Rapid Seed Security Assessment in the *Belg* Growing Areas of Amhara, Oromia, SNNPR and Tigray Regions of Ethiopia

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CRS
CATHOLIC RELIEF SERVICES

ACRONYMS

ASE	Amhara Seed Enterprise
ATA	Agricultural Transformation Agency
BoA	Bureau of Agriculture
CRS	Catholic Relief Services
DRMFSS	Disaster Risk Management and Food Security Sector
EIAR	Ethiopian Institute of Agricultural Research
ESE	Ethiopian Seed Enterprise
FAO	Food and Agricultural Organization of the United Nations
FCU	Famers' Cooperative Unions
FGD	Focus Group Discussion
FSS	Formal Seed Sector
ISSD	Integrated Seed Sector Development
KII	Key Informants Interview
LM	Local Market
MARC	Melkassa Agricultural Research Centre
MLND	Maize Lethal Necrosis Disease
MoANR	Ministry of Agriculture and Natural Resources
NARS	National Agricultural Research System
OSE	Oromia Seed Enterprise
PHE	Pioneer Hybrid Ethiopia
QDS	Quality Declared Seed
REST	Relief Society of Tigray
RFB	Regional Finance Bureau
SSCF	Seed Security Conceptual Framework
SSE	Southern Seed Enterprise

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[1] A team of four specialists

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SUMMARY

Seeds and/or planting materials are the basic inputs in agricultural production, and are central part of farmers' life in Ethiopia. Seed security provides opportunity for increasing productivity and production of crops, and subsequently contributing to improving food security. The 2015 government-led multiagency mid-year Humanitarian Requirement Document[2] revealed that inadequate rainfall was received in almost all *belg* crop producing areas of the country, and this contributed to rapid deterioration of the overall food security. With significant reduction in the production across two consecutive seasons, an estimated 10.2 million people are affected and in need of emergency assistance[3]. There is, however, no sufficient information on the impact of the 2015 drought on seed security situation in the affected areas.

CRS has conducted this rapid seed security assessment (SSA) with overall objectives of understanding the seed systems, constraints and opportunities in the *belg* growing areas. The assessment specifically focused at assessing seed security situation, establishing seed requirement for major crops produced in the drought affected *belg* growing zones and woredas and providing information that helps in developing and/or redesigning seed intervention plans, projects or programs.

Participatory methods were used to collect qualitative and some minimum quantitative data from the Federal Ministry of Agriculture and Natural Resources (MoANR) and Regional Agricultural Bureaus, National Agricultural Research System (NARS) public and private seed enterprises and their agents, agro input dealers and local grain market traders; Farmers' Cooperative Unions (FCUs) and primary cooperatives and drought affected community members. Primary data was collected from across four regions (Amhara, Oromia, SNNPR and Tigray) covering 10 zones and 17 *belg* growing woredas. The most affected woredas and kebele were purposely selected. Overall, discussions were held with 125 key informants and 17 FGDs consisting of 363 (30% females) community members. Data from different sources were triangulated. Qualitative and quantitative techniques of data analysis were used.

The analysis of data showed that the major crops grown by households in the assessed zones during the *belg* season include maize, barley, wheat and tef, haricot beans, potato and sweet potato. Maize and haricot beans are widely grown across the assessed woredas of Oromia, SNNPR and Tigray regions, while barley is predominant in the highlands of Amhara and some parts of Oromia regions. The other crops are either zonal or woreda specific. Planting of *belg* crops is done between mid-January through March, with significant variations in cropping practices, average land area and seed rates across zones.

The *belg* crop performance was considered poor in 2015 compared to normal years, with production losses ranging from about 45% to 99%. Similarly, the *meher* season production loss was estimated at 25% - 96% across zones visited. These were attributed to late start, poor distribution, insufficient amount and early cessations of rains experienced in the affected areas of the four regions. Other factors such flood, hailstorm, pest and diseases and frost in the highland areas aggravated the situation.

In years 2015, about 72.2% of the farmers sourced seed from the informal sector, with the majority of them souring from local markets (31.4%), followed by own saved seed (28.4%) and social networks (9.7%). About 77.5% famers sourced their haricot bean seed from the local market, while some 56% and 38.6%, respectively bought wheat and barley from the local market. Owns saved seed was the major source of barley and tef seed in 2015,

[2]Ethiopia Humanitarian Requirements Document [HRD] Mid-Year Review 2015
[3] Ethiopia Humanitarian Requirement [HRD] - December, 2015

with up to 40% and 30% of the famers, respectively depending on this source. About 27.2% of the famers sourced seed from the Farmers' Cooperative Union (formal sector) which was an important source of wheat and maize, for about 44.0% and 53.2% of the famers, respectively. In 2016, lesser proportions of the famers are expecting to use seed from the informal sources due to the loss of *belg* and significant reduction of *meher* production in 2015. As a result, up to 33.3% of the famers are expecting seed assistance. The informal sector is expected to serve less than half (35.6%) of farmers it served in 2015, thus leads to significant reduction in the proportion of farmers who will use own saved seed (-23.0%) and local market (-11.6%). This change in seed source signifies limited availability of own saved seed, and possible reduction in supply or increase in grain/seed prices from the local markets in the assessed woredas.

In terms of seed availability, over 140,051 tons of major cereals; 6,000 tons of major pulses; 884 tons of potato and 29.5 million cuttings of sweet potato will be potentially[4] available from the intermediate and formal sector nationwide. This could potentially contribute up to 21.5% of the national seed required. The available seed would enable planting an area of maize (61.2%), wheat (35.7%), tef (19.5%), haricot beans (7.4%), barley (4.5%) and smaller area coverage of other major *belg* crops. This implies that with the limitations of the formal sector, the farmers and seed emergency response organizations will have to rely on informal sources for some crops such as tef, haricot beans, barley, potato and sweet potato. For the 2016 *belg* and *meher* seasons access to seeds could be the major limiting factor because of poor harvest, limited disposable assets, constrained social capitals and lack of credit and financial services among the affected households. Some persons contacted perceive that seed coming from the *meher* harvest could be of poor quality because of poor grain filling, which could result in poor germination. Field observations revealed mixed results, with some fields having poorly filled grains while pockets of fields could produce grains that could be used as seed. The seeds from different existing sources vary in quality. The formal seed source is considered as good followed by farmer saved seed while those from the social network are considered as medium to good quality. The seed from local markets are of least quality due to mixed varieties, and sometimes with weed seed. Limited concerns were raised by the farmers regarding the adaptation and suitability of the varieties being cultivated in their areas.

The proportion of seeds insecure households in the studied areas is high. Participants of the FDG reported 55-90% of farmers are seed insecure. The team triangulated information obtained from different sources. Woreda level officials and experts reported a range of 28-86% seed insecure households in the affected *belg* growing areas. The major drivers of this high level of seed insecurity include: the severe impact of the drought on production during the two consecutive seasons negatively impacted on the seed availability from the informal sector; several re-plantings during the *belg* and *meher* seasons resulted in exhaustion of own seed stock; low levels of disposable capital assets and progressive increase in prices of seed will limit access to seed by the drought affected households. Critical challenges in addressing seed insecurity include inadequate supply of seeds of some crops from the formal sector, weather related changes; restrictive guidelines on seed sourcing from the informal sector for emergency response and untimely seeds delivery by governments and other emergency seed actors.

These findings and challenges necessitate the following actions. Given the poor performance of crops in the last two consecutive seasons, and the expected reduction in the amount of seed that will come from the informal sector, and the limited capacity of farm households in the drought affected woredas and kebeles, emergency seed support is inevitable.

The immediate actions for seeds response will be targeting the most affected woredas, kebeles and farmers. There is a need to provide short maturing varieties of the major crops grown in the *belg* season by considering their

[4] Potential availability recognizes quantity, but consider that the available quantity is not yet in close proximity to the farm households, and need to be there in time for planting

adaptability to an agro-ecology. For emergency responses, sourcing seed from both the formal and informal sectors based on availability and depending on local situations, number of crops and choice options, use voucher or direct distribution methods. It is also recommended to supply complementary input such as fertilizers and pesticides along with seed or facilitate for farmers to access them.

In the medium to long terms, government and development partners should consider promoting community based seed production and create link with cooperative unions and private sector. Support investment in small-scale irrigation facilities to guard against risk of crop failure arises because of drought. In addition, there is need to study disaster risk reduction reserve fund recently started and support, promote crop and varietal diversification, promote seed insurance scheme and climate smart agriculture.

1.0 INTRODUCTION

1.1 Background

Seeds and/or planting materials are the basic inputs in agricultural production, and are central part of farmers' life in Ethiopia. Seed security provides opportunity for increasing productivity and production of crops, and subsequently contributing to improving food security. Food and seed security are inter-related but are not the same as one may have enough seed to plant but no food to eat or vise-a-versa. Therefore, those factors that affect food security of the farming households may directly or indirectly affect seed security.

The 2015 government-led multiagency mid-year Humanitarian Requirements Document [5] revealed that inadequate rainfall was received in almost all *belg*[6] crop producing areas of the country, and this contributed to the rapid deterioration of the overall food security. The onset of the *belg* rains was delayed, followed by intermittent rains and unusually long dry spells. These led to repeated planting across the *belg* growing areas of the country, with significant reduction of the production and productivity of crops. The *belg* planted area was significantly lower than the last five years average– with an estimates ranging from 25% to 55% in the southern *belg* producing areas and 50% and 58% in the northern *belg* producing areas, with production losses reaching as high as 99% in some areas[7]. In these areas, the pre-harvest assessment report indicates reduced *meher*[8] production due to missed long-cycle high-yielding crops and below-average and delayed rains. With poor rainfall performance and subsequent poor harvest across the two seasons, an estimated 10.2 million people are affected and in need of emergency assistance[9]. This number is expected to increase in the near future as farmers deplete their little stock from *meher* harvest.

The pre-harvest crop production assessment normally gives emphasis to production performance and its implications on food security but does not give sufficient attention to the impact of drought on seed security situation of farmers in the affected areas. The rapid seed security assessment was aimed at filling the gap to complement the 2015 pre-harvest crop production assessments and other food security related assessments.

1.2 CRS and Partners' Preparedness

The rain for the upcoming 2016 *belg* season is likely to be near average[10] and CRS Ethiopia is preparing to support farmers to capitalize on the rains and recover from the effects of the two consecutively failed seasons and subsequent poor harvests. With this in mind, CRS is designing a recovery seed response program for *belg* producing woredas to be implemented through local partners. The project intends to provide agricultural recovery planting materials, primarily seed of major crops, to communities in 37 *belg* growing woredas between January and March 2016. The project targets the poorest of the poor in the affected areas.

In order to better inform seed recovery programs for the *belg* production season in 2016, this report provides an insight into the current seed security situation based on the assessments carried out in the *belg* growing areas of

[5]Ethiopia Humanitarian Requirements Document [HRD] Mid-Year Review 2015
[6]*Belg* planting season - January to March, depending on the crops
[7]Ethiopia Humanitarian Requirements Document [HRD] Mid-Year Review 2015
[8]*Maher* planting season - April to September, depending on the crops
[9] Ethiopia Humanitarian Requirement [HRD] - December, 2015
[10]Gideon Galu, Yakob Seid and Chris Shitote, ETHIOPIA: 2015/16 El Niño Brief, USAID Mission – Addis Ababa, December 9, 2015

Amhara (North Wello, South Wello, and North Shewa Zones), Oromia (East Hararghe, West Hararghe, and West Arsi Zones), SNNPR (Wolaita Sodo, Kambata-Tembaro and Hadiya Zones) and Tigray (Southern Tigray zone) Regions.

1.3 Objectives of the assessment

The overall objective of the rapid SSA was to understand the seed systems, constraints and opportunities in the *Belg* growing areas. The specific objectives of the rapid seed security assessment were to:

a) assess the current seed security situation (availability, access, quality and varietal suitability) among farming communities within different agro-ecological zones and determine whether there is acute seed insecurity;

b) establish seed requirement for major crops produced in the *belg* season, and outline roles and responsibilities of key actors in the seed system;

c) produce recommendations for addressing the acute seed insecurity and needs of the communities in question in preparation for the upcoming *belg* season; and

d) provide information that helps in developing and/or redesigning seed intervention plans, projects or programs for the affected communities in the short and medium/long terms.

2.0 SEED SYSTEM IN ETHIOPIA AND SEED SECURITY CONCEPTUAL FRAMEWORK

This section discusses seed systems in Ethiopia, the major actors and their roles in the seed supply chains. It also looks into emergency seed policy guidance and provides the conceptual framework for analyzing seed security in emergency, rehabilitation and development context.

2.1 Seed Systems in Ethiopia

Seed system is the sum of physical, organizational and institutional components, their actions and interactions that determine seed supply and use in quantitative and qualitative terms, and can be loosely divided into formal and informal sector (Thompson and Scoones, 2012). Seed system in Ethiopia represents the entire complex organizational, institutional, and individual operations and interaction associated with the development, production, processing, storage, distribution, and marketing of seed in the country. Farmers, particularly smallholders, access seed through multiple seed sources within three systems in Ethiopia: formal, intermediate and informal seed systems[11]. These systems operate simultaneously and interact at different levels. The formal system is the origin of improved seeds in both the intermediate and informal system. The intermediate system (community based seed producing, processing and distributing cooperative unions and seed grower groups) is a blend of formal and informal systems. Though not well developed, few commercial private seed producers are also operating in the country as part of the formal system.

2.1.1 The formal seed system

The formal seed system is regulated – right from breeding through production, processing and marketing- with emphasis on quality assurance of traceable varieties. The major actors within the formal system are: the National Agricultural Research System (NARS) which includes the Ethiopian Institute of Agricultural Research (EIAR), Regional Agricultural Research Institutes (RARIs) and Universities responsible for variety development and supply of initial seed (breeder, pre-basic and basic seeds); seed enterprises such as the Ethiopian Seed Enterprise (ESE,) Oromia Seed Enterprise (OSE), Amhara Seed Enterprise (ASE) and South Seed Enterprise (SSE). The formal seed system also includes private seed companies such as the Pioneer Hybrid Ethiopia (PHE) specialized in hybrid maize seeds, and private firms producing hybrid maize seed and other crop varieties. The seed enterprises play major roles in production of basic and certified seeds of improved varieties targeting various agro-ecologies in Ethiopia. All actors have inter-dependent roles within the system and inefficiency of one actor could negatively affect performances of the rest of the actors.

The formal seed system is supported by government institutions which are involved in regulatory and inspection processes. The Ministry of Agriculture and Natural Resources (MoANR) is the major regulatory body while crop protection and seeds laboratories undertake the seed inspection and certification services. The MoANR provides legal and regulatory framework for variety release procedures. The MoANR and regional Bureau of Agriculture also oversee multiplication, certification, inspection, estimation of seeds demand, and allocation and distribution of seeds to regions, zones and woredas. Institutions such as Intellectual Property Rights, and Standards Agency and law enforcement are also important institutions for effective functioning of the formal seed system.

Seed demand estimation: In Ethiopia, seed demand estimation is done by Regional Bureau of Agriculture (BoA), through the zonal and woreda offices. The estimation is normally based on the area under crop and seed rates

[11] Ayana, *et al.* (2014)

that Development Agents (DAs) collect from farmers. Once this is done, the estimate is submitted to the regional BoA that reviews and makes final allocation of seed to zones and woredas.

Seed distribution: This is done mainly by the seed enterprises, Famers' Cooperative Unions (FCUs) and to a limited extent by the agents of the seed enterprises across the country and few agro-input dealers in some locations. The seed allocated to FCUs is distributed or sold to famers through the primary cooperatives and/or woreda agricultural office.

2.1.2 Intermediate (semi-formal) seed system

This system includes a nascent intermediate system centered on community-based seed production (CBSP). The system receives support from the NARS, Universities, Non-Governmental Organizations (NGOs), and seed development programs such as the Integrated Seed System Development (ISSD) Programme; and some regulatory oversight from BoA[12]. The new guideline for quality-declared seed enables community based seed producers to channel the seed into the formal system. The seed distribution channel of this system includes community based seed production by organized farmers in the form of cooperatives, model farmers, and/or individual entrepreneurs.

2.1.3 Informal seed system

The informal seed system is called so because it is non-regulated. It covers methods of seed selection, production, and diffusion by farmers. Seed is usually produced and selected from normal grain production activities; selected and saved/stored for next planting; exchanged/bartered or given as gifts between farmers and/or sold/bought in the local market.

In Ethiopia, the informal system accounts for about 90% of the seed used by smallholder farmers, though significant proportion of maize seed (40-50%) used by the famers comes from the formal sector[13]. Millions of the Ethiopian farmers still depend on the informal system due to its relatively cheaper price and readily availability within reach just at the time the seed is needed.

2.2 **Seed Regulation and Guideline**

The MoANR's seeds regulatory directorate has developed guideline/manual for emergency seed response. The emergency seeds response guideline requires that seeds should be procured from identifiable or traceable sources and be inspected and approved by authorized body in the region. The guideline outlined sources of seeds and quality requirements. As per the guideline, grains harvested from fields planted with the objective of producing seeds, but rejected during inspection, should be re-evaluated and could be used as seeds for the coming *belg* season.

The seeds guideline also requires that seeds for emergency response should be from a registered and known variety, free of disease and not mixed with other varieties, and should be of known origin and year of production. In terms of quality it should meet minimum standard established for emergency seed response (Table 1).

Table 1: Minimum requirement for the following emergency crop seed certification

[12]MoANR and ATA (2013)

[13] Yonas *et al.,* (2008); Asnake et al. (2014)

Crop type	Purity (%)	Infection/infestation (Max %)	Germination (%)	Moisture content (max %)
Haricot bean	93	0.4	85	12
Chickpea	-	0.4	85	12
Mung bean*	93	0.4	85	12
Wheat	95	0.1		13
Soya bean	93	0.2	70	12
Sesame	97		85	8
Lentil	93	0.4	85	12
Maize**	95	0.1	85	13
Barley	95	0.1	80	12.5
Sorghum**	97	1	75	12
Tef	-	1	80	11

* Lentil standard is used for mung bean; ** Open pollinated maize and sorghum; Sources: MOANR

When grain produced for food is used for seed, it should be from known sources and be free from pests and diseases and be pure variety that is not mixed. Possible sources suggested are state farms, cooperatives, large commercial farms and individual farmers. Indicators to be considered for the minimum quality requirements for seeds to be sourced from these sources include checking physical appearance (fully filled, non-shriveled, unbroken not mixed with inherent materials and other varieties), clean or to be cleaned if not clean, and acceptable germination percent (undertake testing and establish germination levels). The seeds to be procured from the above sources should be properly labeled, indicating the origin and source (vendor) of seed. Practical application of the guideline under emergency where the farmers' produces failed and limited seed is available in the formal seed system may be challenging as seed supply may rely on the informal sector for seed recovery.

2.3 Seed Security Conceptual Framework

According to FAO (2008), household seed security is said to exist when the household has sufficient access to adequate quantities of good quality seed and planting materials of preferred crop varieties at all times following both good and bad cropping seasons. According to Sperling (2008)[14], farm families are 'seed secure' when they have access to seed of adequate quantity, of acceptable quality, and in time for planting. Here, seed is broadly defined to include not just grains that are sown, but also cuttings, tubers, and other agricultural planting materials.

Seed Security Conceptual Framework (SSCF) consists of four distinct elements – Availability, Access, Quality and Varietal Suitability (Table 2). Therefore, seed insecurity exists when any of the above aspects is significantly constrained. Knowing which particular elements of seed insecurity are present is critical for designing appropriate interventions.

Table 2: Seed security conceptual framework – elements, definitions and indicators

Elements	Definition	Indicators
Availability	Seed supply from one or more sources (formal, intermediate and/or informal) that is sufficient enough to meet seed needs of farming households within a	a) *Quantity* – Seed should be sufficient (enough) to meet the planting need of all famers. b) *Proximity* – Seed should be within reach of all famers.

[14] L. Sperling (2008). When disaster strikes

	defined geographic area at planting time.	c)	*Timeliness* – Seed should be available in time for planting.
Access	The ability and willingness to acquire seed through cash purchase, exchange, loan, barter or use of power in social networks. Whilst seed may be available from alternative sources, it may not be easily accessible by all farm families, especially when they have no or limited resources and poor access to credit.	a) b) c) d)	*Seed prices* – high price could limit farm family from accessing quality and quantity of seed they need. *Disposable assets* – this may include livestock, harvest from annual and perennial crops that the famers may derive income from. *Social capital* - ability to borrow; receive gift and remittances from other members of the society. *Access to credit* – presence of financial services could enable farm households access credit.
Seed quality	Capacity of the seed to establish good crop under normal growing conditions. Seed quality includes a number of seed attributes or indicators.	a) b) c) d)	*Germination* – ability of seed to sprout and grow into a normal seedling within a specified duration. *Analytical purity:* – the extent to which a given seed lot has other crop seed, weed seed, broken seed, and the in heart matters. *Varietal purity:* – the extent to which a given variety is mixed with other varieties of the same crop. This may or may not be of concern to famers. *Seed health (Phytosanitary):* – the extent to which a given seed lot or source has pests and/or seed borne diseases.
Varietal suitability	The extent to which crop varieties are adapted to local farming conditions (soils, rainfall condition) and practices (intercropping), as well as social acceptability (having traits preferred by the farmers).	a) b)	*Adaptability:* – performance (growth & yields) of given variety within a range of agro - ecological zones. *Preference:* – meeting end users' needs (e.g. food, fodder, feed, value addition, market, etc.) of the famers

Source: FAO (2014)

Seed system resilience: A particular individual, household or community can be said to be resilient in seed security terms if after a particular shock, series of shocks and /or longer term stresses, it is able to maintain or increase its level of seed security as defined by the four elements. In this sense, “resilience” is a quality which cuts across the four elements.

3.0 ASSESSMENT METHODOLOGY

The rapid SSA entailed collecting and analyzing data that provide better understanding of the seed security situation, as well as provide possible options for seed interventions in support to the seed insecure households/communities in the drought affected areas. Participatory rapid data collection method was used, and strategic approach included triangulation of information from various sources in order to ascertain the validity of the data/information collected; rigorous data analysis and interpretation of the findings in order to provide practical recommendations for short, medium and long term interventions by key stakeholders.

3.1 Sources of Data

With the help of the CRS and its partners' technical staff, federal, regional, zonal and woreda levels organizations and institutions that involved in seed related activities or that have interest in supporting seed security were identified for interview and consultation. The identified sources, discussed below, provided secondary and primary data necessary for the assessment.

At federal level, Disaster Risk Management and Food Security Sector (DRMFSS) of the MoANR,the Agricultural Transformation Agency (ATA),the Ethiopian Seed Enterprise (ESE), Pioneer Hybrid Ethiopia (PHE) and other private seed producing companies, agricultural research centers, Haramaya University and the Integrated Seed Sector Development (ISSD) project were the major sources of information. Zonal and woreda Agriculture Offices, Regional Seed Enterprises (ASE, OSE, SSE) and their agents, agro-input dealers, local grain market traders, FCUs and private seed producers were important sources of information. At the kebele level, Development Agents (DAs), primary cooperatives and community were the major sources of information.

In preparation for data collection, the assessment team members held a one day[15] meeting to discuss and review list of sources of data, develop guides and checklists (tools) for data collection, and agree on the data collection field work plan. The guide and checklists were designed to enable collection of qualitative information with some minimum quantitative data.

3.2 The SSA Tools

The SSA tools developed for the data collection were grouped into four broad categories: - a) key informant guides, b) local market and agro-input dealer checklist, c) seed producer checklist and Focus Group Discussion (FGD) guide (Annex 1).

a) *Key Informants Interview (KII) guide:* This targeted officials/experts in selected organizations/institutions individually or in small group (2-3). It provided contextual information – mostly qualitative but with some limited quantitative primary data. At federal level, the major focus was on general overview of the impact of drought, emergency seed policy and guideline issues, and measures to address seed related problems. At zonal and woreda levels, the major focus was on the farming and seed system; agricultural input demand estimation/plan, supply and distribution; crop production and the extent the zone or woreda was affected by drought in the failed 2015 *belg* and m*eher* seasons; implication of the poor harvest in the context of seed security

[15] 9th November 2015

of the affected population; and possible ways of addressing any acute and/or chronic seed insecurity. In addition, where applicable, secondary data relevant to the scope of the assessment were collected after the interview.

b) *Local Market (LM) and Agro-dealer guide:* Local markets and agro-input dealers are possible sources of seed to farm households/communities across Africa. The LM tool was used to gather information on the various aspects of seed security - seed availability by crop and variety and sources, seed prices, quality and suitability of varieties available with these sources. It also looked at some of the practices traders carried out by grain traders in regards to grain/seed quality.

c) *Seed producers guide:* this guide helped understanding of production activities, types and volume of seed being produced by the various individuals, groups and/or cooperatives. It also examined challenges and opportunities for improving seed production.

d) *FGD guide:* This guide was used at kebele level with the affected community. In each of the FGDs, between 7 to 35 famers (males & females) participated (Photo 1) in discussing seed security related issues such as the major crops and varieties grown in their area, average area cultivated per household, seed rates, and yield in normal and bad years, seed sources and channels, seed availability, access, quality and varietal suitability for the major crops.

Photo 1: FGD in Shashamene

The participants also discussed seed security related challenges and suggested ways how the community can address acute seed insecurity. This provided useful insights into the seed security situation at community level.

e) *Field observations:* in order to validate some of the information on poor performance, and more specifically to check if the harvest can be used as seed, the assessment team members made some impromptu check in to a number of crop fields within and outside the sampled woredas.

3.3 Data Collection

The primary data collection was carried out across the four regions covering 10 zones and 17 *belg* growing woredas. Two teams of two experts each carried out the field assessment, in parallel, from 10th to 27th November 2015. Additional support was provided by CRS implementing partners in facilitating contacts for the teams with various institutions and organizations and offices at zonal, woreda and kebele levels (sources of information).

In each of the selected zones, 1-2 woredas were purposely selected in consultation with the zonal agriculture office. In each of the sampled woredas, 1-2 kebeles, severely affected by the drought, were selected with the assistance of the woreda agriculture office. Both the zonal and woreda offices assigned relevant experts that accompanied the assessment team to the woreda and kebeles, respectively. Data were also collected from men and women farmers through individual interviews and Focus Groups Discussions (FGD).

Overall, a total of 94 key informants were interviewed from the MoANR at federal level and zonal, and woreda agriculture office at regional level; 31 other key informants from seed enterprises/companies, farmers' cooperative unions, primary cooperatives, local grain traders, agro-input dealers and community-based seed producers at zonal and woreda levels; and 17 FGDs held with 363 (30% females) members of various farming communities across the zones assessed (Table 3). The assessment team also collected a number of secondary data at various levels for further review and triangulation with the primary data. This included seed related regulations and guidelines, past and recent pre-harvest assessment reports, seed stocks, carryover seeds, number of affected households by kebele and woreda, seed distribution channels and challenges within the seed systems.

Table 3: Assessment zones, sources of information and number of persons contacted

Region	Zone	AEZ	Key Informant group		FGD		
			MoANR/BoA /NGO/FAO	Other KII	Male	Female	Total
Federal			6	8			
Amhara	North Shewa	H	9	1	18	6	24
	North Wello	H	12	1	20	12	32
	South Wello	H	8	3	47	28	75
	Sub-total		*29*	*5*	*85*	*46*	*131*
Oromia	East Hararghe	H/mm	9	2	31	11	42
	West Arsi	L/M	6	4	51	13	64
	West Hararghe	H/M	11	3	20	1	21
	Sub-total		*26*	*9*	*102*	*25*	*127*
SNNPR	Hadiya	M	8	2	22	13	32
	Kembata-Tembaro	M	4	2	14	2	16
	Wolaita	L/M	11	2	20	8	28
	Sub-total		*23*	*6*	*56*	*23*	*76*
Tigray	South Tigray	L/M	10	3	17	12	29
Overall			**94**	**31**	**260**	**106**	**363**

3.4 Data Analysis

Qualitative data analysis- The processes in qualitative data analysis included identifying recurrent or common observations, concept, ideas, issues relating to the cropping and seed system as well as the elements and indicators of seed security. The information was then triangulated from various sources to validate the consistency of the data. The findings and observations were then discussed and logical interpretations provided by assessment team members.

Quantitative data analysis – for the minimum quantitative data collected from the primary and/or secondary sources, statistical summaries such as percentages, sums, averages and standard deviation were used to provide insight into data.

3.5 Limitations of the Assessment

Primary data collection was mainly in the worst affected zones, woredas, and kebeles; hence the assessment could have missed opportunity to critically examined potential availability of seed from the informal sector in the less affected zones and/or woreda.

Given the fact that the assessment team used mostly qualitative method in assessing the situation, some quantitative data provided by the key informants based on their personal judgment may be influenced by factors such as personal biasness due to physiological effect and magnitude of the devastating drought, etc.

Some of the seed producers' groups and cooperatives could not be visited as a number of them where located in different woredas and/or in distant kebeles, hence making it difficult to ascertain the volume of seed from some of these intermediate producers, specifically those who do not have contract with seed enterprises or have no intention of selling to the seed enterprises.

4.0 FINDINGS

4.1 Crop Production System

Crop production is one of the major livelihood activities of most households in the areas that were visited. The predominant cropping practice in the assessed zones of Amhara, Oromia and Tigray region is sole cropping, while in East and West Hararghe Zones of Oromia as well as some woredas of SNNPR, intercropping and relay cropping are common. The production practices across the *belg* growing areas of Ethiopia vary. In most areas, farmers plant (January and March) *belg* crops, harvest the crops and plant (July – Sept) in the same field in the *meher* season with short maturing crops. For, example, in Shashemene and Shalla woredas, fields planted with maize in *belg* (February) will be planted to tef or haricot bean in *meher* season.

In Menz Mama Midir woreda of North Shewa zone and Desie Zuria woreda of South Wello Zone, fields are designated for planting either in *meher* or *belg* seasons only. Thus, in a year, farmers produce a single production (mostly sole cropping) on a piece of land either during *belg* or *meher*. These woredas in the highlands have relatively lower mean temperature (10^{o}C to 18^{o}C). This means the crop growth is slower for highland woredas than in the warmer low/mid land woredas. In the highland areas, local barley and wheat varieties are known to have relatively long growing periods. Across the *belg* growing areas of the highlands, barely is planted mid-January and harvested in mid-July, meaning the crop stays in the field for 6 to 7 months, hence not enough time to grow the second crop in the same field.

4.1.1 Major crops for the *belg* season

The major crops grown by households in the assessed zones during the *belg* season include maize, barley, wheat and tef, haricot beans, potato and sweet potato. The proportion of households growing these crops varies between 25% and 100% depending on the location (Table 4). Maize and haricot beans are major crops across the woredas assessed in the lowland and midland of Oromia, SNNPR and Tigray Regions, while barley is predominant in the highlands of Amhara and some parts of Oromia regions. The other crops are either zonal or woreda specifics. Time of planting *belg* crops varies from place to place, with most planting done between mid-January through March depending on the start of rains in a given location. It was reported that the trend of the *belg* rain onset has been shifting towards *meher* season due to, perhaps, the effect of climate change.

Table 4: Percent of households growing major crops and planting time in the assessed zones and woredas

Region	Zone	Woreda	Major crops							Planting
			Barley	Maize	Tef	Wheat	H. Beans	Potato	S. Potato	
Amhara	S. Wello	DesseZuria	100							Mid-Jan
		Kutaba	100			50				Mid-Jan
	N. Wello	Gubalfto	100					75		Mid-Jan - Feb
		Wadla	100							Mid-Jan - Feb
	N. Shewa	Menz Mama M	100							Mid-Jan - Feb
Oromia	West Hararghe	Tulo	80	100			100			Feb – Mar
		Gemechis	25	100		50				Feb – Mar
	East Hararghe	Karsa		40				33		March
		Meta	65			25		45		March
	W. Arsi	Shalla		100	45		70			Feb
		Shashemene		75	90		80			Feb
SNNPR	WolayitaSodo	Dugna Fango		100			30		75	
		Humbo		100			100		80	
	Hadiya	Gombora		73			63	84		
	Kembata-Tembaro	Kadida Gemila		95			90	75		
Tigray	S. Tigray	Raya Alamata		90	80					Feb
		Raya Azebo			75					Feb

4.1.2 Area cultivated and seed rates for major crops

The average land area cultivated per crop, and seed rates used by given farmers varies from location to location. Land area cultivated per crop depends on the average land holding, priority a farmer attaches to a crop and the number of crops cultivated per household. Seed rates on the other hand depends mostly on the sowing methods (broadcast vs. row, grain size), the cropping practices (sole, mixed/intercrop or relay cropping), the purpose for which the crop is being cultivated (food, cash or both) and the general soil fertility levels. Because of the high variations in the size of land cultivated across the 10 zones (17 woredas), understanding the household seed requirements need careful examination of the area and seed rates used per crop in these locations.

Maize: The average area planted with maize per household varies across the woredas, with Tulo and Karsa being significantly lower, while Shalla being significantly higher than the overall average (Figure 1a). This significant variations in the areas allocated to maize partly affect the amount of maize seed required by the household. With the exception of the farmers in Raya Alamata (Southern Tigray zone) and Tulo (East and West Hararghe zones) woredas (Figure 1b), most locations use seed rates within acceptable range of the recommended rate (25kg/ha). From the FGDs, farmers in Raya Alamata and Tulo indicated that they use significantly higher seed rate because maize crop is partly used for livestock feed. As the crop continues to grow, they keep on thinning the weakling plant and stripping lower leaves to feed their livestock until the right plant density is achieved.

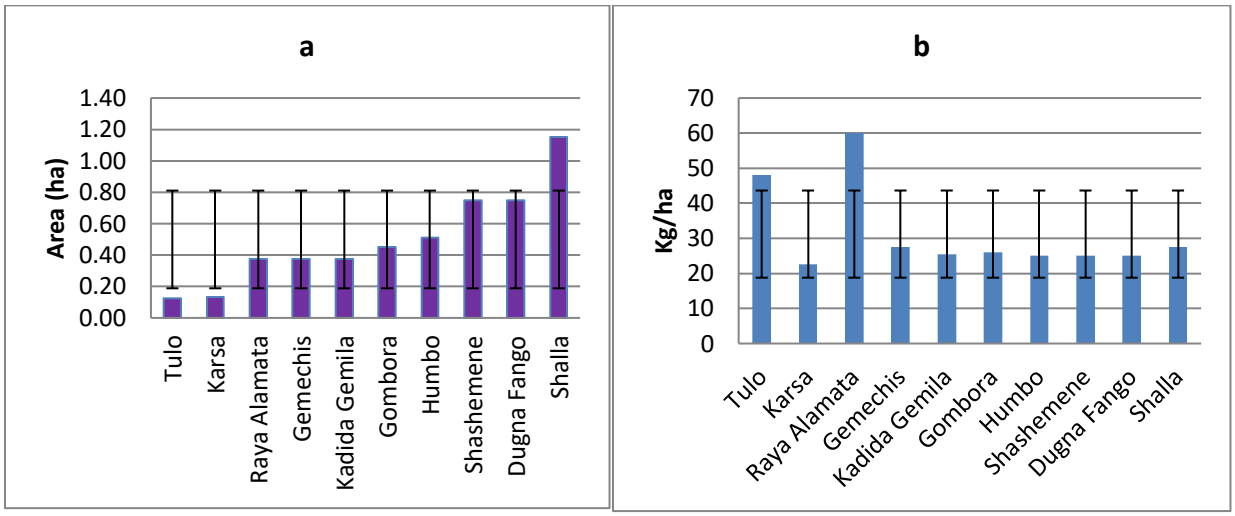

Figure 1: Maize a) average area per household, and b) seed rates (kg/ha).

Haricot beans: The area under haricot beans varies from location to location, with significantly lower and higher area per household in Tulo and Shalla, respectively (Figure 2a). In Shashemene, Gombora and Shalla, famers reported that because of the delayed rains this year; they shifted more of their maize fields to short maturing crops such as haricot beans.

Seed rates for haricot beans range from 53 kg/ha to 100 kg/ha across the woredas assessed. Though the seed rates across a number of locations are within acceptable recommended rate (100kg/ha), the seed rate (53kg/ha) in Kadida Gamila (Figure 2b) was, however, significantly lower than the recommended rate. This could partly be attributed to the practice of intercropping haricot beans with maize.

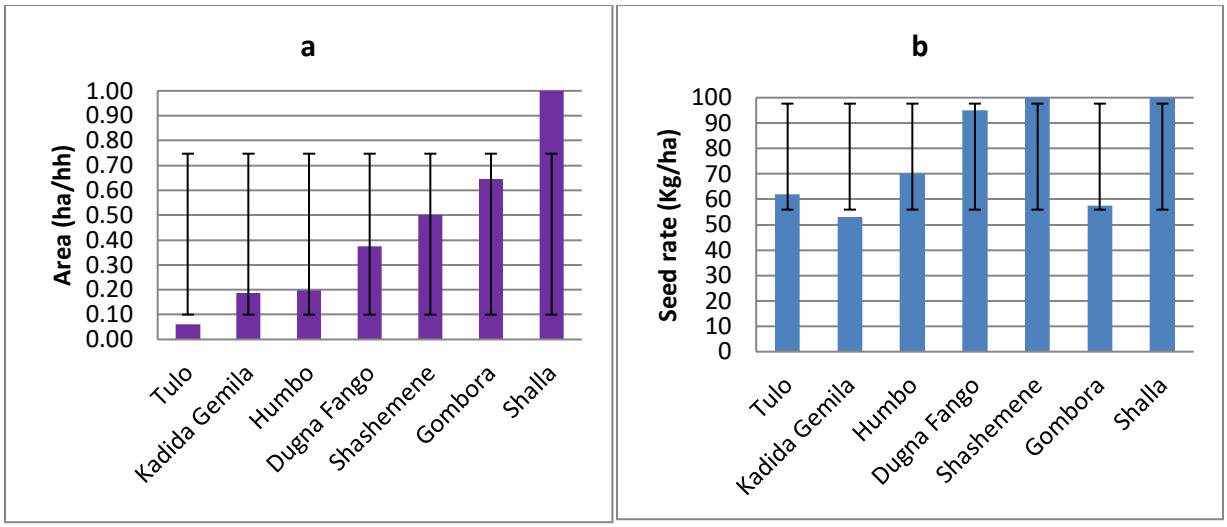

Figure 2: Haricot beans a) average area per household and b) seed rates.

Barley: Similarly, the area cultivated per household under barley varies from place to place, ranging from about 0.13 ha in Gemechis to 1.0 ha in Wadla (Figure 3a). In the Menze mama madir and Wadla woredas (altitude is about 3400-3500 meters above sea level), farmers allocate neally all their cultivated land to Barley in the *belg* season. Seed rates for barley across most locations visited are within aceptable range though significantly lower than the average was reported in Gemechis (Fig. 3b).

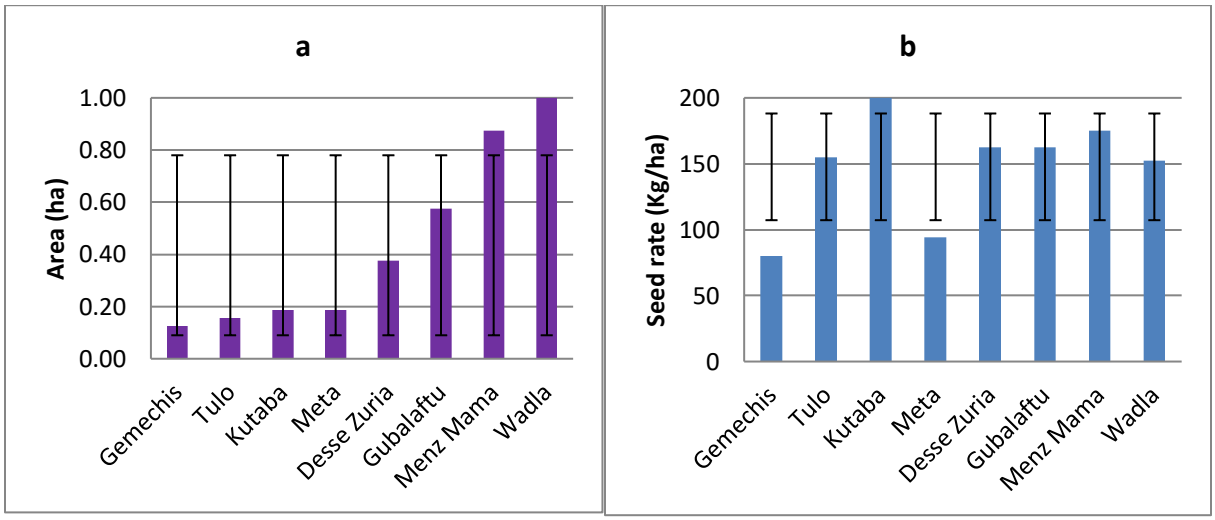

Figure 3: a) Barley area per household and b) seed rates

Tef: The area cultivated per household varies across the tef growing woredas, and this ranges from 0.5 ha/HH in Raya Alamata to 1.5ha/HH in Raya Azebo, which is significantly higher than the average across the four woredas (Fig. 4a). The area in Raya Azebo is significantly higher because most of the households allocate nearly all their cultivated land to tef during *belg* season, while in the other locations, other crops such as maize and/or haricot beans are cultivated alongside tef during the *belg* season. Significantly higher seed rates (60kg/ha) is reported at Raya Alamata compared to the normal seed rates of 25-35 kg/ha (Figure 4b), and no clear explanation could be given by the farming population. This could partly be attributed to lack of proper agronomic knowledge on the best seed rate among farming households.

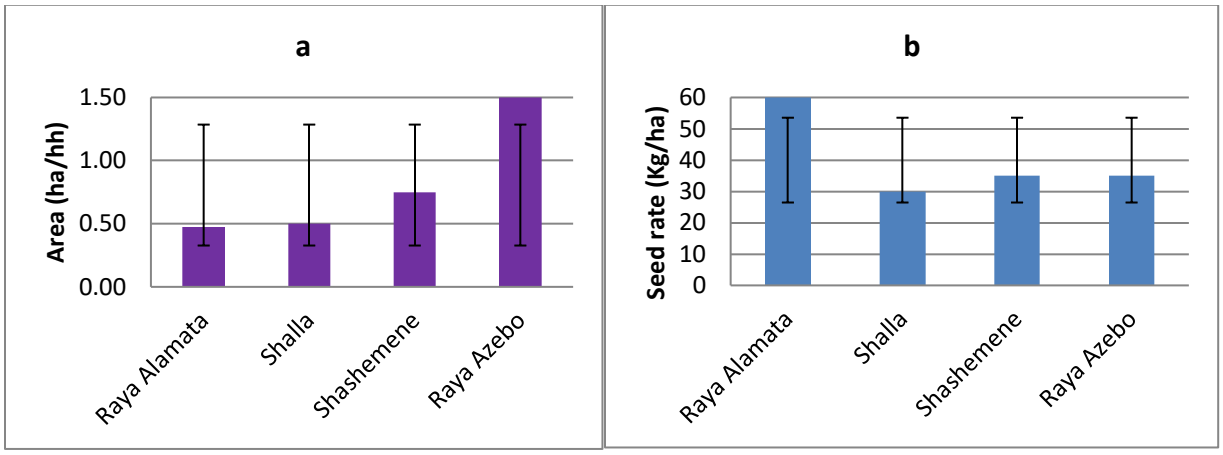

Figure 4: Tef a) average area per household, and b) seed rates

Potato: With the exception of Gombora (0.4ha/hh), the area under potato is relatively smaller compared to all other crops, rearely exceeding 0.125ha per household. The seed rate was only significantly higher in Karsa compared to the overall average.

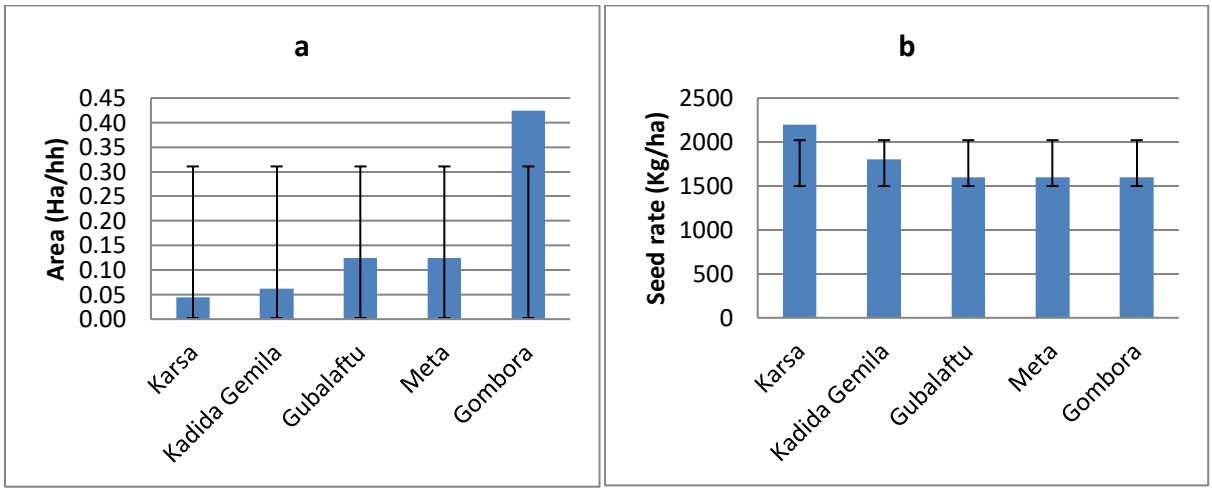

Figure 5: Potato a) average area per household, and b) seed rates and requirements per household.

4.1.3 General crop performance in 2015

Overall, *belg* crop performance was poor in 2015 compared to normal years, with production losses ranging from about 49% to 99% in the *belg* season. Similarly, the available pre-harvest assessment data showed that the production loss for the *meher* season could be between 25% and 96% across the locations visited (Table 5, Photo 2.). These high losses were mainly attributed to late start, poor distribution, insufficient amount and early cessations of rains culminating into drought conditions experienced across the four regions.

Table 5: *Belg* and m*eher* production and losses[16] in 2015

Zone	Woreda	*Belg* production			*Meher* production		
		Expected (tons)	Actual (tons)	Loss (%)	Expected (tons)	Actual (tons)	Loss (%)
West Arsi	Shashemene		-	70		-	25
N. Shewa	Menz Mama Midir		-	86		-	47
South Wello	Desire Zuria	46,360	2,318	95	75,495	55,111	27
	Kutaba	6,116	2,324	62	29,703	11,287	62
	Zonal total	**148,421**	***20,779***	***86***	**1,029,003**	***679,142***	***34***
N. Wello	Gubalfto		-	95		-	-
	Wadla		-	89		-	-
	Zonal total		**-**	**-**	**1024,284**	***327,771***	***68***
S. Tigray	Raya Alamata	73,400	4,404	94		936	97
	Raya Azebo	88,300	883	99	66,444	5,980	91
	Ofla	8,380	4,274	49	59877	17963	70
	Zonal total	**142,490**	***14,249***	***90***	**290,554**	***101,694***	***65***
Hadiya	***Zonal total***	**1,101,761**	***418,669***	***62***		**-**	**-**
West Haraghe	***Zonal total***				**8,555,000**	**2,418,271**	**72**
East Haraghe	***Zonal total***				**10,896,293**	**3,280,379**	**70**

Sources: Extracted from *Belg* and *Meher* seasons harvest and pre-harvest assessment reports

Photo 2: Assesment team member checking sorghum field with zero harvest in Shasemene

[16]Production losses were either compared to 2014/2015 production or planned figures. Losses were attributed to both reduction in the area cultivated and poor yields due to the drought

Besides the drought conditions, other factors such as flood (in Raya Azebo and Weri), hailstorm, pests and diseases across a number of locations; and frost mostly in the highland areas aggravated the situation. In the areas visited, there is high level of soil degradation either due to demographic pressure (midland/highland) or livestock population (lowland), hence impacting negatively on environment and the eco-system productivity in general. These crop losses could have had significant impact on the informal seed sources, particularly on the availability and quality of seed from own saving, social network and/or local market.

4.2 Seed Security Situation

Seed security in the assessed zones for the 2016 seasons will depend on the overall seed demand of the farming population, seed sources used by the famers, availability of quality seed and suitability of varieties from these sources and capacity of the famers to access the seed from these sources. The overall requirement or seed demand of a farming community depends on two critical factors, a) the total land area under each of the major crops, and b) the seed rates. Regarding availability, seed could come from different sources, but this has to be in close proximity to the famers and should be available at the right time for planting. Seed quality and suitability of varieties are two other important aspects of seed security that need attention, as poor quality seed do not ensure good crop establishment and productivity while unsuitable variety may not be adapted to the local agro-ecological conditions and/or do not meet general need of the farming community. One critical element of seed security is access to seed, which depends on the capacity of the famers to acquire available seed from optional sources. The assessment here examined these factors in order to determine seed security outlook for the upcoming *belg* season

4.2.1 Seed demand

The seed demand (requirement) for *belg* and *meher* seasons is normally estimated by the woreda and zonal agricultural offices and submitted to regional BoA. In some zones, the seed demand for the upcoming *seasons* has been estimated while others are in the process of doing so. Using available data on the average land area per household for major crops, seed rates, households numbers and percentage of household growing the major crops during the *belg* season, an estimated 9,779 tons of major cereals, 2,864 tons of haricot beans, 13,435 tons of potato and 304 million cuttings of sweet potato will be required to meet the overall planting need of the farming community in the assessed *belg* growing woredas.

Based on the percentage of seed insecure households estimated by woreda agricultural experts and that obtained during a number of participatory FDGs, the overall requirement for the emergency seed response in the assessed woredas is estimated at 6,316 tons of seeds for major cereals, 1,941 tons of haricot beans seeds, 8,087 tons of potato tubers and about 231 million cuttings of sweet potato. The major crops and quantity of seed required for emergency response varies from woreda to woreda (Table 6). This amount is significantly high and requires concerted response from a number of key stakeholders interested in intervening with seed and planting materials.

Table 6: Seed and cuttings requirement for emergency response in 2016 *belg* season for sampled woredas

Woreda	Major Cereals					Pulse	Roots & Tubers	
	Barley (tons)	Tef (tons)	Wheat (tons)	Maize (tons)	Total (tons)	H. Beans (tons)	Potato (tons)	S. Potato (#cuttings)
DesseZuria	974				974			
DugnaFango				190	190	108		113
Gemechis	20		40	83	143			
Gombora				287	287	168	4114	
Gubalfto	156				156		250	
Humbo				317	317	343		118
KadidaGemila				78	78	77	725	
Karsa				21	21		557	
Kutaba	86		21		107			
Menz Mama Midir	966				966			
Meta	311		126		436		2443	
Raya Alamata		230		145	375			
Raya Azebo		485			485			
Shalla		43		202	245	447		
Shashemene		451		269	720	764		
Tulo	169			57	226	33		
Wadla	591				591			
Grand Total	**3,272**	**1,209**	**187**	**1,648**	**6,316**	**1,941**	**8,087**	**231**

Note: Sweet potato unit is in million cuttings.

4.2.2 Seed sources

Famers in the *belg* growing areas access seed from different sources within the formal and informal sectors. According to the focus group discussions, about 72.2% of the farmers sourced seed in 2015 from the informal sector, with the majority of them souring from local markets (31.4%), followed by own saved seed (28.4%) and social networks (9.7%). For famers who planted haricot beans in 2015, 77.5% of them sourced seeds from the local market while for wheat and barley, 56% and 38.6%, respectively bought seed from the local market. Farmers in Shashemene and Shalla woredas bought seeds of haricot bean and tef from local grain traders. This is also true for tef growers in Raya Alamata woreda. Own saved seed was the major source of barley and tef seed in 2015, with up to 40% and 30% of the famers, respectively depending on this source.

In the assessment about 27.2% of the famers sourced seed from the FCU (formal sector) in 2015. The formals sector was an important source of wheat and maize, with about 44.0% and 53.2% of the famers acquiring the seed from this source, respectively (Fig. 6). Only about 5.0% of the famers sourced seed from the agro-input dealers, and this was mainly in Shashemene and Shalla Woredas, in West Arsi zone. The formal sector played a very limited role as main source of seed such as haricot bean, barley and tef in 2015.

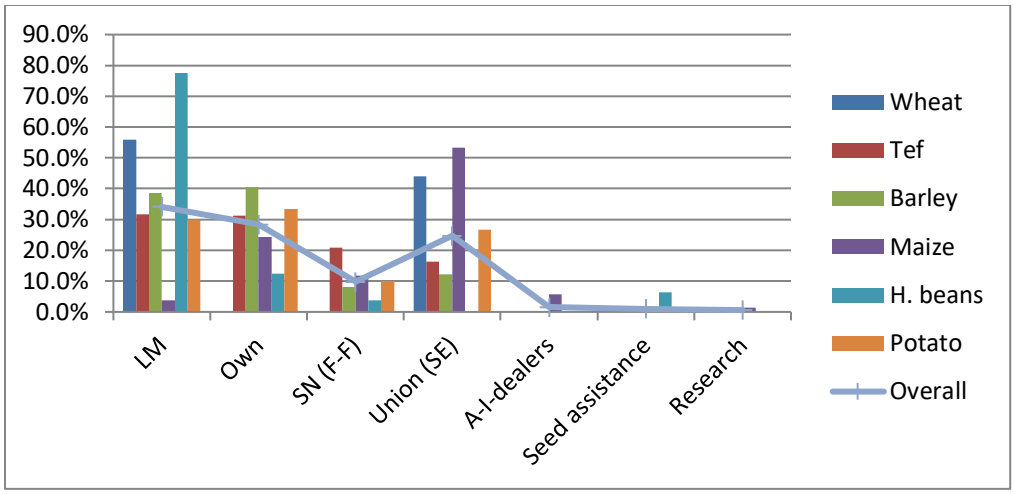

Figure 6: Proportion of famers getting seed from various sources in2015 planting seasons

For the upcoming 2016 seasons, seed sourcing by the famers might change significantly. Lesser proportion of the famers are expecting to use seed from the informal sources such as famer own saved seed and local market due to the near total production loss of *belg* and significant yield reduction in *meher* season of 2015. There are high expectations among the farming population in the assessed areas for seed assistance in 2016. Up to 33.3% of the famers are expecting seed assistance. Many of them expect that unions will be the major source of wheat (50%), barley (50%) and haricot bean seed (37.7%) for the 2016 seasons (Figure 7). Higher proportion of the farmers expect to get more tef seed (56.7%) and maize (50%) from unions, while those in Shashemene and Shalla expect to get maize seed (25%) from the agro-input dealers. The expectation of seed assistance is similarly to the findings of Long term seed aid study in Ethiopia[17].

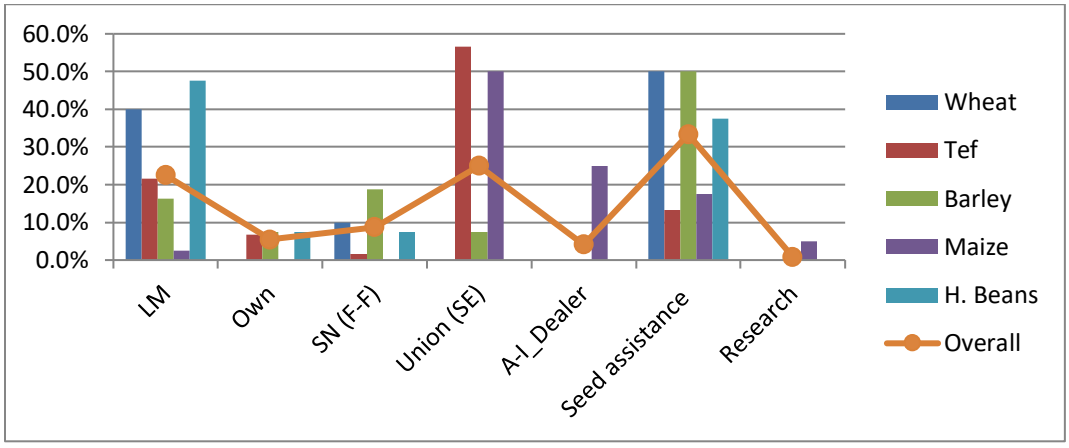

Figure 7: Proportion of famers expecting seed from different sources for the upcoming seasons in 2016.

The local market will probably remain to be an important source of haricot bean seed, whereby up to 47.5% of the haricot bean growers hoped to get seed from this source in 2016 season. Similarly, about 40% of the farmers who grow wheat expect to source seeds from the local market and 50% of farmers

[17] Sperling *et al.,* (2007)

expect to get seed from emergency seed from NGOs and government. The high expectations for the emergency seed support signify acute seed insecurity in the assessed zones.

Though the market will still make some contribution as expressed by those who hope to get seed from this source, there are, however, concerns on the quality and prices of seed from this source. The agricultural experts at zonal and woreda levels reported that the rains stopped at flowering and grain filling stages in most areas, and this most likely affected the physiological development of the grains resulting in poor seed quality that may lead to poor germination, growth, productivity and production. Again, since there was poor production, the supply of grain is expected to progressively get lower and lower in the local markets. Therefore, the forces of demand and supply are expected to push the prices of the grains that could be used as seed upward.

Change in seed sourcing between 2015 and 2016

Given the poor performance of crops in the last two consecutive seasons, the assessment revealed a reduced proportion of farmers depending on the informal sector. The percentage of farmers to use this sources is expected to drop by about nearly half (35.6%) of the percentage of farmers that used the informal sources 2015. The proportion of farmers who will use own saved seed (-23.0%) and local market (-11.6%) significantly decline though social network remains fairly the same in the following season (Figure 8). This signifies limited availability of own saved seed, which could majorly be attributed to the impact of drought. The reduction in seed access from the local market could signify either limited availability or stressful access which could be linked to limited supply and possible increase in prices of grain that could be used as seed for planting in the upcoming seasons.

Overall, seed availability through the formal channel (the unions and seed enterprises) appeared stable as one possible source of seed for 2016 seasons, but expectation is high on seed assistance (32.4%), possibly because of very limited availability from the informal sector (local market and own saved seed) and/or limited access from the local market. In West Arsi zone, particularly in Shashemene and Shalla woredas, where few agro-input dealers operate, famers expect an increase in supply from this source to contribute to the overall pool of seed sources, majorly for hybrid maize seed. The significant increase in the percentage of farmers hoping (from 5% to 25%) to get seed from the agro-input dealers in these two locations demonstrates their willingness to acquire seed from this source. However, their ability to do so may be lacking.

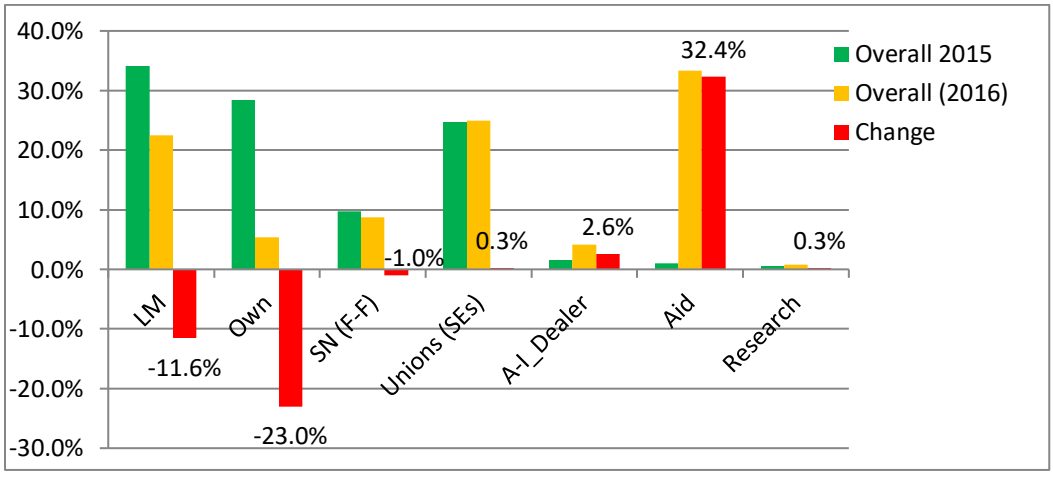

Figure 8: Changes in proportion of farmers sourcing seed in 2016 compared to 2015

4.2.3 Seed channels

Seed from the formal sector is highly controlled, and channeled mostly through the primary cooperatives and/or the woreda agricultural offices. Some limited quantities pass through the agro-input dealers and agents of the seed companies (Figure 9). Though the policy directive from the government requires that "the poorest of the poor" are provided seed on loan basis, the assessment team learnt that in some locations, relatively "better off" farmers who buy fertilizers from the cooperative could as well be granted access to seed on loan as well.

The major channels of the informal system are the farmer's own saved seed; seeds flow from farmers to farmer and from grain trader to farmers through market and the origin of the seed in the informal channel is mostly from farmer's production.

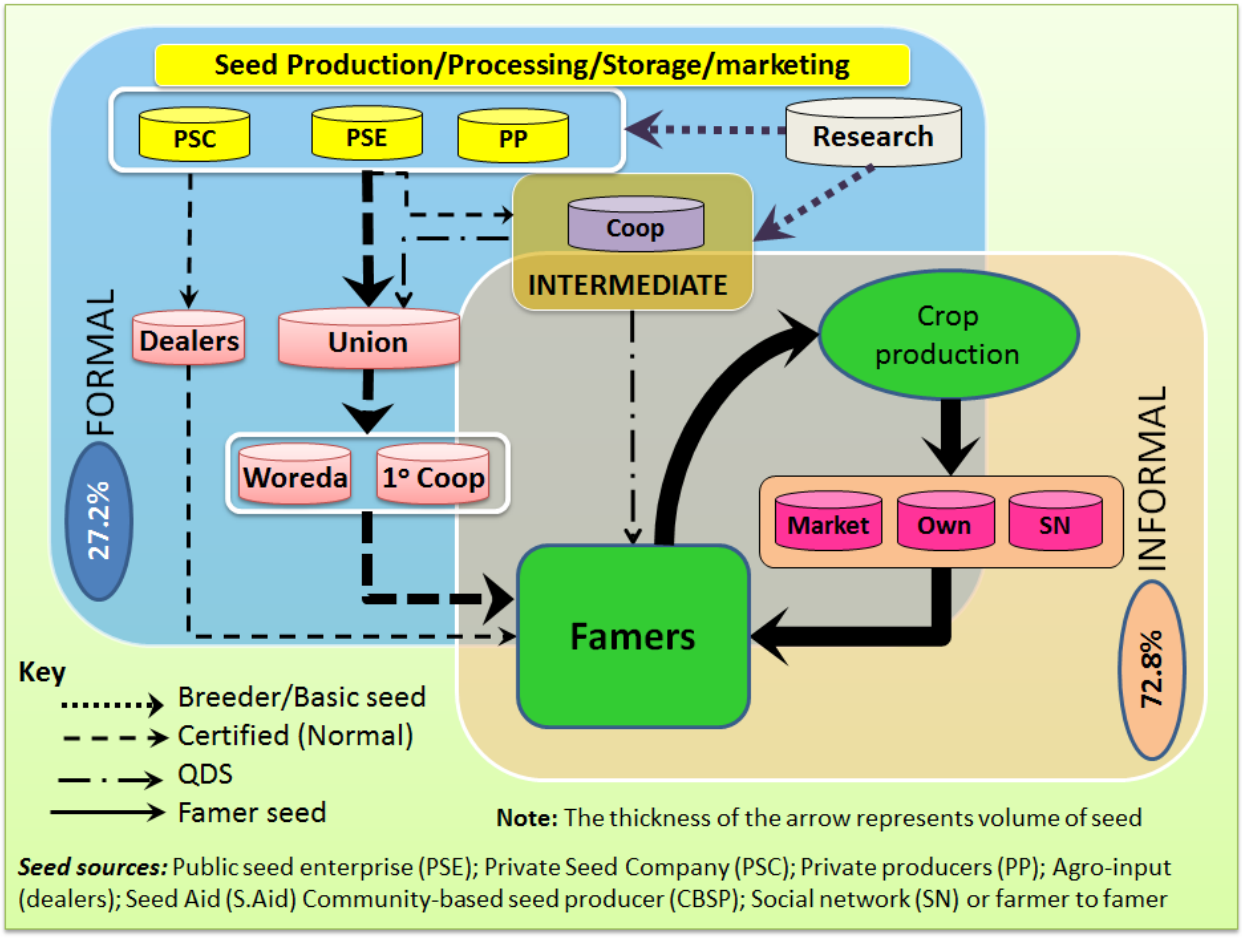

Figure 9: Seed sources and channels in Ethiopia

4.2.4 Seed availability

For any agricultural production to take place, seed must be available in the required amount, within close proximity to the farming households and at the right time for planting, irrespective of the source and

variety. Seed availability, therefore, defines the entry point in crop production and this needs critical examination especially when disaster occurs. This reports examined and analyzed seed availability from both the formal and informal sector, putting into perspective the major indicators of seed availability (Box 1)

Box. 1 Indicators of seed availability

a) *Quantity* – should be sufficient to meet the planting need of all famers in a given location
b) *Proximity* – it should be within reach by the famers in a given location
c) *Timeliness* – seed should be available in time for planting in a given location

i) Availability from formal seed sources

From the formal sector, over *140,051* tons of major cereals; 6,000 tons of major pulses; 884 tons of potato and 29.5 million cutting of sweet potato will be potentially[18]available (Table 7) for use by the famers nationwide. This potentially available seed includes carryover from previous harvest and forecasted seeds from the 2015 harvest. Overall, the seed available from the formal and intermediate sources could contribute up to 21.5% of the national seed requirements[19] (Figure 10). By crops, the formal sector will be able to provide seed that can cover about 61.2% of maize area, 35.7% of wheat area, 19.5% of tef area, 7.4% of haricot beans area and 4.5% of barley area. Similar contributions by the formal sector in Ethiopia have been reported in other assessment reports[20]. Quantity of other seeds including food barley seeds that are supplied from the formal sources is very limited. The fact that large volumes of these seeds are still with the different seed enterprises, making them available within proximity to the farm households requires immediate attention, particularly for *belg* season, and this need to be done in a timely manner.

[18] Potential availability recognizes quantity, but consider that the available quantity is not yet in close proximity to the farm households, and need to be there in time for planting
[19]Based on the area planted with crops in 2014.
[20] CRS, 2007; and CRS; 2012

Table 7: Crop seed estimated to be available with the formal seed producers

	Crop	Seed Source – quantity in tons							Total
		ESE	OSE	ASE	SSE	PHE	Private	Cooperatives	
Cereals	Maize (H)	4,818	6,704	1,471	2,865	9,000	3,979		28,837
	Maize {C}	909			23			730	1,662
	Wheat	17,410	31,529	12,858	4,146		745	19,384	86,071
	Barley (M)	649	3,437	1,377				1,650	71,13
	Barley (F)	259	71	10				714	1,054
	Tef[21]	2,813	148	5,822	920		414	4,555	14,671
	Sorghum	79		667				394	539
	F. Millet	49						53	102
	Sub-total	*26,986*	*41,888*	*21,605*	*7,953*	*9,000*	*5138*	*27,480*	*14,0051*
Pulses	H. Bean	817	155	8	600		106	777	2,462
	F. Bean	82		23				394	497
	Field Pea	33						104	135
	Lentil	347						451.1	798
	Chick Pea	1002		56				1,049.0	2,106
	Sub-total	*2,279*	*155*	*87*	*600*	*0*	*106*	*2,773.4*	*6,000*
Root and tuber	Potato						1,425	7,416.2	8,841
	S. potato						9.2	20.0	29

[21] There could be some double counting for tefas seed enterprises source raw seeds from cooperatives and data are collected from the two sources

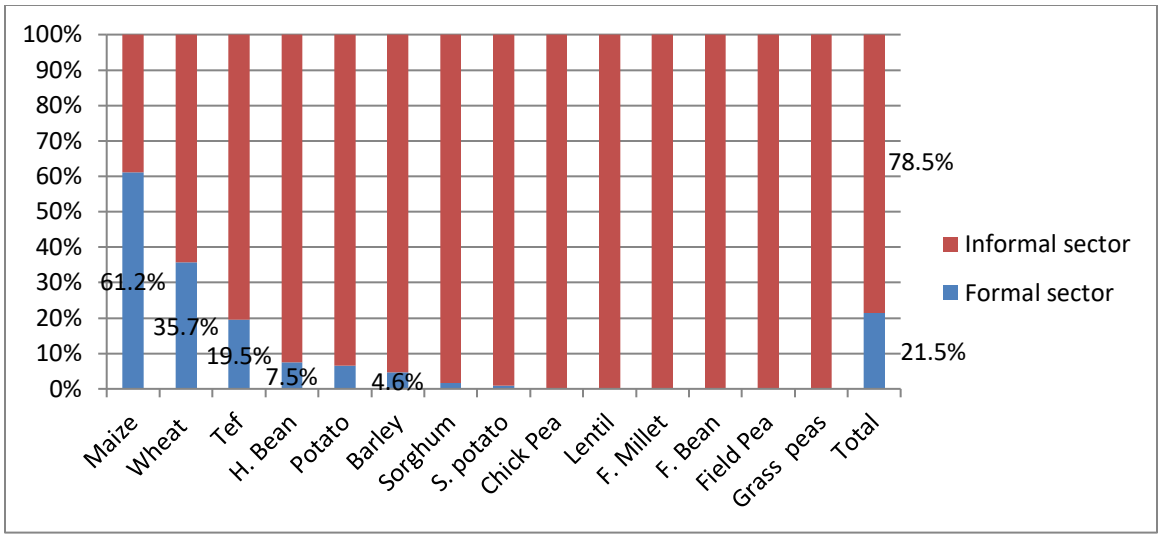

Figure 10: Proportion of crop area that could be covered by seed from the formal sector in 2016[22]

Analysis of the seed supplied through the formal channel in Amhara and Tigray in 2015 showed that, despite the supply being less than the plan, about 17% to 42% of the seed supplied was not utilized at zonal levels (Box 2), and this scenario may cut across a number of zones and regions. The carryover is not limited to the zonal and woreda levels. The seed enterprises have also stock of carryover from last seasons. For example, about 1,140 tons of carryover was reported by Amhara Seed Enterprise, and about 4,890 tons reported by Oromia Seed Enterprise. There are, however, a lot of challenges with the formal channels which is highly controlled by the government. Apart from the carryover, there were complaints about the late delivery of seed, some pockets of quality concerns with lack of accountability from the supply side. Assessments of performance and experiences of the Integrated Seed Sector Development (ISSD) project direct seed marketing in Amhara and SNNPR revealed similar findings[23].

Box 2. Seed carryover in some zones in 2015

Zone	Quantity (tons)				% Carry over
	Plan	Supplied	Utilized	Carry over	
South Wello*	-	1,734	1,379	355	20
North Wello*	3,868	1,426	1,149	282	20
Southern Tigray*	3,142	1,560	1,289	270	17
S. Eastern Tigray	1,450	417	323	93	22
Eastern Tigray	1,223	1,223	711	512	42

[22] Reference area (Ha) is for 2013/14, on the assumption that the area will not change significantly
[23] Getahun *et al.,* 2014; Nefo *et al.,* 2014

The seed carryover by the union/zone/woreda in 2015 was attributed to a combination of factors including:

a) *Mismatch between demand for seed and allocation made:* this was also noted to increase the operational costs of the unions and excess supply in one area and deficiency in other areas.

b) *Late delivery attributed to limited financing of the union:* Procurement of seed by the union depends on the financing by the Regional Finance Bureau (RFB), which provides limited finance by installment (E.g. Yewol Union in South Wello received funding in April, May and June) which limits timely delivery of seed to the farmers. The procurement of the last lot may be effected late and by the time seeds are transported to distribution centers, the planting window may have passed.

c) *Famers change in demand and use local seed:* Though the demand for the seed at woreda level is provided way before the start of the planting season, change (delay) in start of the rain sometimes forces famers to change their priority crops and this leads to change in demand, and hence carryover.

d) *Relatively high prices of seed from the union:* Analysis of prices of seed from the formal and informal sources shows that the prices from the formal sources are 1.5 to 2 times higher than the prices of grain/seed from the informal sources (local market and social network), and farmers make choices based on their purchasing power and this may partly contribute to carryover.

ii) Seed availability from the informal sources

Major sources of seed from the informal sector include own saved seed, local market and the social network or famer to famer seed transfer. Although there was almost total loss in the *belg* season, and poor harvest from *meher* in general, pockets of fair harvest have been observed across areas visited, and some famers have not lost hope in using seed from their little harvest (Photo 3). From a number of FGDs, farmers recognized that despite poor harvest in 2015, the informal sector will still continue to play some roles (Figure 7), with seed coming from relatively better off production areas through trade, particularly social network and local markets (Photo 3), and specifically to those who can afford to buy.

Seed that could still be sourced by the famers through the informal channel will include barley, haricot beans, tef and wheat, and to some limited extent potato. In some of the woredas visited in North Shewa, North and South Wello zones, famers still practice traditional seeds selection, cleaning and selling of barley and wheat seed during planting time. This implies that the informal system could still provide windows of opportunities to source of seed of these crops for emergency support. As observed in these locations, some primary cooperatives, with support of NGOs are already buying and storing potato seed for next planting. In Shashemene and Shalla where farmers tend to depend more on local markets, grain traders/markets remain potential sources that will probably make some seed available to the farmers who can afford.

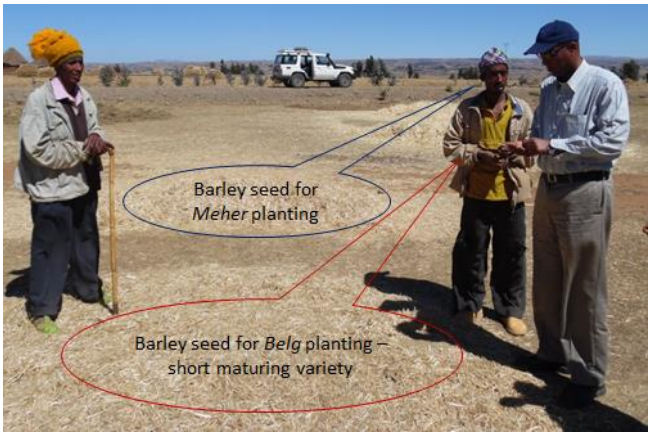

Photo 3: Assessment team member (left) discussing with a farmer threshing barley seeds in Wadla and checking (right) quality of bean (Nasir variety) in Shashemene grain market

Grain traders in Shashemene market consider cleanliness and freshness (recent harvest) of the crop/variety as well as the origin of the crop/variety. In addition, where the grains are not clean enough, they pay women to do additional cleaning to meet some minimum analytical purity, and sometimes grade grain and seed differently. Though the local grain traders may move grains from areas with relatively good production to areas with poor harvest, supply demand effect may push the prices of grain higher as the limited harvest get depleted, hence limiting access to seed for the most vulnerable households in the hard hit areas.

4.2.5 Seed access

Seed access denotes ability and willingness of the farm family to acquire seed through cash purchase, exchange, loan, barter or use of power in social networks. Major indicators of seed access are indicated in Box 3. Whilst seed may be available from alternative sources, it may not be accessible to all farm families due to lack of capacity, power, status or influence, and/or price deterrence. Where availability from own seed and social network is highly constrained, famers may access seed from the local market and/or the formal sector (seed enterprises) if they have the capacity to do so.

Box 3. Indicators of access

a) *Seed prices* – prices of seed from different sources or changes in price affect access to seeds
b) *Disposable assets* – (grain, small ruminants, perennial crops e.g. Coffee, Khat). Access could be limited as there is significant production loss, livestock loss, change in prices of livestock and grains or perennial crops.
c) *Social capital* (social network)- receiving seed with less financial capital, remittances. With wider effect of disaster social capital may not holds.
d) *Credit and financial services*. Where famers have no or limited access to financial services, access to seed my constrained

Prices of seed from various sources: From the discussions made with the famers, the price of the seed from the union, even under normal situation is relatively higher when compared to prices of grain/seed in the local market (Table 8). The prices of the seed (e.g. tef and haricot beans) collected and sold locally by the union are relatively cheaper than those coming from the seed enterprises. It should, however, be noted that the variation in seed prices from different sources is due to better quality seed, transportation and overhead cost depending on how far the kebeles are from the seed stores. The complaints by farmers on the prices of seed from the unions (seed enterprises) are well recognized by agricultural experts at zonal and woreda levels. This in many cases lead to poor access to seed from the union as famers with limited resources tend to resort meeting their seed need from local market and social network, but mostly seed of lower quality. In North Shewa, North and South Wello Zones of Amhara Region, farmers produce, select, clean and keep stock of local seeds for own use and to sell as seed in local market or through the social network. In these locations the price of seed is higher than the price of grain (barley) for food. In areas where grain is sold as seed in local markets, relatively higher price is charged for the seed because of quality difference.

Though the prices of seed from the formal sector are relatively high, these are expected to remain stable since they are regulated by the government which involve in setting prices by considering the seed production costs and farmers' ability to buy the seed. However, the prices of both grain and seed in the local market or those from the social network are expected to rise due to limited supply from the poor harvest experienced in 2015.

Table 8: Seed prices (Birr/kg) from cooperative Unions and Local market in 2015 *meher* season

Crop	ESE price	Union Price	Local Market Price (Birr/kg)		Price difference between Union & LM
			Grain for	Seed	
Wheat	13.80	13.8 - 18.2	9.0		
Tef	22.58	16.0 - 24.0	10.0 - 12.0	14.0 - 16.0	2.0 – 8.0
Barley	13.57	15.0 - 23.6	11	13.0-20.0	2.0 – 3.6

Sorghum	14.53	16.5	7		
H. Beans	17.39	12.0 – 18.0	6 – 8	8.0 -11	3.0 – 6.0
Maize (Hybrid)	18.3- 22.6	22.0 – 28.8			
Maize (Hybrid) – Pioneer		42.8 – 48.8			
Maize (Composite)	11.5	11.5 – 21.6			

From the key informants' interview and FGD, possible seed access mechanism by the famers include among others;

a) *Sales of livestock – mainly small ruminants*. It was noted that about 80% of the farming households own livestock with those in the highlands having 3-7 sheep, those in the midland having 1- 4 small ruminants while those in the lowland areas have larger herd size. From a number of FGD, famers indicated between 500 to 700 birr per animal, perhaps due to poor animal body conditions resulting from reduced feed supply. With the declining feedstock, livestock body conditions are expected to deteriorate further, and this will push the livestock prices downwards, affecting the food and seed purchasing ability of the farmers.

b) *Seed loan from cooperative unions:* The guideline on input distribution allows cooperative unions, through the primary cooperative societies at kebele level, to provide seed loan to most vulnerable households. However, any default in repayment of the seed and/or fertilizer loan automatically leads to no access in the subsequent distribution programme, hence aggravating the seed insecurity status of those who failed to produce and repay the loan. It should also be noted that cooperative unions provide seed mostly for the *meher* season, and therefore this option is most likely not going to be there for the affected households in the *belg* season.

c) *Remittances:* Some members of the FGDs indicated that few relatives in towns and beyond sometimes send financial support to relatives. It was, however, noted that a very few number of households normally benefit from remittances. As it is not a common option, it may not as such contribute for most farmers in the affected areas as far as seed access is concerned.

d) *Sales of pulse, potato and grains (malt barley):* Some crops such as pulses, potato, haricot beans, and tef are mainly produced as cash crops to generate income. In the severely affected areas, this income is expected to significantly decline due to total loss or poor harvest. Thus, accessing seed through income generated from the sales of crops will decline.

e) *Cash for work/manual labor work:* though some famers mentioned this as one of the copying strategies to earn a leaving, these are not always available and the earnings are just to meet daily requirements. It is hardly saved and not possible to assume that considerable number of households will access seed through this income source.

Overall, because of poor harvest, limited disposable assets, constrained social capitals due to the impact of the drought and lack of credit and financial services among the affected households, access to seed by resource poor households is considerably limited.

4.2.6 Seed quality issues

Seed quality is an important element of seed security as it defines the success or failure of crop establishment, and contributes to productivity of the crop planted. Indicators of good seed quality are indicated in Box 4. A number of agricultural experts at the zonal and woreda levels expressed fear that the seed from the *meher* harvest could be of poor quality in terms of grain filling and could be reflected in poor germination when used as seed by the famers. Poor grain filling could be attributed to a number of factors, key among which are low amount of rainfall during the flowering and grain filling stages, frost and hailstone in some locations.

Box 4. Seed Quality Indicators

a) *Germination:* – ability of seed to sprout and grow into a normal seedling within a specified duration.

b) *Analytical purity:* – the extent to which a given seed lot has other crop seeds, weed seeds, broken seed, and the in heart matters.

c) *Varietal purity:* – the extent to which a given variety is mixed with other varieties of the same crop. This may or may not be of concern to famers.

d) *Seed health (Phytosanitary):* – the extent to which a given seed lot or source has pests and/or seed borne diseases.

The assessment team carried out spot checks in a number of crop fields across the assessed areas (Photo 4). There are, however, mixed observations with some significant number of observed fields having completely no harvest, others with very little harvest and poorly filled grains, and pockets of fields that famers could possibly source seed with minimum acceptability. From experienced famers in the highland areas or North Wello, barley and wheat seed are normally got from the fields in the bottom of the valleys as they are considered less susceptible to frost than those in open fields.

Photo 4: Assessment team member a) carrying out quality spot check in fields; and b) tef grain that could be used as seed in the local market in North Wello Zone, Amhara region.

Seed sources present mixed seed quality issues. From a number of FGDs, farmers rated the quality of seed received from the seed enterprises through agriculture office or unions as very good followed by farmer retained seed (often the second generation of improved seed received through the formal

channel) - rated as good quality. The seeds accessed through social network were in most cases rated as medium to good quality while the seed accessed from local market were considered of least quality due to seed impurity where mixture of varieties (sometimes with weed seed) are common. Some concerns that require attention are seed sourced locally by some unions and distributed to the famers, for example, famers in Raya Azebo complained about mixed tef variety, which was poor in germination, distributed by the cooperative union for the 2015 *meher* season.

In the maize and wheat growing areas, there were concerns about possible spread of Maize Lethal Necrosis Disease (MLND) and yellow rust which could be transmitted through seed. The fact that the formal sector is the major source of maize seed, care need to be taken in regards to the potential danger of MLND from this source.

4.2.7 Varietal suitability

Varietal suitability was assessed in terms of ecological suitability of the varieties to produce high yield in a reasonably shorter period, resistance to pests and disease, economic suitability (attracting higher demand and price) and social acceptability including taste for consumption. Generally, farmers appreciate the performance of some of the varieties being distributed through the formal channels, particular in terms of yields and earliness in maturity that enable them to escape mild dry conditions. Few concerns were raised by famers in regards to suitability of varieties currently cultivated by the community. For example, there were some of concerns, for example, in North Wello, by framers who reported that wheat variety called *kakaba* does not do well in colder areas such as Borana.

Box 5. Indicators of varietal suitability

a) *Adaptability:* – performance (growth & yields) of given variety within a range of agro - ecological zones.
b) *Preference:* – meeting end users' needs (e.g. food, fodder, feed, value addition, market, etc.) of the famers

Discussion with Alamata Agricultural researchers indicated that there was stem rust epidemic which led to complete loss of wheat crop in three kebeles. Different varieties of the major crops selected for the emergency interventions have been disseminated and are in use by the farmers. These varieties are adaptable under specific agro-ecologies. Some of the popular crop varieties being cultivated across the assessed woredas are given in Annex 2.

4.2.8 Overall seed security situation

The proportion of seed insecure households in the areas studied is high. The team triangulated information obtained from different sources. Participants of the FDGs reported 55-90% of farmers as seed insecure. Woreda level officials and experts reported a range of 28-86% seed insecure households in the affected *belg* growing areas. The proportion of seed insecure households at zonal level was lower in general when compared to woreda and community level figure on seed insecurity (Table 9). The difference is attributed to the intensity and severity of the drought at the different levels. The zone level figure considers non affected woredas as well, while the woreda level data includes non-affected kebeles as well. The community level data explains their context, though expectations may pull the figure up to a certain degree, as the most affected kebeles were visited.

Table 9. Proportion of seed insecure households in the affected areas

Zone	Proportion of seed insecure households as reported at --- level (%)		
	Zonal	Woreda	Community
East Hararghe	38.0	38.4	82.5
West Hararghe	34.4	33.7	65.0
Hadiya	15.7	86.0	80.0
Kembata-Tembaro	46.2	28.0	90.0
WolaitaSodo		69.0	83.0
West Arsi		80.0	55.0
North Shewa	75.0	70.0	60.0
South Wello	50.0	85.0	80.0
North Wello	50.0	53.0	58.0
Southern Tigray		30.0	90.0

In general, the near total production loss in the *belg* and poor performance of the *meher* season significantly reduced overall availability of seed from the informal sources. Though significant volume of certified seed is available with the formal sector, this could only be considered potentially available until when they are brought in close proximity with farming community at right time for planting. With significant reduction of availability of seed from the informal sector, and with limited disposable assets, constrained social capital, possible increase in grain/seed price and lack of credit and financial services, access to seed will be the major limiting element even if the seed is made available from the formal sector.

4.3 Drivers of Seed Insecurity

There are a number of factors that directly or in directly contribute to seed insecurity in the areas assessed. The major ones are:

a) *The severe impact of the drought on production in two consecutive* seasons – The belg season failed by about 90% in some zones (e.g. Southern Tigray), and in some woredas the loss is as high as 99% (Raya Alamata). The pre-harvest assessment equally showed that the production in the *meher* season was poor. In areas where the main source of livelihoods is agriculture, such severe drought impact negatively on income source, hence all other livelihood aspects.

b) *Several re-plantings during the belg and meher seasons*. Farmers in the areas visited reported that they replanted two to three times and exhausted their seed stock and capacity to buy from alternative sources.

c) *Low level of disposable assets.* The average asset base in terms of livestock is small. About 20% of the households have no livestock, and a substantial number of farming households has less than two small ruminants. Thus, the resources base is low to finance seed purchase from their meager productive assets (livestock). Besides, there are already poor terms of trade for livestock, and declining livestock prices as their body condition deteriorates due to feed shortage.

d) *Increase in prices of seed and other food items:* as the year progresses, the little harvest stock of crop will be further depleted, and demand for grains in the local market continues to rise, and by the planting time, and the prices of grain that could be used as seed will increase. This will further limits many poor households from accessing seed from this source, leave alone the seed from the union that they have all along been complaining of the high price even in a normal situation.

4.4 Seed Security Challenges

The followings were identified as major seed security challenges in Ethiopia

a) *Inadequate seed supply by formal sector:* The problem is more severe for some crops such as barley, tef, haricot beans and sorghum. The impact of the drought and repeated planting significantly affected availability of seeds of local varieties in a number of places. For example, *Muhira* sorghum is commonly grown in east and west Hararghe zones and serves as sorghum basket of the country. The crop is hard hit by the drought considerably reducing the yield. Thus, there is high concern by the experts of zonal agriculture offices and Fedis Agricultural Research Center that accessing adequate sorghum seed supply may be challenging.
b) *Unpredictability of weather (climate change):* this renders farming households vulnerable to weather related disasters. There is reported shifting of the *belg* season into the *meher* season, with *belg* considered more unreliable as compared to *meher.* This affects the livelihood of the farming communities and their capacity to access seed.
c) *Restrictive guidelines on seed sourcing from the informal sector for emergency response:* The current emergency seeds response guideline requires that seeds should be procured from identifiable sources, be known varieties, inspected and approved by authorized body in the region. The guideline also requires that grains harvested from fields planted with the objective of producing seeds, but rejected during inspection, be evaluated and used as seeds for the coming *belg* season. In the *belg* growing areas, the number of seed grower cooperatives and groups are very limited or non-existent in some woredas. Thus, the guideline appears to be restrictive of accessing seed from informal sources if it is to be sourced from other sources.
d) *Pests and diseases:* Stem yellow rust on wheat, MLND and smut in maize; blight and spider mites on potato, stem maggot and leaf blight on beans, and cut worm on cereals exacerbated by the effect of drought. This constrains supply of seeds from a number of sources.
e) *Agricultural water and soil conservation challenges in some areas* – soil erosions in a number of areas, and with limited land for cultivation, continuous cultivation on the same piece of the land and hence affecting productivity of the land, and subsequently impacting negatively the seed from informal sector.
f) *Untimely seeds delivery:* Farmers compared the effectiveness of seed supply through different channels. They reported that cooperative unions and NGOs do not supply seeds on time. As per farmers view, the local market channel is more effective in timely delivery of seed. However, the latter may provide low quality seeds (mixed varieties, infested by weeds seeds, resulting in different height and different maturity dates causing inconvenience in harvesting).

5.0 CONCLUSION AND RECOMMENDATIONS

5.1 Conclusions

The major crops grown across the *belg* growing areas include maize, barley, wheat, tef, haricot beans, potato and sweet potato, with significant variation in household land holding and area under these crops. Overall, *belg* crop performance was poor in 2015 compared to normal years. Given the poor performance of crops in the last two consecutive seasons, the proportion of farmers who will depend on own saved seed, local market and social network for seed and planting materials in 2016 is expected to significantly reduces compared to the year 2015.

The proportion of seed insecure households in the areas studied is high, ranging from 55-90% in the assessed zones. This is strongly attributed to significant reduction of *belg* and *meher* production, limited disposable assets, constrained social capital, progressive increase in grain/seed price and lack of credit and financial services. As a result, the overall requirement for the emergency seed response for the *belg* growers in the assessed zones is estimated at 6,316 tons of major cereals, 1,941 tons of haricot beans, 8,087 tons of potato and about 231 million cuttings of sweet potato.

The formal sector is expected to supply about *140,051* tons of major cereals; 6,000 tons of major pulses; 884 tons of potato and 29.5 million cutting of sweet potato for the next production seasons. Part of these seeds could be used for emergency response. There is, however, very limited quantities of seed of major crops such as beans, tef and barley from this source. Therefore, famers and any emergency seed response will have to largely rely on the informal sector for these crops.

5.2 Recommendations

From the high proportion of seed insecure households as a result of drought in the target region, zones and woredas, there is a need for a concerted action by all the key stakeholders (Government, Donors and Humanitarian Organization) to provide emergency seed assistance to the most affected households. Considerations should equally be put on medium to long term solutions to address seed insecurity problems and challenges.

5.2.1 Immediate actions

a) *Emergency seed support:* given the magnitude of the drought affected households in the woredas visited, emergency seed support is inevitable. This, however, should be directed to the most affected, seed insecure households in target locations. Given the resource limitations, beneficiaries in the target locations should be selected in a participatory manner in order to identify the neediest households for this response.

b) *Seed allocation by the regional government:* Considering that the regional government plays an important role in seed allocation even in a normal year, careful consideration need to be taken by the regional government in making such allocations to ensure that; i) adequate attention is given to the most affected, ii) the right variety and quantity is transported to a particular locality, and iii) NGOs work with the Regional BoA and zonal and woreda agriculture in responding to needs

for emergency seed response in the affected woredas. Moreover, this should be done in consultation with other key stakeholders interested in emergency seed response. The regional seed inspection and quality assurance section should be consulted.

c) *Varieties for distribution:* The fact that *belg* is less reliable due to the erratic and short duration of the rainfall, it is recommended that organizations responding with emergency seed provide mostly short maturing and drought tolerant crop varieties.

d) *Seed for emergency response from the formal sources:* Seed of adaptable certified varieties, particularly maize, wheat, tef and haricot beans could potentially be sourced from the formal sector (public seeds enterprise, private seed companies, state farms). However, care should be taken when sourcing seed for different agro-ecologies taking into consideration adaptability of varieties and susceptibility of varieties to pests and diseases.

e) *Informal sector source:* Given the limitation of the formal seed sector in providing seed of crops such as barley and sorghum, procurement of seed from the informal sector is inevitable. This could be done by the unions with technical support from zonal/woreda agricultural offices and seeds inspection and quality assurance body. The fact that there are few seed inspectors in the country or at regional and zonal levels, it would be advisable that the few inspectors train the agronomists at the zonal and woreda levels on procedures for seed inspection and rapid seed quality test to enable them support local seed procurement from the informal sources. This will, however, require flexibility in the emergency seed guideline to ensure quality and adequate supply of seed for emergency response by delegating woreda level agronomists to inspect quality of grain to be purchased for seeds.

f) The distribution of emergency seed should follow the existing distribution channels - from the cooperative union to primary cooperatives or where this structure is weak, the agricultural office should work closely with NGO partners on the ground.

    i) *Voucher based seed distribution – empowering the beneficiaries in making choice of input:* Where possible, minimize logistical challenges that come with direct seed distribution, the beneficiaries should be issued with seed vouchers to enable them access the type of seed they need. This could be materialized when seeds are procured and distributed by cooperatives located in the affected kebeles.
    ii) *Direct seed distribution:* where only one crop is to be distributed or time doesn't allow for voucher based distribution, direct seed distribution could be applied.

g) *Complementary input supply and distribution:* Where resources allows, the emergency support should consider providing access to complementary inputs such as fertilizers and pesticides to enhance productivity of the crop. If resources do not allow, alternative mechanisms for creating access to complementary inputs are necessary for optimum benefit from the accessed seed.

5.2.2 Medium/Long-term recommendations

a) *Promote community based seeds production*:-To overcome seeds shortage, establish/strengthen existing seed grower groups and/or seeds producing cooperatives at woreda level, and link them with cooperative unions and private sector i.e. grain traders that eventually develop to seed

distributer or agro dealer; and investment in small-scale irrigation facility to guard against risk of crop failure from drought would add more value to this effort.

b) *Strengthening the reserve fund:* The communities contacted in Shashemene reported that they contribute for Disaster Risk Reduction (DRR) fund. This is a government initiative and it is in the right direction in view of DRR with the involvement of the community. However, the initiative is at its infant stage. The experience and challenges need to be documented and shared or scale up in areas where such initiative have not started yet.

c) *Crop and varietal diversification.* In some locations farming households depend on very few crops and/or varieties, hence making them much more vulnerable to climate variability and pending risk from drought, floods, pests and diseases. Research and extension should put more efforts in developing and promoting new varieties suitable for diverse agro-ecologies.

d) *Seed insurance:* When possible, along with community based seeds production, the government and NGOs like CRS need to promote seed insurance scheme among seed grower groups in the nearby future.

e) *Promoting climate smart agriculture.* A number of *woreda* officials suggested shifting from *belg* production to *meher* production as *belg* is becoming less reliable. This, however, might not be a long term solution due to the unpredictable climate variability. A longer term option is to promote climate smart agriculture for sustainable seed, food and livelihood security.

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ANNEXES

Annex 1: Data collection instruments (to reduce size, tools not included and will be provided upon request)

Annex 2. Popular improved and local varieties grown by famers in different locations

Belg Crop	Varieties	Woredas
Barley	Ferke (for belg), Mawugie (for meher); Holker (Malt barley)	Menz Mama Midir
	Sene (for belg), Ginbote (for meher)	Desie Zuria
	Enat-Gebs, Gendit, Wagrie, Tegadime	Kutaber
	Bardo Aifere (for belg), Ehilzer (meher)	Gubalafto
	Tikur Ehilzer, Holker, Tegadime Ehilzer	Wadla
	Locals	Karsa, Meta
H. Beans	Nasir, Dinkenesh, Awash 1	Shashemene/Shalla
	Awash1, Mexcan	Meta
Maize	BH540, BH546, BH660, Jabi (2358), Limu Shomne	Shashemene
	PHP3253 hybrid	Karsa
	Pioneer (shone, jabi)	Gemechis, Tulo
	BH660, BH661	Karsa, Meta, Gemechis, Tulo
	BH540, Melkasa 2, Limu, BH543	Shalla
	Melkassa 1,2,4, 6	Meta, Gemechis,
Potato	White, red	Gubalfto
Tef	Buniye, Adillo, Karaket	Shashemene
	Adillo, CR-37, Kuncho,	Shashemene, Meta, Gemechis
	Kuncho	Meta
Wheat	Digalo	Menz Mama Midir, Kutaba
	Gundip (Danfi), Kakaba	Kutaba
	ET13	Karsa,
	HAR1685	Karsa, Meta
	Pavon 76	Karsa, Meta, Gemechis, Tulo
	Kaqaba	Meta, Gemechis, Tulo
Sorghum	Hamdiye	Karsa, Gemechis
	Muhira	Karsa, Meta
	Abshir	Karsa, Meta, Gemechis
	Gubiye	Karsa, Meta
Potato	Ciro, Gudane	Karsa, Meta