



**Farmer seed systems (FSS) in Sub-Saharan Africa**

**A Study on Farmer Managed Seed Systems (FMSS) in Ethiopia with a particular focus on Amhara, Tigray and Oromiya regions**

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## About the author

Dr Fassil Gebeyehu, is currently General coordinator of the African Biodiversity Network (ABN) based in Thika, Kenya. Fassil holds a PHD from Durham University. His PhD studies with small-scale farmers focused on local meanings, uses and understandings of seeds, and on the mechanisms by which these understandings are learned. Of particular interest was the perceived problems and benefits of 'traditional' seeds, in relation to the various forms of modern seeds now being introduced. In this respect the research highlights how different local attitudes to seeds relate to local social differences including with respect to perceptions of, and relationships to, the state, and those of generation. The research highlights the problems of narrowly economic evaluations of agricultural systems, revealing how in the study region (Amhara) seeds are intimately bound up in a range of social practices and is consequently valued in a range of different ways.

ABN is a network with more than 36 partners of Community-Based Organizations (CBOs) and Non-Government Organizations (NGOs). ABN is also working with strategic partners and alliances from Colombia, India, Brazil, Spain, UK and other parts of Europe. ABN enables Africans to voice their views on issues such as genetic engineering, agro fuels, biodiversity protection, mining and the rights of small holder farmers.

Prior to his studies Fassil served as a team Leader of the Youth Development Programme in the Institute for Sustainable Development (ISD). Fassil was also served as the programme head in ISD's school programme with elementary and high school students as well as out school youth to introduce bicultural diversity ideas through visits and residencies organized jointly with traditional farming communities in many parts of Ethiopia. His program that was implemented in various parts of Ethiopia was of exceptional value to youth and connected them to intact and creative livelihood systems.

Because of his background in Management, Fassil also took on the additional role of Head of Finance and Administration in the ISD Management. About the 20 years' time he spent with ISD, ABN and through his overseas higher education he enormously contributed the following amongst many:

### **Some experience with former employer, Institute for Sustainable Development (ISD)**

1. Contributing the ISD bio cultural diversity programme focused on the extra-curricula opportunities in the schools in order to attract and support strong interest from students and commitment from the teaching staff.
2. Influencing government to adapt policy on cultural day of nations and nationalities at national level
3. Coordinating and editing booklets in local language on indigenous trees, seeds and cultural artifacts written by students
4. Writing a book on experiences in the biocultural diversity programme (under edition).
5. Initiating two programmes in ISD known as cluster training and back to root programmes. Cluster training is providing trainings for the youth in organic farming and natural fertilizer.

Back to root programme is an activity to inspire young people about community livelihood and indigenous Knowledge through action learning

### **Regional/International experience – trainings, presentations, dialogues and talks**

1. Provide trainings on Community Seed Knowledge to ABN partners in Kenya, Ethiopia, Ghana, Benin, Togo, Uganda
2. Provide trainings on Youth, Culture and biodiversity in Ethiopia, Kenya, South Africa, Benin, Ghana, Togo
3. Presentations on the experience of youth and environmental education from national and regional perspectives in Leipzig - Germany, Columbia, UK, South Africa
4. Meetings and presentations in Germany with different government officials, Schools administrations, and media personnel.
5. Participation in United Nations' 2016 virtual dialogue on Harmony with nature initiative available at (<http://www.harmonywithnatureun.org/knowledgenetwork/2016-dialogue/>)
6. Provide talks and interviews in many countries in Africa and Europe some among many available at :  
<https://rethink.earth/seeds-of-investment-for-the-future/>  
<http://concerntina.blogspot.com/2016/09/abn-organises-learning-programme-for.html>  
<http://foundation1259.rssing.com/chan-6083965/latest.php#item4>  
<http://www.seedsoffreedom.info/seeds-of-sovereignty/>
7. On job trainings - capacity building-trainings and workshops on world environmental leadership in Munich, Germany
8. Attend/contribute in regional and international dialogues/ meetings/conferences such as in FAO, IUCN, UNFCCC, SKI<sup>1</sup>
9. Provide a motivational talk in the occasion of capacity building training organized by Ministry of Urban Development and Housing to environmental and social focal persons of ULGs, city managers/mayors, regional environmental and social specialists, regional mobile team coordinators and environmental focal persons from REPA and zonal EPA

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<sup>1</sup> Seed and Knowledge initiative (SKI) is a continuous dialogue between scientists and farmers on issues of seed and agriculture. It is co-hosted by the University of Cape town (UCT) and Bio watch

## Executive summary

Farmers Managed Seed System (FMSS) has been playing the pivotal role in sustaining small holder agriculture whereby more than 85% of population in Ethiopia depends on. FMSS in the case of Ethiopian agriculture entails mixed crop and livestock production system which is common in the northern and central highlands of the country, which constitutes about 45% of the land mass. Ethiopian agriculture in this case has a long history dating back to the Axumite kingdom (100 BC–1000 AD) (Beshah, 2003: 37).

Aligned with Farmers Managed Seed Systems (FMSS), local seed diversities are major elements of practicing this kind of farming as farmers' are able to multiply them in the context of different agro-climatic zones across diverse mountainous landscapes and fragmented farm lands. In this vein, farmers' developed experiential knowledge on seeds and their socio-cultural contexts over time. Such a knowledge system which is inspired by and aligned with the natural order also helped local seed diversities to exist and remained productive for many centuries. As a result, FMSS provided sustainable food supply and nutrition for millions of poor farmers under the ever changing climatic conditions.

This study is aimed to explore the existing situation of FMSS in Ethiopia. The geographical focus of the study is mainly northern part of the country whereby agricultural practices and Farmers Managed Systems (FMSS) have been implemented since the 12th century. The study assessed main threats and opportunities with respect to FMSS from various perspectives including government intervention, influence by external actors, interactions of farmers with various stakeholders as well as status and impact of policy on seed and agriculture.

The study identified that FMSS are key to ensure food sovereignty through sustainable management of local seed diversities which have potentials to remain productive under volatile agro-climatic zones. Furthermore, FMSS is found to be significant for maintenance of socio-cultural integrity as well as conservation of biodiversity through farmers' holistic approach of conserving nature and wild relatives along with multiplication of seeds. The study also identified that there is enabling policy to promote and strengthen FMSS in Ethiopia which granted farmers to grow, store, exchange and sale their farm saved seeds. Human and democratic rights to live according to cultural contexts is also recognized by the Ethiopian constitution. However, the study result shows that written policies and regulations are not implemented on the ground to the extent in which it had originally been written on paper. In contrast, promotion of improved seeds and external high inputs such as chemical fertilizers are negatively influencing the existence of local seeds and FMSS in all study areas.

## List of abbreviations

ADLI	Agricultural Development-Led-Industrialization.
AGRCK	Access to Genetic Resource and Community Knowledge
ASPIF	Agriculture Sector Policy and Investment Frame work
ADLI	Agricultural Development-Led-Industrialization.
BoA	Regional Bureau of Agriculture
CSB	Commercial Seed Bank
CSA	Central Statistical Agency
COMESA	Common Market East and South AFRICA
DA	Development Agent
EIAR	Ethiopian Institute for Agricultural Research

ESE	Ethiopian Seed Enterprise
ESGPA	Ethiopian Seed Growers and Processors Association
FTC	Farmer Training Center
FMS	Farmers Managed Seed System
FSS	Formal Seed System
GM	Genetically Modified
GOE	Government of Ethiopia
GTP	Growth and Transformation Plan
HLI	Higher Learning Institute
IBC	Institute for Biodiversity Conservation
IV	Improved variety
MoA	Ministry of Agriculture
NARS	National Agricultural Research System
NBD	National Biodiversity Diversity
NGO	Non-Governmental Organization
NSIA	National Seed Industry Agency
NAP	National Agriculture Policy
NSSDS	National Seed System Development Strategy
NSP	National Seed Policy
NSS	National Seed Strategy
NVRC	National Variety Release Committee
PBP	Plant Breeder Proclamation
PVP	Plant Variety protection
PBR	Plant Breeder Right
PQCMR	Plant Quarantine Council of Ministers Regulations
PSE	Public seed enterprise
QC	Quality control
RARI	Regional Agricultural Research Institute
RSE	Regional seed enterprise
SNNP	Southern Nations, Nationalities and Peoples Region
SRS	Seed Research Strategy

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TMARR1:	Tigray Mohoni Agriculture Research Institution Respondent
TTSR:	Tigray Tabiya Stega Respondent
TGAHR:	Tigray Gereb Aba Hagos Respondent
THAR:	Tigray Hadis Adi Respondent
TTSP:	Tigray Tabya Tstega Participant
TMRIP:	Tigray Mohoni Research institution Participant
ARMAR:	Amara Region Masha wereda Agriculture office Respondent
ARMBR1:	Amara Region Mekdela Bazura Respondent
ARMTR:	Amara Region Mekdela Tebi Respondent
ARMTP:	Amara Region Mekdela Tebi Participant
ORKR1:	Oromia Region Karsa Respondent
EBRIR1:	Ethiopia Biodiversity Research Institution Respondent
ERIR1:	Ethiopia Research Institution Respondent
KASKAT-R:	Mekele University Agriculture research institute
ARI-R1:	Africa Rising Institute
ISD-R1:	Institute for Sustainable Development Respondent one
MELCA-R1:	MELCA Ethiopia Respondent one

## 1.0 Introduction

Threats on local seed supply in Africa has been increasingly concerning as seed companies and organizations such as AGRA have heavily invested in promoting private commercial seed and have taken over national and international research agendas in order to promote the green revolution varieties at the expense of biodiversity. The cumulative result of multifaceted threats and pressure from the corporate world undermines age-old agricultural practices and the integrated culture of seed governance including seed selection, breeding, sharing and storage. Referring to ESAFF (2014) and Lema, (2013), the study published by TOAM asserted that: “There are three major groups of seed supply systems identified in Africa. These are: Informal seed supply (local seed supply systems), Integrated seed supply (community based) systems and the Formal seed supply system”. The “informal seed” sector which will be referred to as Farmers Managed Seed System (FMSS) hereafter, provides about 80-100% (McGuire & Sperling, 2015) and focuses on farmer management of local varieties which have been selected overtime and produced under local circumstances of the seed that is used in agriculture TOAM 2015).

The apparent imposition by multi-national seed companies against African governments has been skewing FMSS and eventually force farmers into buying private seed which is usually chemical-intensive and cannot be replanted. This is combined with the push for contract farming which ultimately turns farmers into casual labourers on their own land. Since the recent past, there has been a common understanding that small holder agriculture is playing a vital role to achieve not only food security/sovereignty but also to bring economic growth particularly in the context of developing countries.

On the other hand, there are differentiated views with respect to what kind of agriculture and associated inputs can benefit economy and sustains the human well-being. Some suggest that agriculture needs to be mechanized and high technologies should be applied so as to feed the growing population of the world and achieve economic growth (Johnston and Mellor, 1961, Hazell and Diao, 2005). Others suggested that the local-specific and experiential knowledge-based agricultural system which is also known as FMSS would work better particularly in the context of small holder agriculture. In either cases, one can argue that in a situation like that of Sub-Saharan Africa, where rural areas account for 70% of the population and 20–40% of GDP, the role of small holder agriculture accompanied by FMSS remains significant and serves as a food source (food sovereignty).

This study is about showcasing and unpacking Farmer Managed Seed Systems (FMSS), how they work and contribute to food and seed sovereignty and maintains and enhances proper nutrition in Ethiopia. It will provide an overview regarding the existing situation of FMSS including varied understandings, interactions of different stakeholders, local meanings and uses. Furthermore, the study explored the perceived problems and benefits of FMSS in relation to the newly introduced seeds which are known as High Yielding Varieties (HYVs). In order to approach these complex issues, the study builds on a range of comparative empirical accounts and draws conceptual underpinnings from literatures as well as case studies to showcase experiences of local farmers which would form the basis of policy influence at local and national levels.

## 2.0 Objectives of the study

### 2.1 General objective

To explore the existing situation of FMSS including their interplay with Formal Seed System (FSS) as well as their role towards achieving food and seed sovereignty in Ethiopia.

### 2.2 Specific objectives

To Understand how FMSS works in the study areas and implication at the national level



To assess the policy environment in regards to FMSS in Ethiopia

To assess the interaction of different actors around FMSS

To explore the role of small holder farmers in FMSS and their contribution towards food sovereignty

To build up on the existing knowledge and experiences regarding seed work in Ethiopia

## **3.0 Study purpose and scope**

### **3.1 Purpose**

This study as illustrated under different sections, intends to unpack and explore ways in regards to how FMSS work and contribute to food and seed sovereignty including the benefits they provide to farming communities in the course of their socio-cultural, economic, spiritual as well as ecological livelihood. The study also explore the political economy of FMSS in relation to high yielding varieties which are introduced by the government aiming to boost productivity through use of high input mechanism. Furthermore, the study intends to examine the range of policy environment to identify the extent to which the existing legal instruments are supporting or not supporting FMSS. In this vein, the study aims to show the overall picture of FMSS at national level though its assessment in four regions of Ethiopia.

### **3.2 Scope**

Due to time and other constraints the scope of the research is limited to three regions of Ethiopia namely Amhara, Tigray and Oromiya regions. Targeted respondents are farmers, farmer organizations, CSOs, and government officials involved in seed works at various levels. The study areas in all selected regions are characterized by the complex topography and traditionally been associated with three mega climatic zones and farming systems. These traditional agro-climatic zones are known as Kolla (warm semiarid), less than 1500m above sea level; Woynadega (cool sub-humid temperate zone), 1500–2400m above sea level; and Dega (cool and humid zone), mostly greater than 2400m above sea level. Amhara and Tigray regions are mostly poses highland areas exposed to high soil erosion.

## **4.0 Research Design and methodology**

### **4.1 Research design**

This study aims to provide an in-depth, contextual understanding of the practices, relationships and understandings that constitute knowledge relating to FMSS and farming in the selected communities in Amhara, Tigray and Oromiya regions. To this end, the research is designed to adopt qualitative approach in which in-depth individual interview, focus group discussion, consultation with stakeholders/key actors/ and desktop research have been conducted.

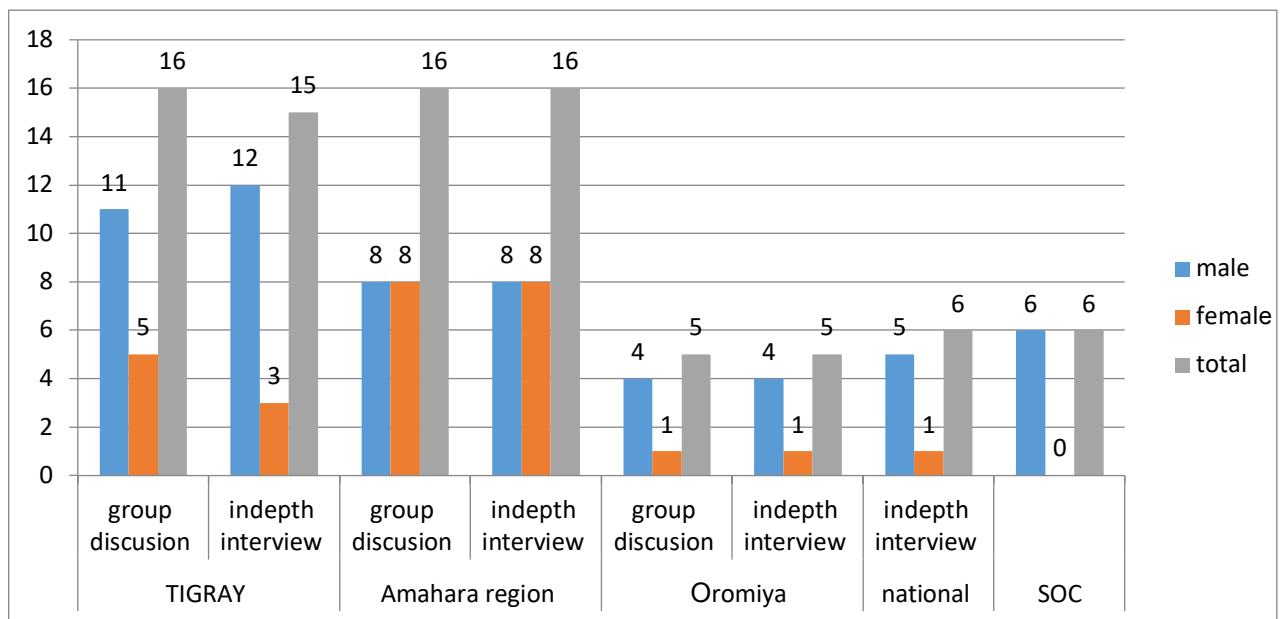
In the course of applying such qualitative methods, the study used non-probability sampling in which the researcher focused on targeted sampling in particular. This strategy provided with the flexibility to meet people (of all age groups and gender) with a range of experiential knowledge and to explore their views and interests on natural resource management including seeds and farming. In this regard, Newing explains that:

“In non-probability sampling, the probabilities that any one case will be included in the sample are not known ... indeed, the total population need not be defined precisely, and no sampling frame is required. (2011: 67)”

## 4.2 Methodology

Primary data were gathered from communities and their stakeholders in Tigray region, Amhara region and Oromiya region of Ethiopia. Three Specific Kebeles<sup>2</sup> have been purposefully selected in Raya Azebo wereda<sup>3</sup> of Tigray region. These are: Tsegea, Gereb Aba Hagos and Hadis Adi. Two Kebeles selected from Mekdela wereda of Amhara region. These are Tebi and Bazura kebeles. From Oromiya region, one kebele has been selected which is called Kara Kebele. A range of qualitative methods were used such as participant and non-participant observation, focus group, informal interaction and in-depth interview with farmers as well as other key actors in relation to FMSS ( Bernard, 2006; Newing, 2011; Puri, 2011a). The selection approach in all study areas has been factored by key reasons such as availability of data, community/farmers long term engagement with agriculture, potential to high diversity of seeds – culture – local knowledge and farming practices, as well as high degree of external intervention on FMSS. Based on recommendations by farmers and social activities in which the researcher had taken part, key informants were selected from the communities as well as Development Agents (DAs) from agriculture extension offices in respective study areas. This process has led the researcher to conduct a number of individual interviews and focus group discussions with knowledgeable local farmers, their families, and community organizations. Other key actors also interviewed such as CSOs, government officials, and organizations involved in seed work.

As illustrated in Figure 3 and 4, the total number of respondents were 85 and all were interviewed from respective study areas of which 19 of them were researchers and government officials at various levels, 6 were from different Civil Society Organizations and the rest were farmers in which about 40 % of them were women.



**Fig 1: Sex distribution of respondents.**

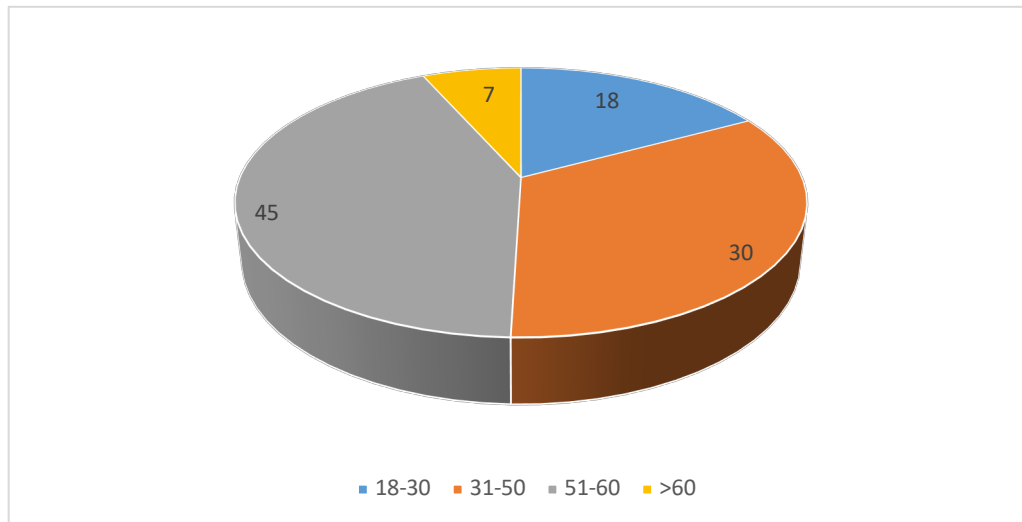
When it comes to age group, 7% of respondent farmers were above 60 years of age. Most respondents are 51-60 years old and this comes to 45% of the total number of respondents. Farmers whose ages are between 31-51 are 30% and farmers between 18-30 years of age are 18%. Such a range of age distribution enables the research to get different perceptions of respondents according to their respective age groups. Old farmers were very knowledgeable and provide information about different aspects of FMSS based on their rich experiences at least since 20-50 years back.

They also compare and contrast with the existing situation including how FMSS is currently working,

<sup>2</sup> The smallest administrative unit

<sup>3</sup> Equivalent to District which is further divided into a number of Kebeles

what elements of life is missing due to loss of FMSS, what are the main challenges of FMSS etc. On the other hand, young farmers brought their insights and experiences on the high yielding varieties while comparing with some remnant local seeds as well as stories of many other seeds from their seniors. Therefore, the age distribution of respondents helped the researcher to incorporate different aspects of FMSS and analyse the pros and cons of FMSS in terms of achieving food and seed sovereignty in Ethiopia.



**Fig 2: Age distribution of respondents.**

The focus group discussion in each study area involves farmers and agricultural experts separately and mixing both groups to explore the necessary information from different perspectives. Issues in relation to FMSS were deeply discussed which forms the richness of the information. Particularly the pros and cons of new seeds (high yielding varieties), their interplay with local seed diversities, the benefit of FMSS as well as the positive and negative impacts of the existing policy on seed and agriculture were thoroughly discussed

### 4.3 Data analysis

Translating data from the local languages (Amharic, Tigrigna and Oromiffa) to English, as well as transcribing and drafting in the form of relevant structures for analysis was a challenging process of this study. In order to get sufficient time for synthesizing field notes and to carry out first draft analysis, the researcher contracted a bilingual assistant who mainly helped the process of data collection, typing and transcribing data. The interpreted and summarized field notes were typed up and analysed in the form of a draft document.

Following fieldwork, field data were systematically analysed to draw out key themes and issues. The semi-analysed and summarized materials helped to identify the primary patterns of data which is often the main purpose of qualitative information (Stahler and Cohen, 2000). This is followed by typing up unfinished data, theming and coding, to understand the general form of the entire data. The complete set of reorganized field notes as well as summarized reports were re-read and the necessary sections highlighted according to the emerging themes. The grounded theory approach (Glaser, 1992) has been used for analysis of all interviews and focus groups, whereby categories and concepts which emerged from the entire texts helped to form the structure and key arguments in this study.

## 5.0 Contextual analysis of Formal Seed System and Farmer Managed Seed Systems in Ethiopia

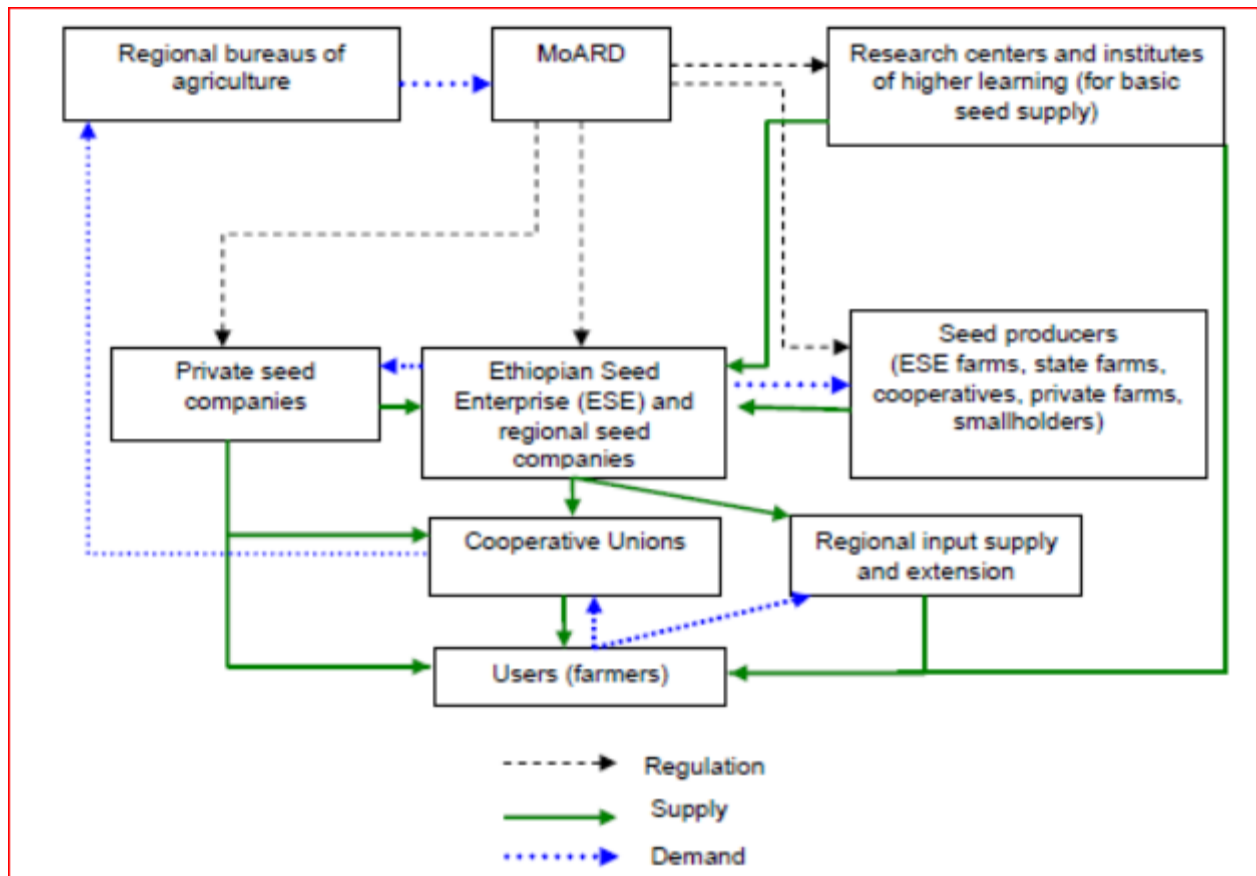
### 5.1 Formal Seed System

Louwaars and Boef (2012) explained that the Formal Seed System (FSS) in the Ethiopian context is designed to certify and release qualified seed varieties through the mechanism by which chain of activities should be undertaken and multiplication processes should be controlled by Public or private sector specialists. In 1995, the current Ethiopian government (FDRE) announced the long-term strategy called Agricultural Development Led Industrialization strategy (ADLI) as part of strengthening FSS (Pound and Jonfa, 2005). ADLI is aimed at achieving economic growth through simultaneous increments of agricultural and industrial output and by creating strong input–output linkage between the two sectors (Ohno, 2009:15).

In order to address the challenge and reverse the limited performance of the agricultural sector, the Ethiopian government has been developing subsequent development and poverty reduction plans, namely the Sustainable Development and Poverty Reduction Program (SDPRP) (2002–2004), Plan for Accelerated and Sustained Development to End Poverty (PASDEP I) (2005–2009), and PASDEP II (2010–2014) (Ethiopian Agricultural Transformation Agency, 2010). Over time, several actions were also taken in support of FSS. One of these is the Integrated Seed Sector Development Programme (ISSD 2015) which aims to strengthen seed producer cooperatives (SPCs) into local seed businesses (LSBs). Production of certified hybrid seeds particularly maize seed in Ethiopia has been operationalized through private small and medium scale seed producers in collaboration with the Bureau of Agriculture (BoA). Distribution also taking place through the government seed distribution system. One can see that this scenario creates conducive environment when it comes to attracting investment in seed production and marketing of seed companies at national and international level (Thomson, 1979; Groosman, 1989; Tripp, 2001).

Further to this, the Ethiopian Plant Breeders Act (2006) aimed to stimulate the growth of a private sector seed industry, and support plant breeding firms in the process of getting return for investments they made on research and development through the commercial sale of improved plant varieties. Ministry of Agriculture Research and Development (MoRAD) is held responsible to administer Breeders' rights and enforced by the judicial system. MoA under the Draft Regulation (Article 19) is also held responsible for the quality control and certification of imported and registered seed released on the domestic market as Certified Seed. David et al (2006) explained that:

“the legislation brings Ethiopia closer to compliance with the conditions for accession to the World Trade Organization, although there remain issues related to the extent to which Ethiopia's judicial system has the capacity to effectively enforce breeders' rights. Ethiopia's regulatory framework sets forth several rules and technical requirements to qualify for a license to produce, prepare, import or export maize seed.”



**Fig 3: A schematic of the Ethiopian seed system. Source: adapted from David J. et al (2006)**

As shown in the figure, different actors are organized under the Ministry of Agriculture to ensure the functionality of the Formal Seed System (FSS). The responsibility of the Ministry of Agriculture (MoA) has been shown including its role in driving the development of laws, standards and procedures (seed system development strategy 2017). The Ministry is also held responsible to control the entry of international organizations who are involved in seed production and supply. Further to this, the ministry is in charge of overseeing the international trade and exchange in regards to germplasm and seeds. Respective actors are also held responsible to undertake various tasks and creating link between them according to the established structure.

For example, the Ethiopian Institute of Agricultural Research is responsible for maintaining and providing breeder seed to basic seed producers for specific crops and crop varieties. David et al (2006) explained that:

“the Institute of Biodiversity and Conservation (IBC) plays an important role in the conservation of local germ plasm and also in the enrichment of the pool of the existing crop germ plasm through the introduction of germ plasm from international sources using ex-situ and in-situ conservation methods.”

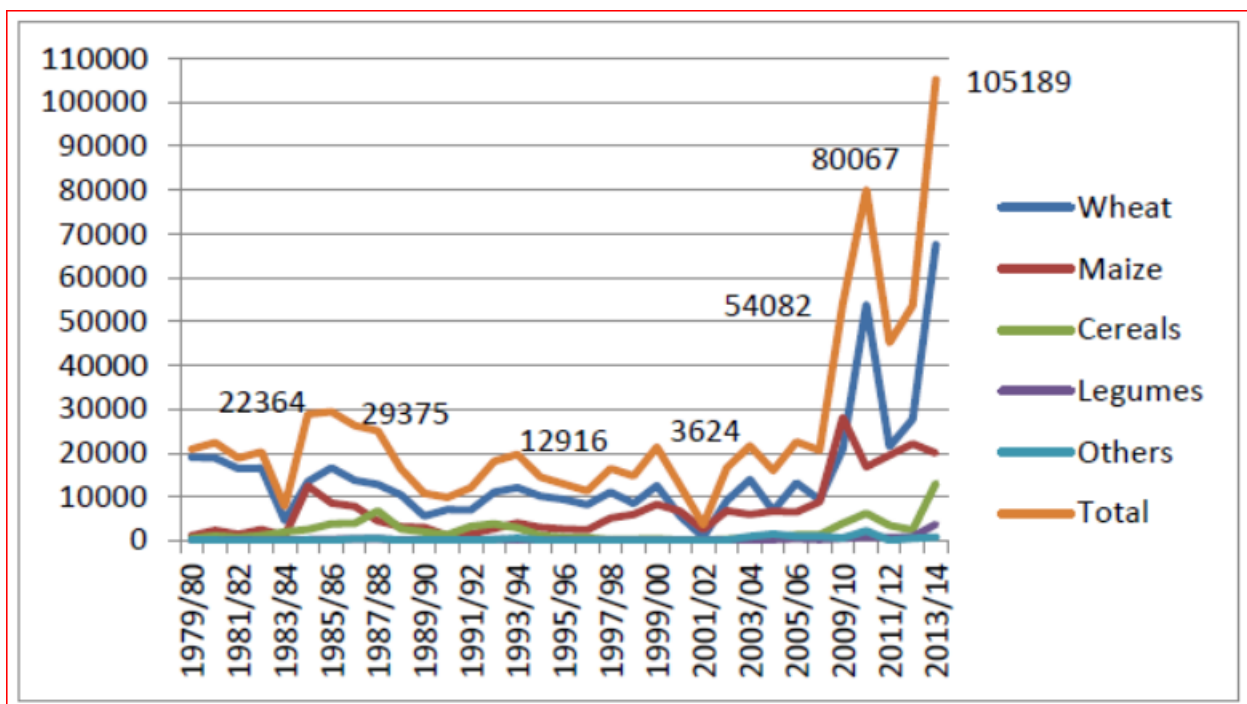
Furthermore, the formal seed market, the production system and distribution of improved seed<sup>4</sup> is dominated by the Ethiopian Seed Enterprise (ESE) at national level. The meaning of improved seeds are sometimes confused with hybrid seeds particularly at farmers’ level as they couldn’t tell which one was hybrid and/or improved seed during the interview process. Some respondents from the Ethiopian agricultural Institute explained that except Sorghum and Maize seeds, introduction of hybrid seeds at

<sup>4</sup> According to the respondent from the Ethiopian Agricultural Research Institute, improved seeds does not necessarily mean all of them are hybrids. Few hybrid seeds particularly maize are released to farmers otherwise most new seeds are improved seeds (high yielding varieties) not hybrids.

farm level is limited so far. The focus is on cross and self-pollination of local seeds. But there are hybrids seeds of the rest are improved seeds. For this reason, this research will hereafter use the term “improved seeds” where ever mentioning seeds other than local seeds.

Coming back to ESE, it has been taking the leading role in seed multiplication and distribution of improved seeds for major crops of cereals, pulses, fruits, vegetables, and forages (Alemu et al. 2008). Atilaw and Korbu (2011) explained that “the total amount of seed supplied by ESE increased from 20,746 tons in 2006 to 54,326 tons in 2010”. There are also key actors which are organized at different levels ranging from the Ministerial level to bureaus, sectors, departments and many other forms of institutions. The Public Seed Enterprises (PSEs) including the Ethiopian Seed Enterprise (ESE) and Regional Seed Enterprises (RSEs) in Amhara, Oromia, SNNPR and most recently, Somali have the largest share in the production and marketing of certified seeds.

The role of the National Agricultural Research System (NARS) is also significant in the Formal Seed System (FSS). The main responsibility is developing improved (high yielding) varieties and best management practices that are multiplied and delivered to farmers in order to increase production and productivity levels of crops. Research institutions are largely linked with extension services to popularize new technologies. Institute of Biodiversity Conservation (IBC) also responsible for conservation of biodiversity, sustainable utilization of resources, and access to and sharing of benefits of biological resources. The Agricultural Inputs Quality Control Department is one of six departments under the Agricultural Marketing and Inputs section of MoARD. “Its main role in the seed sector is to provide licenses to seed producers and certification of seed for domestic, imported, and exported seed” (David et al 2006). Those who produce seed for marketing and commercial purpose or those who import/export needs to have license and certification.



**Fig 4: Certified seed supply in Ethiopia (1979-2014). Source: adopted from (Bishaw and Atilaw 2006)**

The figure shows that although the development of state-run input supply and extension systems did not show similar results to all types of crops, the promotion activities on improved seed and fertilizer in regions were generated some positive impacts over the last two decades in Ethiopia. This was followed by decrease in the beginning of the third decade and picked up again. The formal seed supply on wheat

in particular was accelerated by 2014 while some fluctuations for maize were observed. Other cereals remained the same until 2014 and their supply was picked up a little bit at the end. Although this research was not engaged with exploration of detailed reasons for the fluctuations of seed supply, the potential reason would be related to (among many others) resistance by farmers to accept improved seeds and fertilizers, unforeseen costs for government as well as insufficient infrastructure coupled with an favourable weather condition to deliver in due time within planting seasons. Bishaw and Atilaw (2016) also explained that:

“public sector involvement in Ethiopia’s agricultural sector will remain critical where smallholders have poor access to markets, weak purchasing power, and asymmetrical access to market information”

## 5.2 Farmers Managed Seed System (FMSS)

There seems to have a wider understanding that without due consideration to the small holder farmers, who are feeding the vast majority of the world population it is difficult to achieve food security and even global development. In this vein, Byerlee et al. explained that:

“Given the sheer size of the agricultural sector with an estimated 2.5 billion persons dependent on this activity, with three-quarters of all poor people living in rural areas, and with agriculture as the largest user of natural resources, it is increasingly recognized that realization of the global development agenda will not be possible without explicitly focusing on the role of agriculture for development” (2009: 3).

The fact that the basic feature of FMSS is integration of farming activities with context based knowledge through growing diverse seeds. It has been recognized that seed diversity provide better option for food security particularly in the context of increasingly vulnerable bio-physical and agro-ecological climatic conditions. Shiva (2000) explained that for many centuries, farmers of the third world provided a great extent of diversity of seeds and plants from which consumers are getting nutrition they need. In most cases of Africa, the long term practices of intercropping and cultivar mixtures proved to be an excellent defence against biological and climatic hazards to crops. Evidence from India can be an example in which Indian farmers alone have been breed and maintained 200,000 varieties of rice (Shiva 2000). Rwandan farmers grow up to eight different potato cultivars, bananas, beans, and sweat potatoes at once within farming fields (Brokensha and Little 1988). Similarly, Ethiopian farmers also grow highly diversified – combination of different cropping within the limited area of land.

For most governments, food security would be achieved through boosting productivity per se and this is taken as a priority. Promotion of high input agriculture and development of improved seeds (high yielding varieties) is then prevailed. From practical perspective, the perception of productivity by governments and advocate researchers lies only on the masses of grain yield and other important aspects of productivity is overlooked. However, it should be noted that the life of small holder farmers has been supported for centuries through use of FMSS because and they managed to sustain saving/storing, multiplying and sharing of seeds throughout the historical time (GRAIN, 2015). Alemu (2011) states that there are a number of benefits in regards to FMSS which includes having access to reliable seed production of locally demanded varieties, ensuring production of food crops for consumption rather than cash crops; reduction of seed cost through exchange and marketing within the community and more. Recent studies on FMSS affirms that in most part of Africa including in Tanzania, Malawi, and Ethiopia, the source of seeds for most small holder farmers acquired through FMSS in various forms such as own-saved seed, exchanges with neighbours, and local seed markets among other locally adopted mechanisms (TOAM 2015, Alemu 2011). For this reason FMSS are identified as reliable, affordable and widely used amongst smallholder farmers.

For small holder farmers, productivity is not only about consumption through the physical net production but also farmers’ social, cultural and spiritual needs to be fulfilled by diversity of seeds. Moreover, the aim of agriculture in the context of smallholder farming is not only to maximize yield but

to reduce risk through ensuring stability and sustainability of production system. In this vein, one can argue that agricultural growth in smallholder farming can be possible only if multiple aspects of farmer's experiential knowledge as well as context specific socio-cultural and environmental factors are considered rather than being dependent on induced approaches, technologies and associated resources in the name of "development".

In contrast, much attention has been given to promote high yielding varieties and this is also supported by governments' regulatory tools such as seed legislations, strategies and policies. For example, the COMESA Seed Trade Harmonization Regulations (Article 3) encourages investment in seed business, breeding improved seed varieties as well as increase access to the existing varieties in member countries (Berhanu and Simeon 2001). Seed laws in Tanzania are being changed to boost private sector involvement in the seed industry (TOAM 2016). The consequence of all such kind of actions by governments and regional regulatory bodies could gradually weaken FMSS in the region whereby the core rights of smallholder farmers' to save, share, exchange and sell their seeds will be unprecedentedly denied.

The current problem for practicing and maintaining FMSS in Africa has also been stemmed from a multifaceted perspectives of modern approach towards agriculture. In the first place, the modern approach towards development seems to have emphasizing on industry led development in which agriculture will be mechanized (Hazell and Diao, 2005). In the case of mountainous countries like Ethiopia agricultural practices are characterized by small holding and farmlands are usually fragmented due to many reasons. The nature of farming in these kinds of countries is usually carried out under small land holding with diverse eco system (Bihon kassa Abera 2015).

Farmers plant diversified seeds within limited farm lands to meet diversified needs due to cultural, spiritual as well as economic reasons. This kind of scenario best worked under FMSS for many centuries in different parts of Africa including in Ethiopia.

Agriculture in Ethiopia has been practiced for many centuries and a wide elevation difference (between 116 m below sea level and 4620 m above sea level), induced a very diverse set of ecosystem. This ranges from humid forest and extensive wetlands to the desert of the Afar depression. Ethiopia's latitudinal location which is being near the equator as well as altitudinal difference makes the country as one of the twelve known ancient countries for the diversity and origin of crop plants and their wild relatives in the world. The country is a primary gene centre for crops such as coffee, Niger seed, Teff, Inset and the Ethiopian mustard. Besides, field crops such as Barley, Sorghum, Durum Wheat, Finger Millet, Faba Bean, Linseed, Sesame, Sunflower, Chickpea, Lentil, Cowpea, and Fenugreek and grass pea have wide genetic diversity in Ethiopia (Bihon kassa Abera 2015).

Coming from such kind of natural and cultural background, Ethiopia's economy is highly dependent on small holder farming practices that constitutes 43% of gross domestic product (GDP), 80% of export value and employs 84% of the population (Belete et al.1991 Beshah 2003, Teshome 2006, ATA 2010). However, the problem of land degradation in the Ethiopian highlands where some parts of study sites are located is increasingly affecting agricultural productivity and also causing soil erosion. This situation of land degradation goes to the extent of losing 42 tons of soil per hectare per year on cultivated land in the highlands (Hurni 1998) and Ethiopia has one of the highest rates of soil nutrient depletion in sub-Saharan Africa (Stoorvogel and Smaling 1990). Land degradation also contributes to low agricultural productivity, which is reflected in cereal yields averaging less than one ton per hectare in most of the highlands.

FMSS in Ethiopia accounts for 80–90% of the seed used by smallholder farmers (Abebe 2010, Bishaw 2008). This shows the fact that the sector has a significant role to play and the age long experiences and knowledge of small holder farmers has to be considered in development planning in regards to future of agriculture in the country. In practice, most government agricultural programs in Ethiopia, do not consider multi-level interests/knowledge of farmers on their diverse seeds which are context based, culturally sensitive and environmentally adoptive for centuries. Their indigenous knowledge, local skills



and farming experience are not taken into account during the process of development planning. When it comes to policy support in this regard, Proclamation 482/2006 provided community right to access to genetic resources but this seems to have proclaimed to support conservation of biodiversity in general rather than management of seeds. Article (8) reads as:

“Local communities shall have an inalienable right to use or exchange among themselves their genetic resources or community knowledge in the course of sustaining their livelihood systems in accordance with their customary practices or norms...no legal restriction shall be placed on the traditional system of local communities on the use and exchange of genetic resources and community knowledge.”

Some findings of this research shows that in almost all levels of development planning, farmers are not invited to the extent of investing their local and indigenous knowledge at the level of their satisfaction. Despite their participation and involvement, the extent of external intervention by different actors has been apparently growing which is increasingly affecting their integrated livelihood and sustainability of FMSS. In this regard, FMSS which are mainly integrated with social, cultural and agro-ecological situations, seems underestimated despite the fact that they played a vital role in sustaining life for centuries as well as achieving broad-based economic growth for the last 40–50 years (Kisamba-Mugerwa, 2005).

This leads to have the growing concern for many people regarding the way that agriculture is developing in Africa which is also true in Ethiopia. Ruben (2005) explained that:

“there has been too much emphasis on increasing land productivity and not enough on the need for sustainability, stability (reduction of annual fluctuations in output) and multiple outputs (crop diversification in order to reduce income risks).”

This scenario reveals that the future of agriculture for development is spearheading towards a market-oriented and high input agricultural system with the potential of diminishing the existence of FMSS. Similarly, Gloria et al (2017) asserted that national seed policies and commercial seed enterprises in East Africa have given much attention to increasing farmers’ access to modern seed varieties. Despite the limited share of FSS in the region which is less than 20% (compared to FMSS), government and private sector seed breeders, processors, and vendors continued to develop and deliver these new varieties to farmers. The working document developed by MoA and ATA also states that the coverage and distribution of FSS in Ethiopia is not more than 6% of the total land area.

## **6.0 Study findings**

### **6.1 FMSS is playing significant role in livelihood of communities even under external pressure**

One of the interesting findings in this study is the fact that FMSS enables farmers to have access to various livelihood options in which they developed a context based knowledge system through use of different practices. These practices in turn helped farmers to maintain their FMSS according to ecological principles which entails their socio-cultural, spiritual/religious and economic life ways for many centuries. For small holder farmers, seeds are shared elements.

They have personality in which farmers respect them as sacred gifts from nature so that they (seeds) cannot be held in custody/privatised/patented by individuals; rather, seeds belongs to the entire community.

Respondents from all study areas explained that farming and seed knowledge in the case of small holder agriculture is acquired through a day to day experiential learning and embedded into socio-cultural,

environmental as well as ethical contexts which forms the basis of FMSS. In the case of FMSS, the day to day interaction between people and the environment is part of learning and exchanging information/resources. Seed exchange or purchasing from local markets is for example a learning process. Farmers' do not simply exchange or purchase seeds without checking the quality through use of their prior knowledge as well as cross check within their networks. In the process, there a range of communication and exercising of social/cultural norms to ensure the information is truth and reliable. From a range of discussions and participant observation in all study areas, this study also identified the fact that farmers' developed experience based management system about their seeds in which different seed diversities have been nourished in different agro-climatic zones.

The established socio-cultural norms and ethics as well as intergenerational learning amongst elders and youth help individual farmers to strengthen their knowledge on seed and agriculture as well as to acquire new information through various opportunities in which elders and young farmers may come together and interact. As explained in the previous section of this study, the nature of small holder farmers is team working in which elders/experienced farmers come together during different farming activities and social gatherings such as debo,/ofera, Tezkar, ploughing, weeding, harvesting and many more. This kinds of joint activities provide opportunities for children to learn about a ranges of characteristics of different seed diversities since their early ages which motivate them engage and create emotional attachment with seeds as they grow.

Most respondents from Tabiya Tstega, and Gereb Aba Hagos of Tigray region explained that the meaning of seed diversities for them is beyond consumption, because grew up observing how seeds are also part of humans' social and cultural lifeways. Respondents also asserted that local seeds are playing the vital role in bringing people together for team working in which farmers are supporting one another at household, neighbourhood and at community level depending on the bulk of the given work and the urgency to catch up with a particular season. There are different social institutions to make the team work effective. For example in Tigray region particularly where the study areas are located in Tabiya tstega, Hadis Adi and Gereb Aba hagos there is a culture called Debarte. Debarte is a specific area where big tree is found in the middle of green field. Communities gather under the tree and conduct various cultural activities and prayer for the blessing of the harvest. Elders of the community lead the process and different types of food prepared using diversity of seeds.

Respondents from Bazura and Tebi areas from Amhara region also told that they have various cultural/social institutions which are playing central role during the process of farming. Debo is the one among others. Debo is a social institution in which groups of farmers gather to help an individual farmer in his/her farming activities such as weeding, harvesting and ploughing the farm land. Debo is also useful when an individual is building a house or any activity which demands more labour. Depending on the load of the given work, 20-30 farmers can come together at a time to work jointly. In all cases of these kinds of gatherings both in Tigray and Amhara regions, there are division of labour between men, women young and children. Women are responsible to prepare food and drink using various types of seeds.

Men will participate in the farming activities while youth also taking part not only to work but also to learn from older men. Children are responsible to rare animals by the ridge of the farm while watching the actual join their seniors are doing and the social interaction. They will be invited to join the feast when the food comes from home in the mid-day.

Most important note here is that in the occasion of debo (in Amhara), ofera (in Oromoiya) or other types of community gatherings for joint work or for other kinds of social/cultural issues, food and drink must be prepared preferably from local seed varieties. According to respondents from all study areas, preparation of quality food determined by what type of seeds are used.

Food prepared from local seeds are quality food in terms of their test, smell and social acceptance as well. For example, one respondent from Tebi study site in Amhara region (ARMB-R3) explained that:

“someone who is careless in using the right type of seed particularly during the occasions of social gatherings (e.g. wedding), he will be losing his social status and being gradually dis-respected”.

Most respondents from same study site told that some of commonly accepted/appreciated seeds during marriage are: Magna (type of teff) Marute and Chibina (types of sorghum) for making injera<sup>5</sup>, ere (type of barley) and wegere (type of sorghum) for making Tella<sup>6</sup>. In the case of study sites from Tigray region, Aba are, Gedalit, and Jabyo are used for making Tella; Bene Teff for ingera and Dekoko for stew. Some local seeds in Oromiya region also are Haro (white teff) for making ingera, Chick pea and grass pea, for making stew, Ayano, Sinda Bani and Ayb (wheat varieties) for making kollo<sup>7</sup> and Bread during social and cultural events. Shemam, another wheat variety (black wheat), Aba-are and Jamyo, (white and red sorghum respectively) Jamyo used to make Nifro<sup>8</sup> as well as kollo. Among other seeds as shown in the table 2, these seeds still exist where small holder farmers in all study areas are actively growing/using them through their FMSS. The study also identified that women liked to cook food from local seed varieties because most respondents said that they like the food from local seeds; it is tasty, filling and satisfying as well as giving energy for labour throughout the day.

All participants of focus group discussions in Tigray, Amhara and Oromiya regions agreed that local seeds have multiple benefits which fulfil various needs of communities including social cultural, and economic needs as well as satisfaction of moral/religious and health issues. One participant from Tabya Sega

(TTS - P8), study site of Tigray region explained that:

“we prefer local seeds for preparation of food/drink in the occasions of marriage, Teskar<sup>9</sup>, and debo among other social gatherings. We also offer good quality seeds preferably local from seeds to church because we praise God for blessing of our harvest in this way... We prepare different kinds of food like injera from Teff and sorghum and we slaughter goat and sheep from the indigenous animals. The reason of our choice for indigenous crops/cereals and animals is due to their quality and test. When someone use indigenous seeds he will be prestigious and his social position will be respected by the community. Since we began consuming hybrid/improved seeds, which are treated by chemical fertilizers and pesticides, our health is increasingly gotten down...we mill them using modern technology which makes them heated and lose their natural test as well as nutrition. Currently, we are very much concerned particularly about our health and we suspect that this is because of hybrid/improved seeds grown with chemicals.”

Through interactions with other respondents in all study areas, the research further identified that the type of seed to be offered to churches must be local seeds except in a situation where there is no local seed; and in this case wheat crop from improved seed can be offered. Furthermore, most respondents from all study areas, appreciated multiple benefits of local seed diversities as they are comparing benefits with improved seeds. For example, all respondents from Tigray, Amhara and Oromiya regions explained that they prefer local seeds for better taste and nutrition, better residue for animal forage, adaptation to local environment among others.

Some respondents from Tebi and Bazura study areas of Amhara region said that improved Teff seed (cr 37) is white in colour and look good but the injera made from this seed turns out black after baking and it is hard (not soft) for consumption. The Bene local white Teff on the other hand is soft and its injera

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<sup>5</sup> Staple food (soft and spongy bread) for most Ethiopian especially in Northern part, made of mainly from teff but also from barley, wheat, millet and other types of crops.

<sup>6</sup> Traditional brew mainly made from special types of Barley and sorghum.

<sup>7</sup> Grains roasted and to be served as snack.

<sup>8</sup> Grains boiled and to be served as snack as well.

<sup>9</sup> Religion-based social setup/institution where people commemorate their late relatives through prayer in churches and organize feast with food and drinks for invited guests.

remains white after baking. Other respondents from Tigray (TTS-R4, TTS-R5, TTS-R6), complement and said that injera made from their local seeds like Aba are (white sorghum) is sweet and soft compared to injera made from improved seeds. Other benefits from local seeds such as Gedalit and Jamyo, they provide good animal feed than *kodem* (improved sorghum seed). Aba-are, Jamyo, and Gedalit seeds can also provide high production if they get sufficient amount of water but the challenge here is that precipitation in the study area is decreasing over time. As shown in table 1, farmers who have access to irrigation and better water supply such as ground water tend to grow local seeds rather than improved varieties. On the other hand, those farmers whose land is not fertile and no access to irrigation tend to grow improved seeds.

Farmers also recognized that some seeds such as Jamyo, and Gedalit from Tigray and Enat Sinde (wheat variety) from Amhara are naturally taking long time (6-9) months before maturity. This is another challenge under the changing environment where there is no reliable rain water supply. *Kodem* (improved sorghum seed) is better in this regard as it needs less water and can be matured in short time but farmers still do not like the quality in terms of taste and nutrition. However, the amount of mass of stalk from *kodem* (sorghum) is also not as plenty as local sorghum seeds for animal feed. Respondents further explained that even there are many local barley and teff seed diversities which are naturally fast maturing (40-60 days for maturation) in Amhara region.

Table 1 shows that although some local seeds are taking long time to mature, farmers still prefer to plant them if the rain fall is sufficient and/or they have access to irrigation.

**Table 1: Small holder preference of seeds in all study areas within Tigray, Amhara and Oromiya regions.**

No	Name and type of seeds	Farmers' preference			
		When having Access to irrigation/fertile land		When there is no access to irrigation/fertile land	
1		Local seed	Improved seed	Local seed	Improved seed
2	Teff	preferred	Less- preferred	Less- preferred	preferred
3	Sorghum	preferred	Less- preferred	Less- preferred	preferred
4	Wheat	preferred	Less- preferred	Less- preferred	preferred
5	Dekeko	preferred	Less- preferred	Less- preferred	preferred
6	Chickpeas	preferred	Less- preferred	Less- preferred	preferred
7	Maize	preferred	Less- preferred	Less- preferred	preferred
8	Peas	preferred	Less- preferred	Less- preferred	preferred
9	Chickpeas	preferred	Less- preferred	Less- preferred	preferred
	Lentil	preferred	Less- preferred	Less- preferred	preferred
	Fenugreek	preferred	Less- preferred	Less- preferred	preferred
	Linseed	preferred	Less- preferred	Less- preferred	preferred

All respondents from all study areas also affirmed that, local seeds also provide opportunity for women to prepare different types food according to diverse need by the household members and this includes food for daily consumption, for prayer/ritual ceremony, for maternity, for community gathering etc. They further explained that improved seeds cannot provide such kinds of options and flexibility for

households as their diversity is limited and also they are not appreciated by the community when it comes to preference.

Observation from one respondent in Amhara region (ARMB-R2) strengthened what is explained above regarding farmers' knowledge about multifaceted aspects of local seeds. He said that:

“we have in-depth knowledge on local diverse seeds ranging from selection, breeding, harvesting and storing to integrating with our culture as well as aligning our practices in accordance with the natural order and local environment.”

All respondents are knowledgeable about local seeds and associated conservation practices as well as use of different seed diversities for different purposes. Farmers know how seeds should be stored in different state of conditions according to respective characteristics. Some seeds such as Aba are, Jamyo and Gedalit are stored in insira and in Godo (both made of clay). Farmers mix some Teff to minimize damage from rodents. Other seeds such as wheat, Barley, Teff are stored in gota (small in size and made of straw and mud) or gotera (big in size) made of special wood and mud; other seeds such as Sorghum, may be stored underground with the space laminated by cow dung and smoked by special plant etc. Women are creative and knowledgeable in making quality food by mixing different seeds diversities. For example respondents from Tabya Stega of Tigray region told that Aba-are is good for injera when mixed with Teff. Jamyo is also good for injera when mixed particularly with red Teff. Aba-are, Gedalit and Chibina are good for Tella (traditional brew). Saesa local barely is good for malt preparation. Yellow sorghum is also good for making traditional alcohol and local brew. When it comes to marketing. Local Teff diversities such a White Teff and Berke Teff have good market value and they are expensive in local market. Emmer wheat is good for healing a broken bone and (Shinbra/chick pea) is good for children.

Regarding agricultural seasons, farmers know which types of seed needs to be planted when. The decision of planting /sowing a particular seed depends on the amount of rain/moisture, the month in which the rain started, the type of soil and many more criteria. In the case of Tebi study area of Amhara region, for example, the main rainy season is between July and September (locally known as meher-rain). There is also another rainy season (locally known as belg-rain), which falls mostly during March–June but sometimes it could rain in January as well. Respondents explained that during the belg-rain (around February), they often saw white indigenous Teff. They saw Bene Teff in March depending on the availability of the rain. During Meher-rain in Tigray, Aba-are (white sorghum) will be sown and harvesting is in December. And there is other white local indigenous seed we saw it during July and harvest it during December. Respondents from all study areas in Tigray further explained that Bene, Teff, Aba-ere and Jamyo which are diversity of sorghum seeds are natural productive even compared to any improved seeds.

## **6.2 Farmers are not entirely accepted improved seed varieties to integrate with their socio-cultural and religious/spiritual life ways**

Respondents from study areas in Tigray and Amhara regions in particular explained that a number of improved seed varieties have been introduced in their respective localities. Some of these are: [Cr 37, Smada, Boset, Kora, Kuncho (improved Teff varieties)]; [Moko I, Melkam, Birhan, (Sorghum varieties)]; [Melkesa II &VI and Gibe II (improved Maize varieties)]; [Raya I and II, Alamata, ARC (Dekoko varieties)]; [Chaci and Gelilama (improved tomato varieties)]; Mrakofana and Bombayred (improved varieties of pepper and onion respectively)]; [HR 16, HR 85 (improved Wheat varieties)].

In regards to the introduction of improved seeds (high yielding varieties), farmers in all study areas observed that as much the external intervention into their FMSS increases, the characteristics of their seeds, the food they are consuming, the soil characteristics as well as the response from nature are gradually changing. Respondents from all study areas expressed that the social and cultural perspective of their life is also changing because of the changed style of seed supply. They explained that local seed

diversities were associated with customary governance in which some knowledgeable elders used to lead the process of prayer at the community level. This prayer also used to be practiced at household level. All family members were coming together and in this way they used to stay connected. Those prayers/rituals were different in their nature so that various types of seeds were needed according to the type of a particular ritual or socio-cultural activities. However, the newly established system of seed supply (FSS) increasingly disconnecting such an integrated life ways of the community in which the local seed network (FMSS) has also been disconnected and this led to poor communication and sharing of knowledge amongst farmers.

For this and other reasons, the response rating from all study areas shows (see tables in the following pages) that farmers' are engaged with local seeds as well as improved seeds in their farming practices in which they prioritize their needs according to nutritional, market, environmental as well as socio-cultural values.

Table 2: Farmers' valuation of local seeds				
Name of seed varieties	Values related to different use for consumption	Market value	Human & environmental health	Socio cultural value
<b>Sorghum</b>				
Aba-are	To make Porridge (during maternity), injera, Kollo, animals like it.	Very good market demand	Gives healthy feeling when consumed & it is suitable irrigation farming.	High demand during marriage and Tezkar.
Jamyo	To make soft bread ( <i>mebabero</i> ) during coffee ceremony.	High market demand by local hotels and restaurants	Gives healthy feeling when it is consumed; adapted with local micro environment	Culturally accepted and socially wanted during debo, Debatrte, Tezkar & other religious or prayer purposes.
Gedalit	To make porridge ( <i>atmiti</i> ) for children and lactating women; local brew ( <i>tella</i> ).	Moderate market demand by hotels and restaurants at local level	Gives healthy feeling when it is consumed; adapted with local micro environment	Culturally accepted and socially wanted during debo, Debatrte, Tezkar & other religious or prayer purposes.
Marute	Preferred to make quality injera when mixed with Tef; provide energy for farmers; quality local brew.	High market demand by farmers and consumers	Gives healthy feeling when it is consumed; adapted with local micro environment	Culturally accepted and socially wanted during debo, Debatrte, Tezkar & other religious or prayer purposes.
Chibina	Preferred to make quality injera; quality porridge and special food mixed with butter particularly for lactating women	High market demand by farmers and consumers	Gives healthy feeling when it is consumed; adapted with local micro environment	People gain respect when they provide injera made from Chibina mixed with teff (the appearance is white and attractive).
Yellow sorghum	Preferred to make quality local brew and porridge.	Moderate market demand by farmers and consumers	Healthy but not preferred to make injera as its appearance is not attractive particularly if it's not mixed with other seeds like teff	Culturally accepted as this is the seed to make beverage during many types of community gatherings.
Afincha Barya	Good for children, pregnant women and during the process of prayer/ ritual ceremony. Also provide good nutrition during the process of bone setting.	No longer available in local market	Adapted with local micro environment, its residue is good to increase soil fertility	Culturally accepted and socially needed to make different types of food and snacks during the rituals, prayers and community meetings.

Name of seed diversities	Values related to different use for consumption	Market value	Human & environmental health	Socio cultural value
<b>Barley</b>				
Saesa	To produce quality beer for traditional ceremonies; to heal broken bone, to make porridge for lactating women. To make injera, Beso <sup>10</sup> , kollo.	High market demand by farmers and consumers	Good for human health; adapted with local micro environment, Its residue is good to increase soil fertility animal forage and to make house roofing.	Culturally accepted and socially needed to make different types of food and snacks during the rituals, prayers and community meetings.
Demhay	To make local brew and to make bread; preferred for feeding women during and after pregnancy,	No longer available in local market	Good for human health adapted with local micro environment.	High cultural acceptance for feeding the community during Tezkar, Debo.
Sene Gebs	Good to make local brew, has power to maintain women's strength after.	High market demand by farmers and consumers	Has power to heal diseases.	High cultural acceptance for household consumption and local brew.
Ere	To make injera, porridge, kollo.	High market demand by farmers and consumers	Make farmers strong and healthy; adapted with local micro environment, Its residue is good to increase soil fertility animal forage and to make house roofing.	High cultural acceptance for feeding the community during Tezkar, Marriage, Debo.
Nech Gebs	To make quality injera and Gonfo (traditional thick porridge) and Chibeto during harvesting which makes farmers strong the whole day.	Moderate market value	Provides good health and adapted with local micro environment.	High cultural acceptance for feeding the community during Tezkar, Marriage, Debo.

<sup>10</sup> A kind of fast food prepared from barley flour.



Name of seed diversities	Values related to different use for consumption	Market value	Human & environmental health	Socio cultural value
<b>Teff</b>				
Magna	To make special injera (often during special ceremony such as prayer, marriage, rituals etc.).	High market demand by hotels/restaurants, farmers as well as consumers.	Provides good health and adapted with local micro environment.	Very high cultural acceptance for special socio-cultural occasions.
Birke	To make injera and porridge.	High market demand by consumers	Healthy food which provides energy for farmers and laborers; adapted with local micro environment.	Culturally accepted and commonly used for consumption.
Binc,	To make injera (fast maturing type of Teff).	High market demand by farmers	Fast maturing and favourite for farmers; adapted with local micro environment.	Very high cultural acceptance supplement food security during short of rain.
Haro	Useful for women during pregnancy which gives energy and lots of iron.	Good market demand	Healthy food which provides energy for lactating women; adapted with local micro environment.	Culturally accepted and commonly used for consumption.
Bursa	Preferred to make injera for daily consumption.	High market demand by farmers and consumers	Farmers relying on Bursa Teff as part of ensuring their food security because of its adaptation to local micro environment and its good taste.	Culturally accepted and appreciated. Most farmers grow this diversity of Teff.
Red-Teff	Useful for women during pregnancy which gives energy and lots of iron (Like Haro teff in Oromiya region).	Moderate market demand	Healthy food which provides energy for lactating women; adapted with local micro environment.	Culturally accepted with limited degree compared to other Teff diversities.
Agay	Agay is preferred for feeding women during pregnancy which gives energy and lots of iron.	High market demand by farmers and consumers	Healthy food which provides energy for lactating women; adapted with local micro environment.	Culturally accepted during Tezkar, Marriage, Debo.

Name of seed diversities	Nutrition value	Market value	Human & environmental health	Socio cultural value
<b>Legumes</b>				
Grass pea	To make stew, Nifro, Gulban <sup>11</sup> and even sometimes to make injera when it is mixed with other seeds diversities.	High demand by farmers, hotels, Restaurants, consumers	Healthy food for humans, animal feed, Ability to fix nitrogen in the soil, and adapted with local micro environment.	Culturally accepted and its benefit appreciated.
Lentil	To make stew, and used as cash crop; animal fattening by feeding the residue (over crushed stalk).	High market demand by traders	High protein seed, adapted with local micro environment.	High cultural acceptance for making stew during community gathering.
Debele	To make stew and porridge for children and pregnant women after and before maternity.	Less available but high market demand	High protein seed to substitute animal protein to some extent, adapted with local micro environment.	High cultural acceptance for feeding the community during Tezkar, Debo.
Chick peas	To make stew, <i>kollo</i> porridge for children, and for pregnant women. Good for common cold treatment mixing with mustard ( <i>sengfich</i> ).	Less available but high market demand	Healthy food for humans as well as animal feed, and adapted with local micro environment.	Very high cultural acceptance for special traditional occasions/rituals including Mahiber, Tezkar, Debo, and Debarie.

<sup>11</sup> Special food associated with the last prayer of Jesus Christ.

Name of seed diversities	Nutrition value	Market value	Human & environmental health	Socio cultural value
<b>Wheat</b>				
Ayano	To make bread for daily consumption, for cultural/social events for wedding, farming, harvesting to make farmers energetic due to its high energy.	Less available at market but high market demand	Gives energy for famers; adapted with local micro environment	Culturally accepted for occasions/rituals including Mahiber, Tezkar, Debo, and Debarde.
Sinde Bani	To make bread, porridge for children and for lactating women; to offer for Churches.	No longer available in local market	Gives energy for famers; adapted with local micro environment	Culturally accepted for occasions/rituals including Mahiber, Tezkar, Debo, and Debarde.
Ayb	To make porridge for children and for lactating women to make them strong after delivery.	High market demand by consumers	Healthy food which provides energy for lactating women; adapted with local micro environment	Very high cultural acceptance during traditional occasions like Kurban <sup>12</sup> , debo Tezkar, mahiber.
Shemam	To make bread for daily consumption and snack for children. To make porridge as well.	High market demand	Healthy food which provides energy for lactating women; adapted with local micro environment	Very high cultural acceptance during traditional occasions like Kurban, debo Tezkar, mahiber.
Emmer wheat	Also good to make porridge for children and for lactating women which makes them strong and healthy.	Less available but high market demand	Healthy food which provides energy for lactating women; adapted with local micro environment	Very high cultural acceptance during traditional occasions like Kurban, debo, Tezkar, mahiber.

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<sup>12</sup> One of the services in Orthodox Church in which special seed diversities are used.

Name of seed diversities	Nutrition value	Market value	Human & environmental health	Socio cultural value
Meke	To make quality bread for church services as well as for consumption during occasions.	High market demand for church and religious services as well as for consumption	Healthy food for humans and adapted with local micro environment.	Very high cultural acceptance during traditional occasions like Kurban, debo Tezkar, mahiber.
Debay	Good to make porridge for children and for lactating women which makes them strong and healthy.	High market demand	Healthy food for humans and adapted with local micro environment.	Very high cultural acceptance during traditional occasions like Kurban, debo Tezkar, mahiber.
Gunde	Good to make <i>Kollo</i> and <i>Nifro</i> for farmers after farming; also good to make Porridge for children and lactating women.	Good market demand	Healthy food for humans and adapted with local micro environment	Very high cultural acceptance during traditional occasions like Kuban, debo Tezkar, mahiber.
Felasha	Used to make strong disease treating local brew; to make porridge for children and for lactating women; also used to make bread for church services.	No longer available in the local market	Healthy food for humans as well as animal feed, and adapted with local micro environment.	Used to have a very high cultural acceptance during traditional occasions like Kurban, Marriage, Tezkar and maiber.
Enat	Good to make injera and bread during wedding and harvesting time as it gives energy for farmers.	High market demand	Healthy food for humans and adapted with local micro environment.	Very high cultural acceptance during traditional occasions like Kurban, debo, Tezkar, mahiber.

**Table 3: Farmers' valuation of improved seeds.**

Name of seed varieties	Nutrition value	Market value	Human & environmental health	Socio cultural value
<b>Teff</b>				
Smada	Not well internalized by farmers but used for home consumption.	Low market demand than local seeds	Most respondents highlighted that new seeds (improved varieties) are causing health problem to humans as they are grown through use of chemicals, pesticides and insecticides.	Poor cultural value and not accepted
Boset	Use for home consumption to make bread and injera but farmers believe it provides less energy.	Low market demand than local seeds	Most respondents highlighted that new seeds (improved varieties) are causing health problem to humans as they are grown through use of chemicals, pesticides and insecticides.	Culturally not accepted
Kora	Farmers using the seed to make bread, kollo and porridge. Appearance and test is not good compared to local seeds.	Low market demand than local seeds	Most respondents highlighted that new seeds (improved varieties) are causing health problem to humans as they are grown through use of chemicals, pesticides and insecticides.	Less cultural acceptance
Kuncho	Some farmers use it for consumption but this when there is no option.	Low market demand than local seeds	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms.	Un known cultural values
Moko I	Farmers using this seed to make local brew ( <i>Tella</i> ) and injera but this is not by choice.	Low market demand than local seeds	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms. Animals also not prefer to consume its stalk.	Less cultural acceptance than local seeds

Name of seed varieties	Nutrition value	Market value	Human & environmental health	Socio cultural value
Melkam	Used for consumption at a limited level.	Moderate market demand but less market demand than local seeds.	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms. Animals also not prefer to consume its stalk.	Less cultural acceptance than local seeds
Birhan	Farmers using this seed to make local brew ( <i>Tella</i> ) and injera but this is not by choice.	Moderate market demand but less market demand than local seeds.	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms. Animals also not prefer to consume its stalk.	Less cultural acceptance than local seeds
<b>Maize</b>				
Melkesa II	Farmers also using this seed to make local brew ( <i>Tella</i> ) and injera but this is not by choice.	Moderate market demand but less market demand than local seeds.	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms. Animals also not prefer to consume its stalk.	Less cultural acceptance than local seeds
Melkesa VI	Accepted as secondary option for consumption. Becoming priority next to local seeds.	Has market demand but less demand than local seeds.	Most respondents said new seeds are causing disease and not environmentally friendly	Less cultural acceptance than local seeds
Gibe II	Almost rejected by most respondents particularly in Amhara region.	Less market demand	Respondents indicated this not good for health and not environmentally friendly.	Culturally not accepted

Name of seed varieties	Nutrition value	Market value	Human & environmental health	Socio cultural value
<b>Legumes</b>				
Raya I and II	Not preferred for consumption	No market demand	Respondents indicated improved seeds are not good for health because of chemicals and not environmentally friendly.	Culturally not accepted
Alamata	Accepted as secondary option for consumption when local seed are not available.	Moderate market demand but less than local seeds	Most respondents said new seeds are causing disease and not environmentally friendly as it causes damage to the soil and micro-organisms. Animals also not prefer to consume its stalk.	Less cultural acceptance than local seeds
ARC	Used for making stew if local seeds are not available.	Less market demand	Respondents highlighted that this new seeds (improved varieties) are causing health problem as they are grown through use of chemicals, pesticides and insecticides.	Less cultural acceptance than local seeds
<b>Wheat</b>				
HR 16	Use to make bread for daily consumption	Less market demand	Respondents feel this is not also safe for health due to reasons associated with chemicals	Less cultural acceptance than local seeds
HR 85	Not preferred for consumption	Poor market demand	Not safe for health due to use of chemicals	Poor/less cultural acceptance
Kutecha	Accepted as secondary option for consumption	Poor market demand	Not safe for humans and environmental health	Culturally not acceptable
kekeba	Accepted as secondary option for consumption	Poor market demand	Not safe for humans and environmental health	Less cultural acceptance

Name of seed varieties	Nutrition value	Market value	Human & environmental health	Socio cultural value
Dedea	Accepted as secondary option for consumption	Poor market demand	Not safe for humans and environmental health	Less cultural acceptance
Dubsa	Accepted as secondary option for consumption	Poor market demand	Not safe for humans and environmental health	Less cultural acceptance
Dema	Accepted as secondary option for consumption	Less market demand	Not safe for humans and environmental health	Less cultural acceptance
<b>Tomto</b>				
Chaci and Gellama	Farmers grow for market. Sometimes also used for	Less market demand	Not safe for humans and environmental health	Less cultural acceptance
<b>Paper</b>				
Mrakofana	Good for making spicy stew. But farmers use alternatively when there is no local paper .	Less market demand compared to local	Not sure its impact on health	Moderately accepted in local cultural settings
Bombayred	Good for making spicy stew. Farmers use alternatively when there is no local paper.	Less market demand	Not sure its impact on health	Moderately accepted



Table 3 shows that almost all types of improved seeds are not socially and culturally accepted by the community. Values of improved seeds related to nutrition, market and health are not appreciated as well. In contrast, all types of local seed diversities are socially and culturally accepted and all values listed in the table also appreciated. However, this doesn't mean that farmers are not using improved seeds. Rather, this study identified that the degree of using improved seeds by farmers is increasingly growing though it was not by preference. Some respondents in study areas of Tigray and Amhara regions explained that they also grow improved seeds mainly because of the pressure from government side. They have been told by agriculture extension agents that improved seeds were productive but farmers identified that productivity is conditional and it depends on high inputs such as chemical fertilizers which also turns out expensive for farmers to purchase. Farmers also identified that some improved seeds can be matured within short period and need less water. However, they are not effective without application of chemical fertilizers. On the other hand, Chemical fertilizers need plenty of water and they would "burn" the soil if otherwise. They found that this is difficult for farming which weather condition is characterized by low precipitation. All respondents also told that agriculture extension agents told them improved seeds were disease resistant, but farmers identified that those new seeds were vulnerable to diseases and environmental stress.

Another challenge where farmers in study areas encountered with is "cluster farming". Respondents said that agriculture extension agents put pressure on farmers to grow improved seeds under cluster farming system. Cluster farming is designed to plant the same types of improved seeds in the clustered farm sites to make the follow up easier for agriculture extension agents. In this regard, all farmers whose farms falls within the same cluster, must seed the same type of crops and no single farmer is allowed to seed another type of crop different from those within the cluster. Farmers in Tebi and Bazura study sites in particular are concerned about cluster farming because they cannot be flexible according to the nature of soil, type of seed and weather conditions. They said that they need seed diversity for various purposes which goes far beyond consumption. For example, some kinds of seeds may be needed for social, cultural and spiritual purposes, and other types of crops may be grown for income generation and the like. For them, FMSS is important as it allows flexibility in their agricultural practices and fulfilling of different socio-cultural needs according to a range of contexts and micro environments.

### **6.3 Farmers' analytical views on local vs improved seeds**

Respondents from all study areas highlighted that they have great extent of respect for local seeds compared to the new/improved seeds because most farmers' believe local seeds have better options in terms of economic, social, cultural, environmental as well as nutritional perspectives of community livelihood. As shown in the table...almost all local seed diversities have good market values, as well as health and socio-cultural values in which all respondents agreed that benefits of local seed varieties are multifaceted which ensures food security/sovereignty under the volatile environment.

However, there are another perspectives of new improved seed varieties in which some respondents explained that most improved seeds are productive subject to high external inputs including chemical fertilizers. Table 4 shows perceptions of respondent farmers in all study areas in which they value productivity according to different selection criteria including ability to resist disease, pests and many forms of environmental stress, as well as suitability for animal feed.

**Table 4: Farmers' perception on productivity between local and improved seeds.**

Local seeds	Productivity	Improved seeds	Productivity
<b>Sorghum</b>			
Aba-are	Productive at normal/longer rainy season but not at short rainy season; on the other hand, it resist disease and draught in which case provides less production; Also provides sufficient mass of stalk for animal feed. The stalk/straw of all local sorghum seeds is thick which can also be used for roofing houses according to many respondents in all study areas.	Moko I	Productive but dependent on fertilizer and other external inputs; No production if affected by disease and it can't resist drought; The straw of all improved seeds is not as sweet as local seeds for animal feed.
Jamyo	Productive at normal/longer rainy season but not at short rainy season; on the other hand, it resist disease and draught in which case provides less production.	Melkam,	Productive but dependent on fertilizer and other external inputs; No production if affected by disease and it can't resist drought.
Gedalit	Productive at normal/longer rainy season but not at short rainy season.	Birhan,	Productive but dependent on fertilizer and other external inputs; No production if affected by disease and it can't resist drought.
Marute	Productive at normal/longer rainy season but not at short rainy season; on the other hand, it resist disease and draught in which case provides less production.	<b>Maize</b>	
Chibina	Productive at normal/longer rainy season but not at short rainy season; on the other hand, it resist disease and draught in which case provides less production.	Melkesa II	Productive but fertilizer dependent and less disease/draught resistant.
Yellow sorghum	Productive at normal/longer rainy season but not at short rainy season; on the other hand, it resist disease and draught in which case provides less production.	Melkesa VI	Productive but fertilizer dependent and less disease/draught resistant.
Afincha Barya	Not productive compared to other seed diversities.	Gibe II	Productive but fertilizer dependent and less disease/draught resistant.

<b>Barley</b>		No improved seed on Barley mentioned by respondents
Sacsa	Productive particularly when there is sufficient water supply such	
Demhay	Moderately productive at regular rainy season but it can resist draught and disease	
Sene Gebes	Highly productive at regular rainy season also can resist draught	
Ere	Highly productive at regular rainy season also can resist draught	<b>Tomato</b>
Nech Gebes	Not productive compared to other seed diversities	Chaci and Gellilama
<b>Teff</b>		
Magna	Highly productive at regular rainy season also can resist draught and disease	Smada,
Birke	Productive and fast maturing during short rain	Boset,
Bine,	Moderate productivity at normal rain fall; also resist draught and disease	Kora,
Haro	Productive and fast maturing during short rain season	Kuncho
Bursa	Highly productive at regular rainy season also can resist draught and disease	<b>Paper</b>
Red-Teff	Productive even at short rain season also resist disease and draught	Mrakofana
Agay	Similar to Red Teff - Productive even at short rain season also resist disease and draught	Bombayred
		Productive but fertilizer dependent and less disease and drought resistant.
		Moderate productive and fertilizer dependent.
		Good productivity but less diseases resistant.
		Not so much productive and not drought resistant.
		Productive but fertilizer dependent and less disease and drought resistant.
		Moderate Productive but fertilizer dependent and less disease resistant.
		Moderate Productive but fertilizer dependent and less disease resistant.

<b>Legumes</b>			
Grass pea	Productive under regular rainy season	Raya I and II,	Productive but fertilizer dependent and less disease and drought resistant.
Lentil	Productive under regular rainy season	Alamata	Productive but fertilizer dependent and less disease and drought resistant.
Debele	Productive under regular rainy season	ARC	Productive but fertilizer dependent and less disease and drought resistant.
Chick peas	Productive under regular rainy season	No improved seed on Chick peas mentioned by respondents.	
<b>Wheat</b>			
Ayano	Productivity even under short rainy season	HR 16	Productive but dependent on fertilizer and other external inputs; No production if affected by disease and it can't resist drought.
Sinde Bani	Productive under regular rainy season	HR 85	Productive but dependent on fertilizer and other external inputs; No production if affected by disease and it can't resist drought.
Ayb	Productive under regular rainy season	Kutecha	Not productive as it is not suitable for most soil types in some study areas.
Shemam	Productive under regular rainy season	kekeba	Not productive as it is not suitable for most soil types in some study areas.
Emmer wheat	Productive under regular rainy season	Dedea	Productive but fertilizer dependent and less disease resistant.
Meke	Productive under regular rainy season	Dubsa	Productive but fertilizer dependent and less disease and drought resistant.

Debay	Productive under regular rainy season	Dema	Productive but fertilizer dependent and less disease and drought resistant.
Gunde	Productive under regular rainy season		
Felasha	Productive under regular rainy season		
Enat	Productive under regular rainy season		

Synthesized information in the table 4 shows that though many respondents perceive improved seeds are causing health problem (because of chemicals), some other respondents seems to have convinced that they should alternatively use improved seed varieties as the climate is changing and water supply is increasingly becoming scarce. On the other hand, farmers in all study areas argue that the significance of local seed diversity is to provide guarantee of productivity through spreading the risk of vulnerability to disease, environmental stress and pest across a range of agro-climatic conditions. In other words, respondent farmers revealed their interest to retain FMSS which helps them to maintain seed diversities, because they know that seed diversities create the mechanism by which farmers can distribute risk of failing production as they plant them along with different seasons and locations.

This research also identified the fact that productivity for small holder farmers is not limited to narrowly economic evaluations; rather, it is intimately intertwined within a range of socio-cultural activities and farming practices and is consequently valued in a range of different ways as some. For example, farmers in all study areas have got selection criteria for seeds in which they also consider the suitability of a crop's residue for animal feed, capacity of growing in different soil types and yield productivity as well. Farmers' preferences for a particular seed is therefore depends on various dimensions rather than yield increment per se. Many respondents in all study areas confirmed that productivity for them includes their animals, the environment, social and cultural contexts. This implies the fact that productivity in the context of small holder farming seems to have valued in terms of its' total value in which farmers may maximize the intended benefit so that the total productivity contributes to their self-sufficiency in food and this implies achieving food sovereignty.

Many respondents in all study areas affirmed that their choice is planting local seeds if there is good rain and/or have good supply of water such as irrigation or ground water. Some reasons mentioned by respondents are:

- Local seeds are also productive if traditional farming system such as crop rotation, mixed farming, fallowing and composting applied.
- They are also productive at home; i.e. the amount of food prepared from local seeds supersede the amount of food prepared from same amount of improved seeds.
- Women prefer to cook food from local seeds because of their taste, appearance and durability without being spoiled after being cooked.
- Local seeds adopt local environment and productive even under harsh weather condition.
- Local seeds are disease and paste resistant.
- Local seeds are socially and culturally accepted as they fulfil multiple needs of communities.
- Local seeds are nutritional and sources of quality foods which is appreciated and gives pride when they are served during community gatherings.
- Local seed diversities spread risk of production failure.
- Local seeds are preferred to be served in various socio-cultural ad spiritual events so that they are means of communication.
- Some types of local seeds are also medicinal to heal various types of sickness.
- Local seeds have good market value and they are increasingly needed by consumers.

When it comes to farmers relationship with external actors' (including government), the study identified that there is a strong account of promoting improved varieties through provision of different extension services. There is also a close follow up by government to ensure farmers' have incorporated improved seed varieties into their FMSS. One respondent in Bazura study site of Amhara region express his

concern about the increasing influence of improved seeds with the potential to replace local seeds in the long run. He said that:

“government is much attentive and supportive to improved seed varieties than local seed diversities in which agricultural extension workers are pushing farmers to buy new seeds and associated chemicals from government...”

Moreover, most farmers in all study areas underlined that improved seeds are not only new to the local environment but also new to farm lands, to the culture of farmers in regards to understanding the characteristics and management. Another respondent (TTS-R1) said that:

“we identified that some of the improved seed varieties such as Denffe wheat are not even productive in red soil which is dominated our farm lands. However, agriculture extension workers are pushing us to grow Denffe wheat without satisfactory results at the end of the day.”

In this regard, most farmers seems concerned about the trend of external intervention. They feel that their farm lands are becoming field laboratories under the expense of their lives and the fate of their children is at stake. Most respondents said that they tried improved seeds in their lands with all accompanied inputs such as chemical fertilizers, pesticides and other inputs but this didn't work to the level of their satisfaction. One respondent from Tebi study area of Amhara region also asserted:

“we attempted to accommodate improved seeds into our FMSS but we realized that there is a challenge in terms of their ability to fit within the local environment. We observed that they cannot cope with various characteristics of local environment including water stress, draught, too much rain, paste, and infestation of weed, different crop diseases and many other challenges of environmental stress. After a long period of observation and field trial, we rejected some improved seeds such as Cr 37 because it is not moisture resistant during germination and it is not rain resistant during fruiting. Its injera is black after baking. It is cheap at the market...”

All respondents from the 3 study areas agreed that local seed diversities are increasingly dominated by newly introduced seeds (improved seed varieties) so that most of them are at a risk of extinction in the near future. Evidently Afncha barya, (one of local sorghum seed diversity), Emmer wheat (one of local wheat diversity), Demhay (one of local barley seed diversity), Saesea (one of barley seed diversity) Meke and Debay (two of wheat seed diversity), Debele (one of peas seed diversity) are some of local seeds in all study areas which are either disappeared or at the edge of extinction.

## **6.4 Critical views and perceptions of stakeholders on local vs improved seeds**

Some respondents from Mekdela/Masha agricultural office, and focus group participants from the research Institute in Tsega Tabya of Tigray region explained that different technologies including in organic fertilizers and other chemical inputs have been used to boost the productivity of crops. They further asserted that government intends to address the challenge of food security through increment of yield productivity per unit area of land and improved seeds are playing the vital role in achieving this goal. On the other hand, all respondents from research institutions and agricultural offices agreed that the role and contribution of local seed diversities in achieving food security is significant; but they underlined the need to have detailed research to enhance productivity through development of improved seed varieties. In practice, there is little effort and capacity built in terms of studying and researching the causes in reduction of yield as well as in finding ways of enhancing the productivity of local seed diversities.

On the other hand, the process of introduction of improved seed varieties has been encountered by multiple challenges ranging from adaptation to the local environment to less acceptance by farmers in regards to integrating the new/formal seed system into their culture and FMSS.

According to an agricultural extension agent from Mekdela wereda/district agriculture office in the study area of Amhara region:

“local seeds have been there with the community for many centuries and they are interwoven with farmers’ culture as well as adapted to the local environment. In the process, they developed ability to resist diseases and different kinds of environmental stress including draught, flood, infestation of weeds, pests and many more challenges. They have also high level of acceptance by local culture and their values related to health, religion/spirituality as well as diversity in fulfilling of various needs is also highly recognized. The formal seed system (FSS) doesn’t have a room to entertain all these aspects of values but attention is being given to boosting productivity.”

Other extension agents from different agricultural offices in all study areas also agreed that different agricultural programs, strategies, technologies and the monitoring /supervision mechanisms doesn’t give much attention to local seeds. Respondents from Ethiopian Agriculture Research Institution (EARI) affirmed that the development of improved seed varieties is a continuous process and new seeds with enhanced traits such as C1, C2, C3 and C4 are released to most part of the country. This scenario shows the fact there is no much support from government to encourage breeding and maintenance of local seeds which puts farmers in all study areas in a situation where they will gradually lose their seeds, associated knowledge and practices.

A government focal person of NGOs in one of study areas in Amhara region explained that save the children and Concern Ethiopia are NGOs working on seeds’ improvement and distribution. Concern Ethiopia currently phased out but in the past years it used to provide improved fruit, vegetables and cereal like wheat, Teff and Maize within the district. Main goals of both NGOs are introducing improved seeds for farmers with the intention of achieving food security. Save the children has also been distributing improved seeds every year. Last year (2017) for example, it distributed 29 quintals of improved wheat and Teff seed varieties. The respondent further explained that:

“there is no clear working strategy to save and maintain local seeds as the priority for government is boosting productivity through development and introduction of improved seed varieties... In practice, there are many challenges to distribute improved seeds as farmers are not happy to take those improved seeds.”

Respondents from some Civil Society Organizations (CSOs) working with communities shows that the external pressure on small holder farming is concerning. In response to this situation, they explained that they are attempting to help farmers in the process of saving cultural/traditional practices related to maintenance of local seeds and other agro-biodiversity activities. One respondent from the Institute for Sustainable development (ISD-R1) asserted that:

“The institute has mainstreamed the basic approaches of seed community knowledge in the wider practice of ecological organic agriculture through applying, Agroforestry, Crop diversification, farmers led on farm research activities, promotion of integrated crop pest management (IPM) etc... Now it is evident that these practices have enabled Ethiopian smallholder farmers to cope up against the negative impact of climate change where lots of examples can be cited.”

One respondent from MELCA Ethiopia (MELCA-R1) also explained that:

“There is little understanding that, local seed diversities and related local knowledge provides an option for resilience especially under changing climatic conditions. The knowledge of the young generation of farmers about the FMSS and their ecological functions are declining from time to time as local seed diversities are left out of production. The knowledge loss is also hastened by the formal education system, globalization, and agricultural development policies, which favors the high input agriculture.”



Those Civil Society Organizations and/or research institutions working to promote improved seed varieties also admitted that attention and support is being given to the development of improved seeds. One respondent from 'Africa Rising'<sup>13</sup> in Raya Azebo study area explained that though there is an initiative at some level to work with local seeds, there is no substantial support and attention for maintenance of local seeds. This is resulted in losing some diversities of local seeds. For example, local potato seed is already disappeared and some other local seed diversities such as Felahsa and Emmer wheat (wheat seed diversity), and Demhay (Barley seed diversity) are disappeared. Furthermore, traditional white Teff with shining seed is already disappeared. Local seeds like sorghum (Aba-are and Jamuya) are produced only by few farmers and they are at the verge of disappearance/extinction. The respondent from Ethiopia Biodiversity Institute said that:

“There is no clear and tangible data regarding lost seeds at national level. However, Bola teff, barely oat, Senday Shehan (used for church ceremony), demetef, gunaza ARESE which are local wheat diversities have totally disappeared.”

Another respondent from KASKAT of Mekele University Agricultural Institute stated that although the importance of local seeds is generally recognized for their multilevel benefits, the research institute focuses on improving of genetic characteristics, multiplication and distribution of new seeds to farmers. According to the respondent, improved seed varieties are disease and drought resistant'. The respondent further argued that it is important to consider how climate is changing and how farm lands are becoming fragmented due to population pressure which needs to have research based actions to boost productivity within limited area of land. Researchers study various levels of characteristics of local seeds as the basis for development of improved seeds. This process is also part of promoting 'quality declared seeds' under the production system by organized small holder farmers which also favoured by the revised Seed Proclamation of Ethiopia (782/2013).

Ethiopia biodiversity is another institution involved in seeds work at national level which hold responsibility of conserving seeds in Ethiopia. The institution has been engaged with conserving germplasm of different local seed diversities as well as improved seed varieties in ventilated and cold rooms for the last 50 years. UNDP and GEF are main supporters for this work among others. In the conservation process, the institute managed to open community seed banks under farmers; cooperatives in twelve weredas/districts of six agroecological zones in Tigray, Oromiya and Amhara regions. Community seed banks are serving communities to store and multiplication of local seed diversities through a mechanism by which individual farmers borrow local seeds from farmers' cooperative seed banks and return with some interest after harvesting.

Some respondent from Ethiopian Biodiversity institute argues that the best strategy of conserving local seed diversity is also conserving biodiversity as this is the link to wild relatives to enhance their production ability overtime.

However, there is no clear direction or system to conserve local seeds along with their biodiversity which is the source of wild relatives. The best working conservation system in regards to local seed diversities is FMSS. However, this sector is not taken as priority by government and ministry of agriculture. Most researchers and agricultural agents in all study areas agreed that conservation of biodiversity has a potential to ensure food security and sovereignty through provision of different options due to seed diversities. Most respondents from agricultural offices, research institutions and farmer cooperatives also agreed that FMSS has been playing significant role to sustain seed diversity by which this sector is still contributing to achieve food sovereignty in the long run.

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<sup>13</sup> An NGO working on seed study in relation to hybridization, multiplication, storing and distribution.

One respondent from the institute asserted that:

“Ethiopia biodiversity conservation is still infant. It needs continuous research, well-structured organization, logistic and financial support to ensure national responsiveness regarding collection of wide range seed diversities. We should work together with many stakeholders including farmers. The issue local seeds and FMSS to me seems like neglected or not being taken seriously. Farmers are knowledgeable not only on seeds but also they are knowledge holders of the entire management of different diversities according to various socio-cultural, economic as well as ecological contexts. They are source of inspirations and information but they also need technical as well as financial support.”

## **6.5 Seed proclamation and the Policy environment related to the impact on FMSS**

The revised Seed Proclamation of Ethiopia (782/2013) is the basic seed law of the country which provides legal basis to the Ethiopian Formal Seed System (FSS). The proclamation address key issues such as variety release and registration, eligibility and certificate of competence for seed producers and seed quality control and assurance. When it comes to facilitating the implementation process a number of regulatory documents were developed. The “seed system development strategy” is developed by Agricultural Transformation Agency of Ethiopia (ATA) and the Ministry of Agriculture. Some key points are emphasized in this documents which includes: variety development, release and registration; improving the delivery of National Agricultural Research System (NARS) regarding early generation seed; expansion of certified seed supply through public and private sector among others (Alemu and Bishaw, 2016).

The Biosafety law which was strict on development GMO research is now revised to give room and facilitate the introduction, testing and release of biotech crops. The Biosafety Law is now revised and is expected to facilitate the contrary to previously very restrictive law which criminalizes research on GMOs. The draft law on Plant Breeder Right Proclamation (PBRP) is also under review to facilitate the protection of domestic and foreign plant varieties in order to give way and build confidence to the private sector to invest in the seed sector.

As explained in earlier sections, the policy environment on seeds is mainly supporting and promoting development of improved seeds as well as establishing/strengthening formal seed system. The Ethiopian seed proclamation 782/2013 granted small holder farmers to grow, multiply, exchange and sale their farm saved seeds (local seed diversities. Other legal documents, proclamations, directives and strategies such as NSP (National seeds policy), Genetic Resource and Community knowledge/community rights proclamations (GRCKCR), national seed system development strategy (NSSDS), plant quarantine council of ministries Regulation (PQCMR), Institute of Biodiversity Conservation Research,( IBCRE) also support the conservation and maintenance of local seeds in many ways and at different levels. However, attentions of decision makers is to ensure food security and alleviate poverty through yield increment using new technologies and improved seeds. Agricultural extension agents also expressed that there is no planned financial and technical support to promote local seed diversities and strengthen FMSS; rather, the emphasis and all kinds of supports goes to support the development of improved seeds. The extent of promotion and support for improved seeds at farm level is therefore dominating indigenous seed varieties and associated cultural practices which is gradually weakening FMSS.

This scenario is exacerbated by the fact that most people at decision making level have limited knowledge and awareness about the legal rights of farmers to exercise their agricultural practices and grow their seeds according to the context based knowledge and experience. All respondents at farmers’ level also underlined that their knowledge is limited on the seed and agriculture policy so that they can’t exercise their rights in terms of growing their preferred seeds according to their own way. As a result, the push from different levels of government on promoting improved seeds is increasingly prevailing at the expense of local seeds and there is no bold resistance to stop and change the situation

This study identified that FMSS is the system which is embedded into the multifaceted aspects of nature conservation which also includes conservation of wild relatives, not only seeds. In this regard, records shows that the prevalence of wild relatives provides wide option of food sources and supports constant food supply. The genus *Coleus* for example has about 30 wild species in Ethiopia. There are also many root crops such as Oromo Dinich (*Coleus edulis*) and Anchote (*Coccinia abyssinica*) which exists both as cultivated and wild (Edwards 1991). In this regard, Regassa Feyissa from Ethiopian Organic Agriculture Institute explained that:

“Management of diversity in cultivated species and even their wild relatives together with ecological and farming systems provides wide option, as plants in both systems are likely to contain genetic characteristics useful in unpredictable situations, satisfies changing preferences, and supports constant supply of food specially at farming community level.”

Most respondents in all study areas agreed that the approach towards development of improved seeds can achieve short term gains but, it is critical to think about the long term negative effect. One respondent from Bazura study area in Amhara region stated that:

“We are forced to buy inorganic fertilizer no mater it may affect our crops. Our agroecological zone is characterized by temperate zone. The rain season is short and erratic. The weather is hot which also hits the land. When we apply chemical fertilizer, and there is no sufficient water, it affects germination of seeds and thereby productivity. We totally reject application of chemical fertilizers but government force us to take it for money. We pay about 1200 ETB and we can't use t so that we sell it 200 ETB or we dump it to local rivers”

## 6.6 Challenges of maintaining FMSS and future trend

All respondents from Oromiya, Amhara and Tigray regions underlined that management of local seed diversities cannot be separated from considering other beings including the land, water, and livestock among others. As mentioned in the previous sections, Farmers' livelihood is intertwined with their group life at household, neighbourhood and community levels. They eat together, work together and socialize as groups. Their life also highly intertwined with religious and spiritual life. All ranges of these kinds of life styles needs to be managed and the entire community members at various levels needs to be part. They must have diverse seeds in order to fulfil multiple needs and such needs in turn helped communities to establish strong cultural norms and ethics in which individuals or groups have been aligned for many generations. Local seeds for all respondents are central not only for food/consumption but also for communication and economic gains. However, things are changing in recent times. The increasing intervention of government and external actors for development and agricultural transformation is affecting the traditional FMSS and this created communication breakdown. One farmer from Oromiya study area explained:

“Our seeds are our source of money to manage our farm, to pay for schools, to buy clothing and many more. Not all seeds are for sale, we know which one is for sale and for consumption. We have different seed diversities for different purposes. If we lose one type of seed diversity, we never lose another type... but now we are facing challenge from external pressure and not sure what to do”

Most respondents argue that their seeds are not all about consumption but also they are sources of pride and means of acquiring social position when we serve them in events where community gather. Some respondents remember few lost seeds and their eyes hold tears when they talk about them. One respondent from Amhara region said that some lost seeds remind his parents and cultural practices he used to participate with them. As explained in earlier sections, the challenge of improved seeds is that communities are not accepted them particularly in terms of using them for cultural/spiritual practices. One who may present improved seeds for cultural/spiritual uses, he may not be respected and his service may not be appreciated. New seeds are filling the gap during draught seasons as they are provided in the form of aid by government. During the time of draught particularly if it is elongated draught, there is the

possibility of losing most local seeds so that farmers have to accept improved seeds for planting. Most respondents feel that they are losing farming freedom as they become dependent on seed supply by government. They ask that why not government help them supplying lost local seeds from gene bank or from communities elsewhere???. One respondent from Tigray study area said that at least they can't offer gifts for churches from improved seeds and they need their seeds for many other reasons.

## 7.0 Conclusion

The study identified that local seed diversities and the aligned FMSS are the major sources of living not only for consumption but also for the prevalence of socio-cultural, economic and environmental wellbeing in all study areas. The majority of farmers in all study areas use local seed diversities and FMSS has been maintained along with diverse forms of agricultural practices. Almost all farmers preferred local seed diversities if agricultural seasons are suitable for planting local seeds. The study identified that the multilevel benefits from local seed diversities are not considered by external actors. These multi-dimensional benefits goes beyond productivity which makes local seeds very important for small holder farmers. In the contexts of all study areas, achieving food security is not about increasing grain production per se. It is rather about nutrition, health, animal feed, fulfilling of socio-cultural and spiritual needs as well as conservation of other plant species in the wild which is biodiversity conservation.

Although different policies and strategies such as (Proclamation number 482/2006 on community rights and seed proclamation 782/2013) provided an opportunity for farmers to access and exchange genetic resources within their localities, the degree of implementation at grass root/community level is constrained by high level of intervention and imposition of external input which would gradually take out FMSS. The study result shows that written policies and regulations are not implemented on the ground to the extent of power as it was written on paper. Rather, promotion of improved seeds and pressure on use of external high inputs such as chemical fertilizers are influencing the existence of FMSS in all study areas.

Evidently, the agricultural extension system and research strategies give high priority for improved seeds than for local seeds. All most all research institutions focus on development of improved seeds with altered genetic characteristics to achieve yield increment within limited area of land, because the idea of productivity is being understood according to narrowly economic evaluations. Such kinds of efforts done by research centres which is biased to the production of high input; high yielding improved varieties of selected crops impacting the productivity and maintenance of local seed diversities which has prompted farmers to seek for the introduction of high input improved varieties. This has played the greater part in causing erosion of FMSS.

As part of strengthening its approach towards agricultural development, the government has significantly invested on the development of institutions responsible for controlling, testing, registering and promoting new/improved seed varieties. The seed policy and regulations are designed to ensure enabling environments for private sector, breeders, foreign companies, researchers and other stakeholders. In other words, the focus of seed proclamation and other regulatory tools encourage development of high yielding/improved varieties and protecting of breeders' right in many aspects while there is no clear and detailed institutional support for FMSS.

Despite all ranges of efforts and many forms of technical and financial supports, improved seed varieties in all study areas are not accepted and they are not taken as priority seeds except in conditions where there is no option due to draught and/or excessive pressure from government.

To sum up, the study attempts to assess how different state actors and other stakeholders in study areas affect the functionality of FMSS either negatively or positively. The study also assess the policy environment of Ethiopia with particular attention how legal instruments on seeds are supporting FMSS and to what extent these are applied on the ground. It is hoped that some findings of this study will

trigger interest of researchers to undertake further exploration of a wide array of local seed diversities in all parts of Ethiopia which provides a range of options in ranges of ecological settings. It is also hoped that findings of this study would motivate stakeholders who are involved in seed work to take further step and to build up on the existing state of understanding in regards to benefits of FMSS.

## 8.0 Recommendations

This study put forward the following recommendations based on the findings which are captured under section of “study findings” and also summarized in the conclusion.

1. The government policy and strategy should be revised to provide meaningful financial and technical support towards strengthening FMSS at agricultural extension as well as research levels.
2. Branches of Biodiversity institution should be opened at wereda/district levels to promote nature/biodiversity conservation which supports maintenance of local seed diversities along with their wild relatives.
3. Different stakeholders involved in seed work should find ways in which they would work together and balance various perspectives of seed productivity to ensure sustainable food supply in Ethiopia.
4. Community seed banks should be promoted as part of the backup mechanism along with household seed storage facilities and gene bank at the national level.
5. Small holder farmers should be invited into any forms of development plans and should be consulted before any sort of intervention has made on seed and agriculture.
6. Various forms of trainings and capacity building opportunities should be organized in a continuous manner to create awareness on policy as well as rights and responsibilities of stakeholders.
7. Government should establish a mechanism by which there will be a clear direction/guidance regarding sustainable support for FMSS and collaboration with research institutions to enhance productivity without compromising diversities and different community values on seeds.
8. Government should also establish a mechanism by which inter-generational knowledge transmission is being put in place to ensure knowledge and practice under FMSS is maintained across generations.
9. FMSS and in terms of which enables protection of wild relatives.
10. Indigenous seeds registration and conservation centre should open in each wereda of the country.

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## 10.0 Annexes

### Annex 1: Case study 1

#### **A farmer who experienced the benefit of FMSS over time and decided to keep growing only local seeds amidst external pressure**

Hafte Sibhato is a small holder farmer in Raya Azebo study area who is 75 years old. He is married with 3 daughters and 5 sons. He told the story which reveals how FMSS worked very well for rural life for the past many years since ancestral time. He remembered that land was fertile and the climate was suitable for farming about 50 years back. He said:

“Precipitation was also good which made the vegetation cover and the landscape ever green. Nature was the source of inspiration and knowledge because knowledge at that time was acquired through interaction with natural beings as well as observing various phenomena. Elders used to take the main role of mentoring and guiding youth in all ranges of life ways. Everything was ordered and our parents used to consult God before they do anything such as farming, harvesting, planting seeds etc. There were a number of prayers, cultural and spiritual practices which brings family and neighbours together. There was lots of interactions and sharing of knowledge amongst people. In all these processes and interactions, our seeds were playing central role. You see, seeds were not only for consumption in our case. They are sacred and by the way, seeds and crops are different. Crops can be sold or consumed but seeds are only for multiplications and for sharing to provide same service. Seeds are used to connect the physical and the spiritual world. We used to respect them (a lot) and used to believe they had personality. All our management systems regarding our seeds used to tie up with our material and spiritual life ways. Our livestock, our land use system, soil and water conservation, household and communal life etc also used to tie up with seeds. We had a ranges of socio-cultural norms to ensure sustainable governance. You can call this farmers Managed seed system or whatever but this was how we managed to keep our seeds for long time...”

As time goes by Hafte Sibhato he observed changes in local environment as human’s action is also changed to satisfy the ever growing humans need. He said that forest were cut down and agricultural land expanded without aligned management of soil. Schools and other infrastructures are constructed whereby small towns emerged nearby rural villages. Farm lands are gradually taken by different modern institutions and lifestyle of farmers are becoming changed. Life is also becoming hard as population explode and the loading capacity of farm land is becoming deteriorated.

Young people are increasingly disconnected from the integrated local knowledge system including FMSS. They also migrate to urban areas as farm lands are also becoming fragmented. The intervention of government is growing with the intention of boosting productivity within limited area of land. Government is looking for the short term gain so that farmers’ are forced to use improved seeds which are also accompanied by lots of chemicals. These are not for free but farmers have to pay.

Farmer Hafte Sibhato further explained that:

“I am the only man in the village who refused to use any external input from the government. But I am also the most productive farmer in my local areas. My friends use different chemicals and certified seeds from government but they are not as productive as me. I know that the provision of these external inputs were not for free which will be counting against my earning at the end of the day. This will be very difficult particularly if I lost productivity due to many reasons. In practice, my friends are experiencing such a challenge. With my local seeds, I am less vulnerable than others who use improved seeds because if I lose one seed, then I will get it from another; in this case I believe that I am productive. Since I produce adequate crops I store enough food for years and am energetic and healthy compared to other farmers similar with



my age and even than many young people. I also believe that I should to be free when it comes to deciding what type of seed I plant and when to do that based on 50-60 years of farming experience. I think I decided right because, I can observe that my friends are becoming dependent on government seed supply. They also losing their seed diversities and they are vulnerable to different environmental hazards due to weak ability of improved seeds to cope with the changing environment”

## **Annex 2: Case study 2**

### **Promotion of formal seed system and introduction of new seeds could not ensure food security**

Negus Godfey is also a small holder farmer with 57 years of age in Raya Azebo. He has 3 daughter and 2 sons. He shared his experience regarding how application of chemical fertilizers is damaging his soil and improved seeds are gradually making him losing local seeds which were best to cope with the local environment.

“The nature of rain fall in our area is characterized by erratic rain fall. Since there is shortage of rain fall and hot climate condition, we are observing the fact that using improved seeds is not effective particularly when it comes to the long term effect. When we plant improved seeds it is the must that we have to also apply chemical fertilizers which are damaging our soil. Agricultural extension agents still insist us to use the same and yet they ask to pay for external inputs which made us to lose productivity. We buy 1200 Ethiopian birr per one quintal and sale it for 200 Ethiopian Birr only because we can't apply it on our farm since we know this was harmful... For example, I buy certified seed like kiros ( CR 37) and fertilizers because I know that I will not be treated well by local administration whenever I need service from government. As a result, I had to sell my oxen to pay the government debt. I then downgraded from my economic as well as social status so that this time, I have to beg others to borrow me oxen for ploughing my farm. I therefore decided not to take any external input from government”.

## **Annex 3: Case study 3**

### **Losing Cactus Plant is negatively affecting farmers' food security in Raya Azebo**

Farmers in Raya Azebo study area told the story how they lose the very important source of food and income because of the sterilization process. Cactus tree is abundant in Raya Azebo area and it is a life supporting plant for farmers in many perspectives. For example, farmers get food from the plant at least twice a year and it is a very reliable even during the draught time. The honey made by bees from this plant is a high quality honey with the very white colour so that it is expensive even throughout the country. Cactus plant is also source of income for farmers to supplement spending particularly for students. Students earn money up to 6000-8000 Ethiopian Birr twice a year out of sale of cactus fruit which helps to buy their clothing as well as necessary materials for education purposes. Farmers also told that the cactus plant is used for animal feed during draught as it holds water and remained green in the event of even severe draught. The sad story began when someone from Netherlands introduce Cochineal insect to the area with the desire to produce some chemical for food colouring. Cochineal insect is naturally breed in cactus plant and feed all the elements in it including water so that the plant ends up not giving any fruit. The insect now spread throughout the area and this is becoming an issue at government level. According to the respondent farmers, they lose one of the important and reliable source of food which ensures food security throughout their ancestral history.

## Annex 4:

### List of some crops which are in use by farmers

Local name	English name	Scientific name
Teff	Teff	Eragrostis teff
Kiro (improved)	kiros	Cr 37
Kora		DZ cr 438
Dabo sinde	Bread wheat	Triticum aestivum
Sinde	Durum wheat	Triticum turgidum var.durum
Bokolo	Maize (improved)	Zea maysL.Melkesa I&II
Mashela	Ethiopian Sorghum (improved)	CR 37,
Mshela	Sorghum	Sorghum bicolor
Mahela	Pearl millet	(Pennisetum glaucum(l.)R.Br.)
Mashela	Figer millet	Eleusine coracucana
Gebes	Food barley	Hordeum vulgare
Yetela gebs	Malt barley	Hordeum distichon
Aja	Emmer Wheat	

Pulse Crops		
shenbra	Chick pea	Cicer arietinum
Dekoko		pisum sativa var.abysinicum
Bakela	Grass pea	Lathyrus sativusL.
Telba	linseed	(Linum usitatissimum.L)
ater	Cow pea	Vigna Unguluata
Fosolya	Haricot Bean	Phaseolus vurguare
Meser	fenugreek	Trigonella foenum-graecum
telba	Linseed	Lens culinaris
nug		Guizotia abyssinica L.
shenbra	Chick pea	Cicer arietinum

Dekoko		pisum sativa var.abysinicum
Bakela	Grass pea	Lathyrus sativusL.
<b>Fruit, vegetable , and tubers</b>		
TImatim	tomato	Lycopersicum esculentum. mill
Dench	potato	Solanum tuberosum
Skar dench	Sweet potato	Ipomoea batatas
shenkurt	Onion	Allium cepa L
Nech shenkurt	garlic	Allium sativum
Tekel gomen	cabbage	Brasica Oleracea
carrot	carrot	Daucus carota L.

## **Annex 5:**

### **Questionnaire to respondents in all study areas**

#### **Personal information**

1. Gender
  - a. Male
  - b. Female
2. Age group
  - a. 18-30
  - b. 31-50
  - c. 51-60
  - d. Above 60

#### **Interview questions with farmers**

1. The amount of land in use
  - a. Big farm holders

- b. Small farm holders
2. Land use
    - a. For farm
    - b. For animals
    - c. Other land use
  3. Can you tell me about your perception on local seeds and improved seeds too?
  4. Is any local seeds you stop growing due to introduction of new/improved seeds varieties?  
Can you list local seeds you stop using?
  5. Can you list improved seed varieties which are introduced in your area?
  6. Is there any local variety which is under risk of extinction?
  7. Is there any local rule or norm that is commonly used to regulate seeds and exchange among farmers?
    - a. Yes
    - b. No
  8. If yes, tell me what rule the community use and why?
  9. Tell me the existing seed governance system in your local area and how is the difference between the old days and now?
  10. What type of seeds due you saw the last farming season list the preferred seeds and priorities according to their benefit?

Seed type	1	2	3	4	5	6	7	8	9

Seed type	Type of benefits							


11. Which seed has what type of benefit?

12. From where do you get seed?

Seed	My own seed	Government	Other external actors

13. Do you pay for seeds and other external inputs?

14. Where do you store your seeds?

15. Is there any responsible body to help conserving local or indigenous seeds?

a. Yes

b. No

16. If your answer is yes can you tell me which organization is responsible to save local seeds and what activities this organization is doing?

17. Does this organization ask payment for their services?

18. Tell me how you identify local seeds and improved seeds

19. Tell me how you value the benefits of local seeds against improved seeds?

Type of seeds	Test	Productivity	Disease resistance	Drought resistance	Social and cultural	Nutrition and health

20. Is there any social and cultural practice which is dependent on the presence of local seeds?

a. Yes

b. No

21. If yes, seeds can you explain which seed and to which type of social and cultural practice?

22. Are you concerned about the disappearance/extinction of local seeds?

- a. Yes
  - b. No
23. If yes, tell me why and what will happen if you lose local seeds?
  24. What is the current status of local seeds in your area?
  25. What change you observed on local seeds and associated practices?
  26. What is the implication of these changes in your life
  27. What types of local seeds do you still use and how do you manage them?
  28. What kind of knowledge and experience do you acquire about local seeds and their management over time?

**Guiding questions for focus group discussions**

1. What are the factor that forced you not to use your own local seeds?
  - a. ....
  - b. ....
  - c. ....
  - d. ....
2. Do local authorities support multiplication of local seeds?
  - a. Yes
  - b. No
3. If no, tell me why?
4. Tell me about stakeholders related to their positive or negative perceptions on local seeds?  
(This will not be publicized)

<b>Name of the stake holder</b>	<b>Positive perception</b>	<b>Negative perception</b>
Farmers at household level		
Local community		
Government organizations		
Seed enterprises		
Civic societies organizations		
Others		

5. Can you express your own perception in regards to how local seeds are important or not so important for food sovereignty?
6. Are you motivated to grow local seeds in your own farm land?
  - a. Yes
  - b. No
7. If no, tell me why not?

8. If yes, tell me what motivates you?
9. Do think that you have knowledge to keep saving local seed diversities as your ancestors did?
  - a. Yes
  - b. No
10. If yes, what kind of knowledge do you have?? And how did you acquired the knowledge?
11. Do you think you can continue multiplying local seeds diversities and remain to be productive under the changing climatic conditions?
  - a. Yes
  - b. No
12. If yes, tell me how?
13. If no, tell me why not?
14. What kind of support do you need to maintain FMSS? And who do you think can provide the proposed support?
15. Have you been organized or participate in seed fair/s to learn, share and promote local seeds?

### **Interview with civil society's organizations involved in seed works**

1. How long your organization worked with community?
2. What is the purpose of your organization regarding seed work?
3. What is the approach of your organization in regards to working with farmers?
4. How does your organization value local seeds and improved seeds?
5. What is the position of your organization in terms of the role of local seeds in achieving food sovereignty?
6. Can you share your thoughts and experiences related to the functionality of FMSS in local areas you are working?
7. Have you been promoting maintenance and appreciation of local seeds???
  - a. Yes
  - b. No
8. If no, tell me why not?
9. If yes, what are the challenges and good conditions you encountered in doing so?
10. How do you see the impact (positive or negative) of seed policy and strategy in Ethiopia on FMSS promotion of local seeds?
11. In your opinion, what major actions should be taken to enhance the positive impact of policy on FMSS works?
12. What kind of support do you suggest in the future to make FMSS work effective?

### **Interview with government organizations and research institutions**

1. Do you think that local seeds have value on ensuring food sovereignty?
  - a. Yes
  - b. No
2. If yes, tell me how?

3. If no, tell me why not?
4. Do you think that improved seeds which are introduced by seed enterprises or by government have better benefit than local seeds?
  - a. Yes
  - b. No
5. If yes, tell me how and what is your practical experience when you work with farmers at the ground?
6. Tell me which kind of improved seed has better value and why?
7. Can you explain about some improved seeds which have been introduced in the local area/s you are working?
8. Tell me your experience regarding their effectiveness
9. Please share your thoughts and experiences about the role of farmers on management of local seeds and indigenous knowledge in your local area.
10. Do you think that agriculture sector/research institutions pay attention to also promote FMSS amongst farmers??
  - a. Yes
  - b. No
11. If no, tell me why not?
12. Do you think the seed policy, strategy and other legal frameworks support maintenance of FMSS?
  - a. Yes
  - b. No
13. If yes tell me whether it is sufficient support
14. If no, tell me what to do to change the situation
15. Tell me what kind approaches and activities are good to promote FMSS in the country in future?
16. Can you share your thoughts on how small farm holder can express their interests and resist outside intervention against their values related to FMSS?
17. Do you think Farmer Managed Seed Systems have role on enhancing resilience capacity to climate change?
  - a. Yes
  - b. No.
18. If yes, tell me how.