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REVIEW OF FERTILIZER USE BY CROP AND BY PRODUCT ETHIOPIA 2017

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1 Introduction

1.1 Background of the study

Agricultural inputs are among the most important requirements to achieve successful production and satisfactory profitability both for agricultural projects and farmers. The agricultural input sector has critical impact on the agricultural productivity of a nation as it influences farmers' access to and use of productivity enhancing inputs. Fertilizers have become major cost of production in Ethiopia along with the cost of other input like seed, pesticides and labor. Considering the heavy dependence of Ethiopian agriculture on rainfall and the extensive dispersal of cropping areas, timely and convenient availability of inputs is a critical factor for attaining production targets. Ethiopia acknowledges the need for increased use of modern fertilizer and seed technologies to achieve sufficient agricultural productivity growth to meet economic development, poverty reduction, and food security goals. Since the early 1980s, the challenge has been to increase farmers' use of productivity-enhancing inputs in a cost-effective, financially sustainable, and environmentally sound manner. However, Ethiopian farmers still lag far behind other developing countries in fertilizer use. Recent years, however, have seen substantial progress in developing input markets in the country.

This report reviews literature and secondary data on developments in the fertilizer sectors in Ethiopia. Ethiopia has invested in agricultural research and development, timely access to and use of high-quality fertilizers inputs, and expanded knowledge dissemination networks to smallholder farmers. The report also assesses the constraints both on the supply and demand side related to fertilizer inputs. In the fertilizer supply side only two fertilizers, namely, urea and DAP have been in use for decades. But recently this has changed and multi nutrient fertilizers (NPS, NPSB, NPSZn etc) are gradually replacing DAP. As such, annual imports of fertilizer have been dominated by these fertilizers. On the consumption side, farmers are applying fertilizer at rates far below the blanket recommendations (100 kg ha^{-1} each urea and NP+) being transferred through the extension system.

Although there is great variability across regions in Ethiopia, data from MoALR/CSA show that overall fertilizer use is increasing every year. This being the case, the consumption is still very low, and it is, besides other factors, largely caused by the lack of knowledge about the use of fertilizers. It is widely recognized that mineral fertilizers must play an important part in improving agricultural productivity in Ethiopian farming systems. However, there are still challenges and addressing issues like strengthening farmers' knowledge on the potential contribution of fertilizers and their use and improving the efficiency of the input value chain and collecting near- to- accurate data on fertilizer use is recommended.

1.2 Purpose of the study

The main purpose of this study was to update the estimates of the types and amount of fertilizer applied/consumed by crop in Ethiopia in the year 2016/17. This was done though collecting primary and secondary data from CSA, MoANR and ABC reports, expert interviews, and published reports.

2 Methodological Framework

2.1 Methodological approach

The central statistics agency (CSA) covered the entire rural parts of the country to conduct the Annual Agricultural Sample Survey each year. It has enumeration areas across the country from which data is collected. For instance, 2016/17 a total of 2,247 Enumeration Areas (EAs) were selected and data was successfully collected from 2,223 EAs (98.93%). From each EA, then 20 households were selected to be used as sampling units. These sampling units are distributed to all over the country and are assumed to represent the country's farming household. It was then possible to collect data from 44,362 households to conduct the Annual Agricultural Sample survey. The agricultural survey collects data on the type and amount of agricultural inputs used, method and time of application of fertilizer, time of planting, frequency of planting, presence of crop damage due to different pests etc. and the amount of yield obtained are collected and summarized.

Based on reports produced by CSA, MoANR and other sources, analysis of the data as per the requirements of the formats provided by IFDC was made. Besides, recommendations, farmers experience and expert guess were made especially in putting the ratio of fertilizer types used when separate report was lacking. Results are presented separately in the excel sheets provided.

The data sources

Data are obtained from Central Statistics Agency (CSA), Agricultural Business Corporation (ABC), and Ministry of Agriculture and Natural Resources (MoANR). Published and unpublished reports and assessment reports were utilized to get relevant information on the input systems in Ethiopia.

Table 1: Institutions used as data source and the type of data obtained

Source Institution	Data type	Methods used to collect data
MoANR	Agricultural policies, Fertilizer consumption trend	• Experts interview • Reports
CSA	Fertilizer utilization, Area, and production	• Annual reports • Website
ATA	Soil information and fertilizer type recommendations	• Annual reports • Website
ABC	Fertilizer imports, distributions, carryovers	• Experts interview

2.2 Techniques and Data Collection Instruments

The list containing EAs of all regions and their respective 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.

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. The sample size for the 2016/17 (2009 E.C.) agricultural sample survey was determined by taking into account both the required level of precision for the most important estimates within each domain and the amount of resources allocated to the survey. In order to reduce non-sampling errors, manageability of the survey in terms of quality and operational control was also considered. All regions were taken to be the domain of estimation for which major findings of the survey are reported.

Enumeration areas from each stratum were selected systematically using probability proportional to size sampling technique; size being number of agricultural households. The sizes for EAs were obtained from the 2007 Population and Housing census frame. From the fresh list of households prepared at the beginning of the survey, 20 agricultural households within each sample EA were selected systematically.

2.2.1 Collaboration with Ministry of Agriculture / Public services

The central statistics Agency is responsible to collect, compile, analyze report the Annual Agricultural Sample Survey results each year. While doing this, it involves ministry of agriculture and its structures down to village level and other public organizations. Besides, recently a team of experts from different public sectors at federal level (CSA, MoANR, ATA…) started a joint data collection visit where the team travelled to different zones and woredas to collect data that can support what the CSA has collected.

2.2.2 The interviews

The agricultural data for the year 2016/17 (2009 E.C.) was collected from sedentary rural peasant households by interviewing the selected agricultural holders and physically measuring their fields to obtain data on crop yields and other items of interest.

The data obtained were recorded in various forms designed for this purpose. Instruments like measuring tape; compass, kitchen balance, scientific calculators, GPS (Oromia region only) and others were used during data collection for a timely and smooth acquisition of accurate data. The procedures for measuring area under crop and area of non - crop fields operated by the holders were performed for the 20 selected households from each sampled E.A. using measuring tapes, compasses as well as GPS. The interview questions are annexed.

2.2.3 The questionnaires

The CSA has standard questioners used to collect data from the enumeration areas. These questioners are designed to get data on agronomic practices, farm size, frequency of tillage, amount and type of fertilizers and seed inputs applied etc.

2.3 Treatment method

2.3.1 Constraints and limitations of the method used

Even though very good data is collected buy CSA from these 2,223 EAs and 44362 households throughout the country, the data obtained is supposed to represent more than 12 million farmers engaged in crop

production. The report also puts some fertilizer use figures without mentioning the proportions e.g., urea+ NPS. So assumption is required to generate how much of each is applied. Given most farmers are using less fertilizer than the recommended rates, and most farmers prefer DAP/NPS more than urea especially when they face shortage of finance to purchase sufficient amounts of fertilizers, it is estimated that in cases where NPS+ urea or DAP + urea is reported, the amount of urea is estimated to be 40%.

The MoANR report deals with data on import and distribution to regions and farmers' cooperative unions. Data on actual amount used and carry overstock is not available timely. It would therefore be good if the CSA also includes proportion of the different fertilizer used in combination. For MoANR, a reporting mechanism, on monthly bases from the different farmer's cooperatives up to region and national levels needs to be established so as to get accurate and timely data.

As mentioned above, the development agents (DAs) are responsible for assessing demand of fertilizer each year at Kebele level. But their involvement during actual fertilizer use assessment is limited. Mostly it is not easy to know how much of the fertilizers a farmer buys are used to each crop. Which crop is a priority for the farmer to receive the fertilizer if the farmer is to choose etc. Besides, the same farmer may not apply similar amounts of fertilizers per hectare every year based on the price of the fertilizers, types of crops he is planting etc. Demands of farmers often change over the changing condition that calls for demand re-vision during planning phase based on the dynamic condition of farmers‟ situation. Establishing a system that (i) ensures quality, (ii) is cost-effective, (iii) is understood by farmers, and (iv) is sufficiently flexible to support and accommodate a growing and diversifying fertilizer sector is required. The change in demand has also implication on fertilizer use. Therefore, developing a clear model and involving the existing more than 60,000 field level Development Agents (DAs) and cooperatives on assessing consumption data and use it as complement to data collected from around 2223 CSA enumeration sites could help to get close to accurate data about fertilizer use in the country.

3 Overview of agriculture

The agricultural sector is the principal engine of growth of the Ethiopian economy employs 83% of the labor force, contributes about 90% of exports and 45% of gross domestic product (GDP), and provides about 70% of the country's raw material requirement for large-and medium scale industries (MoA, 2009). The 83% of the Ethiopian people dwelling in the rural areas do not have the leverage of choosing to neglect agriculture (Akhilesh and Yinges 2013). The agricultural sector in Ethiopia is currently composed of 12.6 million smallholder farmers (who operate on farms averaging 1.2 hectares each) and several hundred commercial farms. The combined annual crop production of these two groups of farms is 31 million tons, with 71 percent of this output comprised of grains (cereals, pulses, and oil crops) and the remainder consisting of vegetables, fruits, and cash crops (mainly coffee, sugarcane, chat, and *enset*). Growth in the sector has been near 8 percent in recent years and in value terms the combined output of the agricultural sector is now worth an estimated Birr 221 billion ($13 billion) according to the latest GDP statistics (Access Capital Research,2012).

Agriculture is the backbone of the Ethiopian economy. This particular sector determines the growth of all other sectors and consequently, the whole national economy. On average, crop production makes up 60 percent of the sector's outputs, whereas livestock accounts for 27 percent, and other areas contribute 13 percent of the total agricultural value added. The sector is dominated by small-scale farmers who practice rain-fed mixed farming by employing traditional technology, adopting a low input and low output production system. The land tilled by the Ethiopian small-scale farmer accounts for 95 percent of the total area under agricultural use and these farmers are responsible for more than 90 percent of the total agricultural output.

Given very low level of inorganic fertilizer use on the country, an obvious policy choice in addressing this challenge is to increase its use to increase crop productivity, Ethiopia has been at the forefront of countries in Africa that have pursued such a strategy. This is reflected in both the economic growth and the poverty reduction strategies that the country has followed over the past two decades, and these policy initiatives, to the large extent, have paid off. Over the two decades following the introduction of fertilizer to smallholder farming in the country under the Freedom from Hunger program in the late 1960s, national annual fertilizer use grew from time to time. Although there is great variability across regions in Ethiopia, data from MoANR show that overall fertilizer distribution to regions rose by 291%, from 297,907.0 MT (2000/2001) to 866,990.00 MT (2016/17) and from 2 types to 5 (Fig 1).

Even though the amount of fertilizer imported increases every year, Ethiopian farmers still lag far behind other developing countries in fertilizer use and the productivity of crops is not increasing with the same rate. This is probably because the commonly applied rates cannot address the needs of the crops. Ethiopia has developed a soil fertility status map for the agricultural lands through EthioSIS project and has identified the type of fertilizers required for the different areas. However, crop and soil specific rate recommendations are lacking, and farmers are still applying the blanket rate recommended years back.

3.1 Cropping systems and agro-ecological zones

Ethiopia is basically an agricultural and pastoral country. The two dominant agricultural systems in Ethiopia are the mixed agriculture of the highlands, where both crops and livestock production are integrated, and pastoralism in the lowlands. The mixed agriculture exhibits several subsystems. Commercial agriculture using the river basins, such as the Awash Basin, is a recent phenomenon.

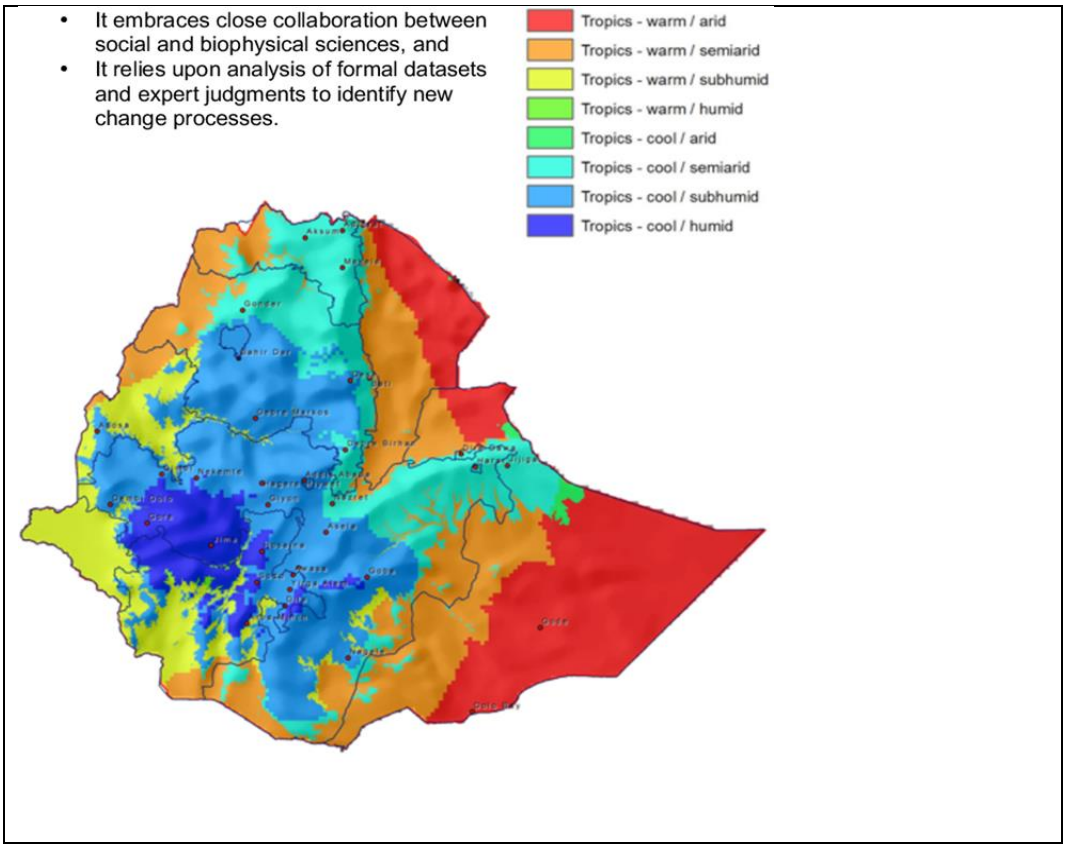
The country has varied agro-climatic zones. The Government extension program lists these as: areas of adequate rainfall; areas of moisture stress; and pastoral areas. Farmers traditionally classify them as dega (cool), woina dega (temperate) and qolla (low land; warm climate). This diversity makes it a favorable region for growing a variety of crops (Desalegn Rahmato 2008).

Ethiopia is divided into 32 agro ecological zones delineated by biophysical conditions (MoA, 2000) which are significantly influenced by altitude, which ranges from -155 to +4,000 meters above sea level. Rainfed agriculture dominates in Ethiopia. However, rainfall distribution and intensity vary spatially, tending to decrease from southwest to northeast (Cheung et al. 2008). Rainfall also varies temporally resulting in incidents of drought every 4-5 years (Osman and Sauerborn 2008). These rainfall patterns affect crop and livestock production and contribute to volatility in food prices, which ultimately affects overall economic development (FAO 2005). Subsistence farming is a typical feature of agriculture in Ethiopia. The midlands and highlands are dominantly characterized as mixed farming systems where livestock and crop production are almost equally important and highly integrated. In the lowlands, pastoral systems dominate, and agro-pastoral systems are only practiced in a few areas. Single cropping is the norm, but double cropping is practiced along rivers and as alley cropping in some parts of the county (e.g., in Bale highlands).

Agricultural production patterns vary markedly across Ethiopia according to agro climatic conditions widely varying rainfall and elevation. Agricultural researchers distinguish five agro ecological regions in Ethiopia: moisture reliable cereal-based highlands, moisture reliable enset-based highlands, humid lowlands, drought prone highlands, and pastoralist area. Most smallholder farmers reside in the moisture reliable cereal-based highlands (i.e. 59 percent of total cultivated area). Farm area in the drought-prone highlands accounts for 26 percent of total area cultivated. With farmers using virtually no irrigation, reliable rainfall is an important condition to achieve good agricultural productivity. Cultivation in the two

other areas (humid lowlands and pastoralist area) is relatively less important, accounting for only 3.9% of all cultivated area in Ethiopia.

Figure 1:Agro-Ecological Zones of Ethiopia, based on Global 16 Class classification system



3.2 Crop Calendar of Major Crops

In the main agricultural regions in Ethiopia, there are two seasons in Ethiopia. The Meher (Main) Season refers to any temporary crop harvested between the months of September and February each year while the Belg Season Crop refers to any temporary crop harvested between the months of Megabit March and August. This report refers specifically to Meher season activities. The Meher season is overwhelmingly important as more than 96 percent of both total crop and cereal production is covered.

For most crops, first ploughing starts immediately after crop harvest and most of the 2nd and third plowings are between May to July. Frequency of ploughing varies among crops and areas but ranged from 2-5.

Maize and sorghum planting is between April and May while for wheat, barley and most legumes, June and beginning of July are the right times in most locations. Teff planting is conducted between 2nd weeks of July to 1st week of August.

Weeding, top dressing and pest control activities are conducted as per the recommendations for each crops and areas and harvesting will be between Octobers to December for most crops and areas.

3.3 Agricultural statistics (areas, production, yield)

Most farmers in Ethiopia are smallholder farms, producing mostly for own consumption and generating only a small, marketed surplus. Only 40 percent of the smallholders cultivate more than 0.90ha and these 'medium-sized farms' account for three-quarters of total area cultivated. Large farms (averaging 323 hectares per farm) are not widely spread in Ethiopia and the contribution of these farms to total agricultural output is limited.

The food crops on which data is collected are the ones that are commonly grown by the majority of peasant holders. In the statistical tables these crops have been categorized into eight groups for simplicity of description and comparison purposes. The groups are cereals, pulses, oilseeds, vegetables, root crops, fruit crops, stimulant crops and sugar cane. Stimulant crops consist of Chat, coffee and hops.

The results of the year 2016/17, Post-harvest Crop Production Survey indicate that a total land area of about **14,708,631.00** hectares were covered by grain crops i.e. cereals, pulses oilseeds, etc. and **6,809,618.00 (46%)** (Table 1) of which was fertilized by different fertilizers. Within the category of grain crops, cereals are the major food crops both in terms of the area they are planted, and volume of production obtained followed by pulses. They are produced in larger volume compared with other crops because they are the principal staple crops.

Out of the total grain crop area, 81.27% (10,219,443.46) hectares) was under cereals. Teff, maize, sorghum and wheat took up 24.00% (about 3,017,914.36 hectares), 16.98% (about 2,135,571.85 hectares), 14.97% (1,881,970.73 hectares) and 13.49% (1,696,082.59 hectares) of the grain crop area, respectively.

Area coverage of pulses was 15.0 % (1,549,913.00 hectares) of the grain crops. Faba beans, haricot beans (white), haricot beans (red), and chick peas were planted to 3.40% (about 427,696.80 hectares), 0.63% (about 78,910.13 hectares), 1.68% (about 211,292.30 hectares) and 1.79% (about 225,607.53 hectares) of the grain crop area.

Similarly, oil seeds added 6.40% (about 804,752.00 hectares) of the grain crop area. Neug, sesame and linseed covered 2.24% (about 281,206.42 hectares), 2.69% (about 337,926.82 hectares) and 0.64% (about 80,353.74 hectares) of the grain crop area, respectively.

The data indicated that the amount of fertilized are is on average 46% of the total cultivated land by all crops. Cereals take the highest arear fertilized (60%) followed by pulses (19%). Of the cereals, however, the most fertilizers go to wheat (84%) and teff (78%).

Table 2:Area planted (ha) and production in quintals for major crops in Ethiopia from 2012/13 - 2016/17

Crop	2012/13		2013/14		2014/15		2015/16		2016/17	
	Area	Prod	Area	Prod	Area	Prod	Area	Prod	Area	Prod
	(in 000, ha)	(in 000 tons)	(in 000, ha)	(in 000 tons)	(in 000, ha)	(in 000 tons)	(in 000, ha)	(in 000 tons)	(in 000, ha)	(in 000 tons)
Cereals	9,601	19,651	9,849	21,584	10,152	23,608	9,974	23,129	10,219	25,385
Tef	2,730	3,765	3,017	4,419	3,016	4,751	2,866	4,471	3,018	5,020
Barley	1,019	1,782	1,019	1,908	994	1,953	944	1,857	959	2,025
Wheat	1,628	3,435	1,606	3,925	1,664	4,232	1,665	4,219	1,696	4,538
Maize	2,013	6,158	1,995	6,492	2,115	7,235	2,112	7,151	2,136	7,847
Sorghum	1,711	3,604	1,677	3,829	1,835	4,339	1,855	4,323	1,882	4,752
F. millet	432	742	455	849	454	915	466	940	456	1,017
Oats	27	44	36	62	28	51	22	40	24	49
Rice	42	121	34	92	47	132	45	127	48	136
Pulses	1,863	2,751	1,743	2,859	1,558	2,672	1,653	2,769	1,550	2,815
F. beans	574	944	538	992	443	839	444	849	428	878
F. peas	256	327	275	380	231	343	221	323	213	348
H. beans	560	463	2,720	199	323	514	358	540	290	484
C/peas	240	410	230	424	240	459	258	473	256	444
Lentils	124	152	126	159	99	137	101	134	114	166
Oilseeds	818	727	816	711	856	760	859	785	805	839
Vegetables	193	852	161		140		201		240	813
Fruits	62	479	72		90		92		108	792
Chat	174	183	222		249		251		255	220
Coffee	529	374	538		562		654		700	469
Hops	23	29	25		28		28		31	40
S/r Cane	22	1,040	29		30		30		31	1,410

*Season refers to the major crop producing months starting from May – December each year. Crops like maize are planted on May while other cereals, pulses and oilseeds on June and July depending on the location. **1 quintal= 100 Kg; 10 quintals= 1 t

Table 3: Major crops grown, area coverage by each, fertilizer type and amount applied and rates

Crop	Total area Cultivated ('000' ha)	Fertilized area Cultivated (000' ha)	Fertilized area Cultivated (%)	2016/17					Recommended application rates(kg/ha) nutrients	
				Area fertilized by product for main crops						
				DAP	Urea	Urea+ DAP	NPS	Urea+ NPS		
All crops	14,708.6	6,809.6	46%	782.2	378.7	5,704.6	1,515.5	2,575.2	N	P2O5
Cereals	10,219.4	6,172.5	60%	662.2	330.2	1,420.5	1,344.8	2,414.8	64	46
Teff	3,017.9	2,367.7	78%	223.7	126.1	537.9	524.3	955.5	64	46
Barley	959.3	500.4	52%	79.4	13.3	111.8	182.3	113.6	64	46
Wheat	1,696.1	1,420.3	84%	150.6	27.0	326.5	345.4	570.8	64	46
Maize	2,135.6	1,302.8	61%	98.7	66.7	298.5	139.6	699.3	64	46
Sorghum	1,882.0	244.6	13%	52.7	57.1	80.3	19.8	34.6	64	46
F. Millet	456.2	299.7	66%	50.3	25.3	59.6	129.9	34.6	64	46
Pulses	1,549.9	296.2	19%	86.8	11.1	35.0	117.6	45.7	64	46
F. Beans	427.7	110.5	26%	29.7	2.4	9.4	57.1	11.9	64	46
F.Peas	212.5	55.9	26%	14.3	0.7	4.7	29.5	6.8	64	46
H. Bean (white)	78.9	13.0	17%	1.9	1.2	4.7	4.1	1.2	64	46

***Source**: CSA, 2017*

NB: more detailed list is included in the excel report

3.4 The main actors in the agricultural sector

The main actors in the agriculture sectors in Ethiopia are:

- The government (both regional and Federal) through the Ministry of Agriculture and Livestock resources and its structures dawn to village level,
- Government administrations at different levels
- The input providers both private and public,
- NGOs who are supporting the extension system and agricultural development,
- Bilateral organizations,
- Donors
- Research institutes
- Universities
- Farmers

Although the roles of most of these actors are defined, there are situations where efforts are duplicated and there is lack of coordination among many actors.

3.5 Agricultural policies

Agricultural Development Led Industrialization (ADLI) being a central pillar of economic policy, different strategies, each having a five-year lifetime, were implemented in the last 15 years. Between 2000/01 and 2004/05, the Sustainable Development and Poverty Reduction Program (SDPRP), 2005/06 - 2009/10 the Plan for Accelerated and Sustained Development to End Poverty (PASDEP) , the first Growth and Transformation Plan (GTP I) between 2010/11 to 2014/15 and the second Growth and Transformation Plan (GTP II) between 2015/16 to 2019/20. All of these strategies have had a set of clear objectives and targets and have recognized agriculture as the heart of the Ethiopian economy and set objectives that aim to boost agricultural production, strengthen agricultural research, and facilitate stronger market linkages.

GTP I focused on accelerating growth in production of traditional crops through promoting the adoption of improved technologies by smallholder farmers and by increasing investment in rural infrastructure. The government has successfully achieved most of the GTPI targets in the sectors. Based on experience and lessons learned from the previous years, the second GTP has been started and accelerated growth in agricultural productivity continues to be an important area of focus. More emphasis was given to high-value crops and livestock production complemented by the establishment of a market system that benefits farmers and non-farm rural actors, maintaining environmental sustainability, promoting climate change adaptation and mitigation etc. being an underlying principle. The GTP II goes beyond production increment to promote more sustainable farming practices and enhanced conservation of indigenous biodiversity resources as well as livelihood development from natural resources (forestry, rehabilitated lands, water resources, etc.). A third area of emphasis is food security that continues to be a challenge. Finally, specific focus is placed on building institutional capacity for implementing and monitoring agricultural development. An underlying principle of the GTP II for agricultural development is that environmental sustainability must be maintained, climate change adaptation and mitigation should be promoted, and growth should be broad based and inclusive, with a particular focus on engaging women, youth and poor households.

The Ethiopian government considered the Agriculture sector as critical sector so as to realize growth in the other sectors such as industrial and manufacturing. As a result, the government has consistently invested at least 10% of government spending to agriculture since 2003. This strong support has resulted

in an average growth rate of over 7% per year in the sector, which has contributed a lot to the double-digit annual growth rate of the overall economy.

4 The fertilizer market in Ethiopia

4.1 Production, import, export, and apparent consumption

4.1.1 Fertilizer production

There is no primary production of fertilizer in Ethiopia. There are, however, five fertilizer blending plants in Becho Woliso in Tulu Bollo, Enderta in Mekelle, Gibe Dedesa in Nekemte, Melik in Worabe and Merkeb in Bahir Dar. The plants currently blend small volumes, approximately 500-1000mt each, with each having an installed capacity of 50mtph, and can blend approximately 50,000mtpy. They have stocks of Boron, Zinc and Sulphur which they use to add to the NPS and DAP to meet the soil/crop specific requirements of a small number of farmers.

4.1.2 Imports and exports

Fertilizer import and distribution is done by the public sector organization called the Ethiopian Agricultural Business Corporation (EABC), formerly known as Agricultural Inputs Supply Enterprise (AISE). EABC imports the fertilizer through Djibouti port, discharges the cargo at the port, and delivers the product directly to the cooperative union warehouses if they are ready or stores in its 33 warehouses located around Mekele, Addis Ababa, Adama, Shashemene, and Komblocha to be transferred later to the cooperatives.

Fertilizer imports plus carryover stock in 2017 was 1,390,535mt. NP compound and Urea fertilizers continues to be the most imported fertilizers to Ethiopia.

Table 4:Ethiopia Fertilizer imports 2015 – 2017

Product	2015	2016	2017 (Import + carryover stock)
Urea	363,539	346,200	574,846
NP 18.9 37.7 0 + 6.95S + 0.1B	55,000	288,000	448,714
NP 19 38 0 + 7S	446,500	237,200	252,033
NPSZnB			74,486
NP 17.7 35.5 0 + 7.6S + 2.2Zn	60,000	54,430	18,052
MOP	33,010		12,928
DAP			9,475
Total (mt)	**958,049**	**925,830**	**1,390,535**

*Data has converted from Ethiopian calendar year (Sep - Aug) to normal calendar years (Jan - Dec)

There is no fertilizer export from Ethiopia yet. But there are ongoing projects both by the government and private sector actors with the aim to export fertilizers in the near future.

4.1.3 Fertilizer Apparent Consumption

In 2017, fertilizers distributed to regions in Ethiopia for use was about 1,390,535mt and it is assumed that is the apparent consumption of 2017 although we can't account for carryover stock from the region level. There was about 16% of carryover stock from the fertilizers distributed to regional level from the national level.

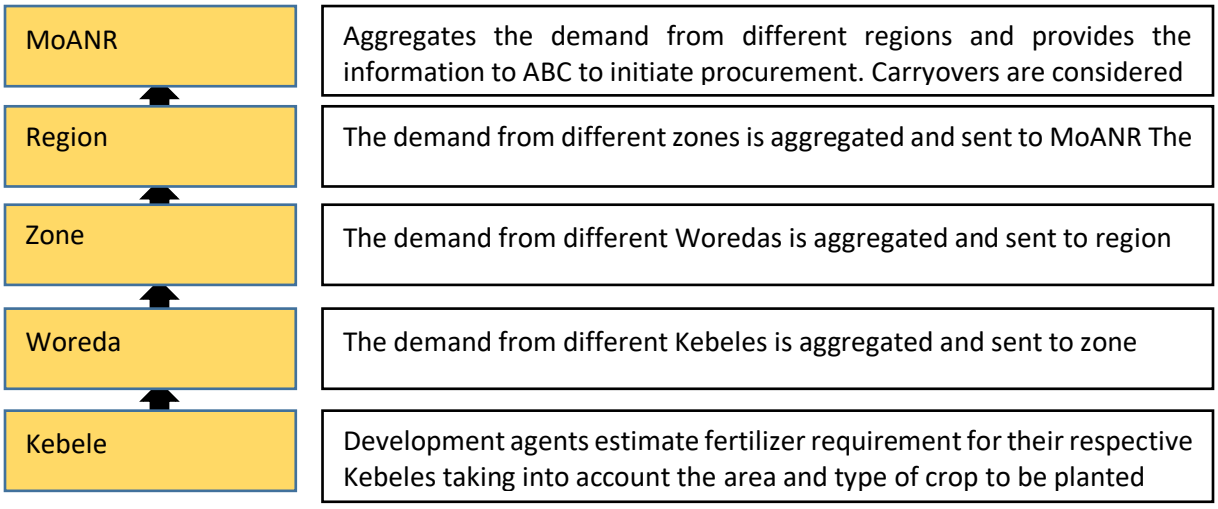
Table 5:2017 Ethiopia fertilizer statistics summary

Product	Supply (Import + carryover stock)	2017 Distribution (to regions)	carryover at central warehouse
Urea	574,846	459,285	115,561
NP 18.9 37.7 0 + 6.95S + 0.1B	448,714	377,527	71,187
NP 19 38 0 + 7S	252,033	238,191	13,843
NPSZnB	74,486	63,455	11,031
NP 17.7 35.5 0 + 7.6S + 2.2Zn	18,052	12,652	5,400
DAP	9,475	9,475	-
MOP	12,928	3,728	9,200
Total (mt)	**1,390,535**	**1,164,314**	**226,222**

4.2 Structure and size of the national market

Demand estimates begin at the kebele level by development agents (DAs), and then aggregated to woreda, zonal, regional and national levels in order for ABC to initiate procurement. This process is coordinated and aggregated nationally by the Input Supply and Marketing Directorate of MoANR.

Figure 2:The Process (steps) of fertilizer demand estimation in Ethiopia



Source: Author, based on information collected from MoANR.

4.2.1 The main distribution channels

The ABC is also responsible for the distribution of fertilizers to farmers directly and through primary farmers' cooperatives and cooperative unions. ABC imports the fertilizer through Djibouti port, discharges the cargo at the port, and delivers the product directly to the cooperative union warehouses if they are ready or stores in its 33 warehouses located around Mekele, Addis Ababa, Adama, Shashemene, and Komblocha to be transferred later to the cooperatives.

The quantity of fertilizer to be distributed to woredas is pre-determined according to a plan aggregated from woreda to Federal level. Farmers, or the cooperatives on their behalf, take delivery from ABC warehouses. Cooperatives' role in most cases is limited to physical facilitation involving no advance

purchase, storage and working capital investment. The 10,000+ primary cooperatives and 180+ farmers' cooperative unions (Bezabih and Mengistu, 2011) in the country play an important part in facilitating the redistribution of fertilizers from ABC to farmer members.

Once the fertilizers arrive to Ethiopia, ABC hands over the fertilizers to FCUs. ABC is given a small compensation for its effort. ABC'S role include selection of supply sources, pre-tender evaluation of reliability, inviting tenders, obtaining competitive price and terms, conclusion of contracts and ensuring that the shipping schedule is in conformity with the prescribed program.

Farmers wishing to purchase fertilizer on cash or credit terms go to the nearby cooperatives and buy the quantity and type of fertilizer they are capable to.

The above trend seems to change in the near future as fertilizer production will be starting soon in Ethiopia. The potash plants in Danakil, the urea plant being erected by the government and the OCP's huge investment in building new fertilizer plant in Ethiopia will all make Ethiopia among Africa's top Fertilizer manufacturer relying on local row materials. The OCP plant alone has a production capacity of 2.5 Million tons/year in the first phase and 3.8 Million tons/year in the second phase. These will be much more than the requirements of Ethiopia and there is a possibility to export fertilizers to the region when all these become functional. OCP has also planned to involve in development of customized fertilizers (NPS& NPS+) that increased yield up to 37% at lower prices.

4.2.2 The key players in the fertilizer market

Local financial institutions such as national bank of Ethiopia (NBE) and commercial bank of Ethiopia (CBE) approve tenders, which the ABC places on the international market for the supply of fertilizer for the two main planting seasons. ABC is decided to be a sole importer by the government with the expectation of bulk purchases that take advantage of economies of scale in procurement and shipping to lower farm-gate prices. Contract arrangements with international suppliers allow for the transfer of ownership of the product as it is unloaded from the vessel and transferred to trucks at Djibouti Port. The contract is flexible and allows the importer to transfer risk and responsibility that may arise from additional port costs resulting from inefficiencies in handling and bagging at the port and demurrage.

ABC hands over the fertilizers to FCUs. ABC is given a small compensation of --- percent for its effort. ABC'S role include selection of supply sources, pre-tender evaluation of reliability, inviting tenders, obtaining competitive price and terms, conclusion of contracts and ensuring that the shipping schedule is in conformity with the prescribed program.

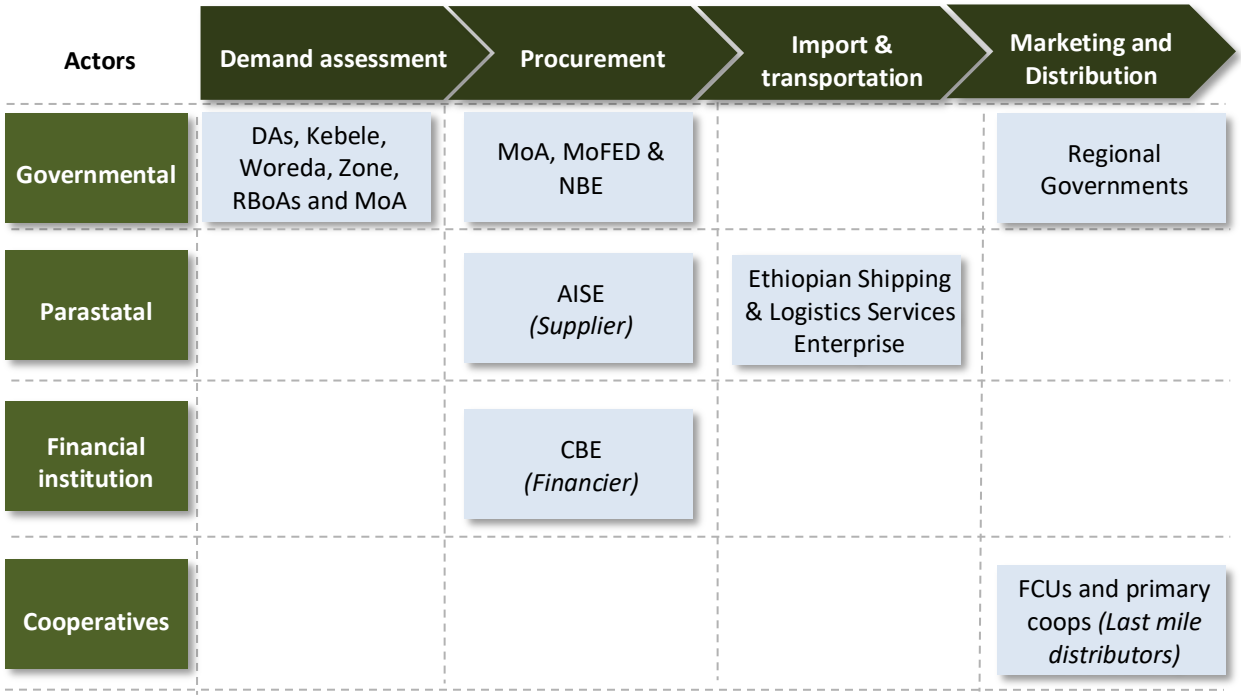
The Commercial Bank of Ethiopia (CBE) issues letters of credit (LoC) on behalf of AISE to procure the fertilizer and makes payments to the international supplier. The bank provides credit to the cooperative unions backed by the credit guarantee of the regional Bureaus of Agriculture (BoA). The regional BoAs set fertilizer prices and margins for the unions and the primary cooperatives and also provide credit guarantees for the unions to obtain and transport fertilizer from the AISE warehouses. In turn, the primary cooperatives receive credit from the cooperative unions and sell the fertilizer to farmers mostly on a cash basis. In remote and food-insecure areas, fertilizer is provided to farmers on a combination of cash and credit basis (50/50), with the credit portion to be paid at harvest.

The fertilizer costs are estimated based on CFR Djibouti plus inland transportation cost from port and unloading at the central warehouse, insurance, financing costs (bank interest rates and LoC bank commissions), and warehouse cost, overhead and operational/administrative costs. Inland transportation, which roughly accounts for 75%, is a major operational consideration in the importation of fertilizer followed by insurance, bank commissions and administration costs at 19 percent and clearing cost, inspections, re-bagging, and spillage losses at 7 percent of total inland cost up to the AISE warehouse.

Inland transportation cost is mainly determined by the distance between Djibouti Port and the AISE warehouse location. Fertilizer prices received by farmers are determined by the regional BoA. The BoA, in consultation with cooperatives, add margins to FCUs and coops to AISE initial price and sets prices for cooperatives, FCUs also add loading/unloading , warehouse rent, bank interest, and other administration costs. The costs of carryover stocks, which include costs from physical losses and implicit costs from deteriorating quality and hence reduced yield response. In addition, these stocks carry the risks associated with fluctuations in global prices.

This price setting process is not attractive to some of the primary cooperatives that sales very small amount of fertilizers. There is need for a new price coordination mechanism that is free of bureaucratic procedures, preserves competitiveness and moderates large price fluctuations.

Figure 3: Diagram showing the different actors and their roles in the fertilizer value chain



Source: Developed based on information from MoANR and ABC

4.2.3 The market size

The fertilizer market size is increasing every year. In 2017/18 the country has bought 1.5 million tons of fertilizer and the fertilizer supply has 0.4 million tons increment than that of the 2016/17 budget year.

4.3 Fertilizer Sector Value Chain Environment

4.3.1 Research & Extension

In Ethiopia, agricultural research underwent significant reform in the early 1990s following the declaration of a decentralized political system of Government of the Federal Democratic Republic of Ethiopia. The National Agricultural Research System has prearranged as including the Federal Research Institute, the Regional Agricultural Research Institutes (RARIs) and research undertakings of Higher Learning Institutions (HLIs). In 1993, numbers of IAR research centers were transferred to the regional governments and become independent research centers. During this time, Ethiopian Agricultural Research Organization (EARO) has established with new set up in 1997 by Proclamation number 79/1997 and later it is renamed as the Ethiopian Institute of Agricultural Research (EIAR) on 25th October 2005.

As per this Proclamation, its objectives are (1) to generate, develop and adapt agricultural technologies that focus on the needs of the overall agricultural development and its beneficiaries; (2) to coordinate technically the research activities of Ethiopian Agricultural Research System; (3) build up a research capacity and establish a system that will make agricultural research efficient, effective and based on development needs; and (4) popularize agricultural research results. The National Agricultural Research System, working in collaboration with public and private stakeholders, is responsible for public research and development and recommendation of fertilizer products and technologies. It also works on integrating development of chemical fertilizer technologies with the use of organic fertilizer technologies, soil and water conservation methods, improved agricultural practices and other relevant inputs.

The MOALR is responsible for developing and refining the overall national agricultural and rural development strategies and policies for the country, with input from the regions and other stakeholders. Within this strategy, the MOALR establishes the overall national extension policy, providing financial support for the extension system and supporting the regions with training and other capacity-strengthening activities.

The actual provision of public agricultural extension and advisory services has been decentralized:

Regional Level

Each region has a **Bureau of Agriculture,** BOA. The regions and their BOAs are responsible for agricultural and rural development policy implementation, coordination, and evaluation. Each BOA has a head and a number of technical and administrative staff, including department heads. These personnel provide technical and administrative support, as well as supervision and monitoring for the woreda- and kebele-level extension offices. Each region's agricultural advisory support is internally divided according to major agro ecological zones, providing more detailed technical and administrative support, especially for the larger regions.

Woreda Level

The *woreda* (district level) **Offices of Agriculture (**WOAs) are the main frontline administrative structures implementing agricultural extension.

The WOAs are composed of different sectors, the largest sector being agricultural development which is responsible for extension services and is usually divided into crop production, livestock production, natural resource management, and extension teams.

The WOA represents a more operational level in terms of reaching smallholder farmers and pastoralists. They do so using a cadre of experts or subject matter specialists (SMSs, who are also found at the regional level). There are more than 700 urban and rural *woredas* (districts) in Ethiopia. There are, on average,

about 30 or so agricultural officers in nine divisions or units within each *woreda* agriculture office, including (on average) about 10 or more SMSs who are expected to provide technical support and training to the DA staff at the *kebele* level. Most of these SMSs are assigned across the same technical areas as the DA staff, that is, crops, livestock, and NRM. In the past, most of the staff assigned to these SMS positions had begun their extension careers at least 5 to 10 years earlier.

Kebele Level

Currently, there are about 8,489 farmer training centers, FTCs, established at the *kebele* level, with roughly 2,500 of these FTCs reported to be fully functional at the present time (Ethiopia, MOA 2009a). Established FTCs are those that have a building and DAs in place. However, they are not functional until they have started one component of training—either demonstration or training. The training may be modular training or may be short-term, based on demand. The target is to have one FTC per *kebele*.

Currently Ethiopia has more than 60,000 field level Development Agents (DAs) who provide extension services in different disciplines to farmers. The main disciplines are crop science, natural resources management and livestock. But depending on the conditions in the different regions, there are also DAs trained on cooperatives promotion, irrigation development, and artificial insemination services.

The national average representation of women in the extension system is about 15.5 %. The so called four major regions of the country have the largest number of DAs. There are at least three DAs per each Kebele trained in the three disciplines. These DAs provide training to farmers, demonstrate new technologies to farmers, collect farmers' demand of different inputs and facilitate the acquisition of these inputs through their working relationship with the woreda office of agricultures and cooperatives. Most of the inputs are purchased by the farmers unless these inputs are provided by either the government or NGOs for demonstration purposes like for instance new fertilizers to be demonstrated on farmers' fields. Farmers purchase the inputs on cash or on credit bases. So, these DAs also identify farmers who need credit and facilitate the process so that the farmers get its input on time.

4.3.2 Regulation of fertilizers

The Ministry of Agriculture and Livestock Resources plays a central role in the development and administration of fertilizer regulations through it plant health and regulatory directorate. Apart from the Ministry of agriculture and Livestock, there are also a number of institutions which can undertake the inspections and/or analysis which include the quality and standards Authority, the national accreditation office, ministry of trade etc.

5 Fertilization and fertilizer use in major crops

5.1 Teff

Teff is Ethiopia's most important and widely grown grain and the main ingredient in injera, the national bread. Teff is a staple in the economy and daily life of Ethiopia, yet improvements in its cultivation have stalled when compared with maize and other crops.

Table 6: Planted area and production

Year	Planted Area (x1000 ha)	Production (x1000 Quintals)
2013/2014	3,016.52	44,186.42
2014/2015	3,016.063	47,506.57
2015/2016	2,866.05	44,713.79
2016/2017	3,017.91	50,204.4

Table 7: Recommended rates and farmer practices

#	Crops	Agro ecological zone	Expected yield	Time of application	Fertilizer product	RAR per product (kg/ha)	N	P_2O_5	S	Zn	B	Source	Date Released
C1	Tef	Countrywide	2-2.5 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C1	Tef	Country wide	2-2.5 t/ha	15-18 DAE	Urea	100	46	0				MoANR	Very old

Fertilizer supply chain

The supply chain is the same for all crops, which is presented in the section 4.2.1

Table 8: Fertilizer consumption

Crop	Type of fertilizer applied	Volume applied (tons) 2016/17
Teff	NP +	202,993.26
	Urea	100,837.04

5.2 Maize

Maize is the largest and most productive crop in Ethiopia (Table 1). ... With an average yield of 1.74 tons per hectare (equal to 3.2 million tons grown over 1.8 million hectares) from 1995 to 2008, maize has been the leading cereal crop in Ethiopia since the mid-1990s in terms of both crop yield and production.

Table 9:Planted area and production

Year	Planted Area (x1000 ha)	Production (x1000 Quintals)
2013/2014	1,994.81	6,4915.4
2014/2015	2,114.876	72349.55
2015/2016	2,111.52	71508.35
2016/2017	2,135.57	78471.75

Table 10: Recommended application rates and farmer practices

#	Crops	Agro ecological zone	Expected yield	Time of application	Fertilizer product	RAR per product (kg/ha)	N	P_2O_5	S	Zn	B	Source	Date Released
1C3	Maize	Maize Belts	6-8 t/ha	at planting	NPS	150	28.5	57	10.5			MoANR	Very old
				at planting	NPSB	150	28.4	56.6	10.4		0.15	MoANR	Very old
				at planting	NPSZn	150	26.6	53.3	11.4	3.3		MoANR	Very old
C3	Maize	Maize Belts	6-8 t/ha	1/3 at planting, 2/3 at 35-40 DAE	Urea	200	92	0				MoANR	Very old
C3	Maize	Non maize belts	3-5 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C3	Maize	Non maize belts	3-5 t/ha	1/3 at planting, 2/3 at 35-40 DAE	Urea	100	46	0				MoANR	Very old

5.3 Cereals

Table 11: Cereals, pulses, oil seeds

Crops	Total area (Ha)	% area covered by the crop	Total production(tons)	% contribution to total yield
Cereals	10,219,443.46	81.27	25,384,723.963	87.42
Pulses	1,549,911.86	12.33	2,814,633.173	9.69
Oil seeds	804,752.00	6.4	839,202.185	2.89
Total	12,574,107.33	100.00	29,038,59.321	100.00

Source: CSA report (2016/17)

The results of the year 2016/17 Survey indicated that a total land area of about 12,574,107.33 hectares is covered by grain crops i.e. cereals, pulses and oilseeds, from which a total volume of about 290, 385, 59.321 tons of grains are obtained.

Within the category of Grain crops, Cereals are the major food crops both in terms of the area they are planted, and volume of production obtained. They are produced in larger volume compared with other crops because they are the principal staple crops. Cereals are grown in all the regions with varying quantity.

Out of the total grain crop area, 81.27% (10,219,443.46) hectares) was under cereals. Teff, maize, sorghum and wheat took up 24.00% (about 3,017,914.36 hectares), 16.98% (about 2,135,571.85 hectares), 14.97% (1,881,970.73 hectares) and 13.49% (1,696,082.59 hectares) of the grain crop area, respectively. The production has similar trend with area. Cereals contributed 87.42% (about 25,384,723.963 tons) of the grain production. Maize, teff, wheat and sorghum made up 27.02% (7,847,174.657 tons), 17.29% (5,020,440.047 tons), 15.63% (4,537,852.339 tons) and 16.36% (4,752,095.604 tons) of the grain production, in the same order.

Pulses grown in 2016/17 covered 12.33% (1,549,911.86 hectares) of the grain crop area and 9.69% (about 2,814,633.173 tons) of the grain production was drawn from the same crops. Faba beans, haricot beans (white), haricot beans (red), and chick peas were planted to 3.40% (about 427,696.80 hectares), 0.63% (about 78,910.13 hectares), 1.68% (about 211,292.30 hectares) and 1.79% (about 225,607.53 hectares) of the grain crop area. The production obtained from faba beans, haricot beans (white) haricot beans (red) and chick peas was 3.02% (about 878,010.879 tons), 0.43% (about 125,980.175 tons), 1.23% (357,942.475 tons) and 1.53% (444,145.926 tons) of the grain production, in that order.

Oil seeds added 6.40% (about 804,752.00 hectares) of the grain crop area and 2.89**%** (about 839,202.185 tons) of the production to the national grain total. Neug, sesame and linseed covered 2.24% (about 281,206.42 hectares), 2.69% (about 337,926.82 hectares) and 0.64% (about 80,353.74 hectares) of the grain crop area and 1.04% (about 302,431.984 tons), 0.92% (about 267,866.546 tons) and 0.30% (about 87,911.655 tons) of the grain production, respectively.

5.4 Fertilization: Recommended Rates and Farmer Practices

Regardless of crops and soils, the national blanket recommendation is 100 kg/ha each urea and NP+ (NPS, NPSB etc) compound fertilizers. In some maize growing areas, the amount of urea will be doubled. But most of the farmers are applying much less than the recommendations in most places while there are farmers who applied much more than the recommendation rates in some areas.

5.5 Fertilizer supply chain

The supply chain is the same for all crops, which is presented in the section 4.2.1

5.6 Fertilizer consumption

Of the total area cultivated by the following crops, on average 60% of cereals, 19% of pulses, 9% of oil seeds were fertilized in 2016/17 cropping season. Of the cereals, teff, wheat and maize took the highest share while haricot bean received most of the fertilizers from pulses. This is mainly due to the importance of the crops in the market. Farmers tend to invest on crops that have attractive price in the market.

5.7 Comments on the quality of the data

The data is obtained mainly from CSA reports, which are nationally accepted as data source. But it has to be noted that the data is based on samples of about 2,223 EAs and 44362 households representing the entire farmers of the country.

6 Type and consumption of fertilizer in Ethiopia

6.1 Recommendations for fertilizer use by crop type (summary)

Regardless of crops and soils, the national blanket recommendation is 100 kg/ha each urea and NP+ (NPS, NPSB etc) compound fertilizers. In some maize growing areas, the amount of urea will be doubled.

6.2 Analysis of fertilizer consumption

Table 12: Actual consumption by product and crop

Crop	Area fertilized by product for main crops in (000'ha)					Amount of fertilizer used by product by crop in quintals				
	DAP	Urea	Urea+ DAP	NPS	Urea+ NPS	DAP	Urea	Urea+ DAP	NPS	Urea+ NPS
All crops	782.2	378.7	5,704.6	1,515.5	2,575.2	719,430	382,070	2,679,969	1,629,082	6,021,045
Cereals	662.2	330.2	1,420.5	1,344.8	2,414.8	55,962	299,858	2,319,177	1,363,820	5,117,063
Teff	223.7	126.1	537.9	524.3	955.5	16,967	70,350	682,457	453,232	1,662,594
Barley	79.4	13.3	111.8	182.3	113.6	68,699	9,056	174,377	194,99	173,991
Wheat	150.6	27.0	326.5	345.4	570.8	15,026	21,144	586,864	405,012	1,279,477
Maize	98.7	66.7	298.5	139.6	699.3	93,44	84,968	638,690	148,872	1,869,613
Sorghum	52.7	57.1	80.3	19.8	34.6	36,915	90,391	159,303	25,924	70,684
F. Millet	50.3	25.3	59.6	129.9	34.6	35,237	13,309	69,889	126,955	45,769
Pulses	86.8	11.1	35.0	117.6	45.7	82,892	9,077	73,298	119,975	102,980
F. Beans	29.7	2.4	9.4	57.1	11.9	27,876	1,686	16,474	58,836	26,219
F.Peas	14.3	0.7	4.7	29.5	6.8	12,110	448	6,736	27,256	16,057
H. Bean white)	1.9	1.2	4.7	4.1	1.2	3,866	776	11,678		2,255

NOTE: 1 ton= 10 quintals. All crops refer to crops not listed here (vegetables, oil seeds, fruits etc)

Table 13: Distribution of fertilizer consumption by crop (FUBC)

Crop	2016/17						
	Amount of fertilizer used by product by crop in (%)					Total Nutrients used in (%)	
	DAP	Urea	Urea+ DAP	NPS	Urea+ NPS	N	P2O5
All crops							
Cereals	78%	78%	87%	84%	85%	85%	85%
Teff	24%	18%	25%	28%	54%	27%	27%
Barley	95%	2%	7%	12%	6%	5%	7%
Wheat	21%	6%	22%	25%	42%	21%	22%
Maize	130%	22%	24%	9%	61%	27%	25%
Sorghum	51%	24%	6%	2%	2%	4%	3%
F. Millet	49%	3%	3%	8%	1%	2%	3%
Pulses	115%	2%	3%	7%	3%	3%	5%
F. Beans	39%	0%	1%	4%	1%	1%	2%
F.Peas	17%	0%	0%	2%	1%	0%	1%
H. Bean (white)	5%	0%	0%	0%	0%	0%	0%

Of the total fertilizer consumed, most of the fertilizers are consumed by cereals (78%-84%). Of the cereals again, teff, wheat and maize are the major crops on which most of the N and P are applied.

6.3 Quantities of fertilizers consumed by type and nutrients

NOTE:

- 1 ton= 10 quintals
- All crops refer to crops not listed here (vegetables, oil seeds, fruits etc.)

Table 14: Quantities of fertilizers consumed by type and nutrients

Crop	2016/17						
	Amount of fertilizer used by product by crop in quintals					Total Nutrients used in Quintals	
	DAP	Urea	Urea+ DAP	NPS	Urea+ NPS	N	P_2O_5
All crops	71,943.00	382,070.00	2,679,969.00	1,629,082.00	6,021,045.00	3,075,049.88	2,764,614.64
Cereals	55,962.00	299,858.00	2,319,177.00	1,363,820.00	5,117,063.00	2,609,218.10	2,350,777.34
Teff	16,967.00	70,350.00	682,457.00	453,232.00	1,662,594.00	816,259.60	747,462.54
Barley	68,699.00	9,056.00	174,377.00	194,990.00	173,991.00	156,347.08	193,495.74
Wheat	15,026.00	21,144.00	586,864.00	405,012.00	1,279,477.00	642,031.63	614,511.74
Maize	93,440.00	84,968.00	638,690.00	148,872.00	1,869,613.00	827,832.31	702,103.96
Sorghum	36,915.00	90,391.00	159,303.00	25,924.00	70,684.00	120,730.43	86,915.60
F. Millet	35,237.00	13,309.00	69,889.00	126,955.00	45,769.00	70,633.00	94,176.62
Pulses	82,892.00	9,077.00	73,298.00	119,975.00	102,980.00	93,982.29	127,430.51
F. Beans	27,876.00	1,686.00	16,474.00	58,836.00	26,219.00	29,595.75	45,705.40
F.Peas	12,110.00	448.00	6,736.00	27,256.00	16,057.00	14,316.42	21,448.01
H. Bean (white)	3,866.00	776.00	11,678.00		2,255.00	5,134.81	5,515.63

6.4 Analysis of nutrient consumption by nutrients (IFA table)

Fertilizer Use by Crop Statistics

Country : Ethiopia

Color Legend

Cell to be filled out | calculations (Not to be filled out) | **Cell to be filled out *if information is available***

	Planted Area (000 ha)	Average Yield (kg/ha)	Percent of the Planted Area that is Fertilized (%)			Recommended Application Rate (kg nutrient/ha)			Actual Application Rate (kg nutrient/ha)			Total Fertilizer Consumption (metric tonnes nutrients)		
Crops / groups of			N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O	N	P_2O_5	K_2O
Cereals														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	10,219		20%	28%					120.58	172.05		1232284	1758284	
Teff														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	3,018	1,664	20%	28%		64	46		31.99	53.86		96534.66	162555.80	
Barley														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	959	2,111	19%	32%		64	46		281.74	438.65		270266.98	420787.20	
Wheat														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	1,696	2,675	19%	30%		64	46		152.44	200.61		258553.77	340258.80	
Maize														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	2,136	3,675				110	69		28.42	28.96		60687.87	61843.12	
Sorghum														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	1,882	2,525	20%	26%		46	64		33.32	51.45		62704.49	96819.27	
Pulses														
2014/15									0.00	0.00				
2015/16									0.00	0.00				
2016/17	1,550	1,675	20%	35%		23	46		37.38	67.55		57930.08	104692.72	
Other crops														
2014/15														
2015/16														
2016/17	2,939													
TOTAL														
2014/15	0.0											0.00	0.00	0.00
2015/16	0.0											0.00	0.00	0.00
2016/17	14.7											366801.64	583343.00	0.00

7 Limitations of the study

7.1 Access to Missing Data - Quantity and Quality

Even though very good data is collected buy CSA from these 2,223 EAs and 44362 households throughout the country, the data obtained is supposed to represent more than 12 million farmers engaged in crop production. The report also puts some fertilizer use figures without mentioning the proportions e.g. urea+ NPS. So assumption is required to generate how much of each is applied. Given most farmers are using less fertilizer than the recommended rates, and most farmers prefer DAP/NPS more than urea especially when they face shortage of finance to purchase sufficient amounts of fertilizers, it is estimated that in cases where NPS+ urea or DAP + urea is reported, the amount of urea is estimated to be 40%.

The MoANR report deals with data on import and distribution to regions and farmers' cooperative unions. Data on actual amount used and carry overstock is not available timely. It would therefore be good if the CSA also includes proportion of the different fertilizer used in combination. For MoANR, a reporting mechanism, on monthly bases from the different farmer's cooperatives up to region and national levels needs to be established so as to get accurate and timely data.

7.2 Recommendations

As mentioned above, the development agents (DAs) are responsible for assessing demand of fertilizer each year at Kebele level. But their involvement during actual fertilizer use assessment is limited. Mostly it is not easy to know how much of the fertilizers a farmer buys are used to each crop. Which crop is a priority for the farmer to receive the fertilizer if the farmer is to choose etc? Besides, the same farmer may not apply similar amounts of fertilizers per hectare every year based on the price of the fertilizers, types of crops he is planting etc. Demands of farmers often change over the changing condition that calls for demand re-vision during planning phase based on the dynamic condition of farmers‟ situation. Establishing a system that (i) ensures quality, (ii) is cost-effective, (iii) is understood by farmers, and (iv) is sufficiently flexible to support and accommodate a growing and diversifying fertilizer sector is required. The change in demand has also implication on fertilizer use. Therefore, developing a clear model and involving the existing more than 60,000 field level Development Agents (DAs) and cooperatives on assessing consumption data and use it as complement to data collected from around 2223 CSA enumeration sites could help to get close to accurate data about fertilizer use in the country.

There are different models that can be used to estimate consumption of fertilizers. But they are mostly "theoretical" for small holder farmers like Ethiopia whose fertilizer use is affected by different factors, both internal and external. Therefore, consumption shall best be estimated through expert judgment taking the average (medium case) scenarios on potential demand i.e. targeted demand (e.g. GTP targets and regional production targets), previous consumptions, timely distribution of fertilizer and seed inputs and the weather condition in the areas. Therefore, it is worth considering the following points to make estimation:

- Fertilizer consumption is increasing every year,
- There will not be much change in cultivated area
- Road infrastructures are improved,
- Farmers' awareness about fertilizer use is increasing. So they will tend to use more rates of fertilizers in the coming years
- Soil test based recommendations are being developed and used,
- Local fertilizer blending plants have already been functional

- Use of mobile input tracking systems and agro dealers are being tried in selected areas. These systems are expected to play a major role when they are fully functional soon.

8 Conclusions

Much of the increase in crop production in the past decade has been due to increases in area cultivated, although better yields also contributed to the augmented production in the period 2004/05–2007/08. With little suitable land available for expansion of crop cultivation, especially in the highlands, future cereal production growth will need to come from yield improvements. Current cereal yields are low, by international standards, indicating growth potential. Use of inputs is at a low level, suggesting substantial scope for raising productivity through irrigation, improved seeds, and fertilizers. However, it seems that growth in agricultural real incomes will also require more diversification and a shift to higher-value crops, in order to respond to changing consumption baskets driven by the increasing per capita income growth in the country.

9 Appendices

9.1 References

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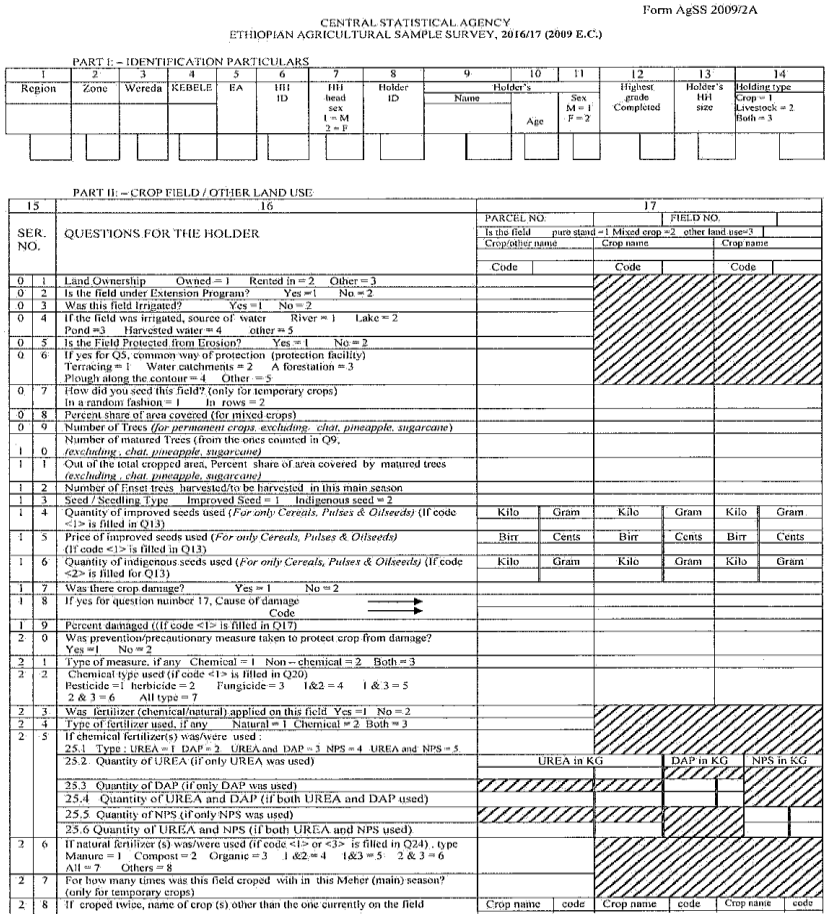
9.2 Fertilizer Grades

The following are fertilizer grades that have been in use and are being used in Ethiopia

Fertilizer type	Grade
Urea	46-0-0
DAP	18-46-0
NPS	19-38-0+75
NPSB	18.9 - 37.7-0 + 6.95S+ 0.1B
NPSZn	17.7- 35.5 – 0 + 7.6S + 2.2Zn

Copy of data set used to generate the analysis

Sample questionnaire



Form AgSS 2009/2A

CENTRAL STATISTICAL AGENCY
ETHIOPIAN AGRICULTURAL SAMPLE SURVEY, 2016/17 (2009 E.C.)

PART I: – IDENTIFICATION PARTICULARS

1 Region	2 Zone	3 Wereda	4 KEBELE	5 EA	6 HH ID	7 HH head sex 1 = M 2 = F	8 Holder ID	9 Holder's Name	10 Age	11 Sex M = 1 F = 2	12 Highest grade Completed	13 Holder's HH size	14 Holding type Crop = 1 Livestock = 2 Both = 3

PART II: – CROP FIELD / OTHER LAND USE

15 SER. NO.		16 QUESTIONS FOR THE HOLDER	17 PARCEL NO.		FIELD NO.			
			Is the field pure stand = 1 Mixed crop = 2 other land use=3					
			Crop/other name		Crop name		Crop name	
			Code		Code		Code	
0	1	Land Ownership Owned = 1 Rented in = 2 Other = 3						
0	2	Is the field under Extension Program? Yes = 1 No = 2						
0	3	Was this field Irrigated? Yes = 1 No = 2						
0	4	If the field was irrigated, source of water River = 1 Lake = 2 Pond = 3 Harvested water = 4 other = 5						
0	5	Is the Field Protected from Erosion? Yes = 1 No = 2						
0	6	If yes for Q5, common way of protection (protection facility) Terracing = 1 Water catchments = 2 A forestation = 3 Plough along the contour = 4 Other = 5						
0	7	How did you seed this field? (only for temporary crops) In a random fashion = 1 In rows = 2						
0	8	Percent share of area covered (for mixed crops)						
0	9	Number of Trees *(for permanent crops, excluding: chat, pineapple, sugarcane)*						
1	0	Number of matured Trees (from the ones counted in Q9, *(excluding , chat, pineapple, sugarcane)*						
1	1	Out of the total cropped area, Percent share of area covered by matured trees *(excluding , chat, pineapple, sugarcane)*						
1	2	Number of Enset trees harvested/to be harvested in this main season						
1	3	Seed / Seedling Type Improved Seed = 1 Indigenous seed = 2						
1	4	Quantity of improved seeds used (*For only Cereals, Pulses & Oilseeds)* (If code <1> is filled in Q13)	Kilo / Gram		Kilo / Gram		Kilo / Gram	
1	5	Price of improved seeds used (*For only Cereals, Pulses & Oilseeds)* (If code <1> is filled in Q13)	Birr / Cents		Birr / Cents		Birr / Cents	
1	6	Quantity of indigenous seeds used (*For only Cereals, Pulses & Oilseeds)* (If code <2> is filled for Q13)	Kilo / Gram		Kilo / Gram		Kilo / Gram	
1	7	Was there crop damage? Yes = 1 No = 2						
1	8	If yes for question number 17, Cause of damage → Code →						
1	9	Percent damaged ((If code <1> is filled in Q17)						
2	0	Was prevention/precautionary measure taken to protect crop from damage? Yes = 1 No = 2						
2	1	Type of measure, if any Chemical = 1 Non – chemical = 2 Both = 3						
2	2	Chemical type used (if code <1> is filled in Q20) Pesticide = 1 herbicide = 2 Fungicide = 3 1&2 = 4 1 & 3 = 5 2 & 3 = 6 All type = 7						
2	3	Was fertilizer (chemical/natural) applied on this field Yes = 1 No = 2						
2	4	Type of fertilizer used, if any Natural = 1 Chemical = 2 Both = 3						
2	5	If chemical fertilizer(s) was/were used : 25.1 Type : UREA = 1 DAP = 2 UREA and DAP = 3 NPS = 4 UREA and NPS = 5.						
		25.2 Quantity of UREA (if only UREA was used)	UREA in KG		DAP in KG		NPS in KG	
		25.3 Quantity of DAP (if only DAP was used)						
		25.4 Quantity of UREA and DAP (if both UREA and DAP used)						
		25.5 Quantity of NPS (if only NPS was used)						
		25.6 Quantity of UREA and NPS (if both UREA and NPS used)						
2	6	If natural fertilizer (s) was/were used (if code <1> or <3> is filled in Q24) , type Manure = 1 Compost = 2 Organic = 3 1 &2 = 4 1&3 = 5 2 & 3 = 6 All = 7 Others = 8						
2	7	For how many times was this field croped with in this Meher (main) season? (only for temporary crops)						
2	8	If croped twice, name of crop (s) other than the one currently on the field	Crop name / code		Crop name / code		Crop name / code	

Analysis reports (RAR, FUBC….)

AFO FUBC Template for fertilizer used by crop-ETHIOPIA

Ethiopia					
Crop	**Types of Fertilizer Applied**	**Volumes of Fertilizer Applied(tons)**			
		2016/17			
Teff	NP +	202,993.26			
	UREA	100,837.04			
Barley	NP +	47,270.98			
	UREA	14,840.32			
Wheat	NP +	167,507.66			
	UREA	76,768.04			
Maize	NP +	174,729.38			
	UREA	108,828.92			
Sorghum	NP +	20,083.12			
	UREA	18,238.58			
Finger Millet	NP +	23,158.68			
	UREA	5,957.22			
Oats	NP +	822.04			
	UREA	102.96			
Rice	NP +	1,384.82			
	UREA	835.28			
Pulses	NP +	30,215.56			
	UREA	7,440.54			
Oil crops	NP +	10,901.58			
	UREA	5,832.92			
Vegetables	NP +	34,271.60			
	UREA	20,521.50			
Root crops	NP +	16,888.00			
	UREA	7,701.30			
Other temporary	NP +	6,462.28			
	UREA	3,813.92			
Stimulant	NP +	5,747.64			
	UREA	3,831.76			
Grand Total		**1,117,986.90**			

Agricultural Statistics-Ethiopia

		Year 2016/17		
Crop	Growing system/region	Planted Area (x1000 ha)	Production (x1000 tons)	Yield (tons/ha)
Teff	Rain fed	3,017.91	5,020.4	1.7
Barley	Rain fed	959.27	2,024.9	2.1
Wheat	Rain fed	1,696.08	4,537.9	2.7
Maize	Rain fed	2,135.57	7,847.2	3.7
Sorghum	Rain fed	1,881.97	4,752.1	2.5
Finger Millet	Rain fed	456.17	1,017.1	2.2
Oats	Rain fed	24.04	49.2	2.0
Rice	Rain fed	48.42	136.0	2.8

S/Total		10,219.4	25,384.7	2.5
Faba Beans	Rain fed	427.70	878.01	2.1
Field Peas	Rain fed	212.53	348.14	1.6
Haricot Bean (white)	Rain fed	78.91	125.98	1.6
Haricot Bean (red)	Rain fed	211.29	357.94	1.7
Chick Peas	Rain fed	225.61	444.15	2.0
Lentils	Rain fed	113.69	166.27	1.5
Grass pea	Rain fed	151.27	297.10	2.0
Soya beans	Rain fed	36.64	81.23	2.2
Fenugreek	Rain fed	34.60	45.48	1.3
Mung bean	Rain fed	37.77	42.92	1.1
Gibto(loupeins)	Rain fed	19.91	27.41	1.4
S/Total		1,549.9	2,814.6	1.8
Oil Seeds	Rain fed	804.75	839.2	1.0
Vegetables	Rain fed	239.61	812.6	3.4
Root Crops	Rain fed	229.08	4,630.6	20.2
Fruit Crops	Rain fed	107.89	792.4	7.3
Coffee	Rain fed	700.47	469.1	0.7
Sugar Cane	Rain fed	31.24	1,410.3	45.1
Grand Total		13,882.4		-

Recommended application Rate(RAR) for fertilizer per crop

#	Crops	Agro ecological zone	Expected yield	Time of application	Fertilizer product	RAR per product (kg/ha)	N	P_2O_5	S	Zn	B	Source	Date Released
C1	Tef	Countrywide	2-2.5 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C1	Tef	Country wide	2-2.5 t/ha	15-18 DAE	Urea	100	46	0				MoANR	Very old
C2	Wheat	Countrywide	4-6 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C2	Wheat	Countrywide	4-6 t/ha	15-18 DAE	Urea	100	46	0				MoANR	Very old
C3	Maize	Maize Belts	6-8 t/ha	at planting	NPS	150	28.5	57	10.5			MoANR	Very old
				at planting	NPSB	150	28.4	56.6	10.4		0.15	MoANR	Very old
				at planting	NPSZn	150	26.6	53.3	11.4	3.3		MoANR	Very old
C3	Maize	Maize Belts	6-8 t/ha	1/3 at planting, 2/3 at 35-40 DAE	Urea	200	92	0				MoANR	Very old
C3	Maize	Non maize belts	3-5 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old

#	Crops	Agro ecological zone	Expected yield	Time of application	Fertilizer product	RAR per product (kg/ha)	N	P_2O_5	S	Zn	B	Source	Date Released
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C3	Maize	Non maize belts	3-5 t/ha	1/3 at planting, 2/3 at 35-40 DAE	Urea	100	46	0				MoANR	Very old
C4	Barley	Countrywide	3 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C4	Barley	Countrywide	3 t/ha	15-18 DAE	Urea	100	46	0				MoANR	Very old
C5	Sorghum	Countrywide	4-6 t/ha	at planting	NPS	100	19	38	7			MoANR	Very old
				at planting	NPSB	100	18.9	37.7	6.95		0.1	MoANR	Very old
				at planting	NPSZn	100	17.7	35.5	7.6	2.2		MoANR	Very old
C5	Sorghum	Countrywide	4-6 t/ha	15-18 DAE	Urea	100	46	0				MoANR	Very old

NB: NPS and NPSB/Zn are replacing DAP with the same rate on product bases

Data sources (reports) used to make the analysis

THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA

CENTRAL STATISTICAL AGENCY

AGRICULTURAL SAMPLE SURVEY

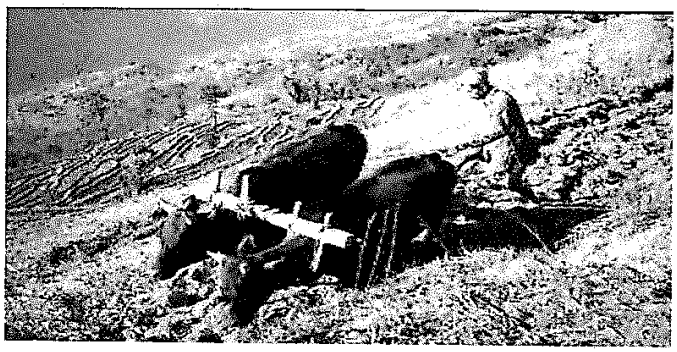
2016/2017 (2009 E.C.)

VOLUME I

REPORT ON

AREA AND PRODUCTION OF MAJOR CROPS

(PRIVATE PEASANT HOLDINGS, MEHER SEASON)



ADDIS ABABA
April, 2017

Table 2: Area, Production and Yield of Crops For Private Peasant Holdings For Meher Season 2016/17 (2009 E.C)

Ethiopia

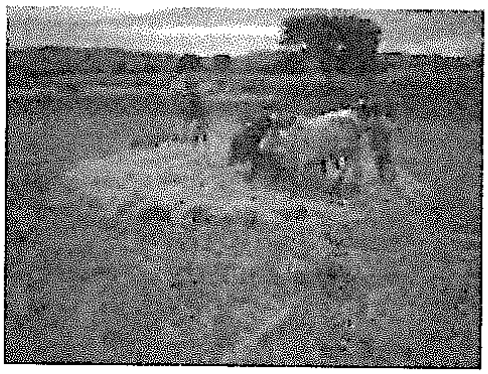
Crop	Number of Holders	Area in Hectares	% Distribution	Production in Quintals	% Distribution	Yield (Qt/Ha)
Grain Crops	17,441,393.00	12,574,107.33	100.00	290,385,593.21	100.00	
Cereals	16,326,448.00	10,219,443.46	81.27	253,847,239.63	87.42	
Teff	6,999,333.00	3,017,914.36	24.00	50,204,400.47	17.29	16.64
Barley	4,170,003.00	959,273.36	7.63	20,249,216.76	6.97	21.11
Wheat	4,995,863.00	1,696,082.59	13.49	45,378,523.39	15.63	26.75
Maize	10,862,725.00	2,135,571.85	16.98	78,471,746.57	27.02	36.75
Sorghum	5,987,038.00	1,881,970.73	14.97	47,520,956.04	16.36	25.25
Finger millet	1,734,537.00	456,171.54	3.63	10,170,592.71	3.50	22.30
Oats/'Aja'	222,738.00	24,040.94	0.19	491,796.43	0.17	20.46
Rice	150,041.00	48,418.09	0.39	1,360,007.26	0.47	28.09
Pulses	9,062,008.00	1,549,911.86	12.33	28,146,331.73	9.69	
Faba beans	3,562,772.00	427,696.80	3.40	8,780,108.79	3.02	20.53
Field peas	1,639,756.00	212,530.56	1.69	3,481,446.31	1.20	16.38
White Haricot beans	1,044,309.00	78,910.13	0.63	1,259,801.75	0.43	15.97
Red Haricot beans	2,903,355.00	211,292.30	1.68	3,579,424.75	1.23	16.94
Chick-peas	1,142,875.00	225,607.53	1.79	4,441,459.26	1.53	19.69
Lentils	799,083.00	113,684.63	0.90	1,662,742.20	0.57	14.63
Grass peas	867,880.00	151,268.58	1.20	2,970,972.08	1.02	19.64
Soya beans	130,022.00	36,635.79	0.29	812,346.59	0.28	22.17
Fenugreek	711,529.00	34,603.35	0.28	454,807.61	0.16	13.14
Mung bean/"Masho"	184,114.00	37,774.30	0.30	429,155.55	0.15	11.36
Gibto	121,127.00	19,907.89	0.16	274,066.82	0.09	13.77
Oilseeds	3,543,697.00	804,752.00	6.40	8,392,021.85	2.89	
Neug	948,833.00	281,206.42	2.24	3,024,319.84	1.04	10.75
Linseed	885,725.00	80,353.74	0.64	879,116.55	0.30	10.94
Groundnuts	535,873.00	74,861.37	0.60	1,296,364.18	0.45	17.32
Sunflower	189,481.00	6,738.00	0.05	79,537.15	0.03	11.80
Sesame	756,782.00	337,926.82	2.69	2,678,665.46	0.92	7.93
Rapeseed	863,470.00	23,665.65	0.19	434,018.68	0.15	18.34
Vegetables	8,060,282.00	239,609.76	100.00	8,126,248.75	100.00	
Lettuce	47,210.00	117.14	0.05	759.55	0.01	6.48
Head Cabbage	466,680.00	6,188.56	2.58	386,814.48	4.76	62.50
Ethiopian Cabbage	4,130,655.00	36,090.31	15.06	3,528,964.26	43.43	97.78
Tomatoes	322,918.00	6,298.63	2.63	283,648.27	3.49	45.03
Green peppers	1,825,204.00	9,832.28	4.10	617,943.29	7.60	62.85
Red peppers	2,980,378.00	180,701.46	75.41	3,298,042.90	40.59	18.25
Swiss chard	136,583.00	381.37	0.16	10,076.00	0.12	26.42
Root Crops	6,830,975.00	229,079.34	100.00	46,305,689.75	100.00	
Beetroot	449,579.00	2,886.07	1.26	253,503.34	0.55	87.84
Carrot	168,252.00	2,578.13	1.13	90,339.27	0.20	35.04
Onion	862,937.00	33,603.39	14.67	3,274,752.45	7.07	97.45
Potatoes	1,197,018.00	66,923.33	29.21	9,214,031.85	19.90	137.68
Yam/'Boye'	440,025.00	5,603.38	2.45	509,643.44	1.10	90.95
Garlic	1,920,901.00	15,381.01	6.71	1,386,643.07	2.99	90.15
Taro/'Godere'	2,250,912.00	48,087.35	20.99	12,179,164.45	26.30	253.27
Sweet potatoes	1,911,161.00	54,016.67	23.58	19,397,611.90	41.89	359.10
Fruit Crops	5,809,369.00	107,890.60	100.00	7,923,665.02	100.00	
Avocados	2,225,681.00	17,834.58	16.53	649,821.04	8.20	36.44
Bananas	3,640,860.00	63,212.97	58.59	5,383,023.41	67.94	85.16
Guavas	557,879.00	3,248.59	3.01	43,265.32	0.55	13.32
Lemons	316,264.00	1,426.25	1.32	77,814.52	0.98	54.56
Mangoes	1,857,387.00	15,413.76	14.29	1,046,461.25	67.89	67.85
Oranges	643,463.00	2,619.80	2.43	206,559.48	2.61	78.85
Papayas	930,532.00	3,489.47	3.23	503,961.70	6.36	144.42
Pineapples	70,584.00	645.19	0.60	12,758.30	0.16	*
Chat	4,621,967.00	255,401.68		2,201,860.32		8.62
Coffee	6,455,194.00	700,474.69		4,690,911.24		6.70
Hops	2,737,451.00	31,366.71		400,736.11		12.78
Sugar Cane	1,565,060.00	31,236.81		14,103,115.39		451.49

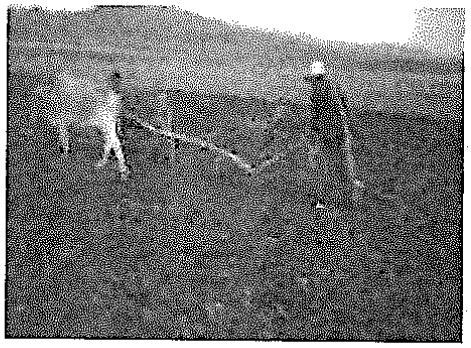
THE FEDERAL DEMOCRATIC REPUBLIC OF ETHIOPIA
CENTRAL STATISTICAL AGENCY

AGRICULTURAL SAMPLE SURVEY
2016 /17(2009 E.C.)
(September – December, 2016)

VOLUME III

REPORT ON
FARM MANAGEMENT PRACTICES
(PRIVATE PEASANT HOLDINGS, MEHER SEASON)





Addis Ababa
June, 2016

STATISTICAL BULLETIN

Table1: Number of Holders, Inputs Applied Area and Quantity of Inputs used, 2016/17

Ethiopia

Crop type	All Crop Area	All Fertilizers		Natural		DAP		
		Hectare	Quintal	Holder	Hectare	Holder	Hectare	Quintal
All	14,708,62	8,473,26	11,431,60	11,889,55	1,587,99	2,494,09	806,34	719,43
Cereals	10,219,44	6,918,31	9,659,539	5,426,259	740,956	1,786,38	662,24	559,62
Teff	3,017,914	2,427,29	3,038,309	348,409	59,639	704,792	223,74	169,67
Barley	959,273	599,320	621,114	892,139	98,886	373,817	79,417	68,699
Wheat	1,696,083	1,463,36	2,442,762	492,248	43,049	429,818	150,63	150,26
Maize	2,135,572	1,614,23	2,635,584	4,115,877	311,486	619,052	98,683	93,440
Sorghum	1,881,971	451,956	383,217	1,351,260	207,336	235,613	52,720	36,915
Finger millet	456,172	316,131	291,160	132,006	16,462	156,481	50,250	35,237
Oats/'Aja'	24,041	11,177	9,620	34,779	1,292	26,469	4,279	3,513
Rice	48,418	34,831	37,773	*	*	9,050	2,523	1,874
Pulse	1,549,912	420,788	388,172	2,268,041	118,330	892,610	88,320	82,892
Horse/Faba	427,697	168,877	131,092	878,235	58,424	265,832	29,692	27,876
Field peas	212,531	70,422	62,606	214,949	14,487	95,835	14,296	12,110
White	78,910	17,777	22,966	320,929	7,994	31,567	1,864	3,866
Red Haricot	211,292	87,204	106,560	803,866	20,277	486,167	30,583	31,347
Chick peas	225,608	17,772	14,399	87,784	6,418	38,683	3,320	2,197
Lentils	113,685	31,238	27,556	50,045	2,174	29,706	3,817	2,169
Vetch/Grass	151,269	5,668	3,447	39,549	3,167	*	*	*
Soya beans	36,636	4,304	4,198	9,412	214	10,879	3,258	1,737
Fenugreek	34,603	11,461	11,371	209,667	2,297	20,080	*	864
Mung	37,774	5,040	1,889	15,382	2,706	3,252	*	*
Gibto	19,908	1,024	2,088	*	*	*	*	*
Oil Seeds	804,752	104,740	188,803	644,189	31,820	120,613	14,301	9,697
Nueg	281,206	23,859	7,459	34,434	7,568	6,788	*	316
Linseed	80,354	10,529	7,802	101,343	2,748	26,052	1,213	1,311
Ground nuts	74,861	11,172	*	80,146	6,257	33,831	1,539	*
Safflower	6,738	2,533	12,664	32,146	496	3,764	*	*
Sesame	337,927	39,220	16,679	92,217	8,975	19,859	8,505	3,397
Rapeseed	23,666	17,428	107,554	342,190	5,776	36,236	1,063	1,303
Vegetables	239,610	191,617	547,931	4,560,926	44,734	238,736	11,027	13,841
Lettuce	117	102	*	23,433	44	*	*	*
Head	6,189	5,081	10,623	236,761	1,510	8,865	*	*
Ethiopian	36,090	26,842	12,990	2,861,862	24,384	66,477	918	1,103
Tomatoes	6,299	2,757	5,247	136,762	1,042	8,981	*	544
Green	9,832	5,760	8,764	1,039,115	3,708	36,333	456	691
Red papers	180,701	150,861	510,021	1,031,454	13,856	125,605	8,912	11,206
Swiss chard	381	213	*	85,847	191	1,332	*	*
Root Crops	229,079	153,557	245,893	3,381,342	67,547	220,476	7,747	10,032
Beet root	2,886	1,719	1,318	266,476	1,024	2,533	*	*
Carrot	2,578	1,907	2,406	77,290	518	*	*	*
Onion	33,603	25,918	81,798	341,762	2,371	25,355	745	896
Potatoes	66,923	58,481	118,861	411,015	9,923	95,198	5,101	5,658
Yam	5,603	3,570	*	300,776	3,368	*	*	*
Garlic	15,381	11,480	26,108	948,901	4,678	35,829	500	698
	48,067	24,772	2,727	1,246,629	23,465	12,801	193	242
Sweet	54,017	25,711	12,206	885,814	22,200	59,742	1,073	2,391
Other	99,349	46,784	102,763	2,441,419	22,140	83,892	3,734	3,913
Fruit Crops	107,891	36,284		2,728,514	33,013			
Avocado	17,835	8,189		1,048,611	7,915			
Bananas	63,213	21,276		1,671,502	19,113			
Guava	3,249	579		157,395	459			
Lemons	1,426	380		92,862	319			
Mangos	15,414	3,466		572,063	3,072			
Oranges	2,620	1,028		258,335	967			
Papayas	3,489	1,194		352,330	997			
Pineapples	645	172		22,402	172			
Stimulant	987,243	284,177		5,344,804	219,296			
Chat	255,402	128,386		1,988,422	78,133			
Coffee	700,475	138,355		3,346,648	127,780			
	31,367	17,436		1,346,932	13,383			
Enset	417,617	299,613		4,642,057	296,783			
Sugar Cane	31,237	11,882		697,543	8,969			
Other	22,496	5,508		1,374,267	4,403			

Ethiopia,2016/17 *(Table 1: cont'd.)*

Crop type	UREA			UREA + DAP			NPS		
	Holder	Hectare	Quintal	Holder	Hectare	Quintal	Holder	Hectare	Quintal
All	1,780,098	401,470	382,070	3,383,340	1,553,382	2,679,969	2,750,725	1,532,404	1,629,082
Cereals	1,335,634	330,328	299,858	3,175,838	1,420,520	2,319,177	2,432,032	1,349,490	1,363,820
Teff	417,700	126,140	70,350	1,383,266	537,912	682,457	1,161,681	524,326	453,232
Barley	102,137	13,329	9,056	574,571	111,768	174,377	539,088	182,278	194,990
Wheat	183,591	27,025	21,144	1,123,608	326,521	586,864	729,156	345,378	405,012
Maize	604,400	66,686	84,968	1,487,722	298,521	638,690	695,902	139,559	148,872
Sorghum	312,971	57,137	90,391	465,064	80,309	159,303	110,427	19,810	25,924
Finger millet	132,742	25,314	13,309	259,155	59,573	69,889	328,595	129,925	126,955
Oats/'Aja'	12,523	*	370	19,731	1,360	1,725	25,944	3,517	3,163
Rice	42,664	14,535	*	17,671	4,556	5,872	*	*	*
Pulse	153,791	12,397	9,077	486,696	32,486	73,298	712,718	120,548	119,975
Horse/Faba beans	37,591	2,396	1,686	142,407	9,372	16,474	404,981	57,085	58,836
Field peas	12,404	677	448	62,377	4,673	6,736	199,639	29,504	27,256
White Haricot beans	11,449	1,212	776	43,838	*	11,678	19,803	4,082	*
Red Haricot beans	45,071	1,451	1,894	198,543	9,849	24,358	117,763	14,839	17,058
Chick peas	9,776	1,038	533	29,861	3,431	6,707	5,450	*	*
Lentils	23,250	3,392	1,819	24,849	1,699	2,184	52,953	8,004	6,714
Vetch/Grass peas	*	*	*	*	*	*	11,550	*	*
Soya beans	*	*	*	3,244	161	*	*	*	*
Fenugreek	26,375	956	*	33,026	1,132	2,495	35,596	3,493	2,395
Mung bean/"Mashio"	4,287	*	*	1,650	*	*	*	*	*
Gibto	*	*	*	*	*	*	8,794	538	944
Oil Seeds	134,704	14,433	*	140,198	16,406	28,528	135,061	19,337	18,122
Nuog	8,365	*	250	13,482	*	1,055	29,160	11,739	3,278
Linseed	13,449	*	388	26,319	*	1,533	23,495	4,122	2,383
Ground nuts	*	*	*	*	512	*	*	*	*
Safflower	5,309	466	393	8,522	*	*	9,840	*	2,251
Sesame	25,547	9,425	2,492	20,123	10,981	7,450	5,314	367	*
Rapeseed	30,932	756	675	54,802	1,983	6,280	65,921	2,510	8,127
Vegetables	345,657	16,645	12,207	358,805	31,361	81,667	172,610	6,621	39,363
Lettuce	2,615	6	6	*	*	*	-	-	-
Head Cabbage	14,177	178	171	13,607	504	1,054	19,594	1,317	*
Ethiopian Cabbage	26,346	228	201	49,847	894	*	27,097	188	1,003
Tomatoes	8,614	155	98	14,829	572	*	*	11	*
Green peppers	39,264	351	*	37,049	457	1,883	20,296	103	374
Red papers	268,586	15,722	11,011	265,515	28,914	73,877	114,771	5,000	34,774
Swiss chard	4,086	*	*	*	*	*	*	*	*
Root Crops	216,803	6,341	8,623	302,732	19,686	54,525	302,840	27,164	56,263
Beet root	10,964	*	*	6,324	*	*	9,106	221	429
Carrot	6,689	146	126	5,305	*	214	*	*	*
Onion	46,530	1,901	1,771	57,036	4,847	13,697	33,476	5,690	8,116
Potatoes	45,375	2,043	3,339	123,236	12,083	29,510	172,607	18,202	42,640
Yam	-	-	-	*	*	*	-	-	*
Garlic	81,095	637	760	80,193	1,758	4,487	63,804	1,612	3,131
Taro/'Godere'	17,915	650	579	11,046	232	635	6,718	118	231
Sweet potatoes	33,420	850	1,807	37,887	248	*	24,740	683	1,154
Other Temporary	97,357	2,737	2,512	156,532	9,164	31,385	65,032	*	7,269
Fruit Crops									
Avocado									
Bananas									
Guava									
Lemons									
Mangos									
Oranges									
Papayas									
Pineapples									
Stimulant Crops									
Chat									
Coffee									
Hops/'Gesho'									
Enset									
Sugar Cane									
Other Permanent									

Ethiopia 2016/17 *(Table 1: cont'd.)*

Crop type	NPS & UREA			INDIGENOUS SEED			IMPROVED SEED		
	Holder	Hectare	Quintal	Holder	Hectare	Quintal	Holder	Hectare	Quintal
All	4,200,003	2,591,672	6,021,045	19,604,952	13,291,161	9,646,641	4,950,711	1,417,458	690,142
Cereals	4,044,624	2,414,770	5,117,063	15,515,463	8,855,232	7,641,111	4,449,621	1,364,212	671,475
Teff	1,857,432	955,534	1,662,594	6,839,504	2,929,721	1,422,830	301,999	88,194	30,352
Barley	525,593	113,642	173,991	4,140,443	944,587	1,663,607	58,300	14,687	25,686
Wheat	1,523,433	570,763	1,279,477	4,537,309	1,531,015	3,122,610	770,964	165,067	307,525
Maize	2,192,572	699,300	1,869,613	8,477,492	1,045,673	551,716	3,692,799	1,089,899	305,223
Sorghum	173,214	34,644	70,684	5,976,951	1,876,689	560,214	23,961	5,282	1,669
Finger millet	139,900	34,608	45,769	1,732,710	455,516	202,604	3,362	656	*
Oats/'Aja'	8,501	567	849	222,738	24,041	38,786	-	-	-
Rice	29,607	5,712	14,085	147,722	47,990	78,744	*	428	727
Pulse	404,674	48,707	102,930	8,934,402	1,535,055	1,766,151	192,605	14,856	17,980
Horse/Faba beans	142,964	11,909	26,219	3,551,076	425,393	605,428	17,917	2,304	3,537
Field peas	74,983	6,785	16,057	1,636,763	212,268	239,137	*	*	*
White Haricot	8,865	1,157	2,255	1,033,626	77,680	87,397	12,550	1,230	865
Red Haricot beans	121,869	10,212	31,904	2,796,471	205,848	195,977	129,117	5,444	6,091
Chick peas	13,329	*	*	1,128,301	222,201	244,951	20,281	3,407	6,097
Lentils	60,708	12,152	14,670	794,037	112,263	98,515	5,046	1,422	*
Vetch/Grass peas	6,373	602	*	867,880	151,269	200,926	-	-	-
Soya beans	*	*	*	127,448	36,330	46,249	*	*	*
Fenugreek	37,538	2,771	4,127	711,529	34,603	22,676	*	-	*
Mung bean/"Masho"	*	*	*	179,388	37,293	14,999	4,725	*	*
Gibto	3,352	93	827	121,127	19,908	9,898	-	-	-
Oil Seeds	212,936	8,442	106,800	3,537,285	799,529	239,379	11,541	5,223	687
Nueg	8,770	924	2,560	948,833	281,206	50,227	-	-	-
Linseed	11,584	702	*	884,981	80,041	46,561	*	*	*
Ground nuts	*	*	*	535,708	74,858	86,754	*	*	*
Safflower	19,084	500	8,921	189,307	6,735	*	*	*	*
Sesame	4,076	*	*	752,742	333,080	41,512	5,597	4,847	370
Rapeseed	168,016	5,340	91,169	861,674	23,609	12,032	*	*	*
Vegetables	585,613	81,229	400,853	8,028,500	236,034	-	79,552	3,576	-
Lettuce	*	*	*	45,079	111	-	*	*	*
Head Cabbage	22,048	1,249	6,047	433,663	4,679	-	37,730	1,510	-
Ethiopian Cabbage	35,419	230	8,053	4,127,164	36,066	-	4,172	24	-
Tomatoes	7,007	*	2,400	309,942	5,134	-	13,907	1,165	-
Green peppers	31,821	*	*	1,818,889	9,779	-	8,474	*	-
Red papers	512,707	78,458	379,154	2,972,662	179,919	-	10,526	782	-
Swiss chard	2,299	*	*	123,751	345	-	12,832	*	-
Root Crops	370,514	25,073	116,450	6,766,760	226,744	-	113,330	2,335	-
Beet root	8,861	81	315	429,461	2,715	-	23,250	171	-
Carrot	9,696	*	1,449	141,098	2,113	-	27,676	465	-
Onion	88,621	10,364	*	826,595	32,789	-	*	815	-
Potatoes	134,080	11,130	37,714	1,188,017	66,328	-	11,859	*	-
Yam	*	*	*	439,410	5,600	-	*	*	-
Garlic	137,393	2,296	17,031	1,917,181	15,371	-	5,201	10	-
Taro/'Godere'	8,317	*	1,040	2,250,317	48,074	-	*	*	-
Sweet potatoes	21,426	*	1,565	1,898,723	53,755	-	*	*	-
Other Temporary	133,601	4,533	57,683	4,527,622	97,006	-	10,749	*	-
Fruit Crops				5,750,553	105,910				
Avocado				2,203,551	17,739				
Bananas				3,621,736	62,490				
Guava				545,684	3,088				
Lemons				307,899	1,285				
Mangos				1,816,552	15,102				
Oranges				632,776	2,437				
Papayas				903,120	3,123				
Pineapples				70,584	645				
Stimulant Crops	232,646	8,001	95,794	10,382,005	966,964		310,269	20,272	-
Chat				4,615,024	254,809				
Coffee				6,295,142	681,163		262,047	19,304	-
Hops/'Gesho'				2,715,049	30,991				
Enset				6,401,091	415,404				
Sugar Cane				1,561,565	31,213				
Other Permanent				3,229,052	22,071				