FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

CENTRAL STATISTICAL AGENCY

Crop Production Forecast Sample Survey, 2010/11 (2003 E.C.)

(Conducted from September 12 to October 25, 2010)

Report on Area and Crop Production forecast for Major Crops (For Private Peasant Holding, Meher Season)

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CHAPTER I

1. BACKGROUND

1.1 Introduction

In a country with dominating agrarian economy like Ethiopia, alleviating food security is one of the most important objectives to be attained by the agriculture system. Though, the agriculture system in Ethiopia is dominated by rain fed agriculture, where the performance of the sector is highly dependant on the timely onset, duration, amount and distribution of rainfall that makes the sector highly vulnerable to drought and other natural calamities.

Thus, in Ethiopia, assessing total food supplies and providing timely early warning signals to the emerging difficulties due to drought and other natural calamities are and remain to be the primary objectives of the efforts to be made annually by the government and the concerned stakeholders. Towards this end, many factors need to be taken into consideration. Among these factors, obtaining reliable and timely pre-harvest forecast estimates of food crop production is paramount importance. Hence, compiling reliable, accurate and timely quantitative crop production forecast estimates for users should get prior consideration. So that the government and the concerned stakeholders could use the estimates to plan in advance and take all the necessary and appropriate measures in administering exports or imports, management of stocks and distribution of food to deficit regions, regulation of price control at surplus or deficit harvest, among others.

In agricultural statistics the term **“forecast”** is used to indicate qualitative or quantitative information compiled and released before harvest. It differs from an “estimate” which is always quantitative and compiled during harvest time or afterwards.

A forecast of crop production can, therefore, be defined as a statement of the most probable production of crop, which is to be obtained (expected) from the coming harvest, based on reasonable expectations of the crop growing conditions that prevail from sowing till the time of harvest.

Accordingly, the 2010/11(2003 E.C.), Crop Production Forecast estimates are based on data collected from peasant holders using scientifically accepted probability sampling methodology subject to the conditions and expectations for the coming harvest at the time of data collection, that is, from 11 September through 25 October 2010 (i.e. from Meskerem 1 to Tikimt 15, 2003 E.C.). *Here, it should be noted that the period of data collection on condition factor was extended till mid Tikimt as opposed to end of Meskerm. This is due to the fact that delaying the period of data collection particularly the data collection on condition factor by few weeks is believed to give a better picture of the coming harvest.*

1.1.1 Major stakeholders involved in providing data on "Condition Factor" for the Annual Crop Production Forecast Survey.

Years have passed, since, the Central Statistical Agency (CSA had increased the number of stakeholders data on condition factor collected from one to five, that used to be only one prior to the year 2005/06(1998 E.C.), with the objective to keep up and improve the data quality in terms of reliability and accuracy. Since then, the Annual Crop Production Forecast survey conducted included the following stakeholders as ultimate statistical unit on collecting "condition factors".

a) ***Sampled Households**:- Each holder who currently operates on grain crop production and found within the sampled households in the selected enumeration area was interviewed to state the expected percentage change on crop yield compared to that of last year's. These holders who are knowledgeable with long years accumulated and rich practical experience are believed to be the major source for accurate and reliable data on condition factors with regard to their specific crops they planted.*

b) ***Development Agents (DAs')**:- Development Agents of Regional Agriculture and Rural Development Bureaus are professionals assigned to each peasant associations. Nowadays, most of the development agents who are assigned to one or group of peasant associations were trained to advice and provide technical assistance to farmers on the use of modern or improved farm management*

practices in order to attain enhanced productivity. While performing their duties the development agents could easily identify the major crops grown, the timely onset and withdrawals as well as the distribution and amount of rainfall which is important for crop production activity in their respective area. Therefore, the development agents who are informative by the very nature of their job are believed to be another source of agricultural information including "condition factors".

c) ***Chairperson of the Peasant Association (PA):-*** *Chairpersons of the peasant association in each selected enumeration area were interviewed to state the expected percentage change of each grain crop yield compared to that of last year's. These individuals are assumed to be more knowledgeable than others about their respective areas due to their duties and responsibilities that would inform them about the supply and magnitude of farm input distribution and weather conditions. Therefore, the peasant association chairpersons are believed to be one of the sources of data on "condition factors'.*

d) ***Community Leaders':-*** *Five farmers' group leaders in each selected enumeration area were interviewed to state and agree on the expected percentage change of each grain crop yield compared to that of last year's. These group leaders are very close to farmers and are believed to be one of the sources of data on "condition factors'*

e) ***Observations from highly skilled professionals:-*** *in 2003 E.C. the CSA in close collaboration with the Federal Ministry of Agriculture and Regional Agriculture Bureaus have performed crop assessment to improve its crop forecast survey results. Hence,* CSA assigned *seven senior professionals to collect data on condition factors and technically assist in the overall field activities of the crop assessment for two weeks time. Therefore, besides their technical assistance to the assessment, the assigned professionals have assessed the conditions of crop productivity with the assessment team and come up with condition factors that reflected the impact of the onset of the late rainfall on grain crops.*

1.2 Objectives of the Crop Production Forecast Sample Survey

The objective of the 2010/11(2003 E.C.), Crop Production Forecast Sample Survey is to produce basic quantitative information on area and expected production of major food crops. This information could be used as an earlier indicator to warn policy makers and planners about the emerging difficulties that result from surplus or deficit crop production in the coming main season harvest. Therefore, timely crop production forecast estimates made on the quantity of the expected production of the 2010/11(2003 E.C.) Meher (Main) season crops prior to their harvest are used as a primary input for policy preparation and implementation of timely measures such as administering exports or imports, management of stocks and distribution of food to deficit regions, regulation of prices at the time of surplus or deficits, …etc. Moreover, quantitative data on crop production forecast will be used as input for estimating Gross Domestic Product (GDP).

CHAPTER II

2. SURVEY METHODOLOGY

2.1 Coverage

The 2010/10 (2003 E.C) Annual Crop Production Forecast Sample Survey covered the entire rural parts of the country except one zone of Gambella Region due to flood, and the non-sedentary population of three zones of Afar & six zones of Somali regions.

To be covered by the survey, a total of 2280 enumeration areas (EAs) were selected. However, due to various reasons that were beyond control, 63 EAs could not be covered. Thus, all in all the survey succeeded to cover 2217 EAs (97.23 %) throughout the country. The Crop Production Forecast Sample survey was conducted on the basis of 10 agricultural households selected from each EA. Regarding the ultimate sampling units, it was intended to cover a total of 22800 agricultural households, however, 22144 (97.12%) were actually covered by the survey.

2.2 Sampling Frame

The list containing EAs of all regions and their households obtained from the 1999 E.C. Cartographic Census Frame was used as the sampling frame in order to select the primary sampling units (EAs). Consequently, all sample EAs were selected from this frame based on the design proposed for the survey. The second stage sampling units, households, were selected from a fresh list of households that were prepared for each EA at the beginning of the survey.

2.3 Sample Design

In order to select the sample a stratified two-stage cluster sample design was implemented. Enumeration Areas (EAs) were taken to be the primary sampling units (PSUs) and the secondary sampling units (SSUs) were agricultural households.

Each zones/special wereda of the four regions (Tigray, Amhara, Oromia and SNNP) were further stratified into three agro-ecology (Kolla , Dega and Weyina Dega). Except Harari and Dire Dawa, where each region as a whole is considered to be the domain of estimation; each

zone of a region / special wereda was adopted as a stratum for which major findings of the survey are reported. For detail of the number of strata in each region see summery table 1 below.

Summary Table 1 Total and covered Zones/Strata by Region

Region	Number of Zones/ Strata	
	Total	Covered
Tigray	**5**	**5**
Afar	**5**	**2**
Amhara	**11**	**11**
Oromiya	**17**	**17**
Somalie	**9**	**3**
Benishangul Gumuz	**4**	**4**
S.N.N.P.R	**21**	**21**
Gambela	**4**	**2**
Hareri	**1**	**1**
Dire Dawa	**1**	**1**
Total	**78**	**67**

2.4 Selection Scheme

Enumeration areas from each stratum were selected systematically using probability proportional to size sampling technique; size being number of households. The sizes for EAs were obtained from the 1999 E.C. cartographic census frame. From the fresh list of households prepared at the beginning of the survey 10 agricultural households within each sample EA were selected systematically.

Estimation procedure of totals, ratios, sampling error and the measurement of precision of estimates (CV) are given in Appendix-I and II respectively.

3. FIELD ORGANIZATION

In order to systematically and efficiently accomplish the data collection activities of the2010/11(2003 E.C.), Crop Production Forecast Sample Survey in the field; a comprehensive field organization was put in place. Accordingly, all the technical personnel of CSA, heads of the 25 Branch Statistical Offices as well as field supervisors and enumerators were fully involved in the administration of the survey operations. For conducting the survey, a total of

2328 (including reserves) field enumerators, were recruited, trained and were assigned in the selected sample EAs. One supervisor was assigned to closely supervise and follow up the work of five enumerators. Moreover, experts from the CSA's headquarters, and other supporting staff were involved in the survey operations.

All enumerators were equipped with the necessary survey material and equipment such as questionnaires, instruction manuals, compasses, measuring tapes, programmable calculators, iron pegs, … etc. just before the deployment to their respective enumeration areas (The survey questionnaires are given in Appendix IV).

3.1 Training of Field Staff

Before conducting the Crop Production Forecast Sample Survey, it required considerable planning and acquisition of all relevant survey materials. These included the training of personnel, procurement of equipment, designing and printing of questionnaires, as well as enumerators' and supervisors' instruction manuals.

The training program for this survey was carried out in two stages. In the first stage, **153** trainees from the CSA professional staff members were trained for **7** days at CSA headquarters. Those trained in the first stage carried out similar training for about **572** field supervisors and **2328** field enumerators for two weeks at the 25 Branch Statistical Offices located all over the country.

The content of the training document focused on specific and details pertaining to the survey, including detailed classroom instruction on the purpose, terminology, concepts and definitions used in the process of undertaking the survey. Furthermore, the training program comprised field practices i.e. how to correctly complete each questionnaire and undertaking the operations of field area measurement techniques.

4. METHOD OF DATA COLLECTION AND CROP PRODUCTION FORECASTING

4.1 Method of Data Collection

The data collected from the sampled agricultural holders for the crop production forecast estimates consisted of both subjective questions through direct interviews and objective method associated with field measurements. Data were collected objectively by measuring all fields under temporary and permanent crops using compasses and measuring tapes (see **Appendix III** for the total number of fields measured). On the other hand, the expected crop production forecast estimates are calculated from the condition factor data that are collected directly from the sampled holders within household, peasant association chairpersons and development agents. The enumerators were trained to systematically present the questions to the respondents on percentage changes using the local translation and meaning. The enumerators were also trained on how to use comparative associations to represent the concept of percentage changes and fill in the questionnaire.

The estimation procedure of forecast survey has proven to be successful in the past years and also avoided the serious problems in Ethiopia of using many different types of local units of measurements that the farmers could otherwise report on their absolute crop yields. These subjective data on percentage yield change are recorded on the questionnaire for each grain crops under investigation.

4.2 Method of Crop Production Forecasting

The Crop Production Forecast Sample Survey is based on what could be considered a three-component production "Model". The first component production "model" is the survey's direct expansion estimate of the actual cultivated area (obtained from the objectively measured fields during the September-October field data collection period). The second component production "model" uses last year's 2009/10 (2002 E.C.) Meher (Main season) crop yield estimate obtained from objectively collected crop cuttings results. The third component production "model" is the

average “condition” factor, which adjusts the previous years’ yield data in order to estimate the current year production.

All specific condition factors (such as weather, pest damage … etc.) affecting the crop growth for the rest of the current season are assumed to be taken into account by the respondent’s own subjective assessment through these “condition” factors.

4.3 Factors that Influence the Expected Crop Production

For the holder, to intuitively formulate the future production of his/her crops in the field, there are numerous factors that he/she has to take into account and make assessment subjectively. Besides the meteorological factors, there are a number of other factors that influence production and yield of crops. The major external factors that have negative and positive influence on yield and production are given below:

4.3.1 Factors that have Negative Influence

- Too much rainfall and lodging of the crop,
- Shortage of rainfall,
- Insect (locust), disease and other pest (birds) damage,
- Hail and frost damage,
- Wild and domestic animal damage,
- Shortage of seed,
- Depletion of the soil fertility, and
- Others.

4.3.2 Factors that have Positive Influence

- Favorable weather conditions,
- Improved seed and cultural practices,
- Application of fertilizers,
- Application of pesticides (absence of pests), and
- Other.

5. DATA PROCESSING

5.1 Data Editing, Coding and Verification

To facilitate the data processing activities, editing and coding instruction manuals were prepared and printed prior to the training of the staff to be involved. Before the retrieval of the filled-in questionnaires from the respective Branch Statistical Offices, the CSA regular editing/coding staff members were given a half day of intensive training on proper questionnaire review techniques. Instructions on how to correctly undertake coding the questionnaire and correcting inconsistencies were thoroughly explained to the editors. A total of 20 editors/coders were involved in this operation.

During the editing and coding processes, two professional staff members from Natural Resources and Agricultural Statistics Department were assigned to guide and supervise the editors/coders in correction of the difficult problems in the filled-in questionnaires. These technical experts were also involved in answering questions, clearing doubts…etc. and facilitate the editing and coding activities. Each editor/coder was assigned to work on a single EA at a time to ensure that all questionnaires were accounted for and completed. Then, the edited and coded questionnaires were also checked and verified by a total of one supervisor/verifier.

5.2 Data Entry, Cleaning and Processing

The data entry operation deployed about 69 data encoders, 3 data encoder supervisors, 7 data cleaning operators and 69 personal computers. The data entered into the computers using the entry module of the IMPS (Integrated Microcomputer Processing System) software, which is a software package developed by the United States Bureau of the Census. Verification was also carried out to ensure the quality of the entry work. Following the data entry operations, the data was further reviewed for data inconsistencies, missing data …etc. by the regular professional staff from Natural Resources and Agricultural Statistics Department. On the other hand, data cleaning computer operators from Data Processing Department fully participated in the data cleaning activities using computer edit program. The final stage of the data processing was to summarize the cleaned data and produce statistical tables that present the results of the survey using the tabulation component of the PC based CSPRO software.

6. BASIC CONCEPTS AND DEFINITIONS USED

The concepts and definitions used in the survey are described as follows:

Enumeration Area (EA): - Is the survey primary sampling unit classified as located in the rural area of the country which is less than or equal to a Peasant Association's area and usually consists of 150-200 households.

Households: - A household may be either;

a) A one person household, that is a person who makes provision for his own food or other essentials for living without combining with any other person to form part of a multi-person household, or

b) A multi-person household, that is, a group of two or more persons who live together and make common provision for food or other essentials for living. The persons in the group may pool their incomes and have a common budget more or less. They may be related or unrelated persons, or a combination of both.

Agricultural Households: A household is considered an agricultural household when at least one member of the household is engaged in growing crops and/or breeding and raising livestock in private or in partnership with others.

Holder: A holder is a person who exercises management control over the operations of the agricultural holdings and makes the major decisions regarding the utilization of the available resources. He has technical and economic responsibility for the holding. He may operate the holding directly as an owner or as a manager.

Using the terminology of a traditional agricultural holding the holder may be regarded as the person, who with or without help of others, operates land or raises livestock for his i.e. the person who decides on what, when, where and how to grow crops and/or raise livestock and has the right to determine the utilization of the products.

Holding: A holding is all the land and livestock kept which is used wholly or partially for agricultural production and is operated as one administratively manage unit by one person alone,

or with others, without regard to title, legal form, size or location. A holding may consist of one or more parcels.

Parcel: A parcel is a portion of land belonging to the holding, which is any piece of land entirely, surrounded by land, water road, forest, e.t.c., which are not parts of the holding. It may consist one or more cadastral units, plots or field adjacent to each other.

Field: A field is defined as any plot of land within a parcel, which can be hole or part of a parcel under the same agricultural practice.

Forecast of Crop Production: It is an estimation of the future realization of final crop production growing under conditions, which introduce a random variable, which can cause an uncertainty as to what the final production at harvest will be.

CHAPTER III

HIGH LIGHTS

On the Major Findings of the Year2010/11(2003 E.C.), Crop Production Forecast Survey

3. Introduction

It is well known that in addition to grain crops, almost all rural and urban households in south and south western parts of the country, consume root crops, namely potatoes, sweet potatoes and Taro (Godere) including Enset as stable food to sustain their livelihood for years. Among the crops mentioned above, Taro and False banana (which locally called as Godere and Enset, respectively,) due to their unique inherent biological behavior are known to perform well in drought prone areas. Besides their adaptability in areas where the annual rainfall is low to support crop production, the products obtained from these crops were found to be rich in carbohydrates, protein and vitamins

As a matter of these facts, almost in all rural and urban households in south and south western parts of the country; it is very common to find food such as Kocho and Bulla, which are the products of Enset crop in their daily dish as staple food all the year round i.e. at the time of surplus and/or drought and/or at the time of poor harvest. Considering the importance of these crops in ensuring food security at household level particularly in south and south-western parts of the country, the Central Statistical Agency included the above mentioned crops in its Annual Crop Production Forecast Sample Survey starting from 2008/09 (2001 E.C.). This report is, therefore, the third of its type to present quantitative information regarding the above mentioned root crops and summarized for the year 2010/11(2003 E.C.) Crop Production Forecast Sample Survey.

Thus, in this report an attempt has been made to present crop area statistics and the volume of the expected production of major crops including root crops (i.e. **potatoes, sweet potatoes, Taro and Enset crops)** only at the country, regional and zonal reporting levels. Following are given the discussions on the major findings of the survey results.

3.1 The prospect of Grain Crops (Cereal, Pulses and Oilseeds) for the coming 2010/11 Meher Season Harvest

The results of the year 2010/11(2003 E.C.), Crop Production Forecast Survey indicate that a total land area of about **12,030,638.06** hectares are covered with grain crops i.e. cereals, pulses and oilseeds, from which a total volume of about **196,636,100.65** quintals of grains are expected to be produced, from private peasant holdings (See Summary Table III.1).

Summary Table III.1 Area under Crop and Expected Production of Grains Crops for Private Holdings,2010/11(2003 E.C.), Meher Season

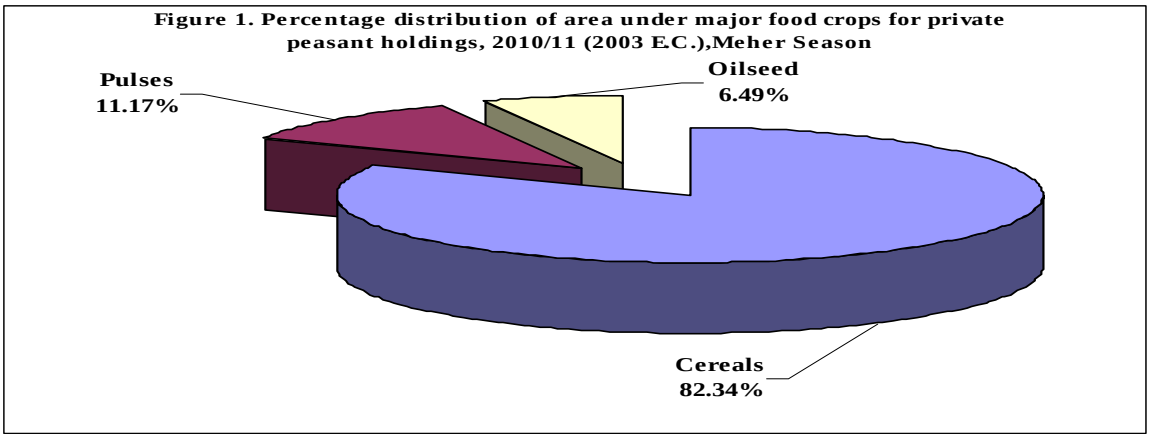
	Total Area		*Expected Production*	
Crop Type	***In Hectare***	***%***	***In Quintals.***	***%***
Cereals	***9,905,524.70***	***82.34***	***172,383,191.42***	***87.67***
Pulses	***1,343,942.70***	***11.17***	***17,487,738.77***	***8.89***
Oilseeds	***781,170.66***	***6.49***	***6,765,170.45***	***3.44***
Total Grains	***12,030,638.06***	***100***	***196,636,100.65***	***100***

Note:- Assuming the 2009/10 Belg season and commercial farms cropland area and production growth rate will be similar to that of 2010/11 forecasted production, the total expected crop production of both season from all sectors for the 2010/11 will be as follows :-

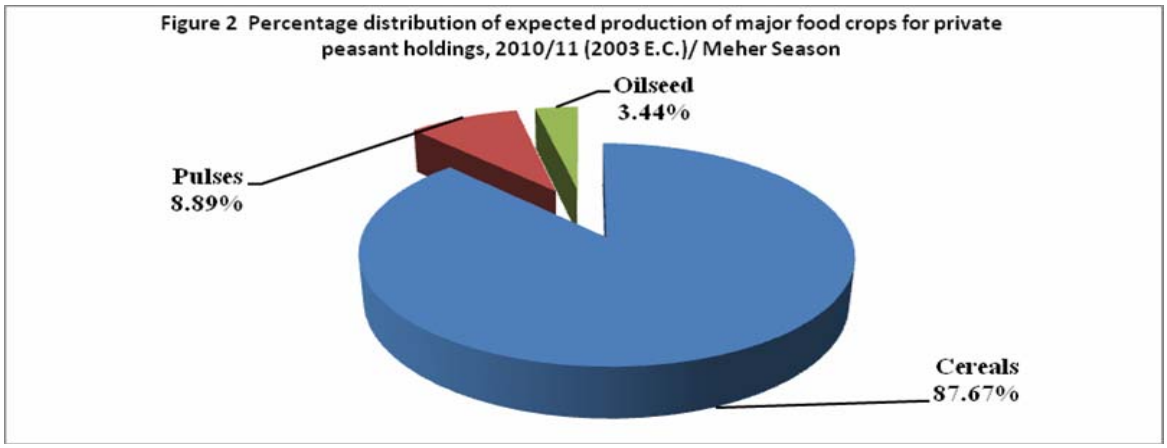
	Grain Cropped Area in Ha	Expected Production in Qts
• **Private holdings in 2010/11 Forecast Meher Season**	**12,030,638**	**196,636,101**
• **Commercial farms Forecast for both Seasons in 2010/11**	**429,282**	**9,277,441**
• **Private holdings in Belg Season Forecast in 2010/11**	**1,294,083**	**14,529,922**

Out of the 2010/11 private holdings total cultivated cropland area and expected volume of grain production, ***9,905,524.70*** hectares are accounted for cereals (**82.34%)** from which about ***172,383,191.42*** quintals **(87.67%)** are expected to be produced during this year's Meher harvest season (See Fig.1 & 2).

Crops such as teff, maize, sorghum, wheat and barley within the category of cereals have covered an estimated total cultivated land area of about **2,722,739.42**; **2,152,571.40; 1,903,022.97; 1,608,198.09; and 1,044,917.87** hectares, respectively (See Table 1).



Similarly, the total volume of about **34,340,420.63; 49,263,541.69; 37,683,045.50; 27,510,840.37; and 15,881,096.32** quintals are expected to be produced in the year 2010/11(2003 E.C.) Meher season harvest, with an average expected yield of **12.61; 22.89**; **19.80**; **17.11** and **15.20** qts/ha, in that order. (For details see Table 1).



Pulses currently planted on about ***1,343,942.70*** hectares of land **(11.17%)** from which about ***17,487,738.77*** quintals (**8.89%**) are expected to be produced in the 2010/11 harvest year. Pulses such as faba beans, field peas and haricot beans are planted in about **469,452.89**; **226,864.92** and **255,715.03** hectares of land from which about **5,806,470.49**; **2,301,720.63** and **3,931,084.52** quintals of these grains are expected to be produced in the coming harvest, with an average expected yield of **12.37; 10.15 and 15.37** quintals per hectare, in that order.

According to the survey results, oilseeds are grown on land area estimated at ***781,170.66*** hectares **(6.49%)** from which about ***6,765,170.45*** quintals **(3.44%)** are expected to be produced in this year's Meher harvest season. Crops such as Neug, linseed, groundnut, and, sesame within the category of oilseeds have covered **226,329.65**; **123,719.97**; **47,307.92** and **357,916.76** hectares of

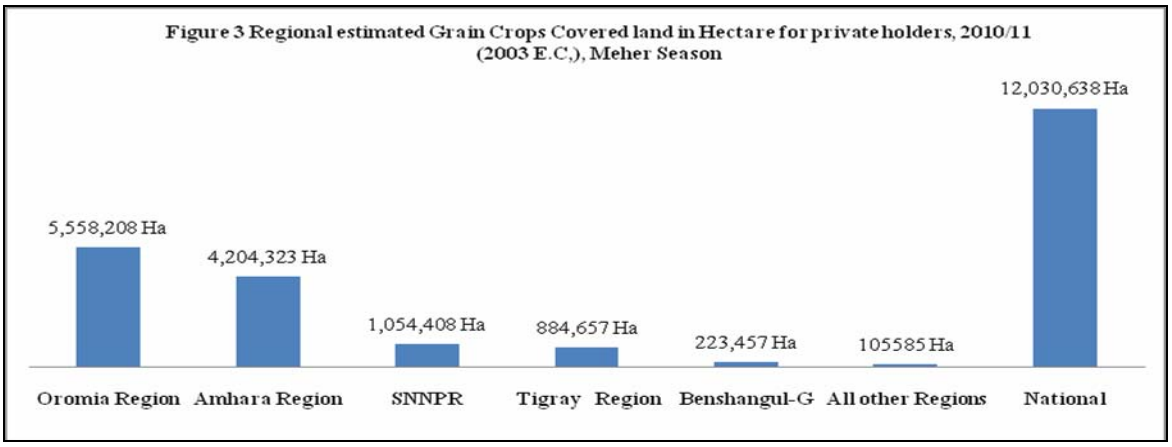
land, from which about **1,641,639.86**; **1,157,936.46**; **582,652.88** and **3,140,177.13** quintals of these crops with an average expected yield ranging from **12.32** qt/ha for groundnut to **7.25** qt/ha for, Neug , respectively, (See Table 1).

As observed from the results of the survey, grain crops are grown in almost all regions of the country, with slight to significant variations across the regions both in the size of cropland area and expected volume of production. Soil type, topography, climate and weather conditions of each regions and farmers preference, which is usually the reflection of speculated market demand for a specific crop by the farmers themselves, and/or advice from the concerned governmental and/or non-governmental institutions among others, are considered as the major contributing factors for the observed regional variations.

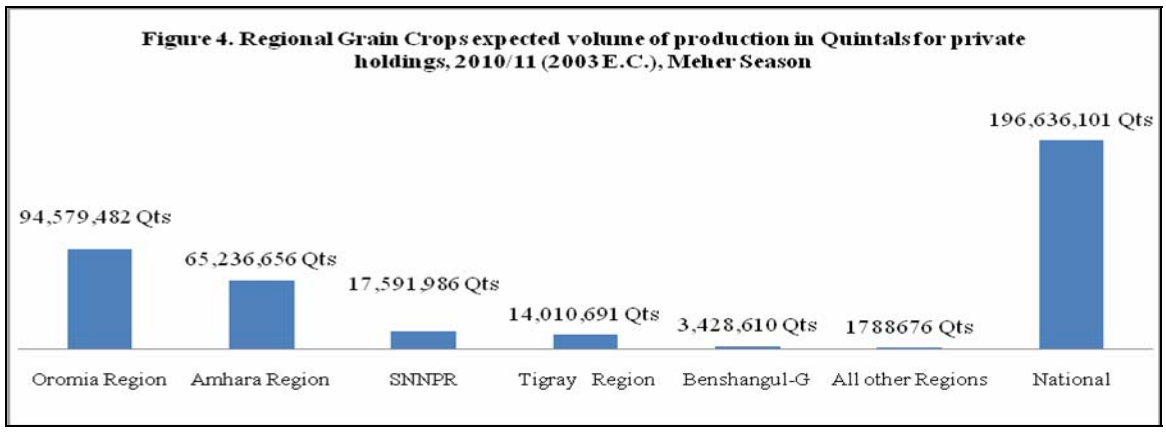
However, the results of the 2010/11 Crop Production Forecast Sample Survey, indicates that both the largest grain cropped land area and the highest expected volume of production to be obtained in the coming Meher season harvest were reported in **Oromia, Amhara, SNNP, Tigray** and **Benshangul-Gumuz** Regions. The total grain cropped area reported in each of the above mentioned regions was **5,558,208.38; 4,204,323.26; 1,054,407.79; 884,656.59** and **223,456.69** hectares of land, contributing for about **46.20%, 34.95%, 8.76%, 7.35%** and **1.86%** to the total country level grain crops covered area, respectively. Similarly, the total expected volume of production to be obtained from the cropland area reported in each of the above mentioned regions was estimated to be **94,579,482.07**; **65,236,655.52**; **17,591,985.67**; **14,010,691.08**and **3,428,610.40** quintals, which accounted for **48.10%, 33.18%, 8.95%, 7.13%** and **1.74%** of the total expected grain crops production reported at country level, respectively (For details see Summary Table III.3,fig 4&5).

Since almost all crops within the cereals crops category served as staple food crops in Ethiopia, the trend of cereal crops covered land area and production data of the last ten-production years showed that cereal crops are found to be the dominant crops grown in the country compared to

pulses and oilseeds.



Accordingly, both the regional cereal crops covered area and expected production estimates obtained from the results of the 2010/11 Crop Production Sample Survey, are higher than those reported for pulses and oilseeds in each of the respective regions (For details see Summary Table III.3).



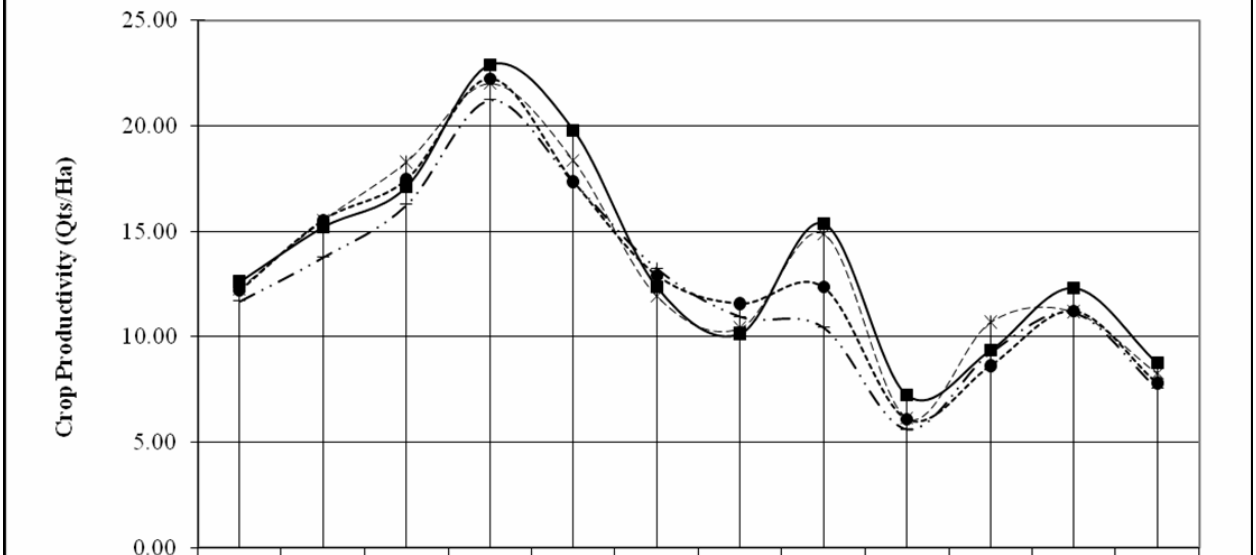
Among cereal crops Teff, barley, wheat, maize and sorghum are found to be the most commonly grown crops across the regions. However, of the regional cropland area and expected volume of production of these crops, **Oromia** Region reported the highest both in cropland area and expected production follwed by **Amhara** and then **SNNP** Regions. Likewise; the expected yield reported for each of the crops mentioned above followed the same pattern where the highest crop productivity i.e 23.40 qts/ha was reported for maize in **Amhara** Region, where as the lowest Crop productivity for oats in **SNNP** Region (See Summary Table III. 4 and Regional Tables). Similarly, Oromia, Amhara, SNNPR, Tigray are the leading Regions in producing both pulses and oilseeds in the country. The total reported cropland area under pulses and oilseeds in these regions was 621,271; 725,179; 172,406 and 83,573 hectares of land, while cropland area

under oilseed was 389,758; 310,716; 7,551 and 115,274, respectively (see Summary Table 5 &6).

3.2 Comparison of the2010/11(2003 E.C.) Pre-harvest Expected Yield with 2007/08, 2008/09 and 2009/10 Post Harvest Estimates.

In this section of the report an attempt has been made to compare the expected crop productivity of selected important food crops obtained from the 2010/11(2003 E.C.) Crop Production Forecast Sample Survey with that of the 2007/08, 2008/09 and 2009/10 post harvest crop yield estimates. Such comparisons are believed to give a bird's eye view on the prospect of the current 2010/11 (2003 E.C) Meher season harvest in terms of crop productivity to grossly evaluate the current year Meher Season performance. Consequently, the results of such comparison will help the stakeholders concerned to easily identify surplus and/or deficit producing regions and pave the way for further investigation, in order to take appropriate measures in advance. Therefore, brief discussions on crop productivity comparisons made for selected important food crops at country levels is presented as follows

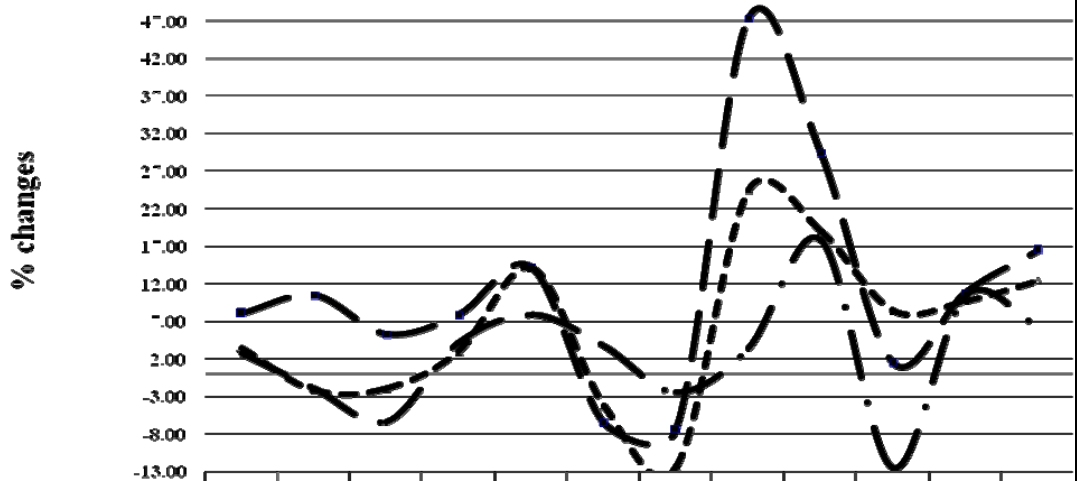
Figure 5. Trends Crop Productivity for selected Cereal Crops, Privateholdings, 2010/2011, Main (Meher) Season.



	Teff	Barley	Wheat	Maize	Sorghum	F. Beans	F. Peas	H. beans	Neug	Linseed	G.nut	Sesame
2007/08	11.67	13.76	16.25	21.22	17.34	13.23	10.95	10.43	5.60	9.22	11.12	7.53
2008/09	12.20	15.54	17.46	22.24	17.36	12.92	11.58	12.35	6.09	8.63	11.23	7.80
2009/10	12.28	15.50	18.27	21.99	18.36	11.93	10.41	14.87	6.15	10.70	11.17	8.25
2010/11	12.61	15.2	17.11	22.89	19.80	12.37	10.15	15.37	7.25	9.36	12.32	8.77

Even though the 'kermet' rain fall was heavy and found to be above normal both in its amount and distribution in many parts of the country, however, in the current crop-growing season, i.e.2010/11 (2003 E.C.), both the country level estimated cropped land area and expected volume of production of grain crops have shown significant increment over the previous three consecutive years post harvest estimates. For instance, the current year i.e. 2010/11 estimated grain crops covered area has increased by about **9.82 %, 7.32%** and **4.58%** over the 2007/08, 2008/09 and 2009/10 post harvest estimate, respectively. Following the same pattern, the current year (2010/11), expected volume of production estimate of grain crops at country level has increased by about **22.59 %, 14.88 %** and **8.78 %** when compared with the 2007/08, 2008/09 and 2009/10 post harvest estimates, respectively(See Summary Table III.3 and figure 5).

Figure 6. Percent changes of the current year (i.e. 2010 11) expected crop productivity over the 200 08, 2008 09 and 2009 10, post harvest estimates, for selected crops privateholding , Main (Meher) Season.



	Teff	Barley	Wheat	Maize	Sorghum	F. Beans	F.Peas	H. beans	Neug	Linseed	Gr-dnut	Sesame
% cha. of 2010/11 over 2007/08	8.05	10.47	5.29	7.87	14.19	-6.50	-7.31	47.36	29.46	1.52	10.79	16.47
% cha. of 2010/11 over 2008/09	3.36	-2.19	-2.00	2.92	14.06	-4.26	-12.35	24.45	19.05	8.46	9.71	12.44
% cha. of 2010/11 over 2009/10	2.69	-1.94	-6.35	4.09	7.84	3.69	-2.50	3.36	17.89	-12.52	10.30	6.30

Moreover, except for pulses, the expected crop productivity is anticipated to be better particularly for cereal crops such as teff, maize and sorghum, where for instance the current year anticipated productivity of teff has shown an increment by **8.05 %, 3.36%** and **2.69%** over the 2007/08, 2008/09 and 2009/10 post harvest yield estimates. Similarly, the expected productivity of maize and sorghum have shown the same trend like that of teff, where the increment of expected productivity of maize and sorghum over the past three consecutive years ranges from **2.92** to **7.87%** for maize and from **7.84** to 14.19**%** increment for sorghum over the 2007/08, 2008/09 and 2009/10 post harvest estimates (See Figure 6 & its data Table).

3.3 The prospect of Root Crops (Potatoes, Sweet potatoes, Taro/Godere and Enset) of the coming2010/11(2003 E.C.) Meher Season Harvest

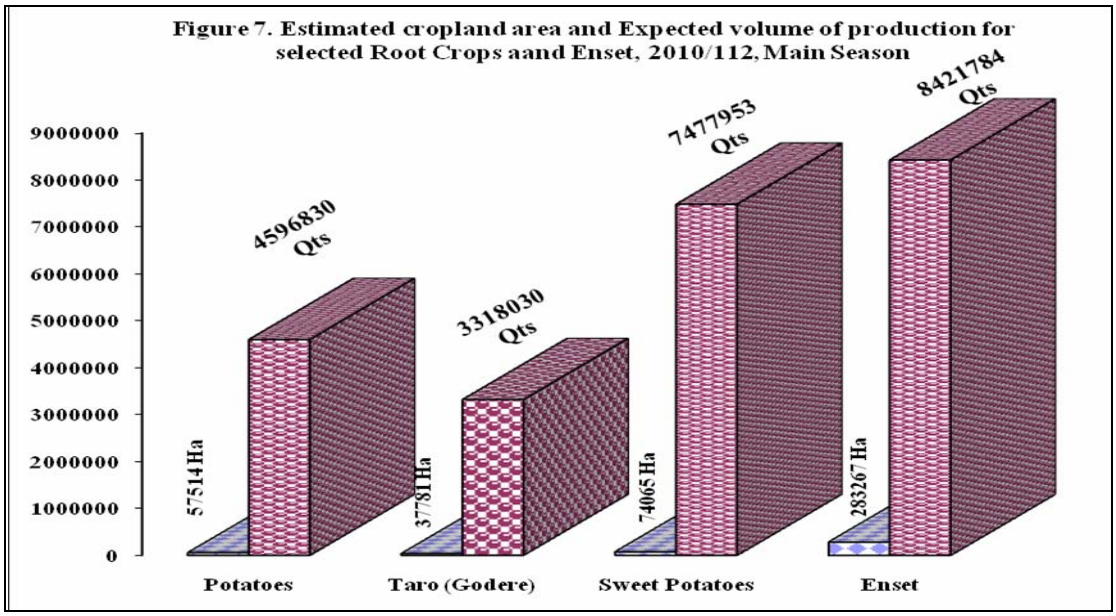
Like that of grain crops, the contribution of root crops such as potatoes, sweet potatoes, Taro(godere) including Enset for human consumption as food crops cannot be over emphasized. The majority of the population in South & South-western Ethiopia solely depends on root crops particularly on those mentioned above for its daily food consumption both during surplus and/or poor harvest years.

Summary Table III. 2 Area under Crop and Expected Production of Root Crops for Private Holdings,2010/11(2003 E.C.), Meher Season

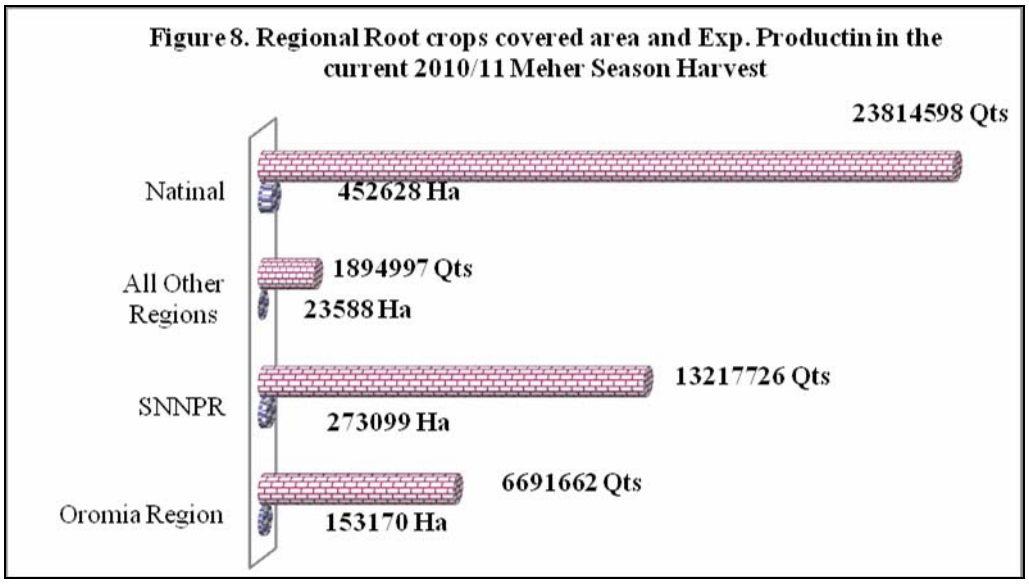
	Total Area		**Expected Production**	
Crop Type	***In Hectare***	***%***	***In Quintals.***	***%***
Enset	***283,266.87***	***62.58***	***8,421,783.83***	***35.36***
Potatoes	***57,514.01***	***12.71***	***4,596,830.44***	***19.30***
Sweet Potatoes	***74,065.43***	***16.36***	***7,477,953.28***	***31.40***
Taro (Godere)	***37,781.28***	***8.38***	***3,318,030.06***	***13.93***
Total Root Crops	***452,627.62***	***100***	***23,814,597.61***	***100***

According to the 2009/10 survey results, Root Crops (i.e. potatoes, sweet potatoes. Taro(godere) and Enset, altogether) grown in 2010 /11 (2003 E.C) covered a total of ***452,627.62*** hectares of land, from which a total volume of about ***23,814,597.61***quintals are expected to be produced, from private peasant holdings (See Summary Table III.2, fig. 7).

Out of these totals cultivated cropland area and expected volume of production, ***283,266.87*** hectares of land is accounted for Enset crop (**62.58%** of the total area under root crops) from which about ***8,421,783.83*** quintals **(35.36%)** is expected to be produced during this year's Meher harvest season (See Fig. 7).



Potatoes, sweet potatoes and Taro (godere) currently planted on about ***57,514.01; 74,065.43 and 37,781.28*** hectares of land contributing **12.71%; 16.36%;** and **8.38%** to the total Root crops covered area at country level, respectively. Consequently, from the total land area covered by each of the above mentioned crops about ***4,596,830.44***; ***7,477,953.28*** and ***3,318,030.06*** quintals, which accounted for about **19.30%; 31.40%** and **13.93%** of the total root crops are expected to be produced in the 2010/11 harvest year, respectively. Moreover, with regard to regional total root crops covered area, and volume of production, **SNNPR**, and **Oromiya** regions reported the highest root crops covered area totaled at **273,099.39** and **153,170.45** hectares of land, from which a total production of **13,217,726.02** and **6,691,662.44** quintals of root crops (potatoes, sweet potatoes Taro and Enset) are expected to be obtained from the 2010/11 Meher season harvest, respectively (See Figure 8).



Finally, users of this report should be aware that the information on what is called condition factors were collected in the month's of October 2010(Tikimet 2003 E.C.). Therefore, the results should be used with great caution in light of the favorable or adverse conditions of weather and other factors, which may affect the crop after the crop production forecast survey data was collected. The effects of these subsequent changes in crop conditions are not reflected in this report.

Note: -

1. If in some tables figures do not add up to total it is due to rounding.
2. Those forecasts designated by "*" in all tables could not be reported because of high coefficient of variation (i.e. they are less reliable). However, they are consolidated in the total estimates.
3. In all tables "-"indicates not reported and "0.00" indicates the value is insignificant.
4. '**' indicates Area under Enset crop mainly occupied by enset crops at different growing stages, this include enset seedlings, enset crops under the process of maturity and also matured enset crops postponed for next year harvest (i.e. 2011/12 (2004 E.C) for various reasons. However, the area is excuded from root crops total.
5. '***'indicates that due to incompleteness of the year2010/11(2003 E.C.) Crop Production Forecast field data collection activities, in Afar, and Gambela regions, the 2009/10 (2002 E.C.) post harvest estimates are imputed for completeness purpose, for each of the respective regions.

APPENDIX I Estimation Procedures of Totals, Ratios and Sampling Errors

The following formulas were used to estimate total area of land under specific crop, production and yield of specific crop in a stratum.

1. For estimating Total Area of Land under Specific Crop:

$$\hat{Y}_h = \sum_{i=1}^{n_h} W_{hi} \sum_{j=1}^{h_{hi}} y_{hij} = \sum_{i=1}^{n_h} W_{hi} y_{hi}$$

In which, $W_{hi} = \frac{M_h H_{hi}}{n_h m_{hi} h_{hi}}$ is the basic weight.

Where:

h Represents the stratum

n_h Is the total number of sample EAs successfully covered in the h[th] stratum.

M_h Is the measure of size of the h[th] stratum as obtained from the sampling frame.

m_{hi} Is the measure of size of the i[th] sample EA in the h[th] stratum obtained from the sampling frame.

H_{hi} Is the number of households of the i[th] sample EA in the h[th] stratum.

h_{hi} Is the number of sample agricultural households successfully covered in the i[th] sample EA in the h[th] stratum.

y_{hij} Is the observed value of the variable y for agricultural households j, in the i[th] EA in the h[th] stratum.

$\hat{Y}_h$ Estimated total for stratum h.

4. Sampling Variance of Estimates:

Sampling variance for the estimate of stratum total of area and production are estimated by the following formulas.

$$Var(\hat{Y}_h)=(1-f_h)\frac{n_h}{n_h-1}\sum_{i=1}^{n_h}\left(\hat{Y}_{hi}-\frac{\hat{Y}_h}{n_h}\right)^2+f_h\sum_{i=1}^{n_h}(1-f_{hi})\left(\frac{h_{hi}}{h_{hi}-1}\right)\sum_{j=1}^{h_{hi}}\left(\hat{y}_{hij}-\frac{\hat{Y}_{hi}}{h_{hi}}\right)^2$$

Where

f_h = average first stage probability of selection of EAs within stratum *h*.

$f_{hi}=\frac{h_{hi}}{H_{hi}}$ = average second stage probability of selection within the i^{th} sample EA in stratum *h*.

Since all strata are independent, the total variance at regional and country level is computed by aggregating the result obtained at Zone/Special Wereda level, i.e.

$$Var(\hat{Y})=\sum_{h}^{L}Var(\hat{Y}_h)$$

Where, *L* is the number of strata (Zone/Special Wereda).

In estimating the sampling variance by the above formula, selection of EAs within a stratum is assumed to be with replacement. By so doing the variance estimate may be slightly over estimated but it greatly simplifies the estimation procedure.

5. Coefficient of Variation (CV) of Estimates:

Coefficient of Variation (CV) in percentage of estimate of stratum total of area and production for a specific crop are given by:

$$CV(\hat{Y}_h)=\frac{\sqrt{Var(\hat{Y}_h)}}{\hat{Y}_h}*100$$

6. Estimator of Ratio:

The estimator of a given ratio in a stratum is $\hat{R}_h = \frac{\hat{Y}_h}{\hat{X}_h}$,

Where, the numerator and the denominator are estimates of stratum totals of characteristics of y and x, respectively.

7. Variance of the ratio estimate of the stratum

$$Var(\hat{R}_h) = \frac{1}{\hat{X}_h^2}\left[Var(\hat{Y}_h) + \hat{R}_h^2\, Var(\hat{X}_h) - 2\hat{R}_h\, Cov(\hat{Y}_h, \hat{X}_h)\right]$$

Where,

$$Cov(\hat{Y}_h, \hat{X}_h) = (1-f_h)\frac{n_h}{n_h - 1}\sum_{i=1}^{n_h}\left(\hat{X}_{hi} - \frac{\hat{X}_h}{n_h}\right)\left(\hat{Y}_{hi} - \frac{\hat{Y}_h}{n_h}\right) + f_h\sum_{i=1}^{n_h}(1-f_{hi})\left(\frac{h_{hi}}{h_{hi}-1}\right)\sum_{j=1}^{h_{hi}}\left(\hat{X}_{hij} - \frac{\hat{X}_{hi}}{h_{hi}}\right)\left(\hat{Y}_{hij} - \frac{\hat{Y}_{hi}}{h_{hi}}\right)$$

6. Ninety-five percent confidence interval (CI) of stratum total :

$$\hat{Y}_h \pm 1.96 * SE(\hat{Y}_h) \quad ,$$

Where $SE(\hat{Y}_h) = \sqrt{Var(\hat{Y}_h)}$ is standard error of the estimate of the stratum total.

Estimates of standard error and confidence interval for the other estimates can also be calculated by adopting the above formulas.

Appendix III(a). Number of Planned and Actually Covered Sampling Units (EAs & Households) of the 2008/9 (2001 E.C.) Annual Crop Production Forecast Survey.

Region	Stratum	Enumeration Areas		Households	
	Zone/Sp.wereda	Planned	Covered	Planned	Covered
Tigray	North Western Tigray	31	31	310	310
	Central Tigray	39	39	390	390
	Eastern Tigray	29	29	290	290
	Southern Tigray	38	38	380	380
	Western Tigray	25	25	250	250
	Region Total	**162**	**162**	**1620**	**1620**
Afar	Zone One	28	28	280	280
	Zone Three	20	19	200	188
	Region Total	**48**	**47**	**480**	**468**
Amhara	North Gonder	49	49	490	490
	South Gonder	44	44	440	440
	North Wello	45	44	450	440
	South Wello	48	48	480	480
	North Shewa	46	46	460	460
	East Gojam	48	48	480	480
	West Gojam	46	46	460	460
	Wag Hemira	29	27	290	270
	Awi	32	32	320	320
	Oromia	28	28	280	280
	Argoba Special Wereda	20	20	200	200
	Region Total	**435**	**432**	**4350**	**4320**
Oromia	West Wellega	43	40	430	400
	East Wellega	40	38	400	380
	Illubabor	48	48	480	480
	Jimma	46	46	460	460
	West Shewa	44	43	440	430
	North Shewa	39	39	390	390
	East Shewa	40	40	400	400

	Arsi	53	51	530	510
	West Harerghe	41	41	410	410
	East Harerghe	48	48	480	480
	Bale	44	30	440	300
	Borena	37	37	370	366
	South West Shewa	38	38	380	380
	Guji	38	38	380	380
	Kelem Wellega	36	36	360	360
	Horoguduru Wellega	36	36	360	360
	West Arsi	39	39	390	390
	Region Total	**710**	**688**	**7100**	**6876**
Somali	Shinile	20	18	200	179
	Jijiga	28	28	280	276
	Liben	24	24	240	240
	Region Total	**72**	**70**	**720**	**695**
Benishangul-Gumuz	Pawe Special	20	20	200	199
	Metekel	25	25	250	250
	Asosa	26	26	260	260
	Maokomo	20	20	200	200
	Kemashi	20	13	200	130
	Region Total	**111**	**104**	**1110**	**1039**
SNNP	Guraghe	41	37	410	370
	Hadiya	34	34	340	340
	Kembata_Tambaro	33	33	330	330
	Sidama	46	42	460	419
	Gedeo	34	33	340	330
	Wolayita	39	39	390	390
	South Omo	36	35	360	350
	Shaka	24	24	240	240
	Keffa	37	37	370	370
	Gamo_Gofa	41	41	410	410

	Bench_Maji	36	36	360	359
	Yem Specia Wereda	20	20	200	200
	Amaro Special Wereda	20	20	200	200
	Burji Special Wereda	20	20	200	200
	Konso Special Wereda.	20	20	200	200
	Derashe Special Wereda.	20	19	200	190
	Dawro	32	32	320	320
	Basketo Special Wereda.	20	20	200	200
	Konta Special Wereda.	20	20	200	200
	Siltie	30	28	300	280
	Alaba Special Wereda.	20	19	200	190
	Region Total	**623**	**609**	**6230**	**6088**
Gambela	Agnuak	21	18	210	180
	Nuer	20	0	200	0
	Mejenger	20	19	200	190
	Etang Special Wereda	20	20	200	200
	Region Total	**81**	**57**	**810**	**570**
Harari	**Harari**	**24**	**24**	**240**	**240**
Dire Dawa	**Dire Dawa**	**24**	**24**	**240**	**239**
Country Total		**2290**	**2217**	**22900**	**22155**

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Oromia	West Wellega	43	40	430	400
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	Arsi	53	51	530	510
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	Horoguduru Wellega	36	36	360	360
	West Arsi	39	39	390	390
	Region Total	**710**	**688**	**7100**	**6876**
Somali	Shinile	20	18	200	179
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	Burji Special Wereda	20	20	200	200
	Konso Special Wereda.	20	20	200	200
	Derashe Special Wereda.	20	19	200	190
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	Konta Special Wereda.	20	20	200	200
	Siltie	30	28	300	280
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Gambela	Agnuak	21	18	210	180
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	Mejenger	20	19	200	190
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	Region Total	**81**	**57**	**810**	**570**
Harari	**Harari**	**24**	**24**	**240**	**240**
Dire Dawa	**Dire Dawa**	**24**	**24**	**240**	**239**
Country Total		**2290**	**2217**	**22900**	**22155**