lines of National Strategic Statistical Plan. The State Strategic Statistical Plan (SSSP) is expected to provide a strategy for strengthening the statistical capacity across the entire state statistical system.

As per the guidelines for preparation of SSSP and implementation of the plan, the state government constituted a High Level Steering Committee under the Chairmanship of Chief Secretary to Government. A core team and specialized teams were also constituted for the successful preparation and implementation of the project. Accordingly, the Expert Committee on Agricultural Statistics was setup under my chairmanship for reviewing the methodology being followed in EARAS and other aspects of the Department of Economics and Statistics in respect of Agriculture Statistics and recommend suitable measures for improvement in the conduct of EARAS.

Since the constitution of the Committee, fifteen meetings were held in all and Committee discussed various issues faced by the department. Meetings of the line departments and stake holders were also conducted and various issues concerning the process of data collection and tabulation of data and co-ordination with other agencies were also deliberated in detail. Non availability of adequate funds was found to be a major problem faced by the Committee on different occasions. This impediment delayed DES in taking up activities suggested by the Committee and completing the same in time.

I would like to touch upon briefly some of the major initiatives taken up by the Committee after detailed discussions. The most important such initiative was the Pilot Study taken up for testing the suitability of the modified sampling design and revision of the existing methodology being followed in the EARAS by DES. Due to shortage of funds, the study could not be taken up and completed as envisaged. However, the field work of the Pilot Study was later on completed satisfactorily as also data entry work. Chairman and two Members, Shri.A.Meera Sahib and Shri.M.Madhusudanan carried out field inspections in three districts to observe the conduct of field work. They had provided on the spot guidance and important clarifications to the field staff on the correct procedures to be

followed in the pilot study and this helped to complete the work as per prescribed instructions and guidelines and in time. DG, DES and member secretary also inspected field work of pilot survey.

The tabulation and analysis of data was undertaken by Dr.U.C.Sud, Director, IASRI and member of the Committee and findings were provided to the Committee. The Committee appreciated the gesture on the part of Dr.U.C.Sud in undertaking this important work and it greatly helped the Committee. The findings of the Pilot Survey were very much encouraging which enabled the Committee to conclude that the modifications of the sampling design suggested and tested in the field were acceptable. The Standard Errors from the survey conducted as per the modified design were also found to be within acceptable limits. The Committee therefore has recommended adoption of modified sampling design and procedures for EARAS, from Agriculture Year 2018-19, after DES completes the administrative and other formalities including obtaining clearance from Government of Kerala and Ministry of Agriculture and Cooperation, Government of India.

As part of the work of the Committee, Chairman and Members also undertook a study tour to Idukki District to appreciate the field problems including increased workload due to hilly terrain and complex nature of revenue records and BTR and subsequently held a meeting of the Committee in Idukki district. This enabled the members to interact with field officers of the district and to get a first-hand experience of field situation in this hilly terrain and consider possible changes in procedures of data collection. Based on these discussions, the Committee was convinced that there is need to increase the manpower resources in the district for collection of quality data under EARAS.

Another important issue critically analyzed by the Committee was the heavy workload of investigators in EARAS. The Committee observed that for proper implementation of the scheme, it was essential to provide additional posts of 103 investigators which was recommended in Interim Report itself.

The Committee gave special attention to discussing the possibility of application of Remote Sensing Technique in the area enumeration and yield estimation of agriculture statistics for which a special study was carried out in two districts of Alapuzha and Palakkad with the guidance and support of Space Application Centre, Ahmedabad. The estimates made from the study by SAC and comparative analysis of DES estimates and those by MNCFC were critically examined by the Committee. Based on encouraging results from the study, the Committee recommended use of Remote Sensing

methodology for area estimation to start with, after carrying out the study in some more districts to evolve a sound methodology for the purpose.

The Committee conducted in-depth discussion on all the Terms of References before arriving at its detailed findings and recommendations including strengthening the technical capability of staff and adoption of latest technological advancements and use of hand held devices for data collection.

The Committee had submitted an Interim Report to the Government in July 2016 after completing deliberations on some of the major Terms of References like requirement of additional staff for timely completion of field work and ensuring quality of data. However Committees' view was that since the Government has declined to sanction these posts twice DG may take up the matter personally again with the Additional Chief Secretary, planning and Economic Affairs for reconsideration of the proposal.

I would like to take this opportunity to place on record my deep sense of appreciation and gratitude to the eminent members of the Committee for extending to me their full support, guidance and cooperation in the deliberations and help in arriving at decisions on complex issues. In particular, my sincere thanks to Dr.U C Sud, Director, IASRI, New Delhi and Shri.A.K.Srivastava, former DDG (Agriculture Statistics) NSSO, FOD, Faridabad and currently FAO Consultant who are two outstanding experts in the country on Agriculture Statistics. The Committee was therefore fortunate to have the benefit of their expertise in successfully achieving the tasks assigned to it. My sincere gratitude also to Shri.A.Meera Sahib former Director, DES who contributed immensely in the deliberations of the meetings and tackling technical and field problems,with his vast experience in conduct of Agriculture Statistics Surveys and deep knowledge of State statistical system in general. Shri.A.K.Srivastava and Shri.A.Meera Sahib also took pains to go through in detail the interim and final reports, suitably editing the reports, fine tuning both content and presentation and achieving excellence in work, in close coordination with Member Secretary and Chairman.

My special thanks are also due to Dr.Manjunath and Shri C. Patnaik, Scientists and other officers of SAC who attended the meetings and extended to the Committee their full support and cooperation in exploring the possibility of adoption of remote sensing technique for crop estimation surveys in Kerala and in the conduct of Pilot Survey. With their support, Kerala has also been included in the Project of Mahalonobis National Centre for Crop Forecasting (MNCF) for the first time. I am also grateful to Shri

DDG, NSSO (FOD), Trivandrum, Shri.T.K.Datta, Statistical Adviser, MOA and Shri.Chanderkant, Additional Statistical Adviser, MOA for their valuable contribution to the deliberations in the meetings of the Committee and help to resolve various issues under consideration.

I record my deep appreciation to the hard work rendered by Shri.K. Damodaran, Member Secretary of the Committee in organization of the Meetings of the Committee from time to time, preparation of agenda notes and other papers, providing logistical support to Committee members and finally, in drafting the Interim and Final Reports. Shri V. Ramachandran DG, DES extended excellent support and cooperation to the Committee in successful completion of the tasks assigned to it, ably assisted by senior officers and staff. My thanks are also due to Shri.T.Gorkey Jose, former Additional Director and Member Secretary who also provided very good technical support to the Committee in its deliberations during his tenure.

I look forward to acceptance of the important recommendations of the Expert Committee, by Government for undertaking EARAS work more efficiently and to bring out lasting improvements in the Agriculture Statistics System in the State in the near future.

M.Neelakantan

Chairman, Expert Committee

CONTENTS

ANNEXURE

LIST OF ABBREVIATIONS

ADG	ADDITIONAL DIRECTOR GENERAL
BTR	BASIC TAX REGISTER
CCE	CROP CUTTING EXPERIMENT
CIFRI	CENTRAL INLAND FISHERIES RESEARCH INSTITUTE
CSO	CENTRAL STATISTICAL ORGANISATION
CSS	CENTRALLY SPONSORED SCHEME
CWC	CENTRAL WATER COMMISSION
DDG	DEPUTY DIRECTOR GENERAL
DES	DIRECTORATE OF ECONOMICS AND STATISTICS
DESMOA	DIRECTORATE OF ECONOMICS AND STATISTICS, MINISTRY OF AGRICULTURE
DMI	DIRECTORATE OF MARKETING AND INSPECTION
EARAS	ESTABLISHMENT OF AN AGENCY FOR REPORTING AGRICULTURE STATISTICS
FASAL	FORECASTING AGRICULTURE OUTPUT USING SPACE, AGRO-METEOROLOGY AND LAND BASED OBSERVATIONS
GCES	GENERAL CROP ESTIMATION SURVEY
GDP	GROSS DOMESTIC PRODUCT
GOI	GOVERNMENT OF INDIA
GPS	GLOBAL POSITINING SYSTEM
HLSC	HIGH LEVEL STEERING COMMITTEE
IASRI	INDIAN AGRICULTURAL STATISTICS RESEARCH INSTITUTE
ICAR	INDIAN COUNCIL OF AGRICULTURAL RESEARCH

ICS	IMPROVEMENT OF CROP STATISTICS
ICT	INFORMATION AND COMMUNICATION TECHNOLOGY
ISRO	INDIAN SATELITE RESEARCH ORGANISATION
ISSP	INDIA STATISTICAL STRENGTHENING PROJECT
KLSSSP	KERALA STATE STATISTICAL STRENGTHENING PROJECT
MNCFC	MAHALANOBIS NATIONAL CROP FORECASTING CENTRE
MOA	MINISTRY OF AGRICULTURE
MOU	MEMORANDUM OF UNDERSTANDING
MRPC	MARKET RESEARCH AND PLANNING CELL
NAIS	NATIONAL AGRICULTURAL INSURANCE SCHEME
NCFC	NATIONAL CROP FORECASTING CENTRE
NCSC	NATIONAL CROP STATISTICS CENTRE
NSC	NATIONAL STATISTICAL COMMISSION
NSSO (FOD)	NATIONAL SAMPLE SURVEY ORGANISATION (FIELD OPERATION DIVISION)
PPQ&S	PLANT PROTECTION,QUARANTINE AND STORAGE
RS	REMOTE SENSING
SDP	STATISTICS FOR DECENTRALISED PLANNING
SDRT	SURVEY,DESIGN,RESEARCH AND TRAINING
TOR	TERMS OF REFERENCE
TRS	TIMELY REPORTING SCHEME
UT	UNION TERRITORY
VFPCK	VEGETABLES AND FRUITS PROMOTION COUNCIL OF KERALA

SUMMARY AND RECOMMENDATIONS

The India Statistical Strengthening Project (ISSP) launched by the Government of India as a follow up measure of the National Statistical Commission (NSC) is an important project towards improvement of the entire statistical system in the country. As a sequel to this, the State Strategic Statistical Plan (SSSP) has been prepared to provide a strategy for strengthening the statistical capacity across the statistical system of the states. Kerala State Statistical System being highly decentralized with coordinating role of Department of Economics and Statistics, it is necessary to streamline the entire system of Agriculture Statistics in the State.

The present Expert Committee was constituted by the Government of Kerala with a wider objective of assessing and suggesting technical, operational and administrative improvement in the present system of data collection through the ERARS scheme and strengthens the role of DES in respect of agriculture statistics. The Expert Committee has been asked to give its recommendations on 12 specific topics under its terms of reference. The Expert Committee attempted to touch upon these items by reviewing all aspects of data collection from coverage, methodology and resources to use of modern technology in agriculture statistics system of the state through extensive discussions with all stake holders. In its course of discussion it has also considered recommendations of earlier committees of Government of India constituted with similar objectives. The Committee, during the course of its review of the present system, also carried out two pilot studies for area and yield estimation in a few districts by suitably modifying the sampling design in respect of area enumeration and introducing remote sensing technology for area and yield. The findings of both the pilot studies are encouraging so far as acceptable equality of the estimates is concerned. The Committee has held detailed deliberations on the Terms of References and has attempted to provide fruitful answers to them. The Recommendations on these TORs are listed below:

TOR 1: Review of methodology of EARAS:

Agriculture Statistics is the backbone of planning for agriculture dominated economy. It is therefore necessary to ensure quality, timeliness and reliability in the whole gamut of agriculture data. Further in this technically advanced world, it is absolutely necessary to have data collection and analysis through most scientific and technological tools. Therefore re-strengthening of the existing system in respect of design, operational

procedure and use of latest statistical and scientific tools is absolutely necessary. The deficiency in the current system of both area and yield estimation are not entirely due to the limitations in its sampling design. The selection of sample clusters for collecting data on land use and crop area and sampling of plots for crop cutting experiments are based on rigorous and statistically sound principles. But the sampling frame suffers from serious lacunae due to non-availability of updated land records as per BTR, FMB etc. which make the data collection work difficult, time taking for timely completion of field work and to some extent it even affects the estimation procedure. If the re-surveyed land records and updated BTR are available, accurate and reliable data can be generated from the current methodology, provided sufficient field resources are provided. It is in this background that the Committee under took a pilot study in five Panchayats and on the basis of observations of the study a new sampling methodology was developed and suggested for implementation.

TOR 2: Modification in sampling design:

The Committee after considering the strength and weakness of the EARAS sampling design strongly recommends that updated BTR and resurveyed records by the Revenue and Surveying department needs to be provided to the Economics and Statistics Department for the efficient and reliable agricultural statistics data collection. The EARAS design is largely suitable for data collection on crop area and yield. However in the absence of un-updated BTR, the post stratification technique may be adopted to overcome the problem. It is also felt that a reduction in number of clusters will be helpful in efficient field data collection without any loss of precision. The results of pilot study reveal that sample size of 100 clusters can be safely reduced to 80 without any appreciable loss of quality and reliability of estimate. In view of fragmented household holdings prevalent in the state, the household approach for agriculture statistics may not yield reliable data.

TOR 3 and 7: Methodology of horticulture data collection:

The Committee carried out a detailed discussion on the issue and concluded that at present there is no established methodology for estimation of area and production of horticulture crops. The methodology as adopted earlier under fruits and vegetable survey by Government of India is under review through the CHAMAN project launched by Ministry of Agriculture,

(MOA), in which use of Remote Sensing Technology coupled with field data collection is under experimentation in IASRI and Mahalonobis National Crop Forecasting Centre (MNCFC) of MOA. A Pilot Survey is also in progress to test the methodology as suggested by IASRI in five states and the initial results are expected to be available shortly. Therefore, the Committee unanimously decided that it would be prudent at this stage to wait for the completion of this study and examine the outcome thereon.

Regarding the floriculture issue the Committee observed that at present there is no scientific sample study in the field of floriculture relating to its area and production but production of large quantity is being done by household cultivators for marketing purposes. The Committee recommended to DES to conduct a pilot study of floriculture if it could be managed with existing resources. Chairman at the same time, expressed his anguish that the additional 103 statistical investigator posts recommended by the Expert Committee have not yet been sanctioned by the Government. DG however agreed to explore the possibility of undertaking the study as suggested by Chairman without affecting regular activities of DES.

TOR 4: Data on agriculture productivity cost of cultivation and farm price:

While the methodology of the survey used by DES Kerala for cost of cultivation survey is broadly same as the one adopted by MOA, GOI, there is urgent need for considering the standard concepts and definitions used in the survey. It was noticed by the Committee that in Kerala, the procedure for estimating the land value in the cost of cultivation is different from the one adopted in other states. As per the guidelines issued by MOA, the rental value of land is taken into account, which is estimated on the basis of prevailing rents in the village for identical type of land or as reported by sample farmers subject to certain ceiling limits. In Kerala, the procedure is different; for assessing the land value, the interest on land value is taken into account. But interest on land value is very high in Kerala and it pushes the cost upwards and due to this, the cost of cultivation estimates are much higher in the State compared to even states like Karnataka and TamilNadu. The Committee noted that the present methodology of the cost of cultivation survey is under review in MOA, GOI. Therefore, the Committee felt it prudent to examine the issue in detail based on the guidelines issued by MOA and in consultation with all stake holders in the state including Planning Board and Department of Agriculture and take a final call on this

important issue. As per the recommendation of the Committee the Ministry of Agriculture, New Delhi made a comparative study of the figures of Central and State in respect of cost of cultivation and production of paddy and coconut. On the basis of the observation of this study, the Committee suggested to follow a uniform procedure in the estimation of cost of cultivation survey and to consider rental value of land instead of Interest on land while estimating cost of cultivation.

TOR 5: Uniformity in data collection by different agencies:

The data collection and compilation of other commodities by different departments as per the methodology decided by them but without formal concurrence of the nodal agency, DES and without adopting proper statistical techniques cannot be continued any longer. For such data collection in future, DES, being the nodal agency for agriculture statistics in the state, it is incumbent on the part of DES to provide all technical support and guidance to them and if possible manpower to all data collecting agencies. It is emphasized again that data collection by all agencies should be under the technical guidance and the support of the DES. Wherever necessary, the administrative formalities for this purpose should be completed quickly and the new system should be put in place without any further delay.

TOR 6: Use of ICT tools in data collection:

The DES is presently having minimum ICT infrastructure and a web site host in the state data centre. The Committee is of the view that extensive use of the ICT technology for strengthening the statistical system in Kerala is need of the day. This includes updating the computing facilities at Head Quarters and District Offices, Taluk Offices and establishing web enabled online data sharing between DES and each line department. A portal with web based data storage and online data transmission facilities needs to be established which will be hosted in a State Data Centre owned by the Government of Kerala. The portal shall be accessed by the users and the beneficiaries through a dedicated and reliable Wide Area Network. Further, up gradation of computer skill of the existing employees for efficient use of latest ICT tools, networking and use of hand held devices for data collection is absolutely necessary by imparting them intensive training in reputed institutions.

Immediate attention should be given to provide PDA/IPAD/Mini Tab to field functionaries for data collection and onward transmission of the collected data to districts and State Head Quarters.

The Committee noted with satisfaction the following developments were speeded up in DES in the recent past as per directions from it:

Distribution of 140 laptops to Taluk statistical offices in addition to two computers each, development of software for data entry and data transmission and also establishment of work stations at 3 Taluks, two Android smart phones were supplied to collect data from the field and onward transmission of data in connection with vegetable survey, fully equipped networking system in all Taluk offices etc are some of the activities carried out under ICT. Moreover, DES decided to use Mobile Application Software in the field of agricultural data collection with the technical support of IASRI, New Delhi. The Committee appreciated the gesture of IASRI to supply the mobile application software free of cost and to impart the necessary training to DES officials.

TOR 8: Methodology for small area and production estimation:-

With the introduction of decentralized planning, the need for local level data on agriculture crops and fruits and vegetables has been emphasized by Planning Board in various meetings of the Committee. The Committee discussed this important issue in detail and endorsed the suggestion and tried to modify the EARAS design to meet this requirement. The Pilot Survey launched, among other things, would also address this issue. After detailed examination of the existing staff resources under EARAS in DES, the workload and estimated time required for completing the field work and for collection of quality data, Committee noted that the staff resources are required to be increased. It emphasized the need for providing qualified and trained statistical personnel at each and every local body for collection of data and monitoring of field to provide data at local level. This can be achieved by creating a minimum of 103 additional statistical posts and deploying field resources suitably in District, Taluk, Block and Panchayat level. Therefore, the Committee strongly reiterates its earlier recommendation for creation of additional 103 statistical investigator posts.

TOR 9:- Reduction of workload of Investigators

In order to reduce the work load of the primary workers and suggest modification in the existing methodology of EARAS, a pilot study was conducted in 5 Panchayats in five districts in the state. On the basis of observations of the pilot study, a new sampling design has been suggested

by IASRI New Delhi under the supervision of Dr.U C SUD. According to the new sampling methodology, 80 clusters have to be selected instead of 100 clusters as in the present methodology. From these 80 clusters, select 65 clusters for crop area enumeration. The 80 clusters with key numbers will be selected without consideration of wet and dry classification. As far as wet and dry classification is concerned, post stratification procedure would be followed wherein the geographical area of wet and dry lands as observed in the field by the field functionary in respect of the 80 clusters would be used to estimate the population values. For estimation of area under crops, 65 clusters out of the above 80 clusters would be surveyed for detailed collection of area under different land use/crops. The Committee observed that the new sampling method will reduce the workload of the primary workers without affecting the efficiency of the estimates. It is recommended that DES may carry out the field data collection of data as per the new methodology in a few more samples in the three regions of the state in the ensuing season and observe field problems if any, for further refinement of the procedure. The modified sampling design and methodology may thereafter be adopted for implementation from Agriculture Year 2018-19 after obtaining clearance from State High Level Coordination Committee and other concerned authorities.

TOR 10: Use of Remote Sensing in data collection:

The Committee is of the view that in agriculture data collection specifically for crop area and yield estimation, there is immense scope for remote sensing technology. The methodology developed by Space Application Centre for crop forecasting and area and yield estimation through satellite imageries with limited ground truth exercise, the operational difficulties of large scale manual field data collection can be reduced appreciably and statistically sound estimate can be obtained. The methodology is being successfully tried and used for major crops in Mahalonobis National Crop Forecasting Centre of Government India. The Committee further discussed the issue with officers from SAC and MNCFC and suggested to check the possibility of using remote sensing technique in the yield estimation in Kerala. Accordingly, two pilot studies were conducted in Palakkad and Alappuzha districts by using remote sensing Technique. Since these two districts have large extended cultivation, the remote sensing experiment has been a great success and the Committee impressed upon Ministry of Agriculture Government of India to include Kerala State under its FASAL project for regular crop forecast on important crops.

Though the multiplicity/mixed crops make the area enumeration more difficult in Kerala, the advanced remote sensing technology is proposed to be used on a sample basis to know the success of the methodology in Kerala. Two pilot studies conducted in Palakkad and Alappuzha districts were a great success. Though there were some variations in the paddy estimated figures of DES and MNCFC pilot study, the Committee decided to accept the remote sensing methodology and check its application further. In order to check the difference in both figures, a senior officer from MNCFC visited again in Palakkad and Alappuzha districts to analyze the situation. DES should examine the results from their analysis and take appropriate decisions in consultation with all stake holders regarding future course of action.

TOR 11: Crop statistics at disaggregated level for crop insurance:

The present method of conducting large number of crop cutting experiments for Panchayat level yield estimation results in incurring huge non sampling errors. The GOI is examining the use of econometric based models and remote sensing based yield estimation with moderate crop cutting experiments to overcome the problem. While appreciating the need for local level data for decentralized planning and other purposes, the Committee recommended that it is not technically feasible to estimate data at lower level without sufficient man power.

TOR 12: Other issues:

(1)The Committee noted that there is a wide gap between production and consumption of rice during last five years. This gap is even wider between the districts. So the Committee strongly recommends taking all steps for augmenting production of rice, including bringing additional area under rice cultivation, simultaneously focusing on steps to increase the productivity as well.

(2)The Committee discussed the overall performance of the State Statistical System and suggested to DES to review the data gaps and quality and timeliness of statistics in respect of various sectors with reference to Rangarajan Commission Recommendations and submit its cogent proposals with the government for effecting overall improvement in the State Statistical System.

(3) In the context of effecting improvements in the system, the Committee also recommended to DG DES to take major steps for further streamlining the system of monitoring and coordination of work within the DES and also with other line departments, based on discussions Chairman had on 27-6-2016 with the then Chief Secretary Shri S.M.Vijayanand while presenting the Interim Report of the Committee. Briefly stated, suggestions of CS included: steps for streamlining of activities of DES including conducting periodic review of various programmes, ensure optimum utilization of staff resources and make DES a vibrant body providing reliable and timely statistics and other indicators to Government for decision making. Chairman therefore suggested to DG for drawing of appropriate action plans on various activities covering EARAS and other schemes and programmes and setting up of Core Groups of senior and middle level officers within DES, among others, to discuss important issues and take suitable decisions for effective and successful completion of the tasks assigned to it. Special attention should be given to optimum utilization of staff resources, ensuring data quality, strengthening of the system of monitoring of programmes and surveys through regular field inspections and periodic feedback sessions with district/ taluk level officers and other measures and also strengthening the technical capability of field staff. The Committee appreciated the steps taken by DG in this regard, in its meeting held on 7-1-2017; it was however recommended that this matter should receive utmost priority for DG and senior officers of DES in future for bringing out overall improvement in the State Statistical System.

CHAPTER-1
GENESIS OF NATIONAL AGRICULTURE STATISTICAL SYSTEM

The Agricultural Statistical System has been subjected to review several times since independence so as to make it adaptive to contemporary changes in agricultural practices. Some of the important expert groups were: (a) the Technical Committee on Coordination of Agricultural Statistics (1949), (b) the National Commission on Agriculture (1976), (c) the High Level Evaluation Committee (1983) (d) the Workshop on Modernization of the Statistical System (1998) (e) National Statistical Commission (2001) and (f) more recently the Experts Group on Agricultural Statistics under the Chairmanship of Prof A Vaidyanathan (2009).

1.2 The efforts for improvement of Statistical system in India have continued since long and realizing the growing statistical needs of the Society and to make sure that these get appropriately addressed, the Government of India set up the National Statistical Commission, the first of its kind, through Resolution No. M/13011/3/99-Admn. IV dated 19th January 2000 of the Ministry of Statistics and Programme Implementation. Dr. C. Rangarajan, The then Honourable Governor of Andhra Pradesh was appointed as the part-time Chairman of the Commission along with eleven eminent statisticians and economists as its part-time members. The National Statistical Commission gave wide ranging recommendations on all the aspects of entire statistical system in the country. Recommendations of NSC are summarized in Annexure 2. In the year 2010,the National Statistical Commission constituted " Committee on Agriculture and Allied Sectors", under the chairmanship of Prof Y K Alagh to review the issues relating to Agriculture Statistics. The Alagh Committee endorsed the recommendations of Vaidyanathan committee (2009) on Agriculture statistics.

1.3 Among the various recommendations for the improvement of the agricultural statistics system by various groups,the most important recommendation put forward was by the Expert Group constituted in 2009 under Dr.A.Vaidyanathan, eminent economist.

1.4 Existing System

1.Current agricultural statistics system in India relies on village Patwaries to compile plot wise data on land wise and crop wise area and estimates of crop yields based on crop cutting experiments in statistically selected villages and plots. The present system is not providing comprehensive, reliable and timely data on crop area and production.

Vaidyanathan Committee

1.5 Ministry of Agriculture in Government of India therefore constituted the committee under Dr. A. Vaidyanathan, eminent economist with following objectives.

(**1**)Review the current methodology used in TRS/EARAS/ICS/ and GCES for estimating land use ,crop area , yield and production estimates and suggest institutional frame work for improvement of agricultural statistics; and

(**2**)Review experience of RS Technology for estimating area and yield of various crops, assess its potential for generating reliable and timely data and suggest measures to effectively exploit this potential.

1.6. The Committee studied the deficiencies in the existing system through the reports of ICS scheme operated by NSSO and also did pilot study in field to observe problems of data collection.

1.7. The Committee suggested restructuring of the system by putting in place an institutional arrangement that would provide reliable and timely data needed for monitoring agricultural trends and for policy making at the State and National levels. This objective can be achieved by properly designed and carefully monitored collection of data on land use and crop area based on complete enumeration and crop yields based on crop cutting experiments on a smaller scale. But it is essential that all the operations involved be planned, managed and supervised by a unified, autonomous and professionally managed organization. For this purpose the Committee recommended setting up of a National Crop Statistics Centre (NCSC) as an autonomous, professional organization in the Ministry of Agriculture of the Government of India. NCSC will be responsible for ensuring the deficiencies in the working of field agencies are corrected.

1.8 The Committee also said that reliable village level data on land use and crop area are necessary for micro level planning and policy by state and local governments. The present system of recording these data must continue but steps must be taken to bring the responsibility for collection and supervision under State Statistical agencies empowered to function autonomous, professionally managed organizations independent of administrative departments. The central government should support and encourage states to undertake these reforms.

1.9 Vaidyanathan Committee has also advocated use of Remote sensing technology in crop statistics for providing independent estimates and also helps the existing system to run more efficiently at all levels. It said that

technical feasibility has been explored and demonstrated by studies of the National Remote Sensing agency. Its capability is increasing with technological advances in satellite design and sensors. RS also could greatly reduce dependence on human agency and attendant errors in collecting data. However, the Committee observed that RS must be viewed as a compliment, and not as a substitute, for conventional methods of collecting data for some time to come. It also noted that even with better technology RS may not be able to provide area estimates for all crops and all regions. Therefore, adoption of RS methodology should be a gradual process starting with measures to make more effective use of existing methodology.

Recognizing this, the Ministry of Agriculture has been working with ISRO since 1987 leading to the launch of the project, in 2002, for Forecasting Agricultural Output Using Space, Agro-meteorology and Land based observations (FASAL). Therefore the Committee also recommended that the present RS programme should be expanded and reorganized to provide reliable and validated in-season forecasts and end-season estimates of area for a wider range of crops at the state and national levels. It emphasized on need for careful planning of the configurations of hardware facilities taking advantage of technological advances in imaging technology as well as sensors that local officials can use for recording plot level land use, irrigation and crops. Hand held sensors (GPS) are now available with the capability to identify lat-long coordinate, and the nature of, and the area under, land use, irrigation status and crops grown on each plot in the cadastral map. They can greatly reduce the effort required to collect the basic data at the village level, improve its accuracy and get them transmitted to a central data network. We recommend that such sensors should be used for village level data collection.

1.10. Present status of implementation of Recommendations.

Vaidyanathan Committee submitted its report in the year 2012. The Planning Commission and Ministry of Agriculture Government of India after long technical discussions on the findings and recommendations of the committee have decided to carry out pilot studies in 5 states, Assam, Gujarat, Karnataka, Orissa and UP, under the supervision of IASRI, ICAR. Main objectives of the Pilot survey are:

i) To develop the sampling methodology for estimation of State-wise crop area and crop yields for major food grain crops,

ii) To test the adequacy of sample size at different stages of sample selection,

iii) To explore the feasibility of using personal digital assistant (PDA) and global positioning system (GPS) device in data collection work in selected Tehsils,

and iv) to carry out statistical comparison of data collected through paper and computer assisted personnel interview (PAPI and CAPI)in selected Tehsils.

The field work of the survey in the pilot study is assigned to mostly non-revenue staff as suggested by the Committee. At present the field work of crop area enumeration according to the existing methodology of TRS and crop cutting experiments using the methodology of GCES is in progress in the assigned states through different agencies other than revenue staff. The sample size for the pilot study is in accordance with the recommendations of the committee. The data for two crop seasons are being collected which will be processed to obtain area and yield of important crops with reduced sample size and control of non-sampling errors. The report is expected to be available by 31-8-2017.

CHAPTER-2

INDIA STATISTICAL STRENGTHENING PROJECT

India Statistical Strengthening Project (ISSP) is a comprehensive project designed to strengthen State statistical systems by way of providing adequate technical and financial support to improve their statistical capacity and infrastructure for collecting, compiling and disseminating reliable official statistics for policy planning purposes particularly at the State and Sub-State levels. ISSP was formulated as a sequel to the recommendations made by the National Statistical Commission (NSC) headed by Dr. C. Rangarajan and constituted for effecting necessary improvements in the Indian Statistical System. The said Commission had inter-alia comprehensively considered various important issues and requirements for the strengthening of the State Statistical System in the Country.

2.2 The participating States/UTs in the Project are required to prepare State Strategic Statistical Plans (SSSPs) outlining the vision, development plan and implementation strategies for the respective State/UT. The State's Specific Strategic Plan was prepared on the line of NSSP. The State Strategic Statistical Plan(SSSP) is expected to provide a state with a strategy for strengthening statistical capacity across the entire State Statistical System.

2.3. The Government of Kerala has signed the letter of participation on 7th May 2008 and as per the guide line for the preparation of SSSP and Implementation of the plan. The state government has also constituted a High Level Steering Committee under the chairman ship of Chief Secretary to government, and a Project Management Team, Core team, Special Teams and appointed two consultants for the successful preparation of the SSSP. The SSSP was finalized through wider consultation with all the stakeholders including service organizations. The SSSP thus finalized was approved by the PMT in the meeting held on 28-02-2011 and finally approved by the HLSC in the meeting held on 31-03-2011.

2.4.The project is primarily aimed at supporting the implementation of the vision of the Indian Statistical System to provide within its decentralized structure; reliable, timely and credible economic and social statistics to assist decision making within and outside the government, stimulate research and promote informed data base relating to condition affecting

coordination of statistical activities within the state as also to assist the line department and data providing agencies to improve the quality and coverage of data being collected and promote their use at the state ,district and local level administration. Thus in Kerala twenty Key statistical activities have also been identified and national minimum standards have been defined. Crop statistics is an important activity covered in ISSP. Besides the twenty key areas, state government has identified seven key emerging area Statistical Activities.

2.5 The list of key activities is as under:

1. State Domestic Product Estimates
2. Estimates of Capital Formation and Savings
3. Estimates of District Domestic Product
4. Estimates on contributions of Local Bodies
5. Data on Major Fiscal Variables
6. Annual Survey on Industries
7. Index on Industrial Production
8. Crop Area and Production Statistics
9. Wholesale PRICE Index
10. Consumer PRICE index
11. Health Morbidity. And Family Welfare Statistics
12. Education and Literary Statistics

12A. Statistics on Education Statistics

12. B. School Enrollment Area
13. Labour and Employment Statistics

13. A. Labour Statistics

13. B. Employment Statistics
14. Housing Statistics
15. Birth and Death Registration Statistics
16. Electricity production and Distribution Statistics
17. Environment and Forestry Statistics.

17A. Forestry Statistics

17. B. Water Supply and Sanitation Statistics
18. Participation in survey of the National Sample Survey Organization
19. Transport Statistics.

19A. Motor vehicle Registration Statistics

19B. Road Statistics.

19C.Traffic Accident Statistics

19D.Passenger transport statistics

20. Statistics for Local Area Planning.

Besides these twenty key areas, state government has identified the following key emerging area Statistical Activities also.

1. Gender Statistics.
2. Human Development Statistics
3. Banking Statistics
4. Unorganized sector Statistics.
5. Poverty Statistics.
6. Service Sector Statistics.
7. Non Residents Keralites (NRK) Statistics

2.6 By realizing the strategies and goals, a well-structured and effective implementation plan has been designed for their meticulous execution. Important among them are:

1. State Statistical Commission
2. Technical Advisory Committees and Expert Committees. This includes:
   (a) Expert Committee on Agricultural Statistics
   (b) Expert Committee on Prices and Price Indices
   (c) Expert Committee on Compilation of State Accounts.
3. User Consultations
4. Strengthening of Statistical Co-ordination
5. Integration of Man power planning with Designing and planning of Surveys.
6. Creating Physical Infrastructure
7. Computer and Communication Technology integration
8. Creating positive image in Official Statistics
9. Engendering official Statistics
10. Cadre Structure and personal Management
11. Intensive training and training Institute
12. Restructuring and Empowering of DES

2.7. Each department is responsible for statistics relating to their specific subject areas while co-ordination role rests with the Directorate of Economics and Statistics. It is also required to provide technical advice on statistical activities to other departments of the state. The state Official statistical system is an integral part of the National statistical system and is largely guided by the latter. In April 2009, the Department of Economics and Statistics was declared as the Nodal Agency for all statistical matters in the state including inter-alia co-ordination of statistical activities of various line departments.

CHAPTER-3

EARAS AN OVERVIEW

One of the major activities of the Department is the collection of Agricultural Statistics. The Agriculture Statistics System is very comprehensive and provides data on a wide range of topics such as crop area and production, land use, irrigation, land holdings, agriculture prices and market intelligence, livestock, fisheries, forestry etc. Areas being covered by the department in the collection of Agriculture Statistics are:

1. Crops statistics (EARAS scheme & ICS Scheme)

2. Advance/Forecast estimate of crops

3. Cost of cultivation

4. Price statistics

5. Agriculture census

6. Wages of Agricultural laborers

3.2. Agricultural Statistics is being collected by the department through the scheme of EARAS. The sampling frame used for the selection of samples for EARAS is the Basic Tax Register (BTR.) This is defective due to large conversion of wet land to dry land and which is not reflected in the BTR. There are serious problems in identification of survey numbers and in particular 10acres of land in each cluster.

3.3. The Major weakness of the statistical system of Kerala has been the absence of a clear vision and the related mission. The vision of the state is to equip the statistical system for timely dissemination of adequate, reliable and credible statistics on economics social and environment aspects at all required levels of disaggregation within its decentralized structure so as to enable objective decision making within and outside the government, stimulate research and promote informed debate on all aspects affecting the life of people.

3.4. The strategy for achieving the above vision the department has the following strategic goals.

1. Sustained improvement of adequacy, relevance, reliability and timeliness of official statistics.

2. Up scaling of data dissemination system.

3. Computer and communication technology integration system.

4. Creating Positive Public Image of official statistics.

5. Engendering statistical system.

6. Statistical capacity building at all levels.

7. Statistical product enhancement.

Present System

3.5. Agricultural Statistics is being collected by the department through the scheme of EARAS. The sampling frame used for the selection of samples for EARAS is BTR and the limitation of sampling frame has already been discussed in para 3.2.

3.6. At present 100 clusters having an area of 10 acre each is selected in an Investigator zone for data collection. But the area covered in the sample for area enumeration is much below the optimum sample size of 20percentage required for keeping sampling error within reasonable limit. So the appeal of the field workers to limit the cluster area to 5 acre in a cluster is not advisable and therefore not recommended.

3.7. Identification of these 100 Key plots and forming clusters by adding at least five survey sub-division numbers each in each cluster with an area of 10 acre and yield estimation of different crops from these 100 clusters are the duty assigned to the Investigators. Regarding the yield estimation of different crops, 50 crop cutting experiments have to be conducted by an investigator. Crop wise details of CC experiments planned are -paddy 4x3 seasons =12, (2) coconut 3,(3) Areca nut 2, (4) Cashew 2 (5) pepper 2 (6)Mango 2, (7) Tapioca 2, (8) Banana 3, (9) Plantain 2, (10)Ginger 2,(11) Turmeric 2,(12)Tamarind 2, (13)Cocoa 2, (14) Nutmug 2,(15)Drumstick 2 (16) Sugarcane 2, (17)Betel Leave 2, (18) Jack 2,(19) Sesamum 2. For conducting these 50 crops cutting experiments, at least 50 days are absolutely necessary. More over for conducting crop cutting experiment, frequent visit in the crop cutting plot is also required. Besides this crop cutting experiments, an investigator is also liable to do crop cutting experiment for crop insurance purpose. The crops coming under crop insurance are Banana Plantain, Tapioca and Paddy. Minimum sixteen crop cutting should be conducted at block level for insurance purpose.

3.8 For conducting a crop cutting experiment on coconut, an investigator has to visit five or six times with the selected cultivator because a cultivator plucks coconuts five or six times in a year. Normally an investigator has to select three coconut cultivators having at least five bearing coconut trees per cultivator for crop cutting experiment. For paddy crop cutting experiment minimum three visits are absolutely necessary ie. One visit at plot selection, second at pre-harvest details collection and finally at harvest stage. An investigator has to conduct total four paddy crop cutting experiments from the different part of the investigator zone in one season from randomly selected four cultivators. Thus for three seasons an investigator has to conduct 12 crop cutting experiments (3x4=12). If the Investigator zone consists of two or more panchayats four crop cuttings should be conducted from each panchayat. Thus the work load of the Investigator will increase in accordance with the number of panchayats come under the investigator zone.

3.9. Conversion of wet land for commercial and other purpose was a frequent phenomenon in the recent past. All land even though it is reported as wet within the BTR, which are not used as wet land or could not be converted to wet land should be treated as dry land for the purpose of agricultural data collection.

3.10. Under the scheme EARAS, collection of data for estimating area and yield statistics for every agriculture year was by way of complete enumeration of villages of the state in a phased manner covering 20% of the selected village in each year. During 1993-94 the Investigator Zones were organized by replacing the village to Panchayats. From 2000-2001 onwards the part Panchayat was discontinued and each investigator zone was formed with full panchayat/panchayats. Cluster sampling method is being followed in EARAS scheme in order to obtain representation from the entire area of the investigator zone. By using this cluster sampling method, block level data is generated.

3.11. With the introduction of Crop Insurance Scheme in the state by the Government of India, block level data on area and production have become inevitable.

System design of EARAS

3.12. Under the present system, the state is divided into 811 investigator zones and a multistage stratified random sampling method is followed within the survey. The CD Block/city Corporation and Municipalities are treated as stratum. Municipalities with an area of less than 10sq.kms are merged with the adjoining Blocks and treated as investigator zone. The blocks are divided into a number of investigator zones depending on the area and nature of land. City/Corporation is divided in to three investigator zones. Municipalities with an area of more than 10sq.kms are treated as a single investigator zone.

3.13. In each investigator zone, 100 survey/ sub division numbers are selected randomly from Basic Tax Register (BTR) in each agriculture year and these are the Key survey numbers for cluster formation in the investigator zone. Two identical plots of same category may be selected from left and right sides of the key plot and form a cluster consists of minimum five plots. The area of these 5 plots is expected to have of 10acres.If there is a short fall of 10 acres even after taking of 5 plots, the short fall will be filled by taking the adjoining plots of the left and right plots in an anti-clock direction. A cluster should have minimum of 10 acres of land and a zone have 100 clusters. Thus a zone have minimum of 1000 acres of land for area enumeration and for yield estimation.

3.14. The work of an investigator in the zone is quite high. The BRT kept in the village office is used as the frame of EARAS is not updated and the conversion of quite large wet land into non agriculture use. The wet land area therefore is not correctly reflected in the multiplier and makes estimation erroneous. All these necessitated the revamping of the current system.

CHAPTER-4

CONSTITUTION AND TERMS OF REFERENCE OF EXPERT COMMITTEE

The High Level Committee held on 10-5-2012 under then Chairman ship of Hon'ble Vice Chairman, State Planning Board opined that the method followed in sample surveys are out dated and completely changed due to the outdated Basic Tax Register. The Committee also opined that there are implementation problems in the department of economics and statistics due to the heavy workload of the investigators. Hence the Committee decided to constitute an Expert Committee to study the shortcomings of the present system and recommend measures to correct the deficiencies. More over for the implementation of the state strategic statistical plan, the government have instructed to constitute Technical Advisory Committees and Expert Committees (para 5.2, 5.2.1 of KLSSP document)

4.2. Accordingly, as per the GO (RT).No.210/12/plg dated 08/06/2012 (Annexure I), an Expert Committee has been constituted under the Chairmanship of Sri.M. Neelakantan, ADG(Rtd) NSSO Government of India, MOSPI with the following members to critically analyze the methodology being followed in the EARAS scheme and suggest suitable changes in the sampling design and methodology and other matters of Agriculture Statistics.

4.3.Expert Committee:

1.	Sri. M. Neelakantan, Additional Director General, NSSO (Retired).	Chairman
2.	Additional Director (Price), Department of Economics and Statistics, Kerala.	Member Secretary
3.	Sri. V.J.Iyer, Deputy Director General, NSSO (Rtd).	Member
4.	Deputy Director General, NSSO (FOD), Kerala.	,,
5.	Deputy Director General (AS), FOD, NSSO, Faridabad, New Delhi.	,,
6.	Director, Department of Agriculture, Thiruvananthapuram, Kerala.	,,

7.	Chief of Agriculture, State Planning Board, Kerala.	,,
8.	The Advisor, Ministry of Agriculture and Cooperation, Government of India.	,,
9.	The Director, Space Application Centre, Ahamadabad.	,,
10.	The Director, IASRI, Ministry of Agriculture, New Delhi.	,,
11.	The Director, Department of Economics and Statistics, Kerala.	,,
12.	The Joint Director (EARAS), Department of Economics and Statistics, Kerala.	,,

4.4. Following are the terms of reference of the Expert Committee:

1. To examine critically the methodology of EARAS scheme being followed by the Department in terms of timeliness, reliability, credibility and adequacy. Also to recommend measures to correct the deficiencies and revamp the EARAS Scheme to generate timely agricultural statistics for the purpose of policy decision and planning in agriculture sector.

2. Recommend suitable changes in the sampling design and methodology for EARAS including:-

(i)Unit of sampling frame from survey numbers to households

(ii)Ways and means of updating of existing Basic tax Register (BTR) in the context of wet and dry lands.

(iii).Possibility of considering each Panchayats an investigator zone depending upon their proportionate area.

3. To examine the methodology for the collection of data on horticultural and floricultural crops.

4.To examine the existing data base on Agriculture Productivity, Cost of Cultivation and Farm Price and suggest suitable framework for data collection under the scheme EARAS.

5. To suggest suitable methodology for bringing uniformity in the data being collected by different agencies.

6. To examine the possibility of introducing Information and Communication Technology in the data collection process from field.

7. To provide a suitable methodology for estimating the production of minor crops, fruits and vegetables.

8. To examine a suitable methodology for small area and production estimation.

9. To examine the possibility of maintaining the quality of data by reducing the workload of the primary workers as per the recommendations of National Statistical Commission.

10. Find the possibility of Remote Sensing Application in the collection of data on agriculture sector.

11. To examine the possibility of generating agriculture statistics at disaggregated level i.e., Panchayat or ward level based on the data need for the effective implementation of National Crop Insurance Scheme.

12.Any other relevant item under EARAS.

4.5. During the period under report, unfortunately, the Committee member Shri.V J. IYAR, Deputy Director General NSSO (Rtd) has passed away. Further, Committee member and Joint Director of EARAS Sri.V.Balan, Additional Director (Prices) and Member Secretary of the Expert Committee Sri.T.Gorkey Jose, have retired from service on November 2013 & April 2015, respectively.

4.6. In the first meeting of the Expert Committee held on 21-11-2012, it was decided to invite Sri.A.Meera Sahib the former Director of DES as a Special invitee in place of late Sri.V.J.Iyyar. Committee also decided to invite Sri T.K.Dutta, Adviser (CS) Ministry of Agriculture and co-operation, Government of India as a special Invitee to the 2nd Sub Committee in the 2ndmeeting. Sri.A.K.Srivastava, one of the prominent members of the Expert Committee retired during this period and the Expert Committee decided to include him as a full-fledged member in the EC and utilize his expertise.

4.7. In the Expert Committee meeting held on 13-7-15 it was decided to invite Smt.E. Baby Director (SDP) and Dr.V.Sureshkumar, Director (SDRT) the two newly appointed directors under KLSSSP project to the Committee meetings in future. Sri.K.Damodaran Joint Director, EARAS now working as the Joint Director of Technical Co-ordination has taken charge of the member secretary of the Committee on 20-7-2015 and Sri.N.Ramakrishnan has taken charge of the Joint Director EARAS & member of the Expert Committee on 29-02-2016.

Sub Committees

4.8. In order to give concentrated attention on the tasks given to the Committee with large number of terms of references and complete its recommendations on time bound manner, two Sub Committees were constituted based on the directions of the Chairman as follows.

1st Sub Committee:

Chairman:

Dr. U.C. Sud, Director, IASRI, Govt.of India

Members

a. Sri. A.K Srivastava, DDG,(Rtd) NSSO,FOD,Faridabad
b.Sri. K.R. Manjunath,Head, Crop Inventory & Agro Eco-System
c.Dr. P. Rajasekharan, Agriculture Chief ,State Planning Board
d.Sri.SubrataDhar, DDG,NSSO,Kerala
e.Director of Agriculture
f.Sri. A. Meera Sahib, Former Director DES,Kerala
g.Sri. T. GorkeyJose,Additional Director,DES,Kerala

Specific aspects to be studied and recommendations to be made by the first sub Committees

4.9 All matters relating to sampling design and methodology including sampling frame and procedures of selection and other technical issues, adoption of small area techniques, effective use of BTR, ways and means of use of remote sensing technique etc. (Terms of References of the Committee at Sl. Nos. 1-3, 7,8,10 and 11.)

2nd Sub Committee:

Chairman:

Sri. M. Neelakantan

Members

a. Sri A.K.Srivastava,DDG,NSSO(FOD)Faridabad
b. Sri. S. Dhar DDG NSSO Thiruvanathapuram
c. Sri.A. MeeraSahib,Former Director DES
d. Adviser, Minsitry of Agriculture, New Delhi.
e. Sri. V. Ramachandran,Director General DES
f. Sri. T. Gorkey Jose, Additional Director DES(prices)
g. Dr.P. Rajasekharan, Chief (Agriculture), State Planning Board. Kerala
h. Sri. R. Balan, Joint Director, Dept. of Economics & Statistics

Specific Areas to be covered by the second sub Committee

4.10 To examine the work load of investigators, staff position, information and communication technology, agriculture productivity, cost of cultivation studies, uniformity in data collection etc. and other areas of improvement. (Rest of the Terms of References of the Committee)

Expert Committee meetings

4.11 Expert Committee both main and Sub Committees together conducted 15 sittings in all. The details of Committee sittings are appended in the annexure-III.

CHAPTER -5
DELIBERATIONS AND MAJOR RECOMMENDATIONS OF EXPERT COMMITTEE

DES and for other aspects in respect of agriculture statistics mentioned in TOR, the Committee critically examined the following issues in detail and decided upon taking up activities on each by way of understanding the field problems, initiating pilot studies, discussion on methodologies of data collection, analysis of past data and application of latest technologies.

1. Requirement of additional staff to meet the increase in the workload of primary workers and supervisory staffs for EARAS and to generate Agriculture statistics at local level

2. Modification in statistical design of EARAS for area and yield estimation in the light of the field problems as reported and observed through ICS scheme of Government of India. The committee suggested conduct of pilot study for arriving at appropriate recommendations for improvement of EARAS.

3. Application of Remote Sensing Methodology for crop area estimation based on study by Space Application Centre Officers in Palakkad and Alappuzha districts.

4. Analysis of data on productivity of paddy in Kerala.

5. Cost of cultivation survey-comparison of methodology followed by the DES and Ministry of Agriculture, Government of India.

6. Discussion on the methodology of data collection for other agriculture commodities by different organizations and the role of DES to reorient the present methodology to make it statistically sound and ensure that the data collection is without any bias.

7. Strengthening the capacity of field staff through initiatives in the area of ICT, Networking, Software development etc.

5.2. Work load of the Investigators- (TOR-1)

5.2.1 The Expert Committee's first terms of reference was to examine critically the methodology of EARAS Scheme being followed by the Department in terms of timeliness, reliability, credibility and adequacy and to recommend measures to correct the deficiencies and revamp the EARAS

Scheme to generate timely agricultural statistics for the purpose of policy decision and planning in agriculture sector.

5.2.2. The Committee went through this subject and noted that agricultural statistics of Kerala was collected through the land utilization surveys conducted every year by the department till 1975-76. The area, Production, Yield and Yield rate of various agricultural crops and land utilization etc were estimated on the basis of the data collected through the land utilization surveys. But the estimates prepared at Taluk/District level were not considered satisfactory on account of small sample size and coverage and quality aspects. At this juncture, the Government of India sponsored the scheme of EARAS in three permanently settled states of Kerala, Orissa and West Bengal as a variant to the TRS Implemented in other states. There are 811 Investigators representing 811 Zones to collect agricultural statistics from 1046 local bodies(earlier it was 1053) Grama Panchayats including municipalities and corporations(3 investigators in one corporation).The basic frame for EAEAS data collection is the Basic tax Register maintained by the Revenue Department.

5.2.3. The Committee deliberated in detail about the ESRAS system and observed that there is no such serious problem in the present methodology but there are problems related to non-updating of the basic tax register by the Revenue Department. The problem is with the frame used and estimation procedure followed in the EARAS scheme. Now Basic Tax Register kept in the village office is being used as a frame for selecting 100 clusters in each investigator zone. Out of these 100 clusters, the numbers of wet and dry clusters are re-allocated in a Panchayat in proportion to wet and dry land area of the Panchayat. As BTRs are not updated regularly as and when changes take place in the area of wet land due to conversion, this is getting reflected in the multiplier .The multiplier used for area enumeration is:

Total area of the panchayath (D+W)

Enumerated area of the panchayath (D+W)

5.2.4. Here, the Dry/Wet area of the Panchayat is taken from the corresponding BTR and the actual enumerated area of the Dry /Wet land is collected by the investigator from the field. But actual dry/wet area of the Panchayat taken from the BTR is not correct and hence the estimates of area are affected which is the limitation of the existing sampling design.

5.2.5. An investigator zone under EARAS Scheme covers one or more Panchayats in some districts. An investigator get 200 working days in a year after deducting holidays, leave days etc and considering the days he has to be in the office for office duties and other assignments like preparation of progress report and other related tasks. In these 200 working days, one investigator has to visit 100 clusters of wet and dry plots (wet-3 visits, dry-two visits). All seasonal crops have to be enumerated by the investigator in the first and second visit in the wet land and first visit of the dry land, and all seasonal, annual and perennial crops have to be enumerated and counted by the investigator during the second visit. It is very difficult to complete one cluster per day in hill terrain like Idukki and Wayanad districts and districts where resurvey records are not available for enumeration purpose. Another important work of the investigator at the field is yield estimation. One investigator has to conduct total of 50 crop cutting experiments.(The number of crop cutting experiment on each crop are :-1) paddy 4x3 seasons =12, (2) coconut 3,(3) Arecanut 2, (4) Cashew 2 (5) pepper 2 (6)Mango 2, (7) Tapioca 2, (8) Banana 3, (9) Plantain 2, (10)Ginger 2,(11) Turmeric 2,(12)Tamarind 2, (13)Cocoa 2, (14) Nutmug 2,(15)Drumstick 2 (16) Sugarcane 2, (17)Betel Leave 2, (18) Jack 2,(19) Sesamum 2. For conducting these 50 crops cutting experiments, at least 50 days are absolutely necessary. More over for conducting crop cutting experiment, frequent visit in the crop cutting plot is also required. Besides this crop cutting experiments, an investigator is also liable to do crop cutting experiment for crop insurance purpose. The crops coming under crop insurance are Banana Plantain, Tapioca and Paddy. Minimum sixteen crop cutting should be conducted at block level for insurance purpose. This is in addition to the above stated normal crop cuttings. Therefore the workload of the investigator is due to:-

1. Conducting three visits in the wet land
2. Enumerating all seasonal crops in all three seasons
3. Conducting more crop cutting experiments.

5.2.6. In addition to the above situation, with the 73rd and 74th amendment of the constitution by the enactment of the Panchayat Raj Nagarapalika Bills, the need for local level statistics has aroused. The collection of local level statistics is not possible in the present set up by utilizing the service of the existing field staff. If one investigator is posted in one local body, local level statistics of the concerned local body can be collected by utilizing their service.

5.2.7.Besides the 811 posts sanctioned under EARAS scheme for doing the field work of the sample survey, additional 242 number of investigator posts are required for the collecting data from all local bodies.(978 Grama Panchayats+60Municipalities+5corportions(3postsin each corporation))That is 1053-811(existing strength)=242.(now total GP comes 1046) Apart from that if an investigator is attached to a local body, the investigator can do the work of the Data Manager in the respective local body. Moreover the investigator can collect local level data pertaining to other sectors of the local body.

5.2.8. Local level statistics is most essential for the successive implementation of the decentralized planning. Action has been taken to post one statistical investigator in each local body as a data manager by using the service of the existing staff of the department.

5.2.9. As per the report of the Vaidyanathan Committee,there are 3 permanently settled states in which the department of economics and statistics collects the data on agricultural statistics through the field staffs qualified in statistics and sample surveys and in the remaining state the department of revenue is responsible for conducting survey through their staffs. The data quality of these three states is much better in comparison with other states. He has therefore recommended other states to follow EARAS Model. In his opinion, there are serious operational problems in the conduct of the TRS as reported by NSSO through its ICS Scheme.

5.2.10. Observing the above facts, the Committee find that the entries in the BTR are not getting updated regularly which affects the sampling frame and subsequent procedures, formation and selection of cluster and key plots. The Committee assessed the EARAS system in Kerala and found that the survey design in EARAS in Kerala is unique and entirely different from other EARAS states. The Committee noted that the system prevailing in Kerala is definitely better one compared to other states. The Committee also observed that the DES staff has been under taking the work as best as possible in the given circumstances with the documents available.

5.2.11. The Committee however felt that the EARAS scheme needs closer scrutiny with regard to the limitations of sampling design due to use of un-updated sampling frame and also operational problems faced by the field staff in the conduct of the survey.

5.2.12. The Committee critically analyzed the above scenario and came to the conclusion that considering the heavy work load in the investigator zones having wet land area of 3000acres and above, additional

103 statistical investigator posts are absolutely necessary for this department for realistic data collection and balanced field operations. Creation of 103 additional posts will be more effective to the decentralized planning process of the local self-government as well as the State Government. These posts should be 51 Statistical Investigator grade 1 posts and 52 Statistical Investigator grade 2 posts.

5.2.13. The distribution of the proposed 103 additional statistical investigator posts to the districts was suggested by the Committee in the following manner keeping in view the estimated workload and all other relevant factors:

Name of District	Total no.of Zone	No.of zones having morethan 3000Acre of wet land	No.of additional Zones required	No. of additional posts required
Trivandrum	61	0	0	0
Kollam	52	0	0	0
Pathanamthitta	38	2	2	2
Alappuzha	44	19	19	19
Kottayam	58	10	10	10
Idukky	38	0	0	0
Ernakulam	66	13	13	13
Trissur	73	14	14	14
Palakkad	87	28	28	28
Malappuram	81	5	5	5
Kozhikkode	56	1	1	1
Wayanad	3	3	3	3
Kannur	71	4	4	4
Kasaragode	50	4	4	4
TOTAL	**811**	**103**	**103**	**103**

5.2.14. According to DG DES, the additional expenditure expected by creating these additional 103 posts is Rs 3.66 crores per annum. The Committee recommended that Government of Kerala may take up with the Union Government, Ministry of Agriculture the proposal to create the additional posts of 103 Investigators under the EARAS Scheme if the additional expenditure in this regard cannot be met by the State Government in view of shortage of resources. As has already been stated earlier, the EARAS Scheme was originally sanctioned by Government of India, Ministry of Agriculture and Cooperation.

Recommendation

5.2.15. Considering the work load of the investigators and the essentiality of the additional hands to carry out the current field situation in a balanced manner, this Committee strongly recommended creating additional 103 posts of statistical investigators. Committee was convinced that these 103 posts of statistical investigators are very essential to this department for effective field operations and for decentralized planning process of the local self-government as well as the State Government. A detailed proposal for the creation of 103 posts was submitted to the government on 23/09/2014&13/04/2015 as per Letter No.EARAS /KSSSP/29514/DES, and after intimating the refusal of the said proposal from the government due to financial stringency, again a detailed proposal was submitted as per the direction of the Expert Committee on 25/03/2017. As stated in para 5.2.14 Government of Kerala may be requested to take up with the Union Ministry of Agriculture the proposal for creation of these 103 additional posts of investigators to meet the increased workload.

5.2.16. After due thoughts and consideration by Experts, the Committee came to the conclusion that in India in the National Sample Surveys covering Agriculture Statistics sector (TRS and ICS), area and production estimates are arrived at based on revenue records and not based on household approach taking into account the clear advantages of such a system and the merits of this system have been well recognised. As for EARAS, the best sampling frame is use of an updated BTR and what is required is periodic updating of the same by revenue authorities and in Committee's view there is no need to experiment with farmers approach. This would also ensure quality of agriculture statistics. So all efforts should be made to use updated BTR for the survey. Updated BTR may be made available to the field staff of the DES. Action to speed up the digitalization of BTR by the revenue department may be taken in a war foot manner.

5.2.17. The Committee therefore recommends continuation of the existing practice in case of unit of sampling. Chairman suggested DES to write to the government to advice Revenue Department suitably for providing updated BTR and resurvey records for the smooth conduct of the EARAS survey. Accordingly two letters -No EARAS/KSSSP/29514/DES dated.18/2/17 and 24/3/17were forwarded to the government for quick favourable action.

5.3. Modification in sampling design. (TOR-2)

5.3.1. The Second Terms of Reference of the Expert Committee was to recommend suitable changes in the sampling design and methodology for EARAS

5.3.2. Field issues and related problems of EARAS as already explained in the previous paras, speak of field reality and problems faced by the investigators. In order to reduce the work load and resolve the issue of un-updated frame, the Committee suggested for conducting a pilot study in five panchayats in five districts in the state in which a modified sampling procedure may be used.

5.3.3. It was suggested that instead of taking 100 clusters in proportion to wet and dry Area, take 80 clusters randomly without wet and dry classification. After enumeration, wet and dry area can be disseminated by post stratification based on the field observations and this will reflect the real situation. Pilot study aims at testing the feasibility of the proposed changes in sampling design.

5.3.4. The selected districts in this regard are Kasaragode,Wayanad, Ernakulam, Alappuzha, and Idukki. The criteria for selection of district are different. It will be one zone consisting of two Panchayats, or part of the Panchayat or one municipality, or one corporation or a zone of a hilly district. The coverage of pilot study is restricted to one season only as pilot study is related to area part only and not for getting yield estimates. It was decided to start the pilot study in July 2015 and complete the work within 3 months.

5.3.5. There was shortage of adequate funds in the KLSSSP project to conduct the pilot study during 2014-15, and hence the pilot study could not be started at the prescribed time schedule. Subsequently after the placing of sufficient funds in the year 2015-16, the pilot study was taken up in 5 districts on 17/08/2015.

5.3.6 There was unexpected delay in the field work at Idukki, Alppuzha and Ernakulam districts due to non-availability of retired hands who were given the field work. As apprehended, the field functionaries were not available in these districts. One field functionary left the field work in between in Alappuzha district. For Idukki district double the honorarium had to be paid for the field work since no field worker could be found to take

up the venture in this hilly district with the recommendation of the Committee. All these created problems in completing the field work in time.

5.3.7. The Chairman of Expert Committee Sri. M. Neelakantan, and members Sri.A.Meera Sahib, Former Director DES and Sri. M.Madhusudanan, DDG, NSSO, undertook field inspection in three different districts and provided on the spot guidance and instructions to field staff to resolve filed problems. Besides, Shri.V.Ramachandran, DG and Sri. K. Damodaran, Joint Director, DES also conducted field inspection of the pilot study. Field inspection was also done by Deputy Directors, Additional District Officers, Taluk Statistical Officers and Statistical Inspectors thereby covering all districts. This helped in successful completion of field work. During the field inspection paddy crop was generally not found cultivated in the sample Panchayats selected for pilot survey. This was a limitation in data analysis.

5.3.8 The Pilot study was planned in one Panchayat each of 5 selected districts. Among the 5 Panchayats selected, 4 Panchayats used the BTR kept in the village as the frame for the survey and details of crop in the survey subdivision wise were collected for area and yield estimation whereas in one Panchayat of Idukki District due to operational issues, household survey data was collected. As such the data of 4 Panchayat only could be processed for wet and dry area estimates using equal probability without replacement sampling design as well as the theory of domain estimation. The data collected in the pilot study in 4 Panchayat were analyzed at Indian Agricultural Statistics Research Institute (IASRI) under the supervision of Expert Group member Dr.U.C.Sud Director, IASRI, New Delhi.

5.3.9. While scrutinizing the data collected in pilot study it was noticed that in a few sub survey numbers wet and dry area both was reported. In such cases, the minor proportion of the wet /dry land was neglected and the sample was considered for the major type of land.

5.3.10 The estimates obtained by domain estimation approach using a sample of 80 clusters using overall multipliers give encouraging results in terms of the Percentage standard errors (SE) of estimates except for one Panchayat where percentage SE obtained is as high as 19.22 for wet area cluster. In all other cases percentage SE is less than 10. The result of the pilot study in terms of multiplier, estimated total wet and dry area and percentage standard error for wet and dry area in each Panchayat is presented in the following tables.

Table 1 Gram Panchayat wise estimates of wet and dry land areas along with their Percentage Standard Errors

Domain	Est_total	Est_%SE
Kasaragod		
Wet	873248.60	6.37
Dry	576675.90	7.48
Wayanad		
Wet	263197.80	8.22
Dry	620038.10	4.62
Ernakulam		
Wet	18387.92	19.21
Dry	624586.30	2.88
Alapuzha		
Wet	67742.90	12.72
Dry	459166.5	2.80

5.3.11. In the second phase of analysis of data of pilot study, the crop wise area collected in a sample of 65 clusters out of the 80 was used to estimate the crop area of important crops. The results are presented below.

Table 2 Gram Panchayat wise estimates and percentage standard errors of area under major crops for wet and dry land areas

Crop Name	Alappuzha				Kasargode			
	Estimates		Estimated % SE		Estimates		Estimated % SE	
	Wet $\left(\hat{Y}_i\right)$	Dry $\left(\hat{X}_i\right)$	Wet	Dry	Wet $\left(\hat{Y}_i\right)$	Dry $\left(\hat{X}_i\right)$	Wet	Dry
Coconut	24815.78	104597.52	4.069	1.508	260008.20	124389.74	2.417	3.352
Arecanut	16210.21	5795.54	0.558	1.78	5471.02	3758.32	4.648	5.950
Cashew	358.43	2981.95	18.223	3.093	812.19	2347.52	16.186	9.275
Pepper	713.71	3460.44	7.928	2.382	352.54	1332.325	13.865	9.319
Jack	4312.02	16669.97	4.637	1.635	6728.15	6264.49	3.953	5.074
Mango	5640.07	28416.71	4.553	1.567	16210.21	8190.87	3.541	4.819

Crop Name	Wayanad				Ernakulum			
	Estimates		Estimated % SE		Estimates		Estimated % SE	
	Wet $\left(\hat{Y}_i\right)$	Dry $\left(\hat{X}_i\right)$	Wet	Dry	Wet $\left(\hat{Y}_i\right)$	Dry $\left(\hat{X}_i\right)$	Wet	Dry
Coconut	8847.55	74350.87	9.039	1.611		145471.60		0.2669
Arecanut	37656.83	61120.16	5.510	1.540		7733.62		0.3604
Cashew	214.74	2934.61	66.068	5.083		483.95		3.1941
Pepper	2782.19	52431.2416	15.092	1.760		2172.33		0.5315
Jack	2748.56	120133.65	15.355	1.493		14599.61		0.3594
Mango	2117.14	62816.69	12.552	1.487		28753.97		0.3036
Rubber	NIL	42281.64	NIL	4.703	NIL	NIL	NIL	NIL

5.3.12. Based on the pilot study, estimates with acceptable level of standard errors of crop area estimates, IASRI has suggested the new sampling methodology under EARAS using double sampling approach.

The new Sampling Methodology

5.3.13. The new sampling methodology proposed to adopt post stratification technique for estimation of area under wet and dry clusters in the investigator zone by selecting a larger sample in the procedure of selection of cluster while a smaller sample is used for estimation of area under major crops and its standard error. The sample size too has been proposed to be suitably reduced in both the phases to ensure quality data collection.

5.3.14. The cluster sampling adopted in EARAS required formation of clusters such that around 10 acre area is covered in each cluster. In doing

so, quite often the constituent plots of the cluster are made of a group of many sub divisions / sub survey numbers. The area under the different crops in each 5 constituent plot is used for estimation instead of sub division wise crop area. In order to reduce the work load without any loss of precision, double sampling approach has been used. While multiplier for crop estimation is obtained using cultivated area of 80 clusters, for crop wise area estimation, a reduced sample of around 65 clusters are considered and crop area recorded in the constituent plots have been used.

Estimation procedure

5.3.15. It is proposed to select the sample within an investigator zone/Gram Panchayat in two-phases for the estimation of crop area at the level of investigator zone. In the first phase (larger sample, say, 80 clusters) is to be selected by Simple Random Sampling Without Replacement (SRSWOR) design. In the first phase, data are to be collected on the wet area/dry area. The second phase sample (smaller sample, say, 65/60 clusters) is to be selected from the already selected first phase sample also by SRSWOR design for enumeration of crop area in each of the constituent plot.

Special Aspects of Idukki District.

5.3.16. The new sampling methodology is based on the analysis of the pilot study results of four districts. Data from the Idukki district is not amenable to the procedures used in the analysis as a different approach has been followed for sample selection of survey/subdivision /plots in the case of Idukki district which is based on the cultivators list and it is therefore different from the standard procedure of sample selection in EARAS. In order to analyze the actual field situation of Idukki district the Expert Committee members conducted field study in Idukki. For comparing the field situation of Idukki with other districts, Committee members visited two adjacent villages namely Kothamangalam and Neriamangalam village offices of Ernakulam district.

Expert Committee meeting at Munnar, Idukki held on 23/2/2017

Specific features of Idukki District

5.3.17. There are 52 Grama Panchayats and 2 Municipalities. Out of these three panchayats - Munnar, Devikulam & Edamalakudy are excluded from EARAS survey, because these three Panchayats, are mainly of plantations. The remaining 49 Grama Panchayaths and 2 municipalities are divided into 38 investigator zones. There are 65 villages and out of these 35 villages are re-surveyed and the Block Maps and FMBs are available in the concerned village offices for EARAS work. But in the remaining 30 villages re-survey work has not yet completed where litho maps or FMBs are not available.

Present practice:

5.3.18. In Idukki district, mainly two types of methodologies are followed for EARAS survey. First one is for the fully re-surveyed investigator zones, and the second for the not resurveyed and the partially re-surveyed zones.

1.Fully Re-surveyed 18 investigator zones:

In these 18 investigator zones, as the usual method is being followed, Basic Tax Registers are used as frame for Key plot selection. The investigator serially lists the survey sub divisions in ascending order. Then by using circular systematic random sampling method, they select 100 key plots for cluster formation. In these 100 key plots, the number of wet and dry key

plots would be pre decided according to the area proportion. Then with the help of Block Maps and FMBs the investigator forms clusters as usual.

2. Not fully Re-surveyed 20 investigator zones:

In this category, generally 2 situations are seen.

(a) Partially resurveyed Zones-- 12 nos.

(b) Not yet resurveyed Zones-- 8 nos.

In these investigator zones, new or old BTRs are used according to availability. In these villages some survey nos. are minor circuits (Area more than 20 acres). These minor circuits are divided into cultivator wise parcels with the help of *Thandaper Register* and accordingly sample selection is done. New BTR's are used in case of resurveyed villages whereas modified old BTR's are used in non resurveyed villages.

Committee also found area under minor circuit varies from 20 acres to even more than thirty thousand acres. Therefore the field staff faces serious field problems particularly in travel for data collection. Further in some cases, a single subdivision in a survey no. with a minor circuit has huge area extending to even 38000 acres, which is spread into 6 Panchayats. So one can imagine the very heavy unmanageable workload in such cases.

Therefore, the field staff has to list sometimes even more than 10 thousand cultivators initially, using Thandaper Register and update them annually. All these call for special treatment in Idukki district, both in terms of procedures and additional manpower to cope with the workload.

During discussions, the District officials also apprised the Committee that there is no chance of Government Purampoke land being included in the sampling frame for selection of Key plots and therefore it is not part of the universe. So the Committee viewed that this practice is technically sound and could continue until such land attains legal ownership with assignment of Pattas by Government which is learnt to be an ongoing process.

Recommendations.

5.3.19. As discussed above, it was observed that there is no chance of Govt. Purampokku being included in the frame of selecting the key plots and hence not the part of the universe. In such a situation, the Committee recommends that if following thumb rule viz considering only the land coming under the village records except Government purampokku in BTR, there may not be any confusion. If so, only land except Govt.purampokku will form the frame under EARAS. As and when part of Govt. purampokku land attains legal ownership and patta assigned by the Govt, they will

automatically come under BTR as well as EARAS frame. When the investigators revise the BTR annually he/she can include it in the list of plots and the change in the total area as well. So the Committee observed that the EARAS Survey is limited to area coming under BTR land except Govt.purampokku. The Investigators should take utmost care in forming the cluster limited to the BTR area. So, the question of inclusion of Govt. purampokku does not arise at present. During the deliberations with the district functionaries, the Committee also learnt that area under cultivation of different crops in such Govt.purampokku is rather negligible compared to the total area of the district. If a key plot happened to be coming in the side of the minor circuit (example south west corner)there is chance to consider the Govt.purampokku for the formation of cluster as side plots. That eventuality should be carefully handled by rejecting such side plots from Govt.purampokku and consider the other side and up or down plots adjacent to key plot.(Usually this is practiced when the side plot is coming on river side, road side ,side of the plantations, side of the forest etc .

5.3.20. The Committee observed that the exclusion of Govt.purampokku from the frame of EARAS survey will not affect the estimation procedure. The Committee further observed that the inclusion of Govt.purampokku will create identification problems in the field and it is better to include this type of land on completion of resurvey work.

5.3.21. The Committee also recommends that there is adequate justification for providing additional resources of field investigators taking into account the difficult topography, extra travel time and survey time required for them to complete the work in time and with the desired quality of data. Committee also noted in this context that the problem found in Idukki district is not an isolated one. It is found in difficult terrain of the hilly tracks and Western Ghat areas. Even special consideration is given in Central NSS programmes in view of difficult field conditions. Further, the present composition of IV Zones may also be reviewed considering the huge area of Panchayats justifying formation of additional IV Zones in the State as a whole to keep the workload in an IV Zone under control. DG may therefore take suitable action urgently on these two recommendations as well.

5.3.22. The Committee further observed that an area of 20 metre width land around the forest lying in between the forest land and revenue land is being cultivated by the farmers. This land has no legal ownership and this is considered as “non man land”. The details of this land, its area, and cultivation are not recorded in the village record or anywhere. This can

be seen throughout the forest boarders of Kerala in Western Ghats. At present this is not coming under the BTR regime. The Committee observed that this has also to be treated as Govt.purampokku land and when it attains legal title and include in the revenue records with maps or identifiable drawings these area can also brought under the command of EARAS. If Govt. decides to have the data on the land described above as non man land DES propose a separated study after formulating a suitable methodology ,separate from EARAS. This will help to report the area and crops, and can arrive at the total area and production of the district concerned. This can be done for all Govt.purampokku land including 'No man land'

5.3.24. With regard to the area coming under Aerodrome, Army camp Canal, Back waters etc from the frame and further estimation process, Committee observed that the post stratification method in the new design shall take care of it.

5.3.25. Since the modified sampling design and procedure are superior to the existing one in use, on the findings of the pilot study, the Committee recommended drawing appropriate action plan with timelines on the implementation schedule with suitable mile stones for ensuring timely start.

5.3.26. To test the feasibility of the newly designed sampling methodology, DES is advised to conduct field testing in one zone each in Coastal, Middle and High land districts as proposed by the Chairman.

5.3.27. Committee also recommended getting the approval of the State High Level Co-Ordination Committee on agricultural statistics to the new methodology before its implementation.

5.3.28. Committee also recommended using the updated BTR as frame for the EARAS

5.4. Methodology for collection of data on area and production on Horticulture and Floriculture, and Minor Crops and Fruits and Vegetables (TOR 3&7)

5.4.1. The Committee was informed that at present DES do not have any data on area and production of fruits and vegetables based on scientifically conducted sample surveys. In fact, it was also noted that even at national level, there is no standard methodology as yet developed by Ministry of Agriculture and work in this regard is still in progress. The Chief

of Agriculture Division, State Planning Board explained their thinking on the subject in meetings of the Committee. He also brought out their demand for such data at local level for decentralized planning. Status of availability of data is the same in case of horticulture sector also. It was however observed that households/ cultivators have been pursuing production of fruits and vegetables in large quantities in the state for marketing purposes.

5.4.2. During discussions regarding the methodology suggested by Planning Board for a full-fledged survey on fruits and vegetables, for the estimation of area and production of fruits and vegetables at Panchayat level, the Committee generally observed that the methodology proposed by them needs further critical review with regard to sampling design in particular as it was not a commonly accepted methodology. DES was advised to discuss the matter further. The Committee however endorsed the need for getting data related to area and production of vegetables and fruits in Kerala not only at state level but also at panchayat level for the purpose of formulation of various government policies. But the estimates of fruits and vegetables at panchayat level are not in any case available in the DES either as part of EARAS or otherwise.

5.4.3. During discussions, it was brought out that VFPCK is an organization of Kerala Horticulture Development Programme and is making efforts for developing a data base in this sector. The market information centre of VFPCK collects price data of vegetables and fruits from 16 vegetable markets in Kerala and 4 out of state markets. The data collected provides details regarding the wholesale price and retail price of major fruits and vegetables which are produced inside and outside the state over phone on daily basis. The detail regarding arrival of fruits and vegetables from outside the state is also reported. The Committee stressed the need for a reliable data on fruits and vegetables and also a suitable methodology for its calculation.

5.4.4. The Committee subsequently discussed in detail the proposed methodology with the Planning Board. The Committee observed that methodology proposed was to use the details of 2011 census as frame. Around 300 to 400 households from each panchayat (30 to 40 clusters of 10 households) may be selected for the conduct of the survey. From each cluster, one farmer house hold may be selected for detailed enquiry. At the listing stage, crop wise area of major crop including fruits and vegetables are to be collected. In the detailed enquiry, the yield rate of crops, production, method of harvesting, frequency of harvest etc may be collected in detail. In addition to the above, a list of agricultural holdings with large extent and institutional holdings may be prepared for group discussion with local representatives and key informants of the Panchayat. The entire data may be collected by direct oral enquiry with the farmers. The Panchayat level co-ordination may be made by combining the data collected from farmer households, along with the data collected from institutional households. After detailed deliberations on all pros and cons of the relevant issues, the Committee concluded that the present sampling design of EARAS in any case is not suitable to provide production estimates at Panchayat level as part of EARAS. More time and resource are required to develop suitable methodology to estimate the production of fruits and vegetables as also horticulture even at state level.

5.4.5. The Committee also suggested that the VFPCK should try to reorient its infrastructure for improving the methodology in data collection with a view to meet emerging requirement of knowing the production and other related indicators in respect of Fruits and Vegetables sector in the state with technical collaboration of DES.

5.4.6. The Committee also was briefed by the Officers from Ministry of Agriculture, Horticulture Division about the Pilot Survey launched in five states as per sampling design provided by IASRI under CHAMAN Project involving field collection of data and analysis of remote sensing imageries.

The field work is currently in progress and the Committee felt that it needs to discuss the matter further before arriving at a draft methodology for the conduct of Fruits and Vegetables Survey in the State as MOA itself is re-examining the methodology. It was therefore noted that it is prudent for DES to await the recommendation from the pilot study which is in progress before taking further action in the matter.

5.4.7. Chairman has requested the Horticulture Division to include Kerala also as a participating state under CHAMAN Project which has been agreed to be considered after the existing field survey is completed and report finalized for consideration by all concerned. IASRI, MNCFC, and MOA (Horticulture Division) are fully involved in the matter of evolving a suitable methodology for this survey.

Recommendations

5.4.8. Since the outcome of the newly designed methodology for the calculation of fruits and vegetables estimates under CHAMAN Project of Govt. of India will be completed shortly and report would be available by end of this year, the Committee recommended to wait for completion of this study and examine the outcome of the results to accept an approved methodology in this respect.

5.4.9. As there is no established methodology for the estimation of production of floriculture, the Expert Committee recommended that the DES may explore the possibility of conducting a pilot study on floriculture using available resources and examine the feasibility of collection of data.

5.5. Analysis of data on Productivity of Major Crops (TOR-4 (i))

5.5.1. This is based on the Fourth Terms of Reference ie to examine the existing data base on agricultural productivity, cost of cultivation and farm price and suggest suitable frame work for data collection under the scheme EARAS.

Productivity of Major crops

5.5.2 As stated in the terms of references with regard to the productivity of crops, the Committee examined the trend in productivity over the 5-10 years in respect of various crops.Annexure-1V

Rice

5.5.3. The Committee analyzed the productivity of rice for the period from 2008 to 2012-13. The state average productivity of rice showed an increasing trend from 2520kg/Ha in 2008-09 to 2577 kg/Ha in 2012-13.The productivity of Rice has increased to 2.26 percentages during the above period. Comparing the productivity of rice in the districts, the productivity was very high in Pathanamthitta (3208kg/Ha) and Alappuzha(3089kg/Ha) and was very low in Kozhikkode(1270kg/Ha) and kannur (1783kg/Ha). Generally there is a declining trend in the district wise productivity of rice. Aannexure-V.

Coconut

5.5.4. During 2006-07 the productivity of coconut at state level was 6935 number of nuts per hectar. It rose to 7365 numbers in 2008-09.It declined to7278 numbers in 2009-10 and again declined 6862 numbers in 2010-11 and showed a slight increase to 7237 in 2011-12.Productivity of coconut is highest in Malappuram(8670nos/Ha) and lowest in Wayanad(4565nos/ha) and Kasaragode(3515nos/Ha) districts

Arecanut

5.5.5.The productivity of Arecanut showed an increasing trend from 2006-07 to 2011-12. It was 1077kg/Ha in 2006-07 and in 2011-12 it increased to 1163kg/Ha. As in the case of coconut the productivity of Arecanut showed a decreasing trend(1001kg/Ha) in 2010-11.The productivity is highest in Kasaragode2887kg/ha) and lowest in wayanad(379kg/Ha)

Tapioca

5.5.6. There was an increase in the productivity of Tapioca during 2006-07 to 2011-12 except in the year 2010-11.It was 28911 kg/ha and 34419kg/Ha in 2006-07 &2011-12 respectively. Comparing the districts the highest productivity is in Wayanad(52505) and lowest in Kozhikkode (21732kg/Ha)

Raw Cashew

5.5.7. The productivity of cashew showed a decreasing trend during the above six years except 2007-08. It was 875 kg/ha in 2006-07 and it increased to 898 kg/Ha in 2007-08. There after there was continuous decrease in productivity and it went to 680kg/ha in 2011-12. With regard to productivity, Kannur district stand first (1044kg/Ha) and Alppuzha stands the least (214kg/Ha).

Black Pepper

5.5.8 From 2006-07 to 2010-11 the productivity of pepper showed a drastic declining trend and a high increase in 2011-12.It was 297kg/Ha in 2006-07 and it decreased to 239,221,248 and 263kg/ha consecutively in the years of 2007, 2008,2009,&2010. Idukky District stand in the first place(528kg/ha) in the case of productivity and Kozhikkode district is the least(180kg/ha).

Banana

5.5.9.In the case of Banana we can see that there is no continuous increase or decrease in Productivity. During 2006-07 the productivity was 7841kg and it decreased to 7411kg in 2007-08,again it increased to 7965 kg/ha in 2008-09,again it decreased to 7923kg in 2009-10.During 2010-11 & 2011-12 it increases to 8244kg and 8703kg respectively. Productivity of banana is high in Ernakulam(9602kg/ha), and Kasaragod(11406kg/ha) districts and lowest in Thiruvananthapuram district(5618kg/ha).

Plantain

5.5.10. There is a fluctuating trend in the productivity of Plantain. During 2006-07 it was 8205kg/ha.In2007-08 to 2011-12it was 7629kg, 7923kg7082kg, 7201kg and6783kgrespectively. During the above period Productivity was very high in Thiruvananthapuram (10568kg) Pathanamthitta (10274kg) and Palakkad (12359kg) districts, whereas it was low in Kannur(3636kg) and Kozhikkode (3735kg) districts .

Jack

5.5.11.There was a continuous decrease in the productivity of jack fruits for the period from 2006-07 to 2011-12 except the year 2010-11.During the last five years the productivity is highest in Thiruvananthapuram(5085nos/ha in 2006-07) district and lowest is in Wayanad(2005nos/ha in 2008-09).

Cocoa.

5.5.12. A mixed trend in the productivity of cocoa can be seen during the year 2006-07 to 2011-12.During 2006-07 its productivity was 540kg/ha and it increased to 1122kg/ha in 2011-12. In-between these years the productivity was fluctuating. From the year 2006 it increased to 656kg in 2007, it decreased to 575kg in 2008, again it decreased to 512kg in 2009 and then increased to 695kg in 2010.Pathanamthitta, Alappuzha,Kottayam and Idukki districts shows highest in productivity. Productivity of cocoa is least in Idukki district.

Sesamum

5.5.13. Sesamum is not cultivated in all districts. There was no cultivation of sesamum in Thiruvananthapuram,Pathanamthitta,Kottayam and Kozhikkode districts during the above period. Cultivation of sesamum was rare in Wayanad, Kannur and Kasaragode districts. Its productivity showed a decreasing trend except the year 2008-09.During 2006-07 it was 402kh/ha and in 2011-12 it was 386kg/ha and in 2008-09 it was 536kg/ha. Highest productivity was in Kollam(675kg in 2010) and least in Palakkad district(111kg in 2010).

5.6. Production and consumption of Rice in Kerala From 2007 to 2012.

5.6.1. During the year 2007 the production and consumption of rice in Kerala was 528488& 3196341 tonnes respectively. Considering the population of the same period, the production gap of rice is 2667853 which come 83percentage .This shows that we are producing only 17 percentage of

our rice requirement. Due to the decline of production of rice in 2012, the gap in the production of rice increased to 84 percentages.

5.6.2. Observing the production and consumption tables the Committee opined that Kerala totally depend upon other states for rice. Considering the district wise details of production and consumption, the gap between these two are much less in Palakkad district. The detailed district wise production and consumption table is appended in the Annexure-V1.

5.7. Cost of Cultivation survey - Comparison of methodology followed by DES and Ministry of Agriculture Government of India. (TOR-4(ii))

5.7.1. The Committee discussed in detail the cost of cultivation and farm price one of the items included as the fourth item of terms of reference. Cost of Cultivation Survey is being conducted by the Department of Economics, on important crops like paddy (in3seasons), Coconut, Areca nut, Tapioca, Banana, Pepper, Ginger and Turmeric. Ministry of Agriculture and Co-operation, New Delhi, is also conducting cost of cultivation studies in different states. Three crops of Kerala namely paddy, coconut and black pepper have been included in the cost of cultivation study conducted by the government of India.

5.7.2. The Economic Adviser Government of India Sri T.K.Dutta made a presentation regarding cost of cultivation survey being conducted by the Ministry of Agriculture. He informed that this scheme is being implemented in 19 states with the objective of collecting and compiling the data pertaining to the cost of cultivation and cost of production of various crops in different states. He further informed that in Kerala only three crops namely coconut paddy and black pepper are covered under the survey. He presented the cost of cultivation data of different states and stated that comparing to neighboring states the cost of cultivation is very high in Kerala. He suggested that a new methodology has to be developed to

overcome this problem connected with the procedure of estimating interest on land value being followed in the state.

5.7.3 The Committee observed that the cost of cultivation of different crops is high in Kerala compared with Tamil Nadu and Karnataka. This may be due to the high interest rate of land value in Kerala. The view of State Planning Board also is that the land value in Kerala is higher than that in other states; it was also brought out that leasing of land is not legally permissible in the state. Therefore, Planning Board suggested that a suitable methodology to be decided by the Committee to overcome this problem of finding a sound methodology for estimating the cost of cultivation in Kerala in consultation with MOA.

5.7.4. On the request of the Committee the Ministry of Agriculture, Government of India made a comparative study of cost of cultivation of coconut and paddy crops and submitted the report to that effect.

5.7.5.The Expert Committee observed further that the GOI and DES, Kerala are following the same methodology regarding cost of cultivation survey, it is necessary to critically examine and check why there is huge variation in cost estimates between Central and State results in respect of certain cost parameters. The Committee also decided to check whether there are any errors in the data collected or while tabulating the work in the DES.

5.7.6 Representatives from MOA have given notes on the conceptual frame work suggested by them to all states and which are being followed by in other states. As per Central guidelines, the only difference in the procedure being followed in Kerala is with regard to estimation of land value. According to MOA, it would be advisable to take rental value of land instead of interest on land value in Kerala also, as in other states for uniformity in following the procedures for cost of cultivation survey. The rental value is estimated on the basis of prevailing rents in the village for identical type of land or as reported by farmers subject to the ceiling of fair rents given in the land legislation of the concerned state, which is 20% of the value of output in the state of Kerala.

5.7.7 It may be seen that in the State of Kerala, while estimating cost of cultivation of a crop, for assessing the land value, “Interest on land value” is taken into account instead of rent. The interest on land value is very high and it pushes the cost upwards. Under the methodology for cost of cultivation surveys of the Ministry of Agriculture, Government of India, only “rental value of land” is considered, which is reported by the sample farmers subject to the ceiling of fair rents given in the land legislation of the concerned State, which is 20% of value of output in the State of Kerala. It is

therefore requested to follow uniform procedure in cost of cultivation survey and to consider "rental value of land" instead of "interest of land". Statements giving item-wise comparative study of cost of cultivation and production of paddy and coconut generated by CS Scheme, Ministry of Agriculture and DES, Kerala, for the latest 3years i.e. 2011-12 to 2013-14 are stated bellow.

YEAR: - 2011-12

Cost Items (R/Ha)	Paddy		Coconut	
	CS Scheme	State Scheme	CS Scheme	State Scheme
Human Labour	20774.58	2355.33	38565.73	25131.00
Animal Labour	363.00	115.00	5.39	0.00
Machine Labour	7837.60	4459.67	202.94	0.00
Seed	1882.46	1698.00	0.00	408.00
Fertilizer & Manure	4882.62	4076.00	11399.39	6840.00
Insecticide	1066.10	435.00	1.84	45.00
Irrigation	278.33	0.00	1095.65	0.00
Miscellaneous	0.00	2356.33	0.00	2497.00
Intt. On working capital	1070.54	1647.00	2581.34	3110.00
Rental Value	14022.35	0.00	20945.60	0.00
Land Revenue	82.02	227.00	0.00	180.00
Depreciation of implements & farm building	319.94	0.00	724.98	0.00
Intt. On fixed capital	393.57	1318.33	1726.19	3493.00
Establishment Cost	0.00	0.00	12627.97	0.00
Repair & Maintenance	0.00	1218.33	0.00	2976.00
Intt. On land value	0.00	61973.33	0.00	354841.00
Cost of Cultivation	52973.11	102879.33	77249.05	399521.00
Cost of Production	1120.82	2912.67	7.01	NR
Yield	43.36	NR	12458.00	NR
Value of Main Product	64413.08	43927.67	101370.30	54240.00
Value of By-Product	5698.66	6548.00	3357.68	4207.00
Value of Gross Product	70111.74	50475.67	104727.98	58447.00

Unit of Cost of Production in Rs/Quintal for paddy &Rs/nut for coconut
Unit of Yield is Quintal/hectare for Paddy & Nuts/hectare for coconut
Establishment cost is calculated for coconut only.

YEAR : - 2012-13

Cost Items (Rs/Ha)	Paddy		Coconut	
	CS Scheme	State Scheme	CS Scheme	State Scheme
Human Labour	22424.38	2325.67	44649.48	32180.00
Animal Labour	296.85	137.00	65.35	0.00
Machine Labour	9288.31	5928.00	112.25	183.00
Seed	2326.53	2100.67	0.00	221.00
Fertilizer & Manure	6745.09	5380.00	11765.86	6879.00
Insecticide	1409.09	256.67	0.00	178.00
Irrigation	315.69	0.00	1738.71	0.00
Miscellaneous	0.37	3494.33	0.00	2165.00
Intt. On working capital	1268.68	1861.00	2960.70	3719.00
Rental Value	16722.48	0.00	14859.08	0.00
Land Revenue	112.21	135.33	0.00	131.00
Depreciation of implements & farm building	221.55	0.00	477.46	0.00
Intt. On fixed capital	273.13	1168.67	1155.56	1929.00
Establishment Cost	0.00	0.00	15799.54	0.00
Repair & Maintenance	0.00	1377.33	0.00	1353.00
Intt. On land value	0.00	66459.67	0.0	552222.00
Cost of Cultivation	61404.39	111554.33	77784.45	601160.00
Cost of Production	1290.70	3455.00	7.13	NR
Yield	43.63	NR	12628.00	NR
Value of Main Product	76769.20	46645.67	74295.41	55535.00
Value of By-Product	6851.70	5779.33	3307.71	2507.00
Value of Gross Product	83620.90	52425.00	77603.12	58042.00

Unit of Cost of Production in Rs/Quintal for paddy &Rs/nut for coconut

Unit of Yield is Quintal/hectare for Paddy & Nuts/hectare for coconut .Establishment cost is calculated for coconut only.

YEAR : - 2013-14

Cost Items (Rs/Ha)	Paddy		Coconut	
	CS Scheme	State Scheme	CS Scheme	State Scheme
Human Labour	25403.67	33493.00	49544.24	36505.00
Animal Labour	82.81	87.00	0.00	0.00
Machine Labour	9772.10	6065.33	95.25	288.00
Seed	2790.72	2402.00	0.00	437.00
Fertilizer & Manure	7989.73	6381.33	12247.29	11183.00
Insecticide	1518.63	449.67	0.50	85.00
Irrigation	145.22	0.00	1406.55	0.00
Miscellaneous	0.00	4590.67	0.00	2242.00
Intt. On working capital	1390.88	2415.33	3158.80	4414.00
Rental Value	18798.49	0.00	21961.15	0.00
Land Revenue	132.57	189.00	0.00	188.00
Depreciation of implements & farm building	205.32	0.00	216.26	0.00
Intt. On fixed capital	320.71	893.67	714.82	2348.00
Establishment Cost	0.00	0.00	17090.27	0.00
Repair & Maintenance	0.00	422.00	0.00	540.00
Intt. On land value	0.00	77292.00	0.00	620809.00
Cost of Cultivation	68550.85	134681.00	89344.86	679039.00
Cost of Production	1346.36	3876.00	8.48	NR
Yield	46.56	NR	12231.00	NR
Value of Main Product	85952.31	62643.33	106503.70	87877.00
Value of By-Product	7879.41	6160.33	3302.06	4427.00
Value of Gross Product	93831.72	68803.67	109805.76	92304.00

Unit of Cost of Production in Rs/Quintal for paddy &Rs/nut for coconut

Unit of Yield is Quintal/hectare for Paddy & Nuts/hectare for coconut

Establishment cost is calculated for coconut only

5.7.8. Statistics for Farm prices TOR-(4(iii)). Regarding farm price statistics the Committee observed that farm price collection does not come under the purview of EARAS. It may not be an item for terms of reference. Director General informed the Committee that there is another Expert

Committee on Price and Price Indices to analyze the current price collection mechanism and suggest any suitable changes required for its improvement.

Recommendation

5.7.9. Committee remarked that district wise report on crop wise productivity, production and consumption will be much helpful to the government for policy decisions. The Committee suggested forwarding of the reports to the government of for consideration. Accordingly the report submitted to the government for favorable consideration.

5.7.10. The Committee recommended that DES may follow the methodology as suggested by Ministry of Agriculture for estimating the cost of cultivation of different crops. DES should therefore take the rental value of land instead of interest of land while calculating the cost of cultivation estimates and this would result in making realistic estimates of cost of cultivation of crops in Kerala.

5.7.11. Regarding farm price collection, the Committee observed that farm price collection is not within the purview of EARAS.

5.8. Discussion with other Departments with regard to area and production of crops. For uniform methodology (TOR-5)

5.8.1 The Expert Committee discussed the Fifth Terms of Reference regarding suitable methodology for bringing uniformity in the Data collection by different agencies

5.8.2 Agricultural Statistics includes all data collected by the DES on area and production and also data collected by other agencies like Rubber Board, Coffee Board, and Spices Board etc. In order to get an idea about the methodology being followed by other agencies in the area and production estimation, the committee carried out discussion with various agencies.

Methodology of Rubber Board

5.8.3 Committee examined the sample design, survey procedure, estimation of average yield, etc followed by the rubber board. Currently, small holding is defined as those of size less than 10 hactares, however,

average size of holding is of half hactare. The sample units are chosen at the beginning of each year. They are identified in such a way that the chosen group would be reasonably a good representative of the country's entire small holding sector. The selection procedure is built up on relevant principles of sampling technique by giving due consideration to agro climatic zones ,age profile of trees, size class of holdings and socio economic profile of farmers which are the significant parameters determining the yield performance.

5.8.4 The Extension Officer of Rubber Board stationed at the respective villages is collecting the data every month by visiting the holdings and physically verifying the information. At the beginning of the each financial year, Rubber Board updates the total area under cultivation of rubber and the area tapping after taken in to account the extent of trees uprooted and the area newly planted crop in the previous year. Total production of natural rubber is estimated on a monthly basis by multiplying the estimated area under tapping with the average yield obtained through the sample survey. Board also compares the production figures given by the traders based on sample survey estimates.

5.8.5. Quick estimates of area, production and average yield are available within 10days after the reference month and final figures area published within two to three months. District level data is being prepared monthly and annually. The Committee felt the need for panchayat wise area and production estimates of rubber and suggested the Director DES to give statistical support for estimating the area and production of rubber at panchayat/block level. In principle, it was agreed that statistical support will be given by DES to Rubber Board for improving methodology for getting information at panchayat level.

Tea Board

5.8.6. Committee analyzed the methodology being used by the Tea Board in the data collection of Tea. The Tea Board used to collect data from registered growers only for estimating area and production of tea through a

set of mandatory forms and schedules up to 2009-10.From 2010-11-onwards ,the farmers enter their data in the web site in every 5th of each month. Production statistics of tea is received from bottling factories. The green leaf statistics is received from the tea plant growers. Committee felt that due to conversion of tea growing area to other crops, there is decline in production, but due to various development efforts, productivity has been on the rise.

5.8.7 Committee is convinced that only 25 percentage of coffee growing area is the relative contribution of small growers.

5.5.18. The Committee desired that the Tea Board may look in to whether there is production in the unregistered sector and if so, how to get it reflected in the tea statistics being brought by the Board.

Spice Board

5.8.8 Then Committee examined the methodology being followed by the Spice Board for their data collection. The total yielding area of cardamom is only an estimate based on the previous year's area, since updated information is not available in the village offices also the problem of leased land, land possessed etc. In Kerala, first, a purposive sample of two districts, viz. Idukki and Wayanad are selected since more than 95% of production is from these two districts. After selecting the district, stratified sampling of villages is done in order to get sufficient data having adequate number of plantation in each category. These villages will be the sampling strata for estimation of the production.

5.8.9. From each of these strata and based on the holding size, 10 to 20 cardamom plantations are selected from each of the categories0-2Ha, 4-6ha, 6-8 ha and above 8ha. From each of these plantations, 5 respective samples /plants are selected. The observation like number of productive panicles per plant, average number of capsules per panicle, etc is collected. Based on this observation, the green yield/plant, green weight of the capsules, dry weight of the capsules, total production and productivity are estimated.

5.8.10. Committee observed that the methodology adopted by the Spices Board could perhaps be considered for collecting the data of vegetables and fruits as well, at lower levels, but after further detailed examination of all relevant factors. It is come to known by the Committee that Panchayat level data is not available with the Spice Board. The officer from Spices Board informed the Committee that they are in need of village wise area and production estimate of cardamom every year.

5.8.11. The Committee suggested the DES to extend the technical support of DES to Spices Board for strengthening the methodological aspect including review of sampling frame with the financial support of the Spice Board.

Coffee Board

5.8.12. On analyzing the activities of the Coffee Board the Committee felt that there will not be much production of coffee from plane area of Kerala along with other crops. The methodology adopted by the Coffee Board is satisfactory since they have been able to meet the demand from supply. Data on area and production of coffee in Kerala is available at panchayat level.

5.8.13 The Committee suggested the Coffee Board to forward a detailed report on the methodology adopted for estimation of area and production of Coffee in Kerala to DES to enable the Committee to suggest improvement, if any called for in the methodology.

Recommendation

5.8.14. As DES is the Nodal Agency for data collection in the state, the Committee recommended that all other data collecting agencies should take the technical guidance and other support from the DES. Without the concurrence of the DES, no agency should carry out any data collection work. The data collected by other departments with the concurrence of the department should be made available to the Nodal Agency as soon as the data collection work is over.

5.9. Strengthening the capability of field staff through initiatives in the area of ICT, Networking, Software development etc. (TOR-6)

5.9.1. Sixth item in the Term of Reference is the use of ICT in data collection. Information and communication technology is an umbrella term that includes any communication devises or application encompassing : radio, Television, CellularPhones,Computer and network hardware and software, satellite systems and so on as well as the various services and applications associated with them, such as videoconferencing and distance learning. Measuring the impact of ICT is critical to better understanding the role of ICT for economic and social development. With the rapid growth ICT sector in India, there is an important demand from the research community and policy makers for better data to ensure that research findings are representatives for the entire country or the state in order to inform policy makers about ICT development and its impact and meaningful interpretation of policies. The application of Information Technology tools in statistical data collection, compilation and dissemination would be a big leap forward. It would be a paradigm shift and help to accomplish new methodological heights.

5.9.2 Kerala has achieved considerable progress in computerizing the activities in a number of departments. The KSSSP envisages the ICT technology for strengthening the statistical system in Kerala .This include update the computing facilities consisting of both hardware and software at headquarters, District Offices and Taluk Statistical offices, provide computers to all the staffs of DES, establish web enabled on-line data sharing between the DES and each of the line departments, and Up-gradation of computer skill by imparting training to the existing employees for efficient computer use.

5.9.3 The Expert Committee discussed in detail the Terms of Reference relating to the enhancement of the use of ICT by DES. The Expert Committee observed and noted that the following activities have been undertaken by the department as a part of ICT.

(1).By using ICT tools to simplify data collection and then processing, 140 Laptops were distributed to Taluk Statistical Offices and District Offices.

(2). Distributed two computers each to Taluk Offices and Districts.
(3).Work Stations were established in Alappuzha and Kollam District offices and Ottappalam Taluk Statistical Office with good facilities.
(4).Broad band connection to all Taluk and District Statistical Offices were established.
(5).For online tabulation and transmission of data, a software has been developed and it is under trail run.
(6).As per the decision of the Expert Committee the DES has decided to use mobile software application in the field of data collection. The Director IASRI, Dr. U C .Sud informed that the IARSI officials are ready to impart training to the DES officials in the use of mobile software application as per request.
7. Purchased two Android Software Smart Phones and two weighting machines to carry out the online vegetable survey conducted in two panchayats of Palakkad and Trivandrum.

Recommendation

5.9.4. Committee recommended for taking immediate action to procure 4 PDA for the field staff on an experimental basis and taking in to account the feedback of its use, recommended procurement of 80 number of devices - 61 numbers for Taluks, 14 numbers for District Offices and 5 numbers for Directorate. Around 50% staff of DES (Except line department) is working under EARAS scheme so the Expert Committee strongly stresses the need and importance of strengthening the ICT infrastructure in EARAS.

5.10. Methodology for small area and production estimation and possibility of Remote sensing Application: - (TOR-8&10)

5.10.1 The main work under EARAS system is area enumeration and yield estimation of different crops. Practical problems faced by the department in area enumeration have explained in the previous sections. For the yield estimation of paddy the department conduct crop cutting experiments of paddy from 5x5sq.m of paddy area. This selected 5x5 sq.m may very often be in the middle or inner part of the selected kandam. So there are resistances from the farmers to cut and take the weight of paddy from this separately selected 5x5 sq.m.

5.10.2 Committee deliberated on the use of remote sensing methodology in order to reduce the work load of the investigators. The advent of satellites has opened the possibility of using remote sensing for estimating land use, crop area and yield. It is used to enumerate the

plantation crops like coffee tea, rubber, coconut etc. Its capacity is increasing with technological advances in satellite design and sensors. It could greatly reduce dependence on human agency and attendant errors in collecting data. Remote sensing tools can only be successfully applied in plantation and orchard and if there are only few crops in the area under investigation. Committee also suggested to collect the available inputs in the form of maps, reports etc from the state remote sensing offices and to examine them whether they are useful for the present system of estimation.

5.10.3. Committee understood that there are practical problems in the application of Remote Sensing in Kerala because of the mixed cropping pattern of Kerala. There are small crops grown within the Orchard and under the shadow of the big trees. This cultivation practice is entirely different from that prevailing in the rest of the country.

5.10.4. Sri.C.Patnaik, Scientist, Space Application Centre Ahmadabad explained the Remote Sensing methodology being followed for estimating the area and production of paddy in Alappuzha and Palakkad districts. This is the first time that in Kerala, SAC conducted such a pilot study(during 2013-14) using the remote sensing methodology. The paddy area estimated by using remote sensing methodology was found to be 9982Ha.in Alappuzha district and 35503Ha in Palakkad district. But corresponding estimates of area by DES were:11438 Ha and 42693Ha respectively in these Districts. The Committee examined the results and appreciated the efforts of Sri. C. Patnaik and Dr.Manjunath for conducting sample survey by using remote sensing.

5.10.5. The Committee would also suggest exploring the possibility of conducting the pilot Study in some more districts by using the remote sensing Technique. Accordingly, a proposal was submitted to the Ministry of Agriculture, Government of India to include the Department of Economics and Statistics, Kerala in the project of Mahalanobis National Forecasting Centre, New Delhi. As a result Kerala has been included in the project of using remote sensing methodology in crop forecasting (FASAL PROJECT) of Ministry of Agriculture Government of India. In this regard two senior officers from MNCFC viz Smt. Neethu, Scientist and Sri. SundeepYadav, Analyst imparted two days training to the field functionaries as well as senior officers of Alappuzha, Palakkad district and of headquarters. The training was online using smart phone having GPRS and Camera facilities.

The department staff doesn't have the smart phone having the GPRS application software. But for the time being they have collected the phone from other sources. First day's field training was at Ernakulam (field convenience) and the second day training was at Cherthala Taluk of Alappuzha District. Two days training was a great success.

5.10.6 As per the direction from the MNCFC, the field staff of DES has successfully collected and forwarded through online the ground truth data of area enumeration of 30 centers each of Palakkad and Alappuzha districts using the personal smart phone of the investigators. Crop cutting experiment details of Paddy (Rabi I) collected by using Remote Sensing Technique from 30 centers each from Palakkad and Alappuzha districts have been uploaded on MNCFC portal successfully.

5.10.7.On analyzing the data on area estimated by the DES and MNCFC with respect to the winter paddy 2015,it was noticed that there existed a wide variation between these two estimates. Director General pointed out that the data prepared by the DES is on the strict scrutiny by the Taluk level officers and District level officers and finally approved by the district level core-committee consisting of principal Agricultural Officer and other district level officers.

5.10.8. In order to check the wide variation in the two figures one senior officer from MNCFC visited Palakkad and Alappuzha districts for the second time. Now the report is under their consideration.

Recommendation

5.10.9. The Committee discussed in detail the possibility of using Remote Sensing Application in collection of data on agricultural sector and thereby to reduce the work load of the primary workers. Department has conducted two sample studies in Palakkad and Alappuzha districts under the guidance of MNCFC by using remote sensing application.

Though there are some variations in the paddy estimated figures of DES and MNCFC, it was decided to accept the remote sensing methodology and check once again its possibility in area and estimation of production of paddy.

5.11. Possibility of generating agricultural statistics at disaggregated level (TOR 11).

5.11.1 The Committee discussed in detail about generating agricultural statistics at disaggregated level. After discussion, the Committee opined that it is not technically sound to estimate data at ward level. The present method of conducting large number of crop cutting experiments and area enumeration of 100 clusters for panchayat level estimation results in introducing huge number of non sampling errors. But the need for Panchayat level estimates is appreciated. Director General pointed out that at present DES is providing Panchayat wise mean yield of paddy to Agriculture Department and National Insurance Company.

Recommendation

5.11.2. The Chairman suggested Director General, DES to request the Government for providing additional staff for collecting data at disaggregated level as per recommendations already made by the Committee.

5.12. Other relevant items as per the terms of reference.(TOR-12)

5.12.1. Chairman asked for specific views of Dr.U.C.Sud in the matter of use of adoption of remote sensing and small area estimation to agriculture statistics and surveys based on studies so far. Dr.U.C.Sud apprised the Members that this issue is still wide open and no conclusions have so far been made at national or international level. It is still at experimental stage. Chairman therefore felt that it is premature for the Committee to take a firm stand on the matter at this stage. The Govt. may have to wait for further developments in the matter before taking a decision for providing valid estimates of crops at panchayat/ village/ ward level to National Insurance Corporation for crop insurance.

5.12.2. Chairman stressed that if additional data requirements are sought from DES by the Government, the Committee's view is that DES after due consideration of the proposal, should project the staff requirement if any for the project and place the demand before the Government for appropriate decision.

5.12.3. DES should identify data gaps with reference to Rangarajan Commission Recommendations and place its proposals with the Govt.for effecting improvements in the state statistical system.

5.12.4. Operational manual and instructions on modified sampling design and methodology and procedures thereof should be prepared for use of the field and HQ staffs

5.12.5. Collection of New Statistical Act (2008).

5.12.6.On discussion regarding the New Statistical Act, 2008 and Rules and its use in various surveys in the state, Chairman pointed out that applying the Statistical Act in all cases of data collection is not intended and it has to be used with due care taking into account the various provisions in the Act and Rules. Director General informed that at present the 74th Socio Economic Survey, Annual Survey of Industries and Economic Census are conducted under the provision of the Act.

5.12.7. Chairman reiterated his views and suggestions to take concrete steps required for streamlining and revitalizing the work in DES to make its working more visible, improve the image of DES, evolve a system for timely monitoring and review of its activities and taking remedial measures for bringing out improvement in output delivery as desired by state higher officers in his meeting. While noting the action taken by DG in the matter, he suggested that utmost importance should be given to this vital task. Various improvement measures and steps should include forming of the Core Group of Officers in the department (which has since been formed) and periodical review of the functioning of the department as per a well laid down Action Plan. He emphasized that DES should be a service oriented department and should meet data needs and other statistical requirements of various Govt. departments and agencies regularly and with minimum time lag in data to help the Govt. in informed decision making based on correct and updated information system. For achieving this, he suggested to assign duties and responsibilities to the senior officers and a monitoring system to be developed. The Core Group should have focus in its actions and comprehensive agenda items should be listed for discussion and problem solving approach be adopted; such meetings should be held fortnightly or monthly. DG along with Senior Officers should also brief Secretary and Chief Secretary periodically on various matters and brief them about the outcome of the steps taken by DES as per review of action plans on current status of all important activities initiated by the department from time to time and based on Core Group Meetings and follow up actions taken. Implementation of decisions and actions needing approval from higher authorities should also be taken up in such meetings with Chief Secretary for obtaining appropriate decisions in such matters.

ANNEXURES

Annexure -Final

Annexure II

Improvement of agriculture statistics-Genesis

Government of India set up the **National Statistical Commission**, the first of its kind, through Resolution No. M/13011/3/99-Admn. IV dated 19th January 2000 of the Ministry of Statistics and Programme Implementation. Dr. C. Rangarajan, the then Honorable Governor of Andhra Pradesh was appointed as the part-time Chairman of the Commission along with eleven eminent statisticians and economists as its part-time members. While the commission touched upon all the sectors for statistical data collection in the country, specific attention was laid on improvement of agriculture statistics system in the country. After long and extensive consultations, the National Statistical Commission made following recommendations for the improvement of all aspects of Agriculture Statistics.

Crop Area Statistics (Para 4.2.23)

1.As the data from a 20 percent sample is large enough to estimate crop area with a sufficient degree of precision at the all-India, State and district levels, crop area forecasts and final area estimates issued by the Ministry of Agriculture should be based on the results of the 20 percent Timely Reporting Scheme (TRS) villages in the temporarily settled States and Establishment of an Agency for Reporting Agricultural Statistics (EARAS) scheme villages in the permanently settled states. In the case of the North-Eastern States, Remote Sensing methodology should be used for this purpose after testing its viability.

2.The Patwari and the supervisors above him should be mandated to accord the highest priority to the work of the girdawari and the patwari be spared, if necessary, from other duties during the period of girdawari.

3.The patwari and the primary staff employed in Establishment of an Agency for Reporting Agricultural Statistics (EARAS) should be imparted systematic and periodic training and the fieldwork should be subjected to intensive supervision by the higher-level revenue officials as well as by the technical staff.

4.For proper and timely conduct of the girdawari, the concerned supervisory staff should be made accountable.

5.Timely Reporting Scheme (TRS) and Establishment of an Agency for Reporting Agricultural Statistics (EARAS) scheme should be regarded as programmes of national importance and the Government of India at the highest level should prevail upon the State Governments to give due priority to them, deploy adequate resources for the purpose and ensure proper conduct of field operations in time.

Crop Production (Para 4.3.12)

6.In view of the importance of reliable estimates of crop production, the States should take all necessary measures to ensure that the crop cutting surveys under the General Crop Estimation Survey (GCES) are carried out strictly according to the prescribed programme.

7. Efforts should be made to reduce the diversity of agencies involved in the fieldwork of crop cutting experiments and use as far as possible agricultural and statistical personnel for better control of field operations.

8.A statistical study should be carried out to explore the feasibility of using the Improvement of Crop Statistics (ICS) data for working out a correction or adjustment factor to be applied to official statistics of crop area to generate alternative estimates of the same. Given the past experience of the Land Utilization Surveys of the NSS and the controversies they created, the Commission is of the view that the objective of redesigning of the ICS, at present, should be restricted to working out a correction factor.

9.The two series of experiments conducted under the National Agricultural Insurance Scheme (NAIS) and the General Crop Estimation Survey (GCES) should not be combined for deriving estimates of production as the objectives of the two series are different and their merger will affect the quality of general crop estimates.

10.Crop estimates below the level of district are required to meet several needs including those of the National Agricultural Insurance Scheme (NAIS). Special studies should be taken up by the National Statistical Office to develop appropriate "small area estimation" techniques for this purpose.

Crop Forecasts (Para 4.4.8)

11.The Ministry of Agriculture and the National Crop Forecasting Centre (NCFC) should soon put in place an objective method of forecasting the production of crops.

12.The National Crop Forecasting Centre (NCFC) should be adequately strengthened with professional statisticians and experts in other related fields.

13.The programme of Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL), which is experimenting the approach of Remote Sensing to estimate the area under principal crops should be actively pursued.

14.The States should be assisted by the Centre in adopting the objective techniques to be developed by the National Crop Forecasting Centre (NCFC).

Production of Horticultural Crops (Para 4.5.7)

15.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.

16.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.

Land Use (Para 4.7.7)

17.The nine-fold classification of land use should be slightly enlarged to cover two or three more categories such as social forestry, marshy and water logged land, and land under still waters, which are of common interest to the centre and States, and which can easily be identified by the patwari through visual observation.

18.State Governments should ensure that computerization of land records is completed expeditiously.

Irrigation Statistics (Para 4.8.15)

19.In view of wide variation between the irrigated area generated by the Ministry of Agriculture and the Ministry of Water Resources, the State Governments should make an attempt to explain and reduce the divergence, to the extent possible, through mutual consultation between the two agencies engaged in the data collection at the local level.

20.The State Directorates of Economics and Statistics (DESs) should be made the nodal agencies in respect of irrigation statistics and they should

establish direct links with the State and Central agencies concerned to secure speedy data flow.

21.Statistical monitoring and evaluation cells with trained statistical personnel should be created in the field offices of the Central Water Commission (CWC) in order to generate a variety of statistics relating to water use.

22.The Central Statistical Organisation (CSO) should designate a senior level officer to interact with the Central and State irrigation authorities in order to promote an efficient system of water resources statistics and oversee its activities.

Land Holdings and Agricultural Census (Para 4.9.13)

23.The Agricultural Census should henceforth be on a sample basis and the same should be conducted in a 20 per cent sample of villages.

24.There should be an element of household enquiry (besides re-tabulation) in the Agricultural Census in the temporarily settled States.

25.Computerization of land records should be expedited to facilitate the Agricultural Census operations.

26.There should be adequate provision for effective administrative supervision over the fieldwork of Agricultural Census and also a technical check on the quality of data with the help of the State statistical agency.

27.The post of the Agricultural Census Commissioner of India at the Centre should be restored and should be of the level of Additional Secretary to be able to interact effectively with the State Governments. Further, this post should be earmarked for a senior statistician.

28.The Census Monitoring Board should be revived to oversee the Agricultural Census operations.

Agricultural Prices (Para 4.10.10)

29.The Ministry of Agriculture should prepare a well-documented manual of instructions on collection of wholesale prices of agricultural commodities.

30.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.

31.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.

32.Latest tools of communication technology like e-mail should be availed of to ensure timely data flow of agricultural prices.

33.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.

34.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.

35.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.

36.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)

37.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)

38.In view of the importance of the Cost of Cultivation Studies in the price administration of agricultural commodities and several studies relating to farm economy, the present programme should continue.

39.Focused attention should be paid to the proper organization and management of the Cost of Cultivation Studies.

40.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.

41.The Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA) should minimize the delay in bringing out the results of the Cost of Cultivation Studies.

Livestock Numbers (Para 4.13.7)

42.The quinquennial Livestock Census should henceforth be taken in a 20 per cent sample of villages instead of cent per cent coverage.

43.The Livestock Census should include some minimum information about the household (size, occupation, etc.) in addition to the head count for more meaningful analysis of the census data.

44. There should be a concerted effort towards better organization and management of the Livestock Census operation through comprehensive

training of the field staff and regular supervision over their work by both administrative and technical personnel.

45. Information Technology tools should be used at various stages of the Livestock Census for rapid processing and preparation of the final reports as well as improving the quality of the data.

Integration of Livestock and Agricultural Censuses (Para 4.14.3)

46.The Livestock and Agricultural Censuses should be integrated and taken together in a 20 per cent sample of villages.

47.Before effecting the integration of Livestock and Agricultural Censuses a limited pilot investigation be undertaken to firm up the procedures of integration.

48.The periodical National Sample Survey Organisation's survey on land and livestock holdings be synchronized with Agricultural and Livestock Censuses in order to supplement as well as help in the crosscheck of information from the two sources.

Livestock Products (Para 4.15.6)

49.The Integrated Sample Surveys should be continued and efforts should be made to fill up the existing data gaps.

50.The Indian Agricultural Statistics Research Institute (IASRI) should be entrusted with the task of developing appropriate methodologies for filling up the remaining data gaps relating to estimates of mutton, pork, poultry meat, and meat by-products.

Fisheries Statistics (Para 4.16.10)

51.The survey design for estimating production of marine fisheries should be modified taking into account the current distribution of landing sites and the volume of catch at different sites. The field staff engaged in collection of data should be imparted regular training and their work should be adequately supervised.

52.The survey methodology for estimating production of inland fisheries especially with regard to running water sources (rivers and canals) should receive urgent attention and the Indian Agricultural Statistics Research Institute (IASRI) along with the Central Inland Fisheries Research Institute (CIFRI) should be provided with adequate support to develop this programme on a priority basis.

53.The States should improve the recording of area under still water by appropriate modification of land use statistics.

54.The discrepancies between the two sources of data namely, Livestock Census and State reports with regard to data on fishermen, fishing craft and gear should be reconciled by adoption of uniform concepts and definitions and review of these statistics at the district and State levels.

Forestry Statistics (Para 4.17.10)

55.Remote Sensing techniques should be extensively used to improve and develop forestry statistics.

56.The State Forest Departments should be adequately supported by the establishment of appropriate statistical units to oversee the collection and compilation of forestry statistics from diverse sources on forest products including timber and non-timber forest products.

57.Arrangements should be made for storage and speedy transmission of forestry data through Information Technology devices.

58.In view of the unavoidable nature of the divergence between statistics from the two sources – land records and State Forest Departments – because of different coverage and concepts, the two series should continue to exist; but the reasons for divergence should be clearly indicated to help data users in interpreting the forestry statistics.

59.A Statistics Division in the Ministry of Environment and Forests with adequate statistical manpower should be created for rationalization and development of proper database on forestry statistics.

Marketable Surplus and Post-Harvest Losses (Para 4.18.4)

60.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.

61.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)

62.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.

63.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)

64.A review of the item basket for the construction of Index Numbers of Area, Production and Yield should be undertaken immediately.

65.The item basket for the construction of Index Numbers of Area, Production and Yield should be different for different States.

66.The present arrangements for the construction and release of Index of Terms of Trade should continue.

Recording of Area under Mixed Crops (Para 4.21.5)

67.The rates used to apportion the areas of constituent crops of major crop mixtures should be fixed for the recognized mixtures at sub-district and district levels and updated periodically.

68.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.

Input Statistics (Para 4.22.8)

69.The Directorate of Economics and Statistics, Ministry of Agriculture (DESMOA) should collect, compile and maintain a complete database on State-wise production, sale of tractors, power tillers, harvesters and other agricultural implements, density of such implements per hectare, investment made, level of mechanization, adoption of water saving devices, etc.

70.A Farm Management Survey on an all-India basis should be conducted on a regular basis preferably at an interval of five years.

71.The Directorate of Plant Protection Quarantine and Storage (PPQ&S) being the apex body for plant protection should act as a depository of information on plant protection. Efforts should be made to design, develop and maintain a comprehensive database on plant protection for effective long-term uses.

72.The Statistics and Computer Unit of the Directorate of Plant Protection, Quarantine and Storage (PPQ&S) should be strengthened both in terms of statistical and computer personnel as well as computer equipment.

73.Information collected through General Crop Estimation Survey (GCES) and the scheme for Improvement of Crop Statistics (ICS) should be compiled to generate estimates on various inputs such as fertilizers, pesticides, multiple cropping, etc.

ANNEXURE III

Expert Committee Meetings

Sl. No.	Expert Committee/ Sub Committee	Chairman	Date	Venue
1	Expert Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd).	21/11/2012	IMG, TVM
2	1st Sub Committee meeting	Dr.U.C. Sud, Head, Division of Sample Survey, IASRI.	05/03/2013	IASRI, NEW DELHI
3	2nd Sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd).	11/03/2013	Mascot Hotel
4	2nd Sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd).	19/06/2013	Govt. Guest House, Thycaud.
5	2nd sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd).	08/10/2013	Govt. Guest House, Thycaud
6	2nd Sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd).	27/01/2014	Govt. Guest House, Thycaud
7	Ist Sub Committee meeting	Dr.U.C. Sud, Head, Division of Sample Survey, IASRI.	21/04/2014	Govt. Guest House, Thycaud
8	2nd Sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd)	12/11/2014	Govt. Guest House, Thycaud
9	2nd Sub Committee meeting	Sri.M.Neelakantan, Addl. Director General, NSSO (Rtd)	13/07/2015	Govt. Guest House, Thycaud
10	2nd Sub Committee meeting	Sri.M. Neelakantan, Addl. Director General, NSSO (Rtd)	07/11/2015	Govt.Guest House Thycaud
11	2nd Sub Committee meeting	Sri.M. Neelakantan, Addl. Director General, NSSO (Rtd)	02/04/2016	Govt.Guest House Thycaud
12	2nd Sub Committee meeting	Sri.M. Neelakantan, Addl. Director General, NSSO (Rtd)	27/06/2016	Govt.Guest House Thycaud
13	2nd Sub Committee meeting	Sri.M. Neelakantan, Addl. Director General, NSSO (Rtd)	07/01/2017	Govt.Guest House Thycaud
14	2nd Sub Committee	Sri.M. Neelakantan, Addl. Dire	23/02/2017	Hotel Old Plaza,Munnar,Idukky
15	1st	M.Neelakantan	03/04/2017	Goust house

ANNEXURE IV

ESTIMATED PRODUCTIVITY OF CROPS (Kg/Ha)

ESTIMATED PRODUCTIVITY OF CROPS(Kg/Ha						
Coconut (Nos/Ha)						
District	**2006-07**	**2007-08**	**2008-09**	**2009-10**	**2010-11**	**2011-12**
1. Thiruvananthapuram	7784	7755	8371	8280	7163	8009
2. Kollam	7830	6453	7586	7270	6743	7721
3. Pathanamthitta	5785	5977	6674	7031	7167	8465
4. Alappuzha	7388	6845	7077	6455	6710	5680
5. Kottayam	5579	5820	5562	5003	5209	5282
6. Idukki	4183	3614	4444	5236	4703	5537
7. Ernakulam	6873	5909	5385	5284	5152	5197
8. Thrissur	7199	7038	6918	6941	6542	6780
9. Palakkad	6979	6988	7617	7292	7146	8145
10. Malappuram	7653	7944	8999	9808	8793	8670
11. Kozhikode	6368	6923	7796	7284	6328	6672
12. Wayanad	3906	3661	3450	4510	5078	4565
13. Kannur	7003	6738	6435	6139	6878	7139
14. Kasaragod	6783	7799	8399	7672	7441	3515
State	**6935**	**6889**	**7365**	**7278**	**6862**	**7237**
Arecanut						
1. Thiruvananthapuram	735	538	602	517	603	510
2. Kollam	709	602	754	748	580	821
3. Pathanamthitta	745	489	513	557	603	619
4. Alappuzha	332	405	606	589	478	408
5. Kottayam	750	846	726	770	737	728
6. Idukki	1476	1126	1191	1143	710	925
7. Ernakulam	1023	1228	1163	1091	1075	939
8. Thrissur	740	663	1004	991	683	666
9. Palakkad	720	693	1293	1133	964	1255
10. Malappuram	947	1002	1174	1277	881	1163
11. Kozhikode	974	1091	1398	1264	908	1069
12. Wayanad	441	379	470	496	676	525
13. Kannur	1109	942	1272	1266	1030	1303
14. Kasaragod	2367	2887	2509	1814	1665	1951
State	**1077**	**1149**	**1289**	**1177**	**1001**	**1163**

Tapioca						
1. Thiruvananthapuram	23084	24984	25922	26284	28697	30616
2. Kollam	27289	30567	28433	29711	28128	31169
3. Pathanamthitta	35280	37361	36479	46092	38416	38283
4. Alappuzha	25071	28187	29211	27346	27615	24919
5. Kottayam	32517	28248	35395	38674	37883	35478
6. Idukki	32326	33213	33128	35364	38613	41320
7. Ernakulam	36528	34701	36955	43370	40344	39358
8. Thrissur	29640	26988	31715	30558	37561	36284
9. Palakkad	26676	22489	23577	31807	27613	30189
10. Malappuram	31673	40507	38883	38826	35853	35148
11. Kozhikode	23058	23061	26123	28070	26451	21732
12. Wayanad	36279	31141	41319	47478	52505	49429
13. Kannur	28635	28600	32692	37321	35625	38431
14. Kasaragod	24410	21715	23151	22748	24057	24849
State	**28911**	**30438**	**31088**	**33733**	**33326**	**34419**
Raw cashew						
1. Thiruvananthapuram	486	419	433	403	365	309
2. Kollam	655	510	448	445	334	273
3. Pathanamthitta	447	339	359	386	342	325
4. Alappuzha	327	395	311	386	236	214
5. Kottayam	384	382	289	314	267	249
6. Idukki	437	364	536	402	285	339
7. Ernakulam	462	447	404	375	322	241
8. Thrissur	397	501	430	407	439	276
9. Palakkad	389	456	468	349	310	236
10. Malappuram	697	876	585	508	365	425
11. Kozhikode	501	663	506	340	449	305
12. Wayanad	650	471	328	700	806	426
13. Kannur	1222	1328	1071	1114	1302	1044
14. Kasaragod	1026	961	1091	632	754	689
State	**875**	**898**	**799**	**731**	**793**	**680**

Black pepper						
1. Thiruvananthapuram	230	256	211	210	197	422
2. Kollam	290	225	189	184	165	359
3. Pathanamthitta	292	303	273	236	229	496
4. Alappuzha	124	116	93	97	100	188
5. Kottayam	168	163	141	144	128	343
6. Idukki	422	357	287	297	354	528
7. Ernakulam	171	163	175	151	143	252
8. Thrissur	179	170	174	183	150	358
9. Palakkad	173	139	154	195	175	340
10. Malappuram	121	129	98	95	83	201
11. Kozhikode	123	91	98	127	108	180
12. Wayanad	269	159	217	271	150	320
13. Kannur	208	149	200	260	182	389
14. Kasaragod	294	238	256	230	372	804
State	**297**	**239**	**221**	**248**	**263**	**445**
Banana						
1. Thiruvananthapuram	6706	6333	7013	7344	5618	6051
2. Kollam	6143	6413	6886	6588	7742	7276
3. Pathanamthitta	8252	8066	7881	8297	7919	7951
4. Alappuzha	7171	6413	6732	8033	7882	7921
5. Kottayam	9094	9305	9440	9051	8864	8781
6. Idukki	7435	7320	8748	7677	8730	8734
7. Ernakulam	8739	8101	9518	9044	9487	9602
8. Thrissur	8869	6393	9050	7896	7868	9228
9. Palakkad	7290	7199	8966	7559	8643	8864
10. Malappuram	7713	7102	7477	6997	7281	9025
11. Kozhikode	8201	7554	7456	7522	7392	8139
12. Wayanad	7410	7459	6008	8611	8404	8677
13. Kannur	9210	6581	7774	7264	8130	8694
14. Kasaragod	9621	11247	8057	7821	11406	6265
State	**7841**	**7411**	**7965**	**7923**	**8244**	**8703**

Plantain						
1. Thiruvananthapuram	10568	8637	7687	9019	7737	7588
2. Kollam	7799	8217	6812	6593	5640	7080
3. Pathanamthitta	10274	9148	8943	9726	7976	9685
4. Alappuzha	6543	8412	6241	6331	6865	5577
5. Kottayam	8563	8882	8688	8425	8255	7772
6. Idukki	9187	9141	7516	7297	9718	9479
7. Ernakulam	8298	8216	6661	6619	7108	7472
8. Thrissur	6615	4781	5414	5467	6410	5720
9. Palakkad	9566	8928	12359	9200	9910	7461
10. Malappuram	7458	6523	7028	4960	6383	5011
11. Kozhikode	5871	5162	4741	3735	4108	3979
12. Wayanad	6794	6085	6198	5711	5651	8340
13. Kannur	5982	4509	4360	3875	3905	3636
14. Kasaragod	7792	5779	5746	5378	5388	5146
State	**8205**	**7629**	**7973**	**7082**	**7201**	**6783**
Jack(Nos/Ha)						
1. Thiruvananthapuram	5085	5018	4783	4615	4836	3337
2. Kollam	4674	4701	3797	3480	4558	3723
3. Pathanamthitta	5082	4663	4756	4114	4329	3583
4. Alappuzha	2543	2669	3410	3695	3908	2513
5. Kottayam	4454	4685	4290	4519	4759	3801
6. Idukki	3387	2801	3491	3435	4468	3750
7. Ernakulam	4699	3575	5003	4508	4169	3430
8. Thrissur	3861	3928	3794	3972	3688	2439
9. Palakkad	4515	4996	4608	4473	4088	3012
10. Malappuram	3994	3725	3249	2812	3284	2499
11. Kozhikode	3032	2319	3124	2508	3005	1913
12. Wayanad	2415	2806	2005	3074	3097	2270
13. Kannur	3595	3576	3562	3709	4537	3024
14. Kasaragod	4423	3596	3780	3419	4063	3789
State	**3769**	**3622**	**3658**	**3583**	**4003**	**3011**

Cocoa						
1. Thiruvananthapuram	429	431	391	333	439	536
2. Kollam	444	105	357	200	125	143
3. Pathanamthitta	452	400	566	569	877	1063
4. Alappuzha	386	480	536	598	1861	1272
5. Kottayam	517	499	579	613	834	935
6. Idukki	630	754	592	493	699	1327
7. Ernakulam	492	498	555	536	645	674
8. Thrissur	230	224	277	224	707	543
9. Palakkad	535	738	538	819	503	727
10. Malappuram	472	512	884	677	316	433
11. Kozhikode	434	534	563	543	689	586
12. Wayanad	184	204	105	364	363	504
13. Kannur	249	346	443	484	641	827
14. Kasaragod	293	427	241	151	440	709
State	**540**	**656**	**575**	**512**	**695**	**1122**
Sesamum						
1. Thiruvananthapuram						
2. Kollam	596	400	570	647	675	582
3. Pathanamthitta						
4. Alappuzha	375	197	839	210	140	357
5. Kottayam						
6. Idukki	429		200	400		
7. Ernakulam	515	208	769	133	167	250
8. Thrissur	143	333	135	333	171	200
9. Palakkad	133	197	273	111	132	176
10. Malappuram	452	381	465	414	444	337
11. Kozhikode						
12. Wayanad	333				200	
13. Kannur		333				
14. Kasaragod	1000	1000				
State	**402**	**321**	**536**	**339**	**439**	**386**

Estimated Productivity of Crops						
Paddy	**2006-07**			**2007-08**		
	Autumn	Winter	Summer	Autumn	Winter	Summer
Thiruvananthapuram	2567	2650	2562	2477	2535	2390
Kollam	2417	2236	1333	2369	2226	1617
Pathanamthitta	2391	2387	3286	2295	2381	2287
Alappuzha	2935	2929	2842	1768	2125	1751
Kottayam	2595	2361	2720	2591	2616	2583
Idukky	2756	2538	2622	2502	2784	1844
Eranakulam	1922	2083	1805	1870	2111	1844
Thrissur	1827	2170	3461	1778	2219	3024
Palakkad	2265	2588	2891	2300	2584	2808
Malappuram	2199	1958	3458	1820	2130	3448
Kozhikkode	1346	1384	1664	1138	1163	2032
Wayanad		2495	2963		2494	2873
Kannur	1898	2057	1224	1822	2088	1562
Kasargod	2383	2122	2149	2166	2079	1851
STATE	**2281**	**2413**	**2881**	**2168**	**2370**	**2404**

Paddy	**2008-09**			**2009-10**		
	Autumn	Winter	Summer	Autumn	Winter	Summer
Thiruvananthapuram	2489	2360	2638	2782	2414	2083
Kollam	2263	2157	703	2346	2304	1867
Pathanamthitta	2331	2494	2929	2520	2471	2619
Alappuzha	2999	3027	3090	3167	3026	2758
Kottayam	3022	2563	3042	2915	2433	2417
Idukky	2636	2594	2368	2567	2682	2491
Eranakulam	1996	2088	1733	1908	2074	1649
Thrissur	1980	2344	3270	1774	2279	3152
Palakkad	2443	2478	2890	2497	2783	2685
Malappuram	2190	1898	3118	1974	2088	3306
Kozhikkode	1338	1241	2097	1277	1143	2018
Wayanad		2610	2816		2490	2819
Kannur	1757	1813	1627	1914	1998	1450
Kasargod	2390	1993	1918	2304	1843	2052
STATE	**2428**	**2370**	**2982**	**2486**	**2533**	**2719**

Paddy	2010-11			
	Autumn	Winter	Summer	Total
Thiruvananthapuram	2407	2390	2097	2372
Kollam	2249	2112	1691	2141
Pathanamthitta	2168	2277	2211	2220
Alappuzha	2284	2386	2560	2464
Kottayam	2940	2258	2757	2773
Idukky	2591	2609	2633	2608
Eranakulam	1902	2041	1944	1977
Thrissur	1982	2471	3179	2620
Palakkad	2485	2463	2782	2493
Malappuram	2111	2106	3359	2354
Kozhikkode	1264	1108	2020	1270
Wayanad		2456	2870	2525
Kannur	2140	2055	2241	2099
Kasargod	2550	2082	2357	2367
STATE	**2415**	**2348**	**2688**	**2452**
	2011-12			
	Autumn	Winter	Summer	Total
Thiruvananthapuram	2604	2535	2393	2563
Kollam	2252	2295	1542	2274
Pathanamthitta	2133	2905	3292	3208
Alappuzha	3063	3105	3096	3089
Kottayam	2854	2687	3109	2970
Idukky	2408	2507	2379	2480
Eranakulam	2070	2197	2181	2144
Thrissur	2124	2659	3631	2943
Palakkad	2439	2858	2920	2672
Malappuram	2072	2167	3609	2468
Kozhikkode	1569	1267	2288	1464
Wayanad		2608	2657	2615
Kannur	2024	2199	2073	2120
Kasargod	2351	1953	2603	2218
STATE	**2519**	**2676**	**3155**	**2733**

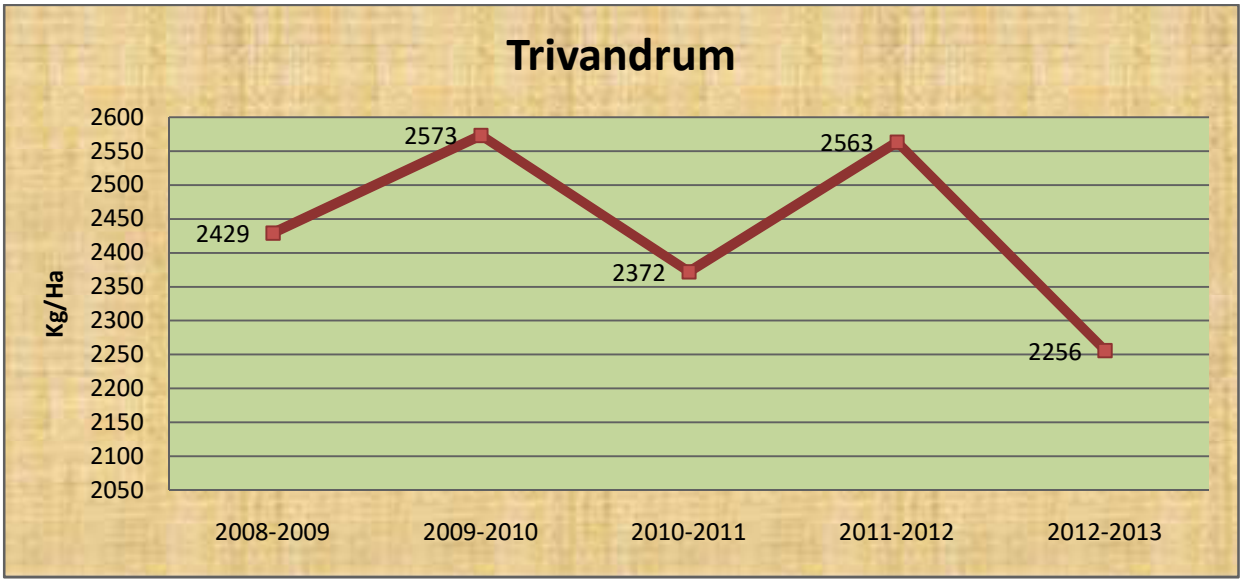
ANNEXURE V

District wise declining trend of productivity of Rice

District	2008-2009	2009-2010	2010-2011	2011-2012	2012-2013
Thiruvananthapuram	2429	2573	2372	2563	2256
Kollam	2149	2301	2141	2274	2111
Pathanamthitta	2760	2583	2220	3208	2650
Alappuzha	3053	2930	2464	3089	2890
Kottayam	2936	2547	2773	2970	2904
Idukki	2598	2636	2608	2480	2707
Ernakulam	1998	1949	1977	2144	2166
Thrissur	2575	2510	2620	2943	2925
Palakkad	2497	2648	2493	2672	2389
Malappuram	2113	2251	2354	2468	2304
Kozhikkode	1390	1313	1270	1464	1517
Wayanad	2657	2552	2525	2615	2742
Kannur	1783	1942	2099	2120	2130
Kasargode	2213	2107	2367	2218	2310
Kasargode	2213	2107	2367	2218	2310
State	**2520**	**2557**	**2452**	**2733**	**2577**

Districts wise reports

1. Thiruvananthapuram



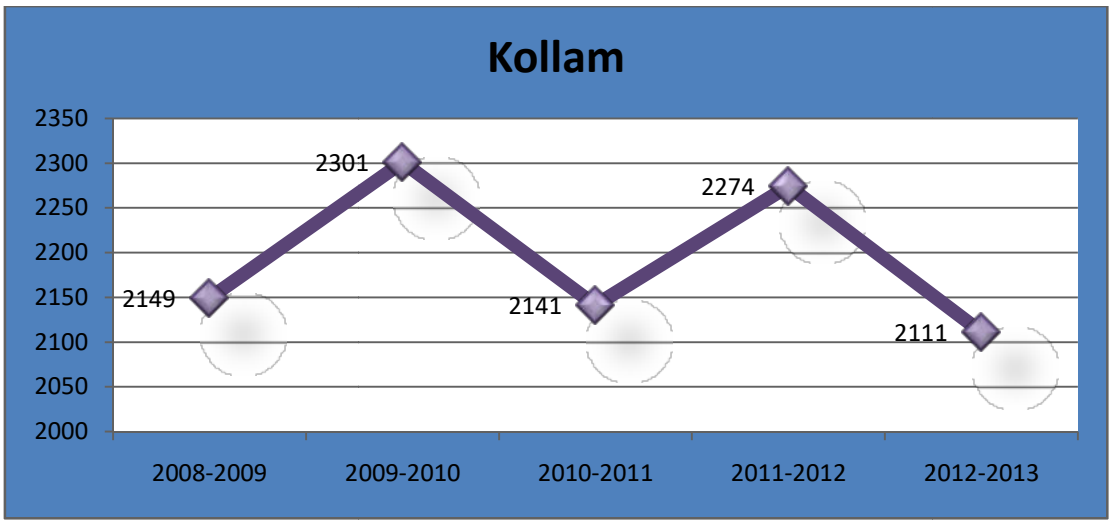
Cultivation of paddy is not as profitable as compared to cash crops. This is the reason for the lack of interest of farmers in paddy cultivation. The farmers rarely use bio-fertilizers which play an important role in

retaining the fertility of soil along with the chemical fertilizers. Majority of the farmers depend on rain for paddy cultivation.

The cultivated area of paddy is very small as compared to the total wet land. This resulted in the increased rate of pest attack. The usage of chemical fertilizer is not according to the direction and guidelines of the agricultural officers and agricultural assistants. Due to high wage rate the farmers could not depute sufficient number of labourers for paddy cultivation. This create bottleneck to the extensive cultivation.

Year	Productivity	Remarks
2008-09	2429	Lack of fertilizer usage ,irrigation& sufficient rain , attack of pest are the reasons for the low yield rate of paddy during the year
2009-10	2573	-
2010-11	2372	Due to heavy rain fall and scarcity of labourers were resulted in low yield rate.
2011-12	2563	-
2012-13	2256	Severe drought caused delay in the

2.Kollam



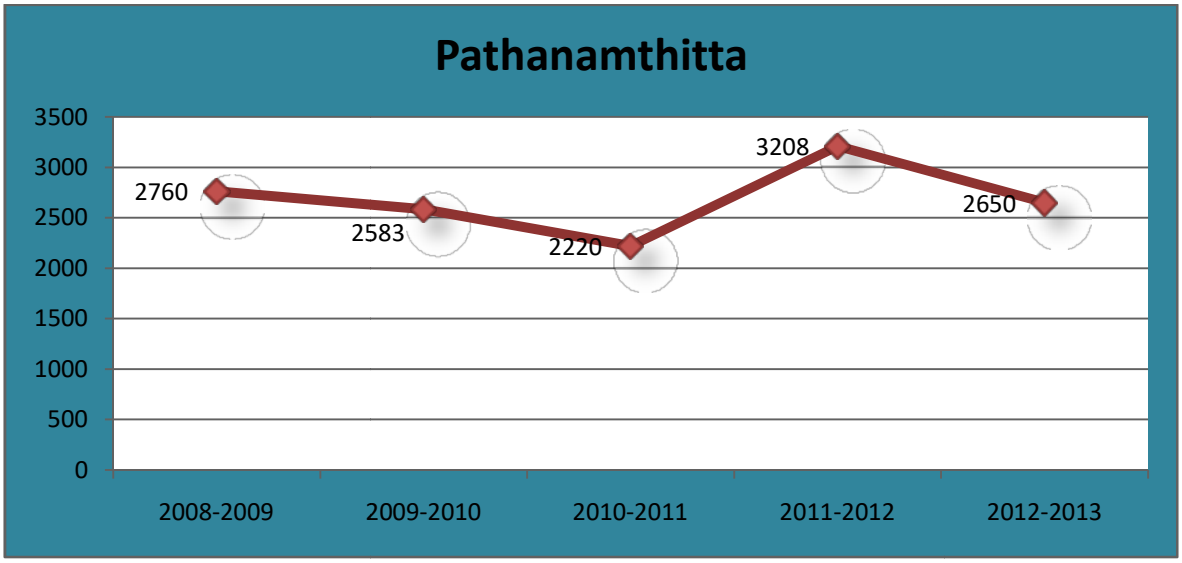
1.On examining the special report and CC schedules from the sub offices, it is reported that declining trend of production of paddy is mainly due to the climate variation. Attack of birds, disturbances of insects, unavailability of labours, irregular raining, un-controlled drought, lack of irrigation facilities etc. will affect the productivity of paddy.

2.Reason for decreasing productivity of Summer paddy in the year 2008-09

In 2008-09 productivity of summer paddy was 703Kg/Ha while in 2009-10 it was 1867 Kg/Ha and in 2007-08 summer paddy was 1617 Kg/Ha. While examining the special report of summer paddy cultivation, it was reported that due to bund collapse there was a huge paddy crop loss in Karunagapally. Continuous rain was other reason reported for crop damage in Kunnathur Taluk. In Kollam Taluk, paddy is ruined due to water tide from Ithikkara river.

Year	Productivity	Remarks
2008-09	2149	Unfavorable climate is affected the paddy cultivation.
2009-10	2301	-
2010-11	2141	Productivity decreased due to disturbances of insects, birds and lack of water in the apt time.
2011-12	2274	-
2012-13	2111	Presence of Salt water, draught, disturbance of birds, insects were affected the paddy cultivation.

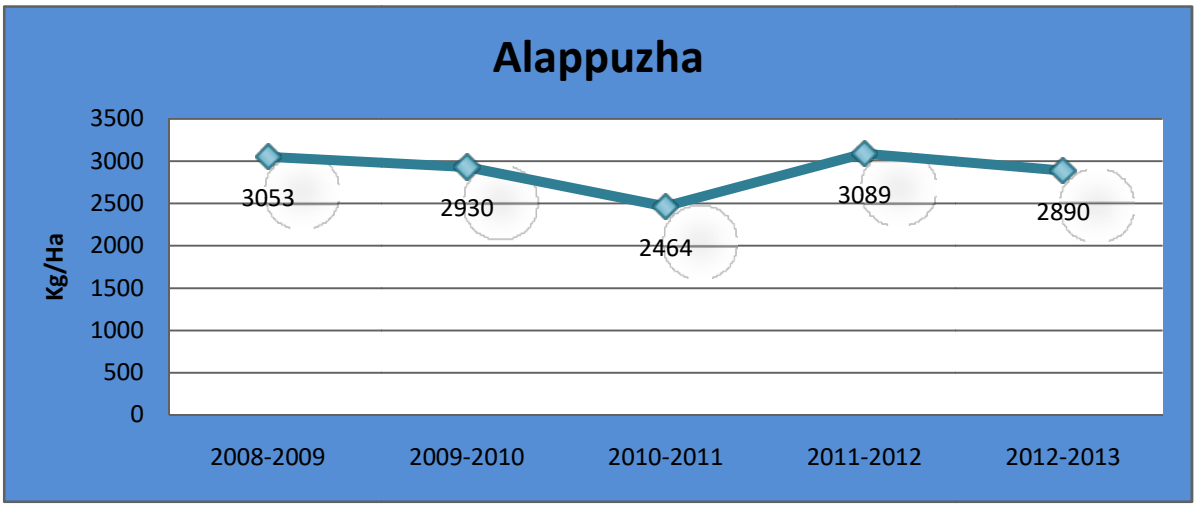
3.Pathanamthitta



Comparing the last five years productivity 2011-12 shows the highest yield. Agricultural department have taken several measures for improving the production and productivity of paddy such as distribution of improved seeds, integrated pest control etc. during this year. Subsidy for fertilizers was also given to cultivators.

Year	Productivity	Remarks
2008-09	2760	-
2009-10	2583	-
2010-11	2220	Crop loss due to bad weather, attack of pest, and shortage of labours etc. resulted in low productivity.
2010-11	2220	Crop loss due to bad weather, attack of pest, and shortage of labours etc. resulted in low productivity.
2011-12	3208	
2012-13	2650	-

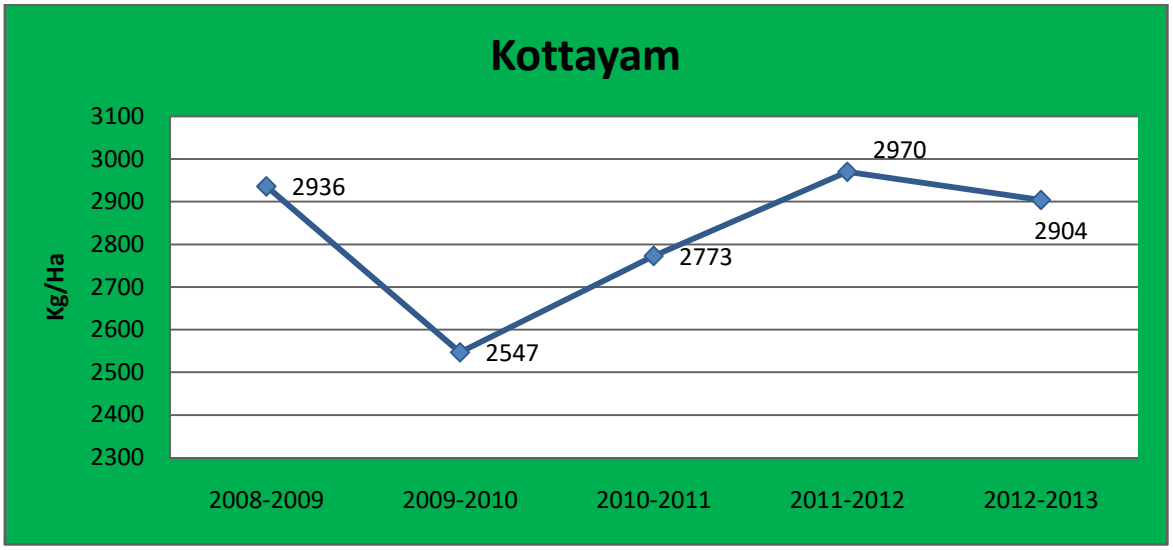
4.Alappuzha



The decrease in the productivity of rice in 2009-10, 2010-11, 2012-13 agriculture year was mainly due to the attack of insects, flood, drought and flow of saline water in the paddy fields. But in 2008-09, 2011-12 year, the crop loss due to the above reasons was comparatively lower and the productivity increased.

Year	Productivity	Remarks
2008-09	3053	-
2009-10	2930	Due to flood and attack of insects .
2010-11	2464	Crop loss due to bad weather.
2011-12	3089	-
2012-13	2890	Spread of weeds, the flow of saline water in the paddy fields, severe drought adversely affected the productivity.

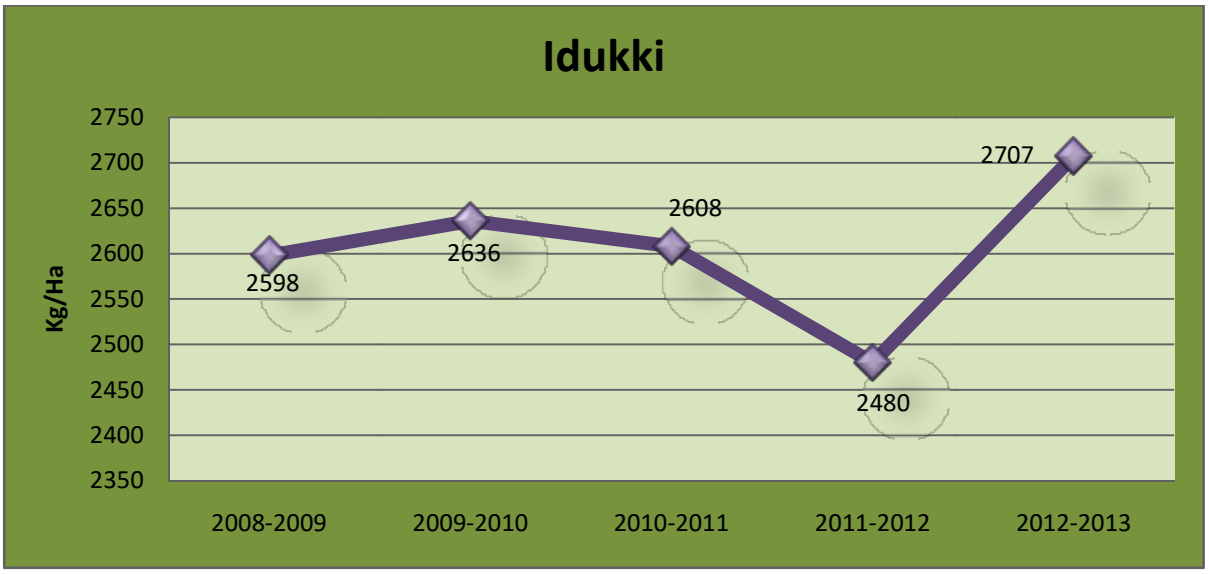
5. Kottayam



In Kottayam district, there was no downward trend found in the productivity of paddy for last 5 years. But in 2009-10 there was a decrease in the paddy productivity compared to that of previous year. The heavy rain and flood during this period was the main reason for the decrease in productivity. It may be noted that, from 2010-11 onwards, there is a gradual increase in the productivity of paddy. This may be due to various programmes initiated by the Government to benefit the Paddy Cultivation and good climatic conditions.

Year	Productivity	Remarks
2008-09	2936	-
2009-10	2547	Heavy rain and flood.
2010-11	2773	-
2011-12	2970	-
2012-13	2904	-

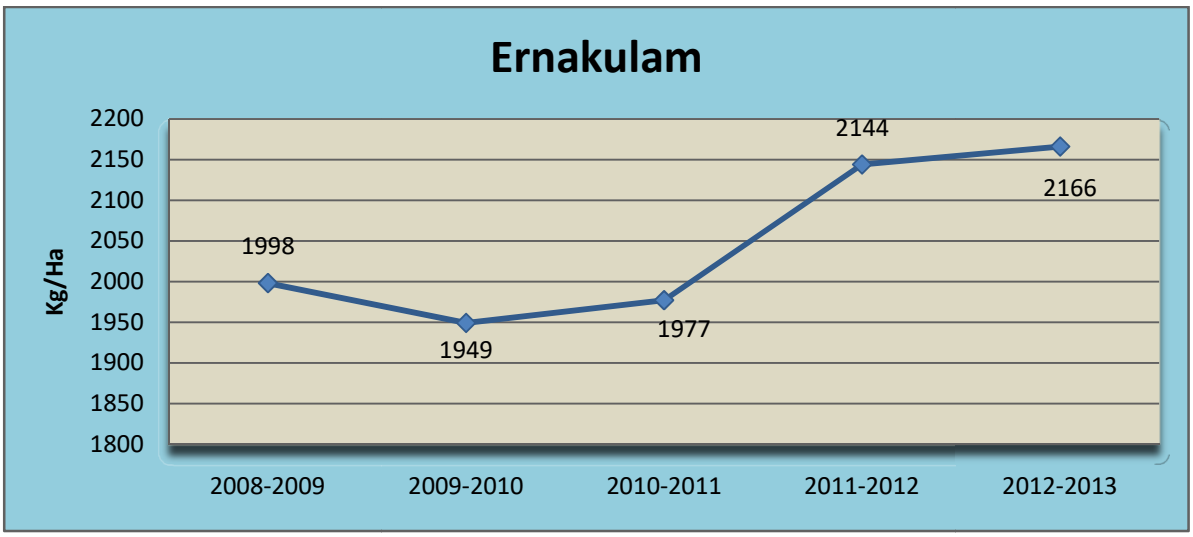
6. Idukki



There is no remarkable variation found in the productivity of Paddy in Idukki District except for the year 2011-12.

Year	Productivity	Remarks
2008-09	2598	-
2009-10	2636	-
2010-11	2608	-
2011-12	2480	Due to bad weather conditions& lack of sufficient rain.
2012-13	2707	Highest productivity during last five year.

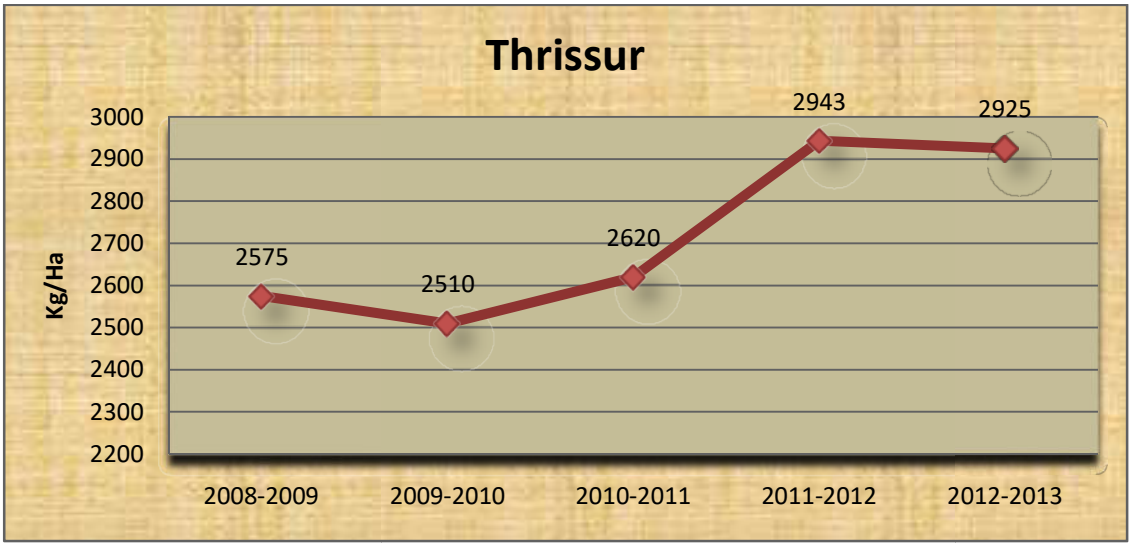
7. ERNAKULAM



The reasons underlying declining trend in the yield rate of paddy is that on account of acute shortage of field hands, who command an unconscionable wage rate which the farmer can ill afford, the cultivators as a whole is dispensing with the process of weed removal. These labour-intensive processes, which is to be performed at the pre-planting time and at frequent intervals during its growth, ensures healthy nutrition for standing crop, but exact a heavy financial toll from the cultivator towards wage component. In cases where the farmer decides to meet this financial burden, the upshot would be certain loss. Another cause is that repeated use of chemical fertilizers has depleted soil of its bio-fertility, leading to diminishing returns.

Year	Productivity	Remarks
2008-09	1998	-
2009-10	1949	-
2010-11	1977	-
2011-12	2144	-
2012-13	2166	-

8.Thrissur

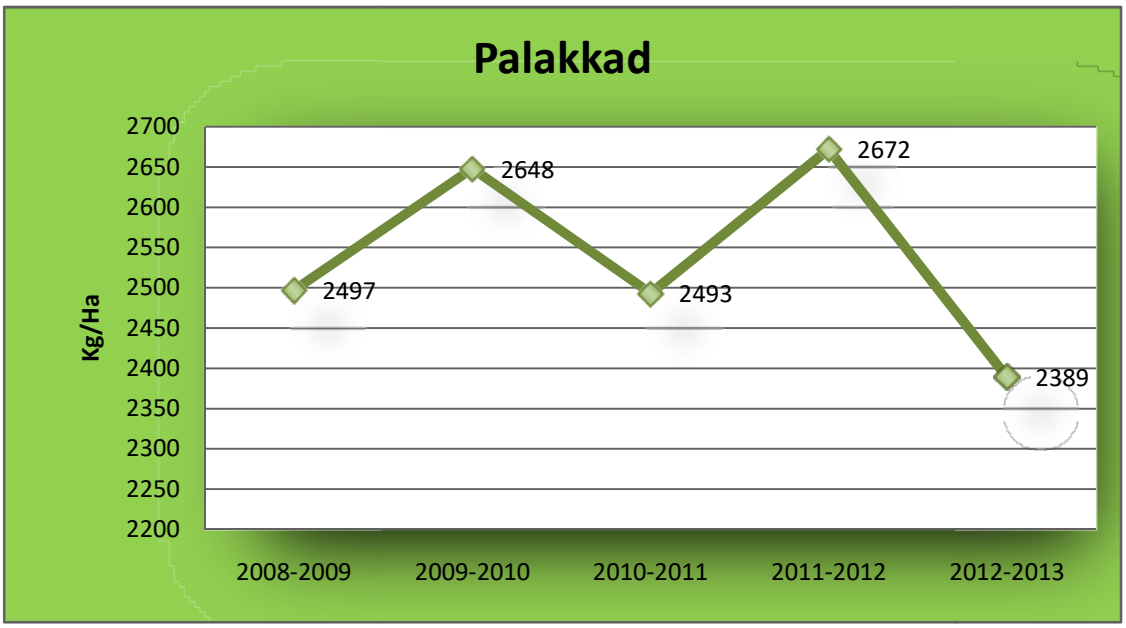


The sudden change or shift from local variety to high yield variety affected the sample average yield rate to some extend and might have of course affected the increased yield rate from 2011-12 onwards. To support the above argument it may be noted that during 2010-11 Agriculture Department supplied more high yield variety seed and promoted high yield paddy cultivation in the district.

Therefore the productivity estimate in Thrissur District from 2008-09 to 2012-13 as reported by DES is reliable and realistic as the significant variations have been rightly addressed and attributed to better agriculture practice in the district in recent years

Year	Productivity	Remarks
2008-09	2575	
2009-10	2510	
2010-11	2620	Using high yield varieties
2011-12	2943	Using high yield varieties
2012-13	2925	

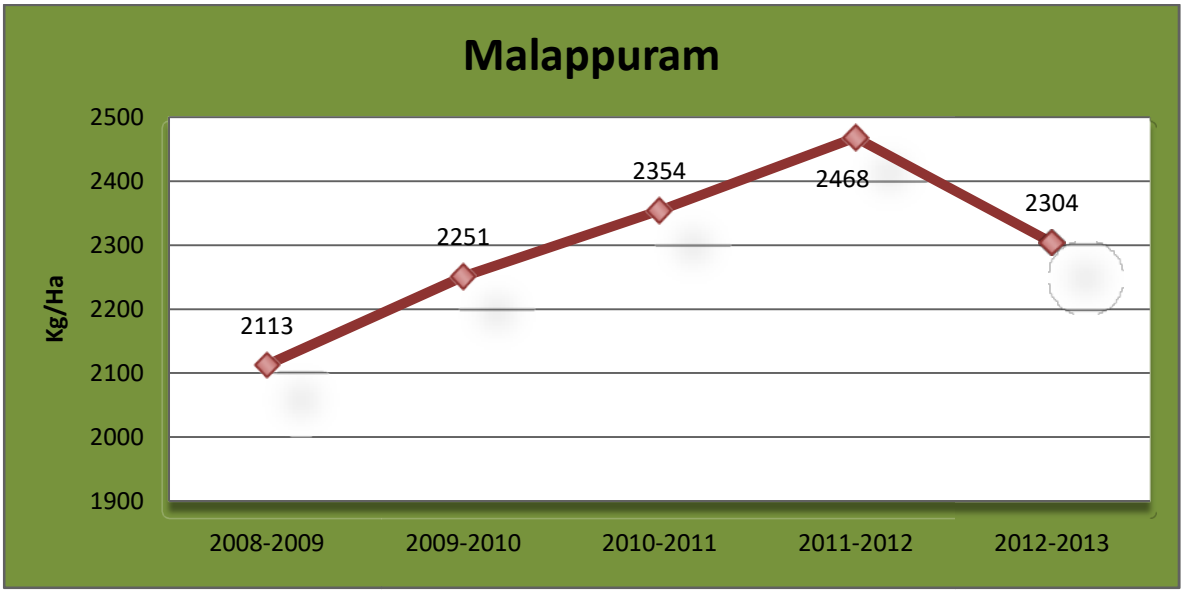
9. Palakkad



In this district, a continuous declining trend of the yield rate of paddy for the last 5 years is not happened. The reason for variation in the yield rate is mainly due to bad weather conditions (i.e. Irregular rain fall, heavy rain, lack of irrigation etc.) , pest attack , crop loss due to wild animals (Pig , Elephant, Peacock etc.).

Year	Productivity	Remarks
2008-09	2497	
2009-10	2648	
2010-11	2493	
2011-12	2672	
2012-13	2389	Lack of irrigation & bad weather conditions.

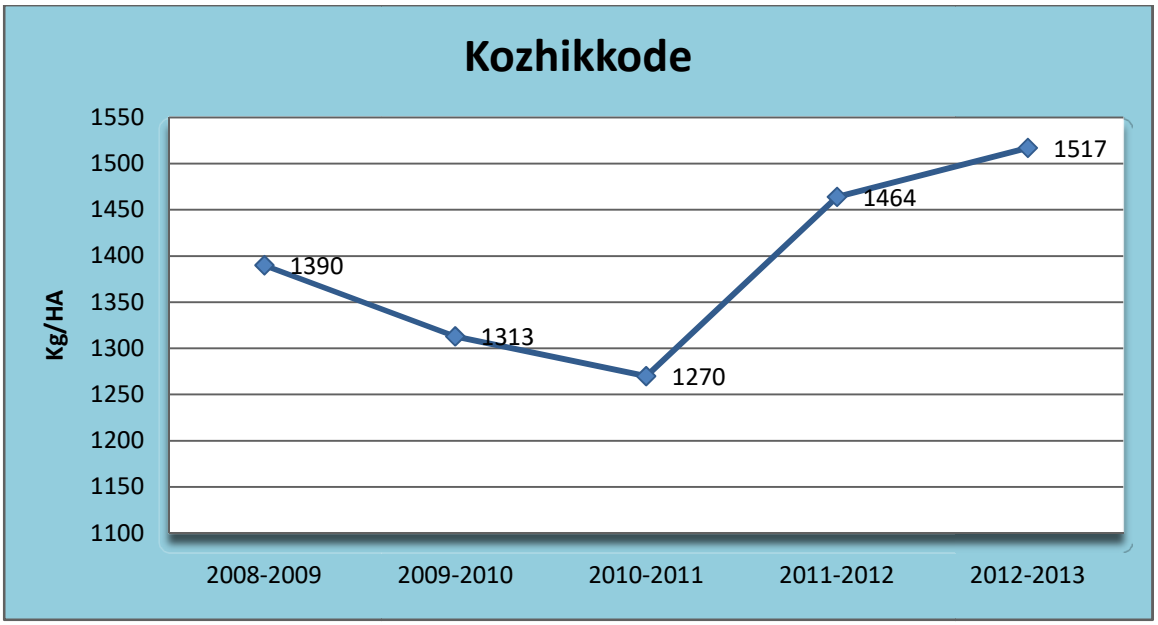
10.Malappuram



It shows that the productivity of paddy in this district is increasing regularly of the above four years.

Year	Productivity	Remarks
2008 - 2009	2113	
2009-2010	2251	
2010-2011	2354	
2011-2012	2468	
2012-2013	2304	Productivity decreased due to shortage of rain.

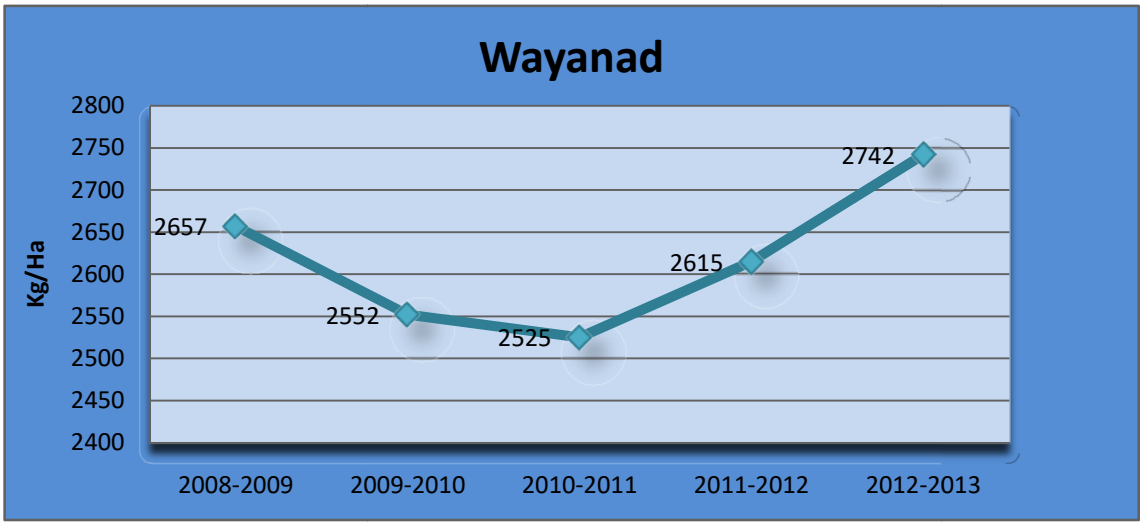
11. Kozhikkode



During the year 2009-10 due to the sudden change of climate i.e due to heavy wind and rain some portion of paddy were destroyed. Hence the productivity of paddy decreased comparing to the last year. During the year 2010-11, most of the cultivators are forced to withdraw from paddy cultivation due to non-availability of agricultural labourers and high production cost. Also due to natural calamity some of paddy crops were destroyed during the year 2010-11.

Year	Productivity	Remarks
2008-09	1390	
2009-10	1313	Productivity decreased due tobad weather conditionsi.e. heavy wind & rain
2010-11	1270	Natural calamity at some parts of the district and non-availability of agricultural labourers resulted in low productivity.
2011-12	1464	
2012-13	1517	

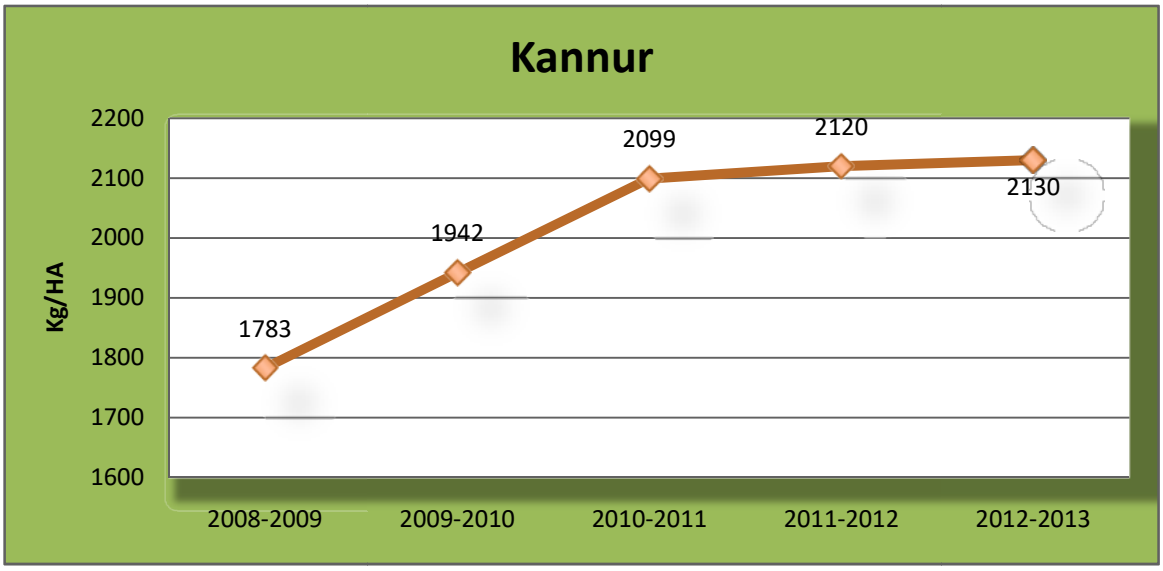
12.Wayanad



Farmers received more awareness in respect of new seeds, like medagascar and use of bio-fertilizers. Promoted group farming effectively in some areas.

Year	Productivity	Remarks
2008-09	2657	
2009-10	2552	Productivity decreased due to severe drought
2010-11	2525	Bad weather, untimely weather resulted decline in area, production and productivity of paddy during 2010
2011-12	2615	Drought was severe, but the interference of farmers at right time resulted in increase of productivity of paddy compared to previous year.
2012-13	2742	Using new methods and bio-fertilizers.

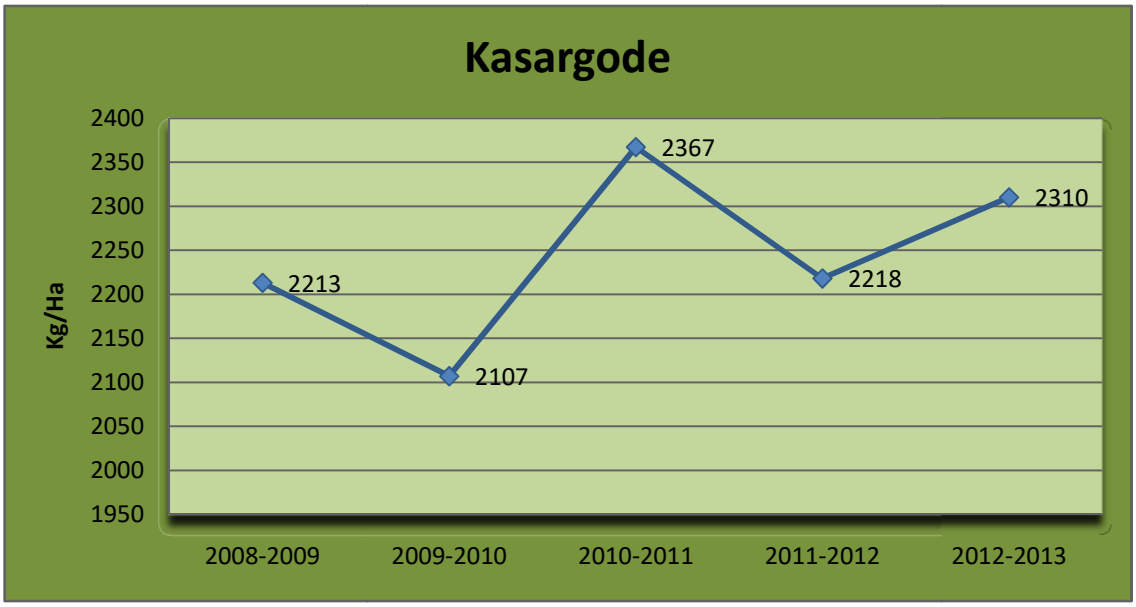
13.KANNUR



In Kannur district, the productivity of paddy is showing a trend of increase from 2008-09 to 2012-13 in the district. The reason for this trend is due to the better practice of cultivation such as use of High Yielding variety of seeds, fertilizers and manures. Also the supporting from the Government through Agricultural Department and the involvement of 'Padasekharasamithi ' were helpful to the cultivators for improving their production. The hike in the price of paddy during the above period and the support from the government in procurement of paddy is also reflected the production rate.

Year	Productivity	Remarks
2008-09	1783	-
2009-10	1942	-
2010-11	2099	-
2011-12	2120	-
2012-13	2130	-

14.Kasargod



Factors such as fertility of land, Monsoon behaviour, rainfall, irrigation, application of fertilizers, climate conditions, marketing facilities, price, availability of agriculture labours etc., determine the productivity of paddy.

Year	Productivity	Remarks
2008-09	2213	-
2009-10	2107	In autumn season there was heavy rainfall during harvest time and attack of pests affected in the
2010-11	2367	-
2011-12	2218	Some paddy fields of border areas were destroyed by wild animals like pig, elephant & monkeys.
2012-13	2310	

ANNEXURE VI

PRODUCTION AND CONSUMPTION OF RICE IN KERALA

Adverse weather has affected the production of rice in India. As far as Kerala context is concerned, productivity has declined from 2557 to 2452 and from 2733 to 2577 during 2010-11 and 2012-13 comparing with its previous years.

Reasons for the decline in the productivity are many. Major among them are lack of adequate fertilizer usage, lack of irrigation, attack of pest, scarcity of labours for harvest, lack of sufficient rain, repeated use of chemical fertilizers has depleted bio-fertility of soil, the high wage rate and shortage of agricultural labours, the shortage of experienced labours etc. District wise productivity is appended.

The subsidies distributed by Agricultural department for paddy cultivation are very low compared to the high input cost of paddy cultivation.

Analyzing the table of productivity of important crops during the last six years, the Chairman suggested that it would be very useful to have a district wise report of production and consumption of rice in Kerala during the last few years as this would be a very valuable input from DES for policy decisions of the Government. DES may therefore get such a report prepared early and after consideration of the same by the Committee, it could be submitted to Planning Board and Government. This is a topical study in view of the fact that cultivated area of crops has been decreasing from year to year and so the only remedy to increase production seems to be the use of high tech farming.

On the basis of the recommendation of the Expert Committee, DES hasprepared a report on district wise production and consumption of Rice for the last six years. It is stated bellow:-

Production & Consumption of Rice

District wise Production and Consumption of Rice in Kerala from 2007-08 to 2012-13(Production & Consumption in Tonnes)					
(Production 2007-08 & Consumption 2007)					
Sl. No.	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	7182	303855	296673	98
2	KOLLAM	7988	248999	241011	97
3	PATHANAMTHITTA	4631	94921	90290	95
4	ALAPPUZHA	62270	188110	125840	67
5	KOTTAYAM	28428	197567	169139	86
6	IDUKKI	5959	100870	94911	94
7	ERNAKULAM	24407	320096	295689	92
8	THRISSUR	59381	314145	254764	81
9	PALAKKAD	244244	278758	34514	12
10	MALAPPURAM	21748	421304	399556	95
11	KOZHIKODE	5097	274460	269363	98
12	WAYANAD	32079	84017	51938	62
13	KANNUR	14111	248795	234684	94
14	KASARGOD	10963	119832	108869	91
STATE		**528488**	**3196341**	**2667853**	**83**

Source.1. Production of Rice--Agricultural Statistics Reports from 2007-08 to 2012-13, Department of Economics and Statistics, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics and Statistics, Kerala

3. Population-- Projected population from 2007 to 2010 and 2012, Census population for 2011. Kerala

(Production 2008-09& Consumption 2007)

					(Production& Consumption in Tonnes)
Sl No	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	7274	306702	299428	98
2	KOLLAM	8292	250767	242475	97
3	PATHANAMTHITTA	7399	95260	87861	92
4	ALAPPUZHA	104250	189067	84817	45
5	KOTTAYAM	32154	198874	166720	84
6	IDUKKI	5494	101333	95839	95
7	ERNAKULAM	25907	323155	297248	92
8	THRISSUR	71909	316776	244867	77
9	PALAKKAD	240143	281391	41248	15
10	MALAPPURAM	23265	428052	404787	95
11	KOZHIKODE	5613	277055	271442	98
12	WAYANAD	33861	85350	51489	60
13	KANNUR	13637	250515	236878	95
14	KASARGOD	11043	121230	110187	91
	STATE	**590241**	**3225236**	**2634995**	**82**

Source.1. Production of Rice--Agricultural Statistics Reports from 2007-08 to 2012-13, Department of Economics and Statistics, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics andStatistics, Kerala.3. Population-- Projected population from 2007 to 2010 and 2012, and Census population for 2011.

(Production 2009-10& Consumption 2007)

(Production & Consumption in Tonnes)

Sl No	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	7564	309576	302012	98
2	KOLLAM	7947	252548	244601	97
3	PATHANAMTHITTA	7738	95601	87863	92
4	ALAPPUZHA	97976	190029	92053	48
5	KOTTAYAM	39413	200190	160777	80
6	IDUKKI	6137	101798	95661	94
7	ERNAKULAM	21024	326244	305220	94
8	THRISSUR	63854	319430	255576	80
9	PALAKKAD	266231	284049	17818	6
10	MALAPPURAM	19893	434909	415016	95
11	KOZHIKODE	4302	279675	275373	98
12	WAYANAD	33157	86703	53546	62
13	KANNUR	13843	252247	238404	95
14	KASARGOD	9260	122645	113385	92
	STATE	**598339**	**3254392**	**2656053**	**82**

Source.1. Production of Rice--Agricultural Statistics Reports from 2007-08 to 2012-13, Department of Economics and Statistics, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics and Statistics, Kerala

3. Population-- Projected population from 2007 to 2010 and 2012, and Census population for 2011. Kerala

(Production 2010-11& Consumption 2007)					
					(Production & Consumption in Tonnes)
Sl. No.	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	6923	312477	305554	98
2	KOLLAM	7155	254342	247187	97
3	PATHANAMTHITTA	6628	95944	89316	93
4	ALAPPUZHA	91325	190995	99670	52
5	KOTTAYAM	40970	201514	160544	80
6	IDUKKI	4744	102266	97522	95
7	ERNAKULAM	17823	329362	311539	95
8	THRISSUR	53079	322105	269026	84
9	PALAKKAD	218155	286732	68577	24
10	MALAPPURAM	21069	441876	420807	95
11	KOZHIKODE	3814	282320	278506	99
12	WAYANAD	27911	88077	60166	68
13	KANNUR	13308	253992	240684	95
14	KASARGOD	9834	124076	114242	92
	STATE	**522738**	**3283811**	**2761073**	**84**

Source.1. Production of Rice--Agricultural Statistics Reports from 2007-08 to 2012-13, Department of Economics and Statistics, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics and Statistics, Kerala

3. Population-- Projected population from 2007 to 2010 and 2012, and Census population for 2011. Kerala.

(Production 2011-12& Consumption2007)

(Production & Consumption in tonnes)					
Sl. No.	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	6139	293764	287625	98
2	KOLLAM	4768	242857	238089	98
3	PATHANAMTHITTA	8989	90188	81199	90
4	ALAPPUZHA	111980	183910	71930	39
5	KOTTAYAM	63579	192477	128898	67
6	IDUKKI	3135	96296	93161	97
7	ERNAKULAM	16572	320047	303475	95
8	THRISSUR	62316	312355	250039	80
9	PALAKKAD	224413	282981	58568	21
10	MALAPPURAM	18577	433775	415198	96
11	KOZHIKODE	4274	278409	274135	98
12	WAYANAD	23526	79359	55833	70
13	KANNUR	12170	249927	237757	95
14	KASARGOD	8555	120992	112437	93
	STATE	**568993**	**3175668**	**2606675**	**82**

Source.1. Production of Rice-Agricultural Statistics Report from 2007-08 to 2012-13 DES, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics and Statistics, Kerala

3. Population-- Projected population from 2007 to 2010 and 2012, and Census population for 2011. Kerala

(Production 2012-13& Consumption 2007)

(Production & Consumption in tonnes)

Sl. No.	DISTRICT	Production of Rice	Consumption of Rice	Production gap	Production gap %
1	THIRUVANANTHAPURAM	4096	294417	290321	99
2	KOLLAM	2928	243282	240354	99
3	PATHANAMTHITTA	6041	89920	83879	93
4	ALAPPUZHA	104593	184054	79461	43
5	KOTTAYAM	51019	192737	141718	74
6	IDUKKI	3183	96114	92931	97
7	ERNAKULAM	8533	321874	313341	97
8	THRISSUR	67569	313743	246174	78
9	PALAKKAD	189229	285010	95781	34
10	MALAPPURAM	15377	439210	423833	96
11	KOZHIKODE	5326	280385	275059	98
12	WAYANAD	28052	79656	51604	65
13	KANNUR	14237	251076	236839	94
14	KASARGOD	8116	121955	113839	93
	STATE	**508299**	**3190791**	2682492	**84**

Source.1. Production of Rice--Agricultural Statistics Reports from 2007-08 to 2012-13, Department of Economics and Statistics, Kerala

2. Consumption-- Report on NSS Socio- Economic Survey 64th Round (Household Consumer Expenditure 2007-08), Department of Economics and Statistics, Kerala

3. Population-- Projected population from 2007 to 2010 and 2012, and Census population for 2011. Kerala

DIRECTORATE OF ECONOMICS AND STATISTICS
KERALA

design: hareesh