



Programme for Agribusiness Induced Growth in the Amhara region

Maize Value Chain Analysis for Mecha District



Updated November 2016
AgroBIG Team

Acronyms and Abbreviations

ACC	Agricultural Commercialization Cluster
ACSI	Amhara Credit and Saving Institute
ADLI	Agricultural Development Led Industrialization
ADR	Adet Research Center
AGP	Agricultural Growth Programme
AISE/AISCO	Agricultural Inputs Supply Enterprise
ARARI	Amhara Region Agricultural Research Institute
ATVET	Agricultural Technical and Vocational Education and Training
BoA	Bureau of Agriculture and Rural Development
BoFEC	Bureau of Finance and Economic Cooperation
BoTIMD	Bureau of Trade, Industry and Market Development
CBE	Commercial Bank of Ethiopia
CHAI	Clinton Health Access Initiative
COMESA	Common Market for Eastern and Southern Africa
CSA	Central Statistics Authority
DA	Development Agent
ECX	Ethiopian Commodity Exchange
EGTE	Ethiopian Grain Trade Enterprise
EIAR	Ethiopian Institute of Agricultural Research
ESE	Ethiopian Seed Enterprise
FREG	Farmers' Research and Extension Group
FRG	Farmers Research Group
FTC	Farmer Training Centre
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GIS	Geographic Information System
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan
ICT	Information and Communication Technology
IFPRI	International Food Policy Research Institute
ILRI	International Livestock Research Institute
MARC	Melkassa Agricultural Research Centre
m.a.s.l	metres above sea level
MDGs	Millennium Development Goals
MFA	Ministry for Foreign Affairs of Finland
MFI	Micro Finance Institutions
MGF	Matching Grant Fund
MoAN	Ministry of Agriculture and Natural Resource
MoFEC	Ministry of Finance and Economic Cooperation
MU	Merkebe Union
OPV	Open Pollinated Varieties
PASDEP	Plan for Accelerated Sustained Development to end Poverty
PIF	Policy and Investment Framework (2010/11-2014/15)
p.p.p.y	per person per year
PSU	Programme Support Unit (AgroBIG)
QPM	Quality Protein Maize
RDPS	Rural Development Policy and Strategy
R&D	Research and Development
RUSACCO	Rural Savings and Credit Cooperative
SAA	Sasakawa Africa Association
SG-2000	Sasakawa Global 2000

SME	Small and Micro Enterprise
SMS	Subject Matter Specialist
SIP	Strategy Implementation Plan
SNNPR	Southern Nations, Nationalities, and Peoples Region
SSI	Small Scale Irrigation
TIN	Tax Identification Number
UARRP	Universal Access to Rural Road Programme
VC	Value Chain
VCA	Value Chain Analysis
VCD	Value Chain Development
VCF	Value Chain Fund
WoA	Woreda Office of Agriculture
WoFEC	Woreda Office of Finance and Economic Cooperation
WoTT	Woreda Office of Trade and Transport
Belg	short rainy season, January to June
Kebele	neighborhood (location of about 5,000 people)
Meher	long rainy season, June to December
Woreda	District

Contents

Acronyms and Abbreviations	ii
List of Figures	v
EXECUTIVE SUMMARY	vi
1. Introduction	8
1.1. Characteristics	8
1.2. Importance to Ethiopia.....	8
1.3. Importance to Amhara and Mecha	9
2. Production.....	11
2.1. Seed	11
2.2. Agricultural practices.....	13
2.3. Water requirements/irrigation.....	14
2.4. <i>Harvesting</i>	15
3. Post-harvest	15
3.1. <i>Handling</i>	15
3.2. <i>Storage requirements</i>	16
3.3. <i>Shelf life</i>	16
3.4. <i>Packaging</i>	16
3.5. <i>Transport</i>	16
4. Marketing.....	17
4.1. <i>Demand and Supply Situation</i>	17
4.2. Quality requirements	18
4.3. Marketing outlets/main segments	19
4.4. Price Fluctuations	24
4.5. Main Value Chain Actors	24
4.6. Supporters and Enablers	28
5. Cross Cutting Issues.....	33
5.1. Gender Inequality	33
5.2. Reducing Social Inequalities	34
5.3. Climate Change Adaptation.....	34
6. Constraints to be addressed	34
6.1. SWOT Analysis	34
6.2. Agro-BIG Interventions.....	35
References	38

List of Figures

- Fig 1.1: Main Maize Producing Areas
- Fig 1.2: Woreda Total HH and Population
- Fig 1.3: Maize Production Potential and Main Crops Area Coverage (20013/14)
- Fig 1.4: Meher Season Main Crops Production Volume in Quintal (2013/14)
- Fig 2.1: Most Common and Released Maize Varieties Adoption Range and Yield
- Fig 2.2: Available Technologies in Amhara Mechanization and Food Science Technology Center
- Fig 2.3: Recommended Fertilizer Rates
- Fig 2.4: Maize Main Diseases in Ethiopia
- Fig 4.1: Production Trend (2011/12 – 2013/14)
- Fig 4.2: Mecha Woreda Production Contribution (2013/14 production season in Qt)
- Fig 4.3: Main Maize Trade Routes
- Fig 4.4: Maize Market Price in Different Wholesale Markets
- Fig 4.5: Mecha Maize Value Chain Map
- Fig 4.6: Primary Cooperatives Purchased Volume in Quintal in 2005 and 2006 E.C
- Fig 4.7: Local collectors at Merawe Market

EXECUTIVE SUMMARY

Study purpose: Maize value chain Analysis study for Mecha District was conducted in November 2014 and update made in April 2016. The main purpose of the study was to conduct a value chain analysis study focusing on Mecha Woreda and to provide recommendations for intervention and leverage areas including business models to be implemented by the stakeholders to improve maize value chain competitiveness.

Methodology used: For the study a Participatory Value Chain Analysis was used as a leading framework in the secondary information review, instrument/tools preparation, data collection, and throughout the process. Focus group discussion, mapping, power and gender analysis and triangulation were done in consultative way for identification and verification. During the study both quantitative and qualitative data collection tools were employed.

Overall situation: Ethiopia is the top in East Africa and the fourth largest maize producer country in Africa. Maize is Ethiopia's leading cereal in terms of production with 6.4million tons. Amhara is one of the major producing regions in Ethiopia contributing about 25% of the national production. West Gojam is among the top zones in the country with a production of 7.8 million quintal per annum which is half of Amhara region production. Mecha Woreda is contributing 26.7%, 13% and 3% to West Gojam, Amhara and National maize production respectively. The national per capita consumption of maize has substantially increased during the last decade.

Maize in Mecha:

- **Production and post-harvest handling:** Maize covered 48% of the total area cultivated of Mecha Woreda. The producers are mainly small holder farmers with about 1.5 – 2 million Qt productions and recently two commercial producers are emerging in the area. According to the study estimate about 35% of the total maize produced in Mecha area is consumed at household level, about 57% of total production is supplied to the market.
- **Supply and Demand:** Next to household own consumption, local drink Areke producers are main buyers of maize from household farmers in the area. Buyers coming from other part of the country who purchased a significant volume from grain traders are also important buyers. Mixing maize with other crops like Tef is emerging as a practice in hotels and family groups in peri-urban areas due to price increase for Tef and other commodities. The total volume purchased by such type of consumers estimated about 30,000 Qt per annum. The feed (poultry and others) and food processing industries can be considered as emerging markets for maize and maize related products like starch, industry level alcohol, and food oil.
- **Chain Actors:** Input (seed, fertilizer and chemicals) suppliers, small holder farmers, collectors and traders, primary cooperatives and Merkebe Union (MU) are among the main actors in the maize value chain.
- **Supporters and enablers:** Regarding financial service, ACSI and CBE are active financial service providers in Mecha Woreda and they have given agricultural loan. There are commercial service providers like transporters and millers. The Agricultural Office, Cooperative Promotion office, Trade and Transport office are among the local public organizations which are providing support at Woreda level. Adet Research Center has a research station in Mecha and there are research trials that cover maize production. There are also many projects and NGOs which are working on maize in the area.
- **Profitability and value share:** With the current situation of high input cost and low output price, Maize production of smallholder farmers is not very attractive enterprise unless done

with high productivity. With existing practice if all major costs of farmers considered they can be profitable if they sell 1 Qt of maize for Birr 417 and above.

- **Upgrading strategy and recommendation.** A combination of product, process and function upgrading proposed for Mecha Maize value chain taking possible demand sink, local context, actors' strength and required time for transition. To make the strategies more concrete, proposed interventions are categorized as short term interventions and Medium and long term interventions. In the long term competitiveness and profitability is the critical areas with more wide demand sink options. For the short term, (i) Possible market based solutions (commercial business solutions) for some of the constraints; (ii) Short term systemic leverage interventions; and (iii) Preparatory works for medium term and long term interventions proposed for action.

1. Introduction

1.1. Characteristics

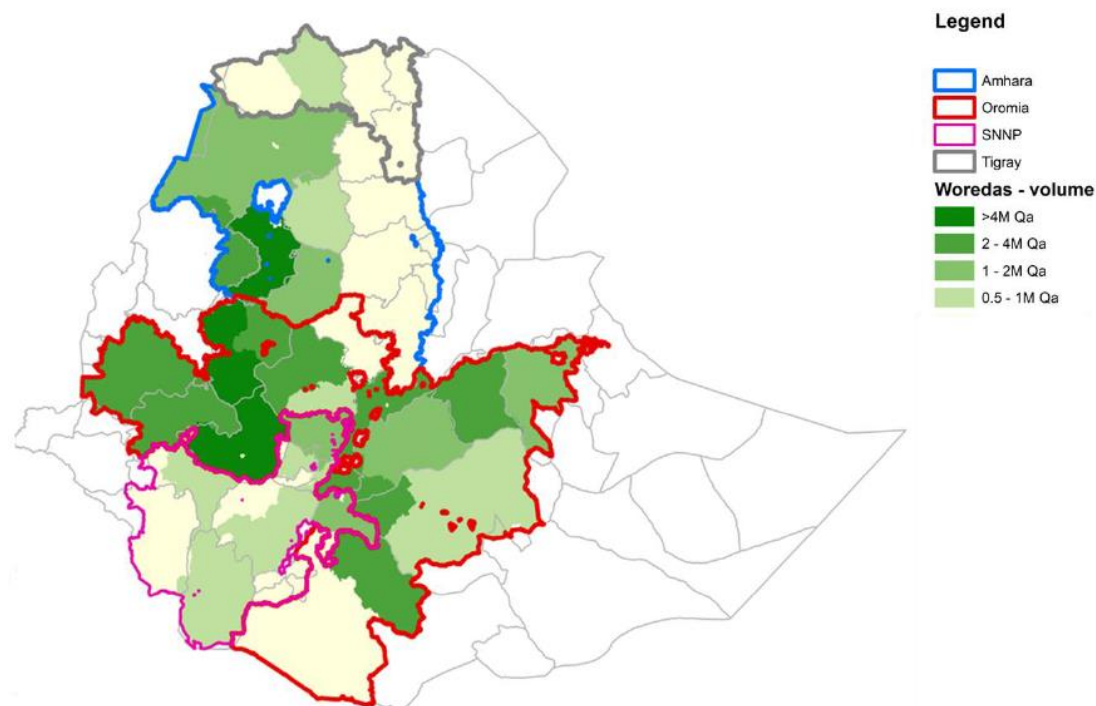
Maize a cereal crop, a member of the grass family, is grown widely throughout the world in a range of agro-ecological environments. It is believed to have originated in Mexico, and to have been introduced to Ethiopia in the 1600s to 1700s. About 50 species exist and consist of different colors, textures and grain shapes and sizes. White, yellow and red are the most common types. The white and yellow varieties are preferred by most people depending on the region. It is consumed as a vegetable although it is a grain crop. The grains are rich in vitamins A, C and E, carbohydrates, and essential minerals, and contain 9% protein. They are also rich in dietary fiber and calories which are a good source of energy.

1.2. Importance to Ethiopia

Maize is Ethiopia's leading cereal in terms of production, with 6.4 million tons produced in 2013/14 by 8.8 million farmers across 1.99 million hectares of land (CSA, 2014). Ethiopia is the fourth largest maize producing country in Africa, and first in the East African region (FAO, 2012). It is also significant that Ethiopia produces non-genetically modified (GMO) white maize, the preferred type of maize in neighboring markets.

Amhara is one of the major producing regions, West Gojam among the top zones in the country. Other major producing areas include East Wollega, Kaffa, East Shewa, West Shewa, West Arsi, Illubabor, East Gojam, West Wollega, and West Harerghe as indicated in Fig 1.1. Currently, maize is the cheapest source of calorie intake in Ethiopia, providing 20.6 % of per capita calorie intake nationally (IFPRI, 2010).

Fig 1.1 Main Maize Producing Areas



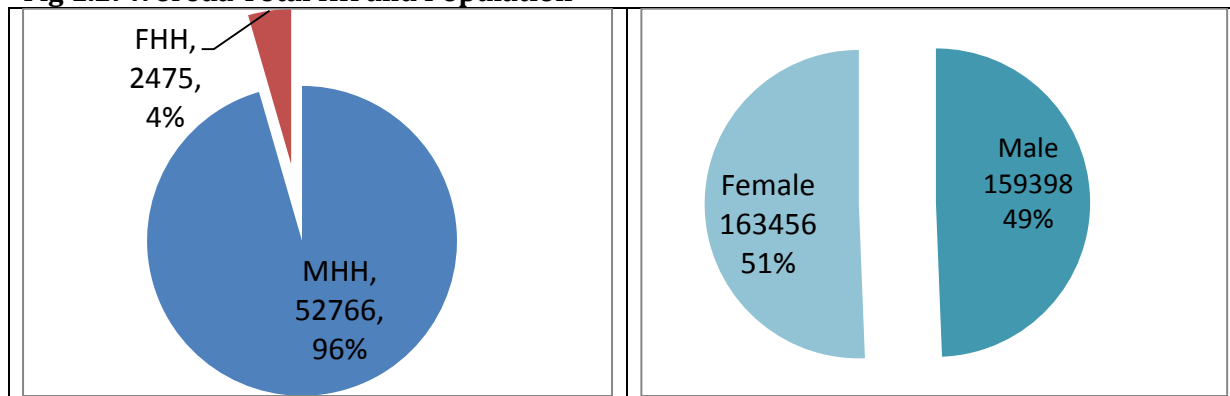
Source: CSA in ATA, 2014

1.3. Importance to Amhara and Mecha

Maize production in Amhara region reached more than 18 million quintal in 2014/15 production season with engagement of more than 2.67 million smallholder farmers (CSA, 2015). West Gojam is one of the highest potential production areas with more than 0.55 million holders engaged in maize production with about 8.7 million quintals annual production.

As per WOA, in Mecha Woreda there are 55,421 (4%FHH) households with a total population of 322,854 (51% Female) almost all engaged in maize production. Maize is produced in all Mecha Woreda (40 rural Kebele) almost by all households in the area.

Fig 1.2: Woreda Total HH and Population



Source: WAO

During the Meher season (main rain season) almost all households produces maize with average land coverage of 0.5 ha to 0.75ha that is 48% of the crop area. There is 7,200 ha irrigable land divided in 12 blocks but Maize is not the common crop during the irrigation season.

Fig 1.3: Maize Production Potential and Main Crops Area Coverage (20013/14 production year)

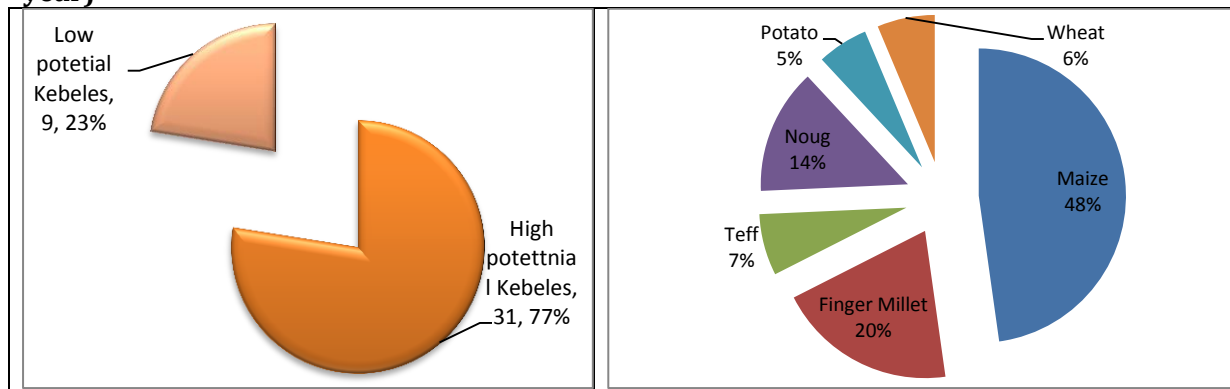
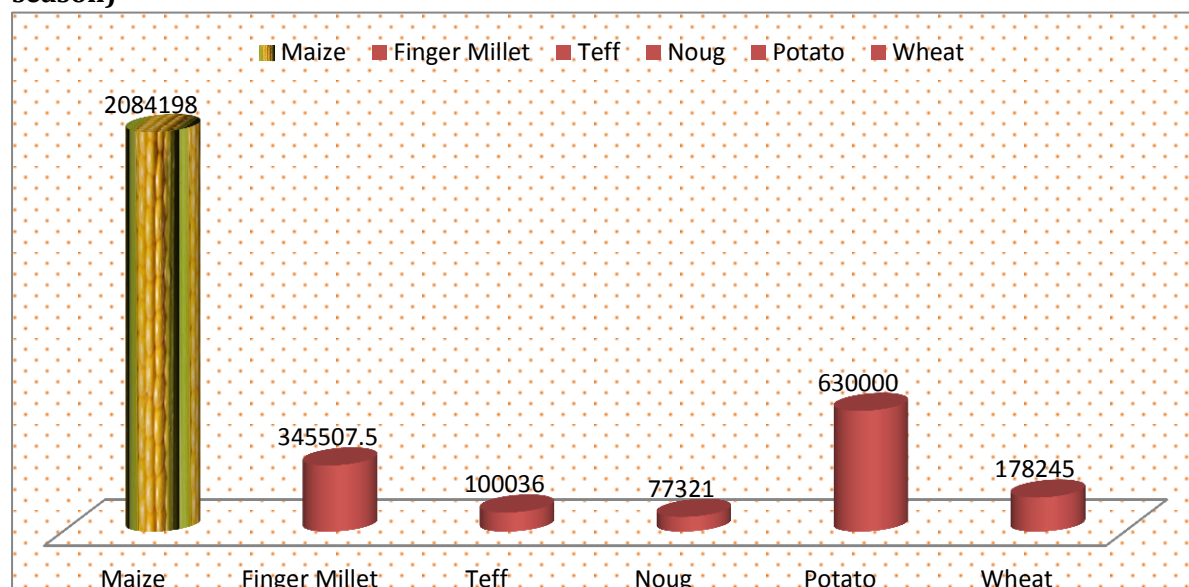


Fig 1.4: Meher Season Main Crops Production Volume in Quintal (2013/14 production season)



Source: WoA

As indicated in Fig 1.3 and 1.4, Maize production volume is by far greater than all the main commodities, more than double in volume as compared to all other commodities total production. The second important crop in terms of volume is potato followed by Finger Millet and Wheat.

2. Production

2.1. Seed

The main varieties grown at national and regional level are BH 660, BH 540, Pioneer (Phb3253). There are many varieties released with different adoption rate in the different agro-ecology zones as indicated in Fig 2.1

Fig 2.1: Most Common and Released Maize Varieties Adoption Range and Yield

Variety name	Year of release	Released by	Altitude range	Rainfall	Maturity days	Average yield (qt/ha)
PHB-30G19 (shone)	2006	PHBSE	1000-2000			80.0
Tabor(30-H83)	2001	PHBSE	1600-2000	800-1600	137	76.0
BH-543	2005	BNMRC	1600-2200	1000-1200	148	75.0
BH-670	2002	BNMRC	1700-2400	1000-1500	165	70.5
AMH850(Wenchi)	2008	Ambo	1800-2600	1000-1200	183	70.0
AMH851(Jibat)	2009	Ambo	1800-2600	1000-1200	178	70.0
BH-660	1993	BNMRC	1600-2400	1000-1500	160	70.0
Shindi(phb-30g-97)	2001	PHBSE	1500-1900	800-1600	137	69.0
BH-541	2002	BNMRC	1000-1800	1000-1200	150	65.5
AMH800 (Arganne)	2005	Ambo	1800-2500	1000-1200	175	60.0
BH-661	2011	BNMRC	1000-2000	1000-1500	160	60.0
BH-540	1995	BNMRC	1000-2000	1000-1200	145	57.5
BHQp-542	2002	BNMRC	1000-1800	1000-1200	145	55.0
BH-530	1996	BNMRC	1000-1300	1000-1500	140	55.0
BH-140	1988	BNMRC	1000-1800	1000-1200	145	53.5
Gambela Comp-1	2002	BNMRC	500-1000	1000-1200	110	45.0
Rare-1	1997	HRU	1600-2200	900-1200	163	42.5
Gibe Comp.-1	2001	BNMRC	1000-1800	1000-1700	145	42.5
Kuleni	1995	BNMRC	1700-1400	1000-1200	150	42.5
A1-Comp	1975	HRU	1600-2200	1000-1200	163	40.0
UCB	1975	BNMRC	1700-2000	1000-2000	163	40.0
Abo-Bako	1985	BNMRC	500-1000	1000-1200	150	40.0
A-511 ^a	1974	HWU	500-1800	800-1200	150	35.0
Melkasa-3 ^c	2003	MARC	1200-1700	600-800	125	35.0
Melkasa-2	2003	MARC	1000-1700	600-800	130	35.0
Gutto	1988	BNMRC	1000-1700	800-1200	126	27.5
Fetene(ACV-3)	1996	HWU	1000-1700	450-550	105	25.0
Tesfa(ACV-6)	1996	HWU	1000-1700	450-550	105	25.0
Melkasa-1	1999	MARC	500-1600	400-500	105	25.0
Katamani	1974	HWU	1000-1700	450-550	105	22.5

Source: Maize Sector Strategy (2013-2017), 2014

The most common seed found and used in Mecha is BH 540, BH 660 and Pioneer (Phb3253). Starting from 2012/13 direct seed marketing practiced in the Woreda. In 2013/14 production season, Ethiopian Seed Enterprise (ESE), Ethio-Agriceft, Yimam Tessema and Pioneer are the four companies which supplied seed in the area. Amhara Seed Enterprise (ASE) was also engaged in seed supply in 2012/13. In total there are 12 private seed suppliers in Amhara region where six of them are actively supplying in each production season. The seed packed in 12.5kg bag and sold to farmers with cash based direct marketing arrangement where cooperatives working as an agent for the seed suppliers on a commission basis.

Seed Suppliers in Mecha for 2013/14 Production Season

Seed supplier	Type of seed supplied	Price (Birr/Qt)
ESE	BH 660	1,650
	BH 540	1,390
YT	BH 540	2416
Pioneer	Phb 3253	4,104

Direct seed marketing is practiced for the last two years in which traceability and tag recording started to assure seed quality and accountability. Cooperatives are getting 40Birr/Qt commission and individuals who may engage also can get similar commission. Pioneer is not working in similar way like the other seed suppliers; they are doing with order based delivery via their agents.

The seed varieties under use are old and their productivity is decreasing and loosing genetic purity and may become susceptible for disease. With the maize initiatives Shone and Limu varieties of Pioneer Company tested in the surrounding area. Seed quality is an issue that may be related to adulteration and management gaps in the seed production process; as to farmers who were present in the focus group discussion this is one critical area that needs attention. Seed quality management and genetic purity problems are also confirmed from the experts in the seed multiplication business too. Maize is used for different purposes but there is no differentiation of seed types during new seed variety promotion which the study team observed as an area to be focused in future activities.



Main Seed Suppliers

- **Ethiopian Seed Enterprise:** is the major seed supplier at country level. The common maize varieties they are supplying are BH 540, BH 660; Timely supply and volume of seed for these common varieties is not an issue. In line with preparing the common varieties, ESE is working to supply QPM seeds (QPM-BH-545) which is equivalent to BH 540 in terms of productivity. The seed color is yellow that is different than the most commonly traded white maize. The seed development is done in collaboration with CIMMYT and other partners. For the promotion of QPM there is basic seed shortage, because of the male parent productivity.
- **Amhara Seed Enterprise:** is a regional seed enterprise which is supplying seed including maize. Even though the enterprise was not active in last production season in Mecha area, when there was shortage in the start of the direct seed marketing they supplemented the seed supply in Mecha area. As indicated above they have a plan to supply QPM in Mecha area.
- **Yimam Tessema:** is a family business established with senior and very experienced former ESE staff and is now supplying quality seed in the region. It is one of the four main seed suppliers for Mecha area. The company seed sold in higher prices than ESE may be related to the quality and farmers trust level. Farmers are willing to pay higher prices for better quality seed. Getting timely cleaning, better warehouse and lab service; capacity limitations to establish own facilities are the main challenges for the company.

Competition of commission payment between the seed supply companies may compromise the seed quality (40Birr/Qt for the cooperatives and 30Birr/Qt for staff); having similar commission should be set for quality competition; staff may sell for companies which pay better commission only.

2.2. Agricultural practices

The smallholder farmers in the area have long years of experience in the use of improved agronomic practice like row planting, proper land preparation, use of improved seed and fertilizer. Farmers value seed significantly and are ready to pay better price for better quality seed (pay three times more for pioneer seed as farmers have more confidence for that seed type). Almost all farmers apply fertilizer for maize production. The rate of application that farmers reported is slightly more than the optimum research recommendation of ARC. The optimum fertilizer application recommendation of the research center is not well known by Woreda extension workers and farmers.

Input use

Seed input use and supply described above. Other inputs use and supply situation briefly indicated below.

- **Fertilizer:** The primary multipurpose cooperatives supply fertilizers (DAP, Urea and NPS) receiving from MU which is nationally imported through AISCO. Starting from 2013/14 production season the voucher system introduced in the region as a pilot for credit purchases with ACSI involvement. Farmers who are taking credit get coupon for the loan and bring to primary cooperatives and they collect fertilizer.
- **Chemicals (Pesticides and Herbicides):** Both AISCO and private vendors supply Pesticides and Herbicides in the region. There is supply shortage and proper use of chemicals. AISCO supplies imported chemicals via unions and primary cooperatives. While a number of farmers buy directly from private vendors in the area that is more easily accessible. AISCO is willing to work with youth groups as an agent but doubting the responsiveness of existing working procedure, bureaucracy and flexibility to provide products on credit basis.
- **Farm tools:** Amhara Mechanization and Food Science Technology Center demonstrated and supplied motorized maize shelling in the past (40-50 Qt/hr) capacity and Manual shelling equipment (24kg/hr capacity). There are private companies and agents who are importing maize shelling equipment and local workshops who tried to adapt the technologies. Private importers and projects tried to promote post-harvest technologies in different part of the country but not picked significantly may be due to the business model and service arrangement problem.

Fig 2.2: Available Technologies in Amhara Mechanization and Food Science Technology Center



To make the agrochemical use more effective in friendly way, youth agrochemical sprayer groups have been organized, qualified and are now providing service to farmers on commercial basis in Mecha and Fogera.

Agronomic practice

Maize production activities begin with land clearing that starts immediately after harvesting the irrigation crop or the previous season crops. All field management activities from planting to

harvesting and post-harvest handling are implemented by members of the HH including men, women and children. Role level of men and women in the different maize production and postharvest activities briefly explained in section 2.4 and chapter 3.

Fig 2.3: Recommended Fertilizer Rates

N-P ₂ O ₅ Kg ha ⁻¹	Varieties							
	BH-540				BH-660			
	Locations							
	Basoliben	Mecha	Yilmana Denssa	Achefer	Ankesha	Burie	Jabi T	Huleteju Enebsie
0-0	2770.3	3371.1	2896.8	3811.0	2183.2	4861.0	4323.2	2624.2
60-46	5665.8	7574.9	5234.4	7272.0	5547.1	7962.2	7188.0	5528.2
120-46	5813.0	8447.3	5595.7	8012.0	6084.6	8568.8	7405.8	6545.3
120-92	5847.9	8363.2	6026.2	9159.7	6091.4	9438.8	7621.0	7162.9
180-92	6071.9	9242.5	6051.1	9657.0	6906.0	9624.1	7888.1	7008.1
180-138	7089.3	10156.8	7047.5	10975.0	7028.0	10322.1	8024.8	8806.0
100-75	6567.4	8351.6	6021.2	8469.0	6084.5	8889.3	7484.0	6182.8
Mean	5689.4	7929.6	5553.3	8193.7	5703.5	8523.8	7075.2	6265.4
C.V (%)	16.99	15.05	17.26	14.56	17.4	10.31	13.77	18.19
LSD _{0.05}	554.0	496.4	637.0	533.7	412.8	449.4	502.3	935.4

Source: ARARI completed research first proceeding, 2006

Disease and pest are not the top main issues and are managed with the existing practice but there are threats that are coming from other countries. Existing common diseases in the country is indicated in Fig 2.4.

Fig 2.4: Maize Main Diseases in Ethiopia

Production zone	Elevation	Maize disease	Insects	Weeds	Other threats
Mid-altitude sub humid	100-1800	Leaf blight, Rust, GLS, and Ear rot	Stalk borer, and Storage pests	• Grass weeds	Low soil fertility
Moisture stress	500-1800	Leaf blight, and Rust	Stalk borer, termites, and storage pests	• Invasive weeds (eg. <i>Parthenium hysterophorus</i>)	
High altitude sub humid (transition and true highlands)	1800-2400	Leaf blight, Rust, Grey leaf spot, and Ear rot	Stalk borer, and storage insects		Poor stalk quality
Low altitude sub humid	<1000	Maize streak virus, Grey leaf spot, and Rust	Stalk borer, and storage insects	• Parasitic weeds (Striga)	Lodging

Source: Maize Sector Strategy (2013-2017), 2014

2.3. Water requirements/irrigation

Moisture stress affects about 61–87% of the landmass in Ethiopia, Kenya and Sudan (Sanders and McMilan, 2001 in Worku et.al. 2011). Currently, it is considered the number one threat to maize production in Africa, especially in sub- Saharan Africa (La Rovere et al., 2010 in Worku

et.al. 2011). Maize is most susceptible to this stress at flowering and often results in barrenness and serious yield instability at the farm level.

Maize produced in Mecha using rain-fed system, use of irrigation not common and less profitable as compared to other high value crops. Existing varieties water requirement varies from 450 – 1600 ml rainfall requirement with a range of 105 – 183 maturity days. See Fig 2.1 for the different variety rainfall and maturity days.

Tests under furrow irrigation have been carried out at different locations. From the tested OPVs, Melkasa2 was suitable for production under irrigated conditions while BHQPY545 and BH540 were superior among the hybrids. Farmers growing maize under irrigation in the central rift valley have already ascertained the top performance of Melkasa2 and BH540 under irrigated conditions. There is also evidence that farmers at Melkasa town produced about 8 t ha⁻¹ of Melkasa2 by combining high plant population (by reducing spacing between plants from 25 to 20 cm) and supplementary irrigation. Also, preliminary results showed that BH140 performed well in the Afar plains under irrigated conditions (Worku et.al. 2011). Maize production using irrigation is not a common practice in Mecha area.

2.4. *Harvesting*

Harvesting and threshing of maize is done manually in most of the cases.

- Sufficient storage space and sacks should be prepared and cleaned before the new harvest arrives. Good hygiene is a very important activity to prevent postharvest losses, the new harvest should never be placed on, or with, grain from the previous season as this will encourage the movement of pests from the old to the new.
- Need to be harvested as soon as physiologically mature and then transported to the homestead for immediate drying. At harvest still too moist and soft to be threshed so most smallholder farmers leave them to dry naturally in the field for several weeks prior to harvest.
- If rain delays the maize harvest then turn cobs down by breaking stem just below cob so the cob hangs down to prevent water entering it.

3. *Post-harvest*

3.1. *Handling*

Existing handling practice varies from smallholder to smallholder. Some use cattle for threshing. There were some demonstration activities to promote threshing equipment. AgroBIG project piloted threshing service by organizing youth groups and providing mobile threshing service in the different villages of Mecha.

To improve quality and reduce post-harvest loss:

- The harvest should be transported to the homestead as soon as possible. Such transport is typically by head load or donkey drawn carts.
- To shell maize, the cobs must first of all be de-husked. At this stage it is important to select out any cobs that are insect or mould damaged since the grain from these cobs would reduce the quality of the other grain if they were mixed.
- It is important to minimize the damage done to grain during threshing as damaged grain is much more prone to attack by insects and fungi. Consequently, techniques that crush and damage grains such as beating with sticks or trampling by cattle, are not recommended.

- The grain should be neither too moist (soft) or too dry (brittle) at the time of threshing; it is best done when grain is around 14 to 16% moisture content.
- Maize cobs are shelled using bare hands; this is slow and is relatively painful when large amounts are done at one time. An alternative is to use wooden or metal hand shellers, where one hand is used to hold the cob and the other rotates the sheller around the cob to strip off the grain. These are tedious to use and have never achieved widespread popularity.
- Hand-cranked or pedal operated shellers are available in a range of models and typically give outputs of about 50-130 kg/hour. For large-scale production a range of different models of motor-driven shellers are available that is powered by electricity or diesel.

3.2. Storage requirements

Farmers keep maize from three months and in rare cases up to 1 year with fumigation depending on the family financial capacity and maize price. The sacks must be prevented from making contact with the floor or walls of the house, from which they might absorb moisture, causing the grain to rot.

Some farmer groups built store that is mainly used for input storage and there is no household or community level appropriate maize storage almost in all the case visited during the study. Primary cooperatives that collect maize to supply to MU for WFP delivery were renting from individuals for short term storage. AgroBig project supported construction of stores for the primary cooperatives.

Most volume of maize is sold after harvest (about 60% based on national studies) but there are farmers that keep until the market is paying better price. Depending with the past production season (2012/13) price increase later the year speculated the same for the year 2013/14 and a number of farmers kept their maize and the price dropped and they lost from 200-300 Birr/Qt. There is no reliable market information to support farmers' market decisions.

The post-harvest loss at producers level estimated about 8-10% by farmers but experts believe that reaches more than 20% (up to 30%) mainly happening at producer level. There is a need to further understand the level of post-harvest losses at farm level and other levels for appropriate actions at all levels.

3.3. Shelf life

When bag stores are well kept and quality management procedures respected then maintaining maize for 12 months is possible. With limited management it can be stored for 3 months.

3.4. Packaging

If adequately packaged, the shelf-life of local surpluses of food may be extended, and this allows the food to be distributed to other areas. Correct packaging prevents any wastage (such as leakage or deterioration) which may occur during transportation and distribution. Good packaging and presentation encourages consumers to buy products. Sacks that are new and reused are the common package used for maize when supplied to the market.

3.5. Transport

Donkey cart and pack animals are the common transports that are used to supply from home to local market or cooperatives store. Different size Isuzu trucks are used to transport to other markets or towns.

4. Marketing

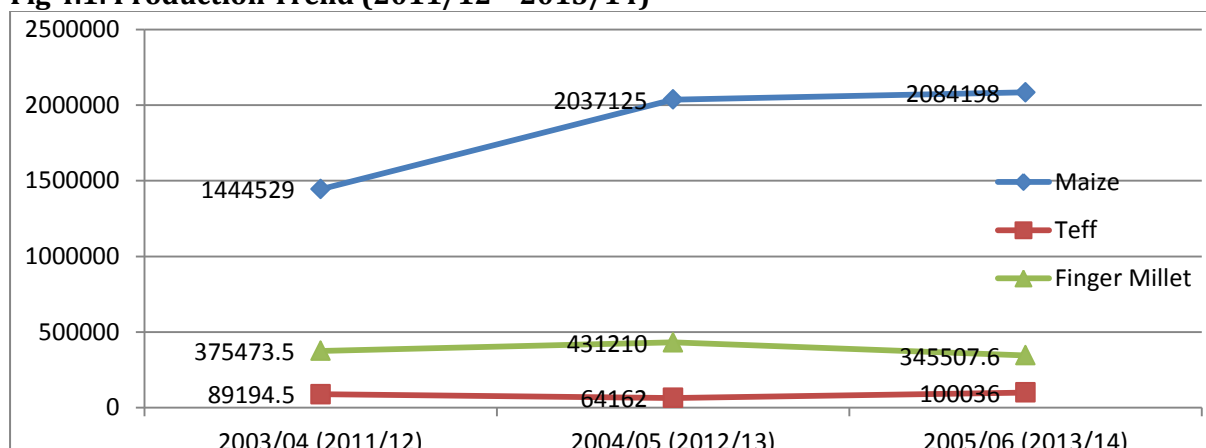
4.1. Demand and Supply Situation

Supply

In Ethiopia, maize grows under a wide range of environmental conditions between 500 to 2400 meters above sea level (ATA, 2014). While significant gains have been made in maize production over the past decade, there remains great potential to increase productivity. Between 2001 and 2011, maize production increased by 50%, due to increases in both per hectare yields and area under cultivation. However, estimates indicate that the current maize yield could be doubled if farmers adopt higher quality inputs and proven agronomy best practices. At present, only 17% of maize farmers representing 30% of maize planted area make use of improved varieties of seed (CSA 2010/11), and only 30% of farmers use the recommended rates for fertilizer application.

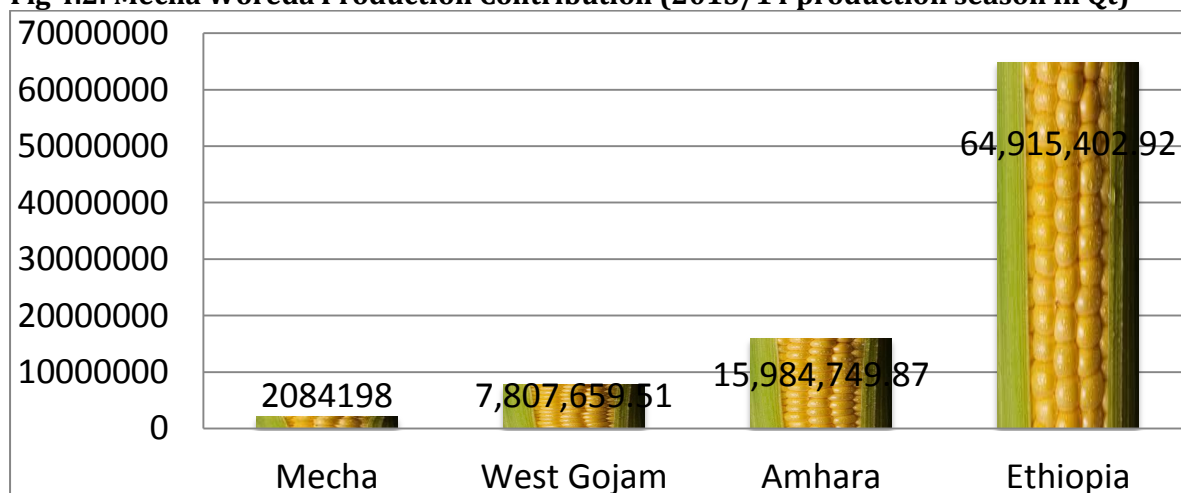
Taking last three years production average more than 1.855 million quintal maize produced annually in Mecha Woreda. Significant production increase observed in the last three years from 1.44 million Qt in 2011/12 to 2.08 Qt million in 2013/14 production season according to the agriculture office data (Fig 4.1). As per the study estimate more than 57% of produced Maize (0.7-1 million Qt) supplied to the market as grain, very small volume as green maize, the remaining 35% will be used for own consumption as indicated above mixed with other crop and for homemade drink (Tela and Areke) preparation.

Fig 4.1: Production Trend (2011/12 – 2013/14)



Mecha Woreda is contributing 26.7%, 13% and 3% to West Gojam, Amhara and National maize production respectively. West Gojam is one of the maize belts in the country that contributes 12% of the national production. Including other areas production Amhara region is contributing 25% of the total national maize production (see Fig 4.2).

Fig 4.2: Mecha Woreda Production Contribution (2013/14 production season in Qt)



Source: CSA and WOA data

Commercial producers: Using the irrigation facilities there are companies developing commercial farms in the areas. There are two enterprises that are actively engaged in the area. Koga-Veg PLC: with 50 ha land started trying to grow baby corn for the export market. The farm has a plan to engage selected farmers first as in-growers and then as out-growers. In the first year the company has a plan to engage 20 farmers and 40 farmers the year after and to reach 1,000 gradually. By working as in-grower farmers will develop their practice to enable them comply with global good agricultural practice and be certified producers. They are working for global good agricultural practice certificate and staff management. They believe engaging the farmers have different advantages (i) land can be used for other purposes after 50 days and (ii) significant volume of green feed (150 Qt/ha) can be used as a feed which increase milk production significantly. They are treating soil acidity for vegetable production but not for others (20 Qt lime/ha) may increase to 40 Qt/ha after next test if it is not the accepted level of PH. The skill of soil acidity treatment can be transferred if needed. As per the experts growing maize with existing soil acidity is not a problem. They have a plan to arrange mobile pest control crew.

Demand

The national per capita consumption of maize has substantially increased from 34 kg/per capita in 2004 and 2005 to 46 kg in 2006, 50 kg in 2007, 48 kg in 2008 and 49 kg in 2009 (ILRI, 2010). Data presented during the third National Maize Workshop of Ethiopia (Worku et.al. 2012) indicated that the per capita consumption had already reached 60 kg per annum. It, however, also became clear that the consumption varied from place to place. In major maize producing areas, maize is a staple food, and in other areas it is used in mixtures with other food grains.

Maize constitutes about 24%-31% of national cereal consumption and is mainly covered by domestic production. Maize is consumed as a staple food in different forms, including: injera (alone or mixed with tef), porridge, bread, grits and nefro. It is also consumed roasted or boiled (especially at green stage) and grits. Moreover, it brewed into tella, araki and other local spirits (ILRI, 2010).

4.2. Quality requirements

The main maize types are categorized by color and size. The main types white, yellow, red, mixed and flint maize. The quality requirement depends on the buyer type. Buyers like WFP have very strong quality parameters and requires fulfillment of the requirements. Specific

buyers' type requirements indicated in the main market segments below. The general Ethiopian Standard maize requirements are:

- Shall be sound clean, reasonably uniform in color according to type
- Shall not contain any additives, contaminants, abnormal, or unnatural odor denoting deterioration
- Shall not contain more than 13% by mass, of moisture content
- Shall be free from insect infestation, living insects, dead insect fragments, rodent contaminations
- Shall not contain more than 0.5% by mass of harmful and/or toxic seeds
- Shall not contain more than 0.02% by mass of smut galls or spores in a sample of 250g
- Shall not contain 0.05% by mass toxic seeds of *crotolarai*, Corn cockle, Castor bean, Jimson weed seed in a sample of 250g
- Broken kernels and foreign matters of maize grain shall not contain more than the value specified

4.3. Marketing outlets/main segments

There are seven main market segments including the emerging markets which include many products. Each market segment size, main characteristics and quality requirement explained in the sub-sections below.

i) Rural Household Own Consumption: for easy analysis and drawing clear picture household own consumption specified as one segment of maize target market. In Mecha area maize produced for household own consumption and as a cash crop to pay different agricultural inputs and other expenses. As per the study estimate from the total maize produced about 35 percent (ranging from 20% to 45%) which is about 530,000 Qt consumed at household level as bread, Injera mixed with other crops, as a local drink *Tela* and *Areke* (both homemade alcoholic drinks) and green maize (*eshete*) prepared in different forms (boiled and roasted). To consume as green maize and for *Tele* drink the local variety preferred but with market preference for white maize and productivity reasons the improved varieties white maize (BH 540, BH 660 and Phb 3253) dominant the production and consumption volume at households level too.

ii) Local drink “Areke” Producers: Local drink Areke producers are very significant volume of maize buyers in the area. As per the study estimate from 280,000 Qt to 500,000 Qt of maize produced in the area is used for commercial *Areke* production. The maize price decline and feed shortage triggered for existence of more Areke producers in the area. It is estimated more than 7,000 individuals, about 10% of the Woreda rural HHs and 30% of the town households (even up-to 50% in some villages and towns) are engaged in Areke production and supply. Almost all individuals who are engaged in Areke production, collection and retailing of Areke are women. Areke is collected on daily basis in the Woreda towns and transported to different corners of the country. The volume of Areke produced and supplied to the market estimated more than 17 million liter per annum equivalent to more than 30 medium sized (500,000 liter liquor factory) or 4 big commercial liquor factories like Ethiopian National Liquor Factory. The byproduct “Birinte” is used for animal feed which encouraged the livestock fattening activities that includes women. Maize



volume that goes to Areke production increased in the past years and the market expected to be stable with some level of increment in the future.

- iii) **Merawie and other Mecha town household consumption:** Maize consumption for daily food is not common in most town households except for the lower income families. As indicated in other reports (Rashid, 2010), maize consumption is quite less in urban areas and in the upper income quintiles. Mixing with other crops like tef is emerging as a practice in hotels and other family groups like other peri-urban areas with price increase for tef and other commodities. Using maize for drink preparation (Tela and Areke) and green maize consumption has similar practice to the rural areas. The total volume purchased by the segment estimated about 30,000 Qt per annum.

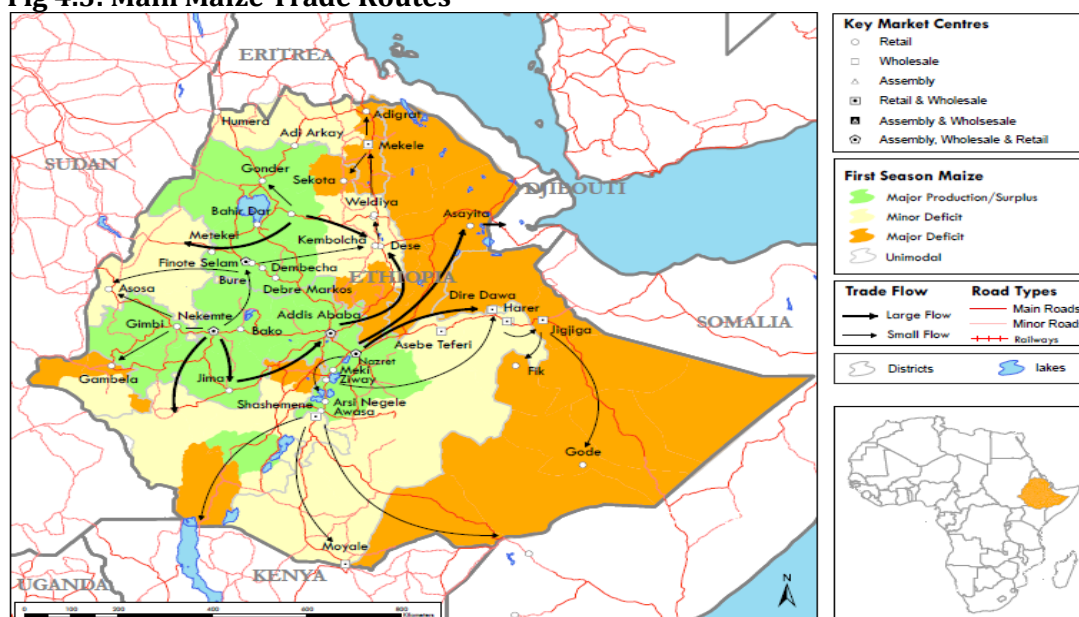


- iv) **Maize buyer from other part of the country:** The next important buyers next to Areke makers are buyers coming from other part of the country. The demand from these areas varies from time to time based on the availability of supply from other producing areas. The volume purchased per annum estimated around 170,000 Qt (30% of the volume sold by local collectors). The local informants indicated the volume sold out from the area is declining in the past years with the production growth in other areas.



As indicated in Fig 2.2 the main trade routes of maize from West Gojam includes to northern part of the country to Gonder, Desse, Woldiya, Mekele, Adigrat and to west to Metekel and further.

Fig 4.3: Main Maize Trade Routes



Source: FEWSNET

The demand for Mecha area maize is significantly affected by the production and supply in other part of the country. The different wholesale markets price is very much linked and the price competitiveness will determine the demand of the product from different part of the country.

v) WFP – PFP project: WFP for its refugee, safety net and other relief assistant program buys maize from producers group with a project called Purchase for Progress (PFP). The project was buying maize from producers throughout the nation in the last few years from cooperatives union. Last year in collaboration to other maize alliance stakeholders bought 375,000 quintal maize from 29 Cooperatives Unions at national level. Merkebe Union (MU) that is based in Bahir Dar is one of the leading Unions who performed well by delivering 45,000 Qt maize in the last trading season (2013/14). This year it is expected MU to buy at least 43,000 Qt maize for WFP. Cooperatives from Mecha supplied about 12% of MU last year supply which is 5,754 Qt. Similar volume of maize expected to be supplied in the upcoming trading season (2014/15) to MU from cooperatives in Mecha area. WFP as a buyer has very clearly determined quality requirements e.g. like 92% clean from anything and accepted moisture level. The market may not seem sustainable in the long-term and the volume may decline gradually that will be replaced to tender based competition. But for short term and transition period it is interesting market to build cooperatives and union capacity in actual contract based trading.

vi) Emerging markets:

Feed – poultry and others: the feed industry expected as one of the potential demand sink especially feed for poultry sub-sector. There are limited business entities in the area who engaged in feed processing business buying limited volume of maize. Wongele, MU and other Unions in Amhara are the visible actors in the region.

Wongele feed mixing company is using maize for the poultry feed preparation. It uses less than 1,000 Qt, (800-900 Qt) maize per annum. The company has a plan to open branch outlets and arrange agents in Mecha and other areas. The new comers in the business in the area like MU which is currently not using maize and other



feed suppliers agents in the area are only potential customers for the future. When the demand for feed develops it will increase but in the short future it will not be more than 5,000 Qt per existing feed mixing plants.

There are national level big feed suppliers who are active in the poultry industry like Alema farm which buys 40,000 - 50,000 Qt maize, per annum. Big volume buyers are looking cheaper options and their suppliers can source from more competitive areas. For example, Wongele getting maize at factory gate with 450Birr/Qt from a regular supplier who is sourcing from Bahir Dar Zuria and other cheaper places. When transport cost and other related costs are taken into consideration the margin will be very much limited to source for Mecha wholesalers. When the maize price increases they are looking to other substitutes too. Availability and price of feed is one of the critical issues for livestock development.



The feed industry has its own challenges like working capital, market outlet and promotion. For the majority the feed is coming from other sources including different crop residue including maize stem and food processing factory and local drinks by-products. In Mecha by-products of Areke is one of the feed sources for many households. About 5.6 million¹ liter fluid (*Birinite*) byproduct is used as a feed for many households. Households who don't keep livestock sells 7- 8 Birr per 20 ltr *Birinte* (1 plastic container). Currently maize volume that goes to the feed industry is not a very attractive segment in the very short run as a bigger demand sink for producers in Mecha area. In the future with the livestock development interventions and feed industry stimulation it may become one of the possible markets. In the short run it can be considered as one of the available options to expand opportunities.

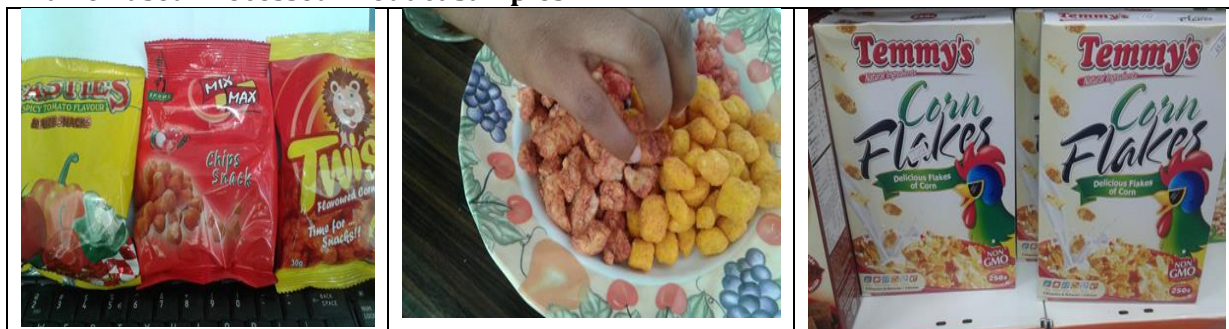
Food processing – industries – BD and surrounding: There are more than 11 flour factories in BD, almost all focusing in wheat flour supply. Among which Guder Agro-Industry has the experience of processing maize (flour, Kiniche, and maize oil) in the past. Have been in operation in supplying the maize products for two years and stopped the processing before four years. The capacity was 3000Qt/month which was about 36,000 Qt per annum. The main reason they stopped was the limited market demand for maize flour and maize oil. The demand for Maize Kiniche was good but it is not profitable without the flour demand for the company. They didn't make any recent market assessment and the factory doesn't have a plan to restart the processing in the short-run. If they start processing they may source from their production farm and they will source only for their supply gaps.

There is upcoming nutritional food processing company around BD with the facilitation of Clinton Health Access Initiative (CHAI) with its Nutrition Program. It is expected a MNC to establish a processing plant with PPP initiative to supply different affordable nutrition rich products for rural and urban consumers. They are targeting also institutional buyers like WFP, which promised to buy 250,000Qt products when they start business. CHAI is facilitating the process of establishing the factory in Bahir Dar Zurai and it is expected to be operational in 2016. The processing plant will have 450,000 Qt annual capacities from which 300,000Qt will be maize as per the plan.

Other most food processing companies who buy maize procure about 4,000-6,000 Qt maize per annum with the limited market demand for their products. Most of the factories heavily dependent for WFP market, which is declining and a number of them also stopped buying significant volume of maize. They process only when they have contracted market. There are few companies who joined the industry recently who use maize for snacks and baby foods. ENRICH PLC is one of the new companies which produce snacks and breakfast's products using maize; The Company uses maize for its snacks, cornflakes and other related products as indicated in figure below. The company is using currently less than 5000 Qt maize. The company is working also to enter to export market and expand its supply capacity. The main challenge for companies like ENRICH PLC is the market size. It is very limited and it needs mass promotion which is not possible with individual companies' financial capacity. The company promotes its products in TV and Radio to some extent but it will take some time to become bigger market with companies' limited promotion. The company is willing to work with cooperatives for better quality maize sourcing. Now the company is getting maize at the factory gate which is at the outskirts of Addis with a price of 530Birr/Qt with Nov, 2014 price. They accept clean maize with acceptable moisture content, free from weevil attack and other pest damages. Support to promote maize related products may be one of the long term investments for more market pull effects.

¹ From 1 Qt (10 Jirane container) * about 20 ltr = 200 ltr multiplied by maize used for Areke production = 280,000 * 20 = 5.6 million ltr

Maize Based Processed Product Samples



Another company called Guts Agro Industry which was established in 2005 currently produces maize-based Lembo snacks as one of its products. The company was supplying significant volume of Ready to use Supplementary Food (RUSF) to World Food Program, between 2009 and 2013; the company supplied a total of 280,000 Qt of RUSF, an average of nearly 6,000 quintals a month. The company started working together with farmers in Sidama area in SNNP region in collaboration with Sidama Elto Union and other supporting projects to improve production and post-harvest handling of Maize.

Other maize products: Starch, industry level alcohol, food oil and biofuel are among the possible emerging maize related products.

- **Starch:** From the official import figures Ethiopia imported 41.94 million Birr value (1.776 million Kg) and 24.73 million Birr value (1.262 million Kg) different starch products in 2013 and in 2012 respectively. With the textile industry and other manufacturing industries emergence which uses different adhesive and starch related products the volume may increase in the future. At the same time there are also other competing sources for starch production.
- **Alcohol:** Alcohol production for medical and other business and beverage industries are also the possible markets for maize. Currently most alcohol producing companies use molasses which is cheaper than maize if there is no shortage. To use maize they need additional processing steps and technologies to convert it to alcoholic drinks. There are companies working to establish such kind of facilities around Addis. Supplying existing locally produced alcohol to commercial alcohol producing companies may be one possible option but needs further investigation. The initial challenge will be looking technologies for treatment of the smoky and other flavors in existing local produced drink Areke. On top of the local companies' production, more than 787,000Kg non-beverage alcohol was imported in 2013 with a value of 130 million Birr in 2013. The volume imported in 2012 is much less than that (251,262Kg with 25,885,540 CIF value)².
- **Oil and others:** As per companies who experienced in the past Maize oil acceptance was very limited. Even though it is very small as compared to the national edible oil consumption, 17,291 liter maize mostly edible oil is imported from different countries with CIF value of 1 million Birr in 2013 and 46,641 ltr imported in 2012 with 1.78 million Birr

² Source – Ethiopian Customs and Revenue Authority

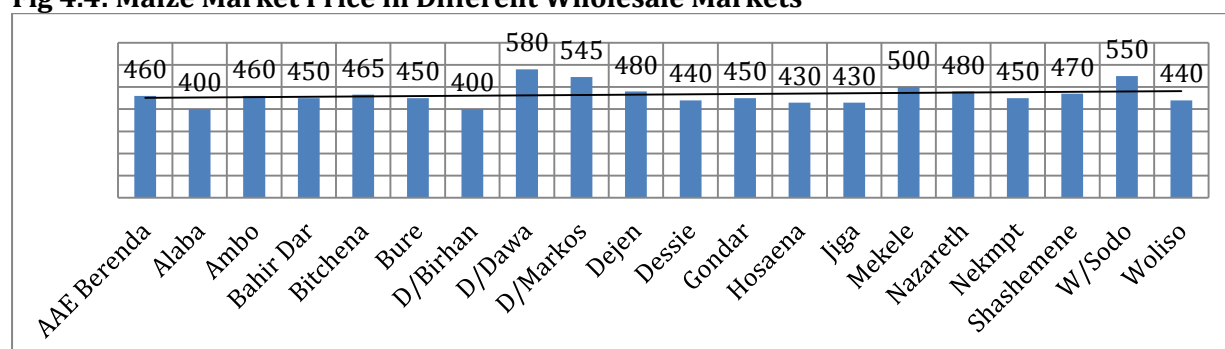
value. Using maize for biofuel and other purposes may not be the priority areas in the short run.

- vii) **Export market:** Maize is not exported currently legally as there is export ban in the country. Before the export ban there was practice of maize exporting to neighboring countries through the borders mainly to South Sudan, Kenya, and Somalia. EGTE was one of the main exporters. If it is allowed with the maize production increase the transport cost is one of the challenges which make the producers in central part of the country not competitive. The export ban lifting may encourage exports in the border areas and will contribute for the price increase at national level which benefits also the central level producers.

New products like baby corn may be one of the possible products by assessing the progress and competitiveness of Ethiopian producers in collaboration with the available local partners like Koga-Veg PLC which has a plan to engage in-growers then to graduate them to out-grower starting with 20 farmers then to reach 1000 out-growers in Mecha area.

4.4. Price Fluctuations

Fig 4.4: Maize Market Price in Different Wholesale Markets

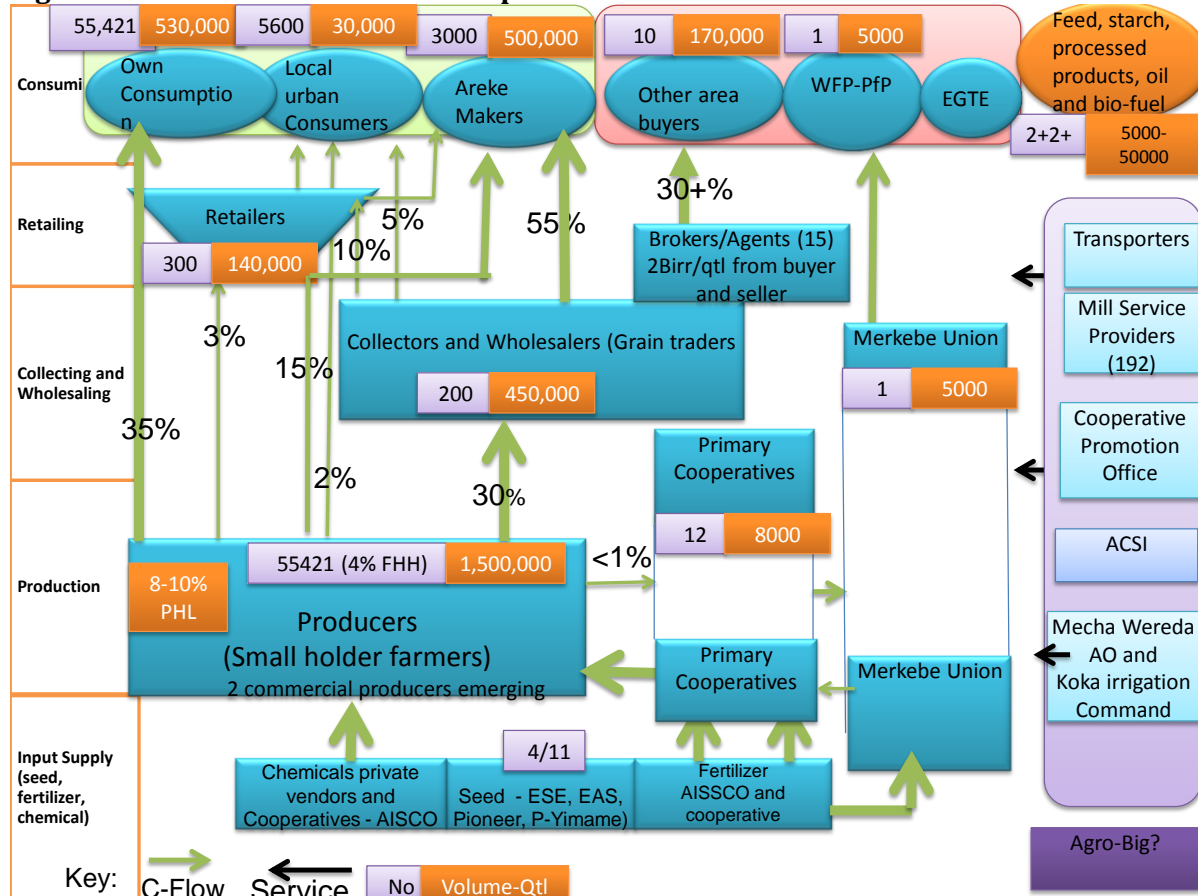


Source: EGTE

4.5. Main Value Chain Actors

As indicated in Fig 2.1, main actors in the maize value chain include input suppliers (seed, fertilizer, and chemicals), large number of small holder farmers, collectors and traders, primary cooperatives and MU. In secondary actors category there are private service providers (mainly transport and milling service). There are public organizations and projects that are providing extension and other capacity building service for the small holder farmers and their organization. From financial institutes ACSI and CBE are providing loan for input purchase and working capital. Actors existing situation, no, volume, main functions and their constraints briefly explained in the sections below.

Fig 4.5: Mecha Maize Value Chain Map



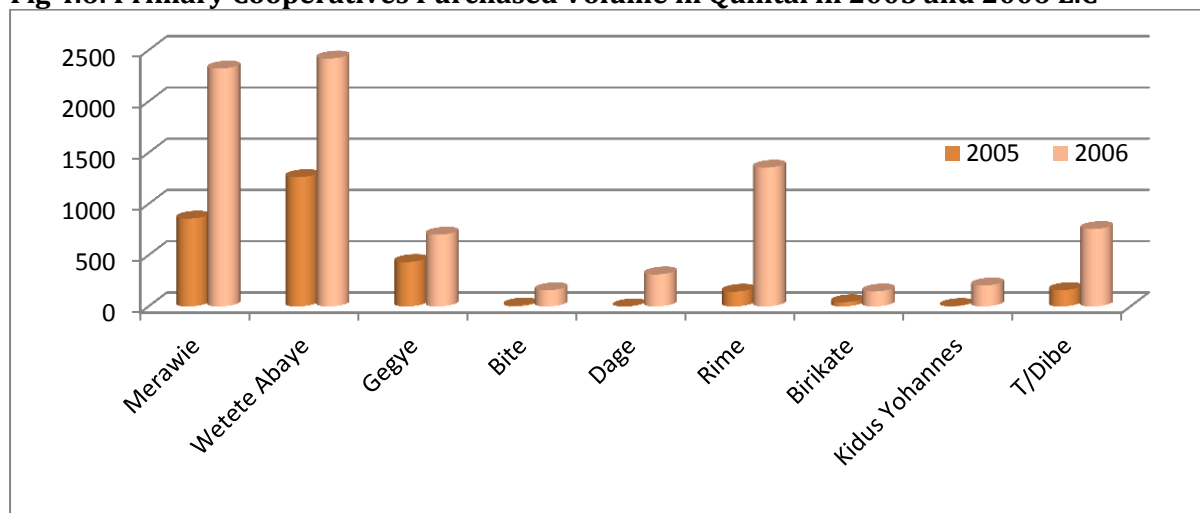
Bulking and Trading

A number of actors are involved in bulking and trading; following is a review of the main actors.

Multipurpose Cooperatives: There are 12 primary multipurpose cooperatives in Mecha that are engaged in grain marketing and other agricultural related activities. All of the primary cooperatives are members of MU. There are also other 12 irrigation cooperatives but their main focus is in the management of the irrigation facility 1 in each irrigation block.

From twelve multipurpose cooperatives nine of them were engaged in maize marketing in the last two years. The total volume they purchased were 8,372 Qt in 2006 E.C. (2013/14) and 2,911 Qt in 2005 E.C. (2012/2013) which is less than 1% of maize traded volume in Mecha during the respective periods. As indicated in Fig 2.13, there is increase of volume purchased in 2013/14 season as compared to 2012/13 year for all primary cooperatives. Of all the primary cooperatives Wetet Abay and Merawi primary cooperatives are the top two buyers in Mecha. They received working capital from MU to procure maize. All of them bought to supply to MU but the extra volume they bought sold to traders on tender basis some also sold with loss due to the price fall in the year. Even though the volume is small Koga Union also started engaging in maize trading and bought 240 Qt in 2013/14 season.

Fig 4.6: Primary Cooperatives Purchased Volume in Quintal in 2005 and 2006 E.C



While engaged in the bulking and trading, their main challenges were working capital and limited purchasing personnel (2 purchasers) who will make serious quality checking, weighing, and payment. It becomes a challenge because they are expected to assure the quality and to complete the procurement in a short period of time to fulfill timely delivery for WFP contract. Some farmers indicated that they lost interest to sell to the primary cooperatives because of the long time it takes for the transactions. They mentioned it may take for them to spend the night there because of the long time it will take to serve one customer as compared to traders which will be completed within minutes. To keep the farmers interest and to procure more maize there should be an improvement in the procurement process at primary cooperatives level. Taking lessons from other areas and may be looking better options like voucher or other simple system. Lack of appropriate storage is another problem for the primary cooperatives. Primary cooperatives that has store also occupied with fertilizer.

To take more function the primary cooperatives need storage and packing facilities or Koga union should be supported to take the bigger aggregation role with better capacity. If such facilities fulfilled and the capacity enhanced the produce can be collected and transported directly from their store, which minimizes two levels of loading/unloading and packaging which is done currently by MU. Considering Koga union limited capacity the better options should be selected because some of the primary cooperatives have better practical trading experience than the union to take more functions with limited support. Making bulking and delivery to final buyer directly from primary cooperatives store may be possible with capacity building support to primary cooperatives. Currently maize cleaning and repacking is done at MU level which can be handled at local level with youth groups or cooperative members. There is a possibility of improving quality further by enhancing further farmers' capacity and encouraging doing the necessary cleaning at HH level. Installing quality based payment system (passing the possible cleaning costs to better quality delivery) that will sustain quality practice at farmers' level for future better product delivery.

Merkeb Union (MU): is one of the strongest unions in the region with a total staff of 87 with 7 technical staff working in input and output marketing. The union is engaged in input and output

marketing and provision of different services. In its input marketing it supplies to its member cooperatives fertilizer (DAP, Urea, NPS), chemicals (2-4d, round up and Prim gram, there is shortage for that), the dominant business transaction for the union. It was also engaged in seed supply before the start of direct seed marketing. They are not supplying any type of farm tools for maize or other crops until now. In their output marketing in addition to maize they also trade rice, tef, wheat, wheat flour using their own milling facility. For financing its different business the union uses its own capital and credit service from Commercial Bank of Ethiopia (CBE) that is mainly for fertilizer transaction.

Maize is the bigger volume traded commodity for MU which is taking much of the marketing personnel team time during the peak trading season. It requires completing the collection and delivery in few weeks' time. They have collected 49,161 Qt of maize from their member cooperatives in 2013/14. From that they have supplied 45,000 Qt to WFP by cleaning and packing using their own facility. From the total volume purchased in the season about 12% (5754 Qt) is sourced from Mecha Woreda primary cooperatives. To offer contract to primary cooperatives for the upcoming trading season, they were waiting for WFP contract during the study data collection time. Taking the union internal capacity, they planned to purchase 80,000 Qt maize. As per the maize alliance team, the upcoming season procurement will be divided into two arrangements, (1) quota based and (2) tender based competition among the unions. MU has very good track record in the past and with the regional maize alliance team members estimate, MU expects to get a contract for about 43,000 Qt (18,000 Qt from quota + 25,000 Qt from the tender). The quota based volume started to be reduced and cooperatives unions expected to enter into more open competition to get offer from WFP. Except WFP the union doesn't have any maize buyer until now. The remaining volume (4008 Qt) from the total purchased volume in 2013/14 still kept in their stock.

They are buying from cooperatives with two types of pricing options, (i) market price at the time of selling and (ii) price set taking primary cooperatives buying price, their costs and a margin of 20Birr/Qt. They provide weekly wholesale price that is collected from Bahir Dar market. They also provide loan service, training and other important information to their member cooperatives in collaboration with other partners (AGP AMDe project, SNV-C4C, Ageritera).

The union stores maize for short time only for about 2 months' time. They use rented warehouse service. They do the cleaning and packing using packing machine in pre-labeled sacks. They recognize chemical supply shortage, price fluctuation/ declining trend while expected to increase and getting another reliable buyer as areas that needs attention.

Private traders (wholesalers and retailers)

Local collectors and wholesalers: There are more than 200 collectors engaged in Maize bulking and trading based in Mecha different towns from which Merawi and Wetet Abay markets are the main ones. They collect from farmers mainly on market days. Brokering is not common in the collection, farmers directly supply to their customer or by comparing the market price they can sell to one of the traders in the market. It is estimated 30% of the total maize produced passes through the collectors. They sell about 20-50% depending on the market demand to other area buyers through brokers. The remaining percentage they sell to local buyers mainly Areke makers (45%).

Fig 4.7: Local collectors at Merawe Market



Local retailers: There are more than 300 maize retailers who buy maize from maize collectors or directly from farmers. They retail on market days for household consumers from rural or urban areas or for Areke makers.

Brokers: There are about 15 to 20 brokers with different capacities. They are very important players for maize traded out of the area. They are receiving order from buyers in other areas mainly from northern part of the country (Tigray, North Wollo, Gonder) and rarely also from buyers from Addis and Adama when there is shortage of production. They will check available volume, quality and price range by going to the different collectors' shops and stores. They are more trusted by the buyers and if they agreed with the price and quality, they will get 2Birr/Qt from both buyers and sellers. The cash transfer will be made to the broker and they are the one who make the payment to the seller. Sometimes the brokers will take the responsibility for credit sales and the buyer will send the money after few days of the transactions.

Ethiopian Grain Trade Enterprise (EGTE): was established under the name of "Grain Board" in 1949. The Enterprise was re-organized in 1999 for the purpose of purchasing grain, oilseeds and pulses both for local wholesale and export. The Enterprise has diversified its business to include Coffee export trade since 2009. Its head office is located in Addis Ababa and to expand its market coverage the Enterprise has 10 branch offices and 91 trade centers throughout the country. The enterprise is buying maize occasionally for national reserve and market stability about 500,000 Qt annually and for next season has a plan to buy 670,000 Qt. Sometimes the enterprise sources from Mecha but it is not a visible actor in the area. As per the organization report³, EGTE signed agreements with cooperatives in Amhara region with Gihon, Damot, Wedera and Admas. Before export ban EGTE is also the lead exporter of grains. Now become under the newly established Ethiopian Trading Business Corporation.

4.6. Supporters and Enablers

Extension/Technical and Other Business Development Service (BDS) Providers

There are commercial service providers like transporters and millers. There are public service providers which mainly focused in the production side services. Woreda Agricultural Office, Cooperative promotion office Trade and Transport office are among the local organizations which are providing support at Woreda level. There are projects and NGOs which are providing

³ Official website - egte-ethiopia.com/

different support activities. Main active supporters and enablers' service and areas of support briefly indicated below.

Transporters: At local level donkey carts owners are the main transport service providers. They are many in number providing transport service from villages to market places, from harvest place to farmers' house/store, village to village by charging on average 10-20Birr per Qt based on the distance. ISUZU, FSR and sometimes heavy trucks owners from the area or other places provide the transport service for maize to different corners of the country. Availability of transport service is not an issue.

Milling service providers: There are more than 150 millers in the areas providing milling service for rural and urban households and Areke makers. They are critical service providers and their main issue is power supply disturbance/shortage.

Mecha Woreda Agriculture Office and Koga Irrigation Command: Responsible for the extension service in crop, livestock and natural resource management. There are about three full time extension agents (DAs) in each Kebele 1 responsible for crop specific issues and 1 additional coordinator/head in each Kebele. There are 22FTC with demonstration site. At Woreda level there are crop and extension team who are providing guidance and support to extension agents in Each Kebele. Farmers met during the focus group discussion mentioned that they have very rare visits for specific commodity issues. The ratio farmers to DA are also is big in Mecha Kebeles as confirmed by the Woreda office experts because of the HHs number in each Kebele. The big ratio will make difficult for extension agents to respond timely for urgent supports required while farmers competing with the season. There were attempts to demonstrate some farm tools like crop threshing, chopper for green and dried crops including maize stem at Woreda level and in FTC. There is training package manual prepared and shared to extension workers. Zonal and regional level offices providing backup service and involving by updating the crop packages. Focus of training content and method of message delivery is an area to be enhanced. The irrigation command area office has 1 irrigation agronomist per block and supporting experts at coordination office level. Responsible for the irrigation time production only. During irrigation season maize is not the main crop. The office has marketing experts started dealing wheat marketing with MU.

Cooperative promotion office: Responsible for organizing producer groups in the rural areas for input, marketing, consumer goods, credit and saving, or other common services. There are 12 multipurpose cooperatives mainly working in distribution of fertilizer, sell of common agricultural produce including maize and distribution of consumer goods.

BoTMD & Woreda Trade Office: Trade regional and Woreda offices are supporting the market linkage facilitation and market information provision. The following services are rendered by the office, (i) strengthening of market linkages; (ii) disseminating market information, (market price information collection on a weekly basis (Wednesday & Saturday) and reported to the respective Zone Office every Monday and average price information is posted on information board; (iii) creating conducive market condition for traders (e.g. map prepared to cluster perishable product traders under market shade in Merawi town). The office responsible for registering and providing license and renewal for grain collectors/wholesalers and retailers. They are collecting main commodities market price including maize. Making meaning from the data and availing for farmers and other actors use is limited.

ARARI – Adet Research Center: is one of the research Centers under ARARI which has research station in Mecha. There are research trials completed and undergoing that covers maize production in Mecha. To mention (i) Fertilizer rate recommendation trail completed and

compiled in ARARI completed research proceedings. (ii) Maize cropping pattern - on going trail
(iii) Crop water requirement for irrigation production, completed recently.

Projects and NGOs working in Maize: There are many projects which are working in maize that are housed in BoA and coordinated by other NGOs (AGP-AMDe, ATA, CHAI-NP, CIMMYT, and QMP). The projects are supporting in improving seed availability and quality, post-harvest handling and supporting producer organizations. The major ones highlighted below to see potential complementarity and synergies during implementation:

- **AGP AMDe** – it was the market pillar component of AGP, USAID project the first phase completed and the second phase not started. The project was supporting Cooperative Unions to procure maize for WFP-PfP in collaboration with other actors. They provided training in post-harvest handling to primary cooperatives members and staff, mainly four unions including MU; Mecha was not their target area but working with MU which has member cooperatives in Mecha. They are supporting MU to enhance their management and store capacity, 50,000 Qt capacity store were under construction for MU and other cooperative unions with match making fund. With other maize alliance members, they were supporting promotion of new varieties (BH 661, and Pioneer Limu and Shone) with the involvement of private sector. After the promotion the new varieties will be included in the region package. There are two additional projects of ACDIVOVA which have activities related to maize (i) seed project which is promoting the new variety seed and (ii) feed project which is looking maize as one of the possible source.
- **Agricultural Transformation Agency (ATA):** Maize is one of the commodities that are picked in the initial group. There is coordination office at regional level but leadership of most commodity specific activities lies at national team. The national team developed Maize strategy for 2013 – 2017 and started some national level activities as part of its maize initiatives. Working with Maize alliance members in improving productivity and quality looking the demands issues as well. In short term interventions, assuring quality supply to WFP by increasing participating Unions and quality of delivery. For the long term in the process of engaging the private sector now trying to understand their challenges and plan to organize a Bazar and private sector workshop. The new Agricultural Commercialization Cluster (ACC) national and regional unit which is under establishment also expected to promote commercialization and agro-processing in different selected cluster. Mecha area as the maize belt in the region expected to be one of the intervention areas in the coming months.

Financial services

ACSI and CBE have a branch in the area which provides the common banking services. ACSI is the biggest MFI in Amhara region and which has branch in Mecha Woreda. Loan for Agricultural activities is the main portfolio and followed by services for MSEs in the towns. Fertilizer, animal fattening, petty trading is the common loan they are providing in the area. They have started voucher system for fertilizer trade. Commercial Bank of Ethiopia has a branch in the area. Merkebe Union Multipurpose gets working capital loan mainly for its fertilizer trading business.

Inadequate access to financial services is one of the major bottlenecks in rural areas. Microfinance institutions (MFIs) and rural savings and credit cooperatives (RUSACCOs) are the only formal financial institutions providing financial services to poor rural households. Currently, only about 15% of rural households have access to savings and credit services. Women account for nearly 50% of the client base of MFIs and RUSACCOs.

Cooperatives have inherent constraints to develop their own capital and to provide collateral for commercial loans. The lack of working capital prevents cooperatives to participate in crop

marketing. Private traders dominate the market and set the purchase prices, because they pay cash on delivery to the farmers.

Amhara Credit and Savings Institute (ACSI)

ACSI is one of the 32 microfinance institutions (MFIs) in Ethiopia and among the largest and best performing MFIs in the country. It is the main financial service provider in the rural areas of Amhara region. ACSI has a wide outreach with a network of 401 branches covering all woredas and 3,449 kebeles of the region with 9,000 staff. ACSI has one million active borrowers and 4 million active savings clients.

Granting of agricultural production loans to farmers is based on business plans submitted by the loan seeker, which are appraised by ACSI for borrower's eligibility and loan feasibility. The amount of loan taken by farmers ranges between birr 4,000-5,000 for onion production at an annual interest rate of 18%. Loans to individuals are usually provided against group collateral. All loans have to be repaid within one year.

ACSI has five branches in Mecha with 64 staff. Most of the staff works in the field dealing directly with farmers' agricultural production loans. Good systems have been developed for the follow-up of loan utilization and loan client relations. Most loans to farmer families are signed in the name of the wife. Women are recognized to be more diligent in dealing with financial issues. Repayment in Mecha and Fogera woredas is practically 100%.

AgroBIG has supported ACSI with a Loan Fund of 5.7 million birr. The Fund is to be used for working capital lending to agricultural cooperatives at 13% interest for the selected value chains and for wholesale lending at 11% interest to RUSACCOs in the Mecha and Fogera woredas. Generally, farmers and cooperatives prefer to borrow from the cooperative financial institutions at lower loan interest and to receive an annual dividend from the cooperative financial institutions.

Cooperative financial institutions

A large number of rural cooperative financial organizations have been established in the country to cater for the financial needs of agricultural and other cooperatives and their members. The rural cooperative savings and credit institutions in Ethiopia comprise of a total of 113 savings and credit unions and more than 15,000 rural savings and credit cooperatives (RUSACCOs). These are members' own institutions and capital for lending is collected from members' share contributions and savings.

The Cooperative Promotion Agency (CPA) is mandated to supervise and audit the operations of cooperative financial institutions according to the Cooperative Law and a large number of CPA field staff is engaged in training and supervision of these organizations and the implementation of the RUFIP programme.

There are 26 cooperative savings and credit unions each serving their designated woredas in Amhara region. They provide loans to farmers' agricultural cooperatives and other types of cooperatives that are members of the unions. This is the main lending channel to RUSACCOs for additional lending capital for loans to individual farmer members. Loan amounts are relative to the share and savings contributions of the member organizations. Loan interest is 10-12% for loan duration of one year. Repayment is nearly 100%.

At the kebele level, farmers receive loans from a total of 2,825 rural savings and credit cooperatives in the Amhara region. Lending interest is stipulated by the bylaws of the RUSACCO as agreed by the members and is currently 12%. Normally the loan duration is one year and group collateral is used for repayment security. Capital for lending by RUSACCOs is limited,

which restricts farmers' opportunities to invest in agricultural production. Repayment culture in rural lending is excellent and normally 100% of the loans are repaid.

Other banking institutions lending to rural farmers and agricultural cooperatives

The National Bank of Ethiopia governs and regulates financial institutions in the country. Foreign investment in the financial sector is not allowed in Ethiopia. A large number of banks operate mainly in large towns and are increasingly widening their branch network also to the woreda capitals. Farmers' cooperatives can receive loans from these banks at commercial terms and by providing collateral for repayment security.

AgroBIG grants

AgroBIG provides co-funding to value chain actors for investments in the selected value chains, through three grant funds:

- 1) Innovation, Demonstration and Research Fund (IDRF); 85% contribution for development and demonstration of innovative approaches and support to research programmes.
- 2) Value Chain Fund (VCF); 85% contribution for small farm investments in mechanization and farmer services.
- 3) Matching Grant Fund (MGF), 50% contribution for large scale investments in post-harvest handling and processing for markets.

To benefit from these grants, applications are to be made that are screened and awarded by a committee based on their usefulness in improving the efficiency of the value chain.

Value chain actors' relationship/governance

The maize value chain shows more of a spot market relationship which is based on price, quality standards and bargaining and negotiation for every batch of transactions. Even though the farmers have the choice to compare price offer from the different buyers and market days the collectors and brokers have more saying in the negotiation. The local collectors will set the price taking the national level price information or the offer they got from the brokers and their own personal speculation. Volume of maize aggregated at producer organization level is very much small with the limited big buyers which give more negotiation power for the producers.

Business Enabling Environment

The policy environment has had various effects on the maize value chain, particularly price policies. Since the early 1990s, the tight regulations regarding the grain trade have been loosened. Recent government policies and strategies, including the Agricultural Development Led Industrialization (ADLI), the Sustainable Development and Poverty Reduction Plan (SDPRP), and the Plan for Accelerated and Sustainable Development to End Poverty (PASDEP), Growth and Transformation Plan (GTP) all highlight the importance of cereals in overall economic development. Another important policy document for the agricultural sector is the Policy and Investment Framework (PIF; 2010/11-2014/15). One of the strategic objectives of the PIF is to accelerate agricultural commercialization and agro industrial development. The commitment of the government is reflected in training and deploying four development (extension) agents to each Kebele (responsible in the areas of crops, livestock, NRM, and home economics), establishing farmer training centers in all Kebele, and strengthening research-extension-farmer linkages to improve technology generation, transfer, utilization and feedback. ATVETs train DAs and DAs in turn train farmers.

Specific to Maize with the leadership of ATA five years (2013-2017) maize development strategy developed. As indicated in the strategy document the vision for the maize sector is to see greater food security and increased incomes for smallholder maize farmers realized through enhanced productivity and better access to markets that are sustainable and efficient.

Generally speaking in Ethiopia, most cereals are non-tradable – meaning they are neither exportable nor importable. As a result, with the exception of food aid import, all major cereals are domestically grown and consumed. In Ethiopia, cereals are non-tradable due to high costs of transporting cereals both from the main port in Djibouti to primary consumption areas and from the main production areas to the port. Thus, the cost of transport is so high that it is not profitable to import or export cereals (IFPRI, 2010).

Like in other African countries such as Tanzania, Ethiopia uses government policy to restrict the export of cereal crops that it considers critical to food security. Although this type of measures is introduced for the benefit of the country, it may not always be beneficial for everyone. An impact of this type of policies is usually that it reduces the price that farmers receive for their commodity.

There are systematic capacity limitations at all levels and in all of the sectorial institutions, but the problem is most severe at the Woreda level. Capacity limitations include human resources, working premises, equipment, communications, machinery, furniture and other facilities. ATVETs and FTCs require capacity building and improved facilities in order to strengthen their competencies to upgrade the skills of DAs and subject matter specialists. There is also weak research-extension-farmer linkages and lack of communication and collaboration with the private sector. Implementation of policies related to food safety and quality improvement to increase domestic and international consumer confidence is also crucial.

5. Cross Cutting Issues

5.1. Gender Inequality

Women accounted for 48% of agricultural labor in Ethiopia, and were responsible for 60-80% of household food production (ATA, 2014). Except ploughing women engage in almost all maize production activities from planting to harvesting and post-harvest handling. Women involvement is relatively high in post-harvest activities (shelling, packing, and sorting). In times when the men are busy in field activities women also occupied by food preparation, home management, taking care of children and other agricultural activities. Although part of the grain harvest is used for home consumption and sold to cover input costs and household expenditures, men have a dominant role in controlling over the benefits of the harvest. Involving women in the appropriate technology development and training provision is limited. Beyond the production level women are more visible in the value chain in maize retailing, Areke and Tela preparation, Areke collection and retailing. Current Areke making process has health and safety issues and it needs attention to reduce the burden in women and family members by looking improved technologies.

In Ethiopia and in the AgroBIG woredas, women are generally disadvantaged. In meetings, few women attend, and their voices are often not heard. Due to many socio-cultural values and norms men have freedom of mobility and participation in different meetings and consequently have greater access to information. Therefore, male heads of household seem to be more likely to adopt new varieties, technologies, cultivation practices, etc. AgroBIG conducted a gender study at an early stage, which identified possible intervention. In particular, AgroBIG has implemented targeted interventions, and avoided standard awareness raising trainings. AgroBIG is also in the process of establishing a very special loan fund exclusively for women entrepreneurs. The support to family financial literacy that AgroBIG has channelled through ACSI, is another example where women have been in the focus.

5.2. Reducing Social Inequalities

Taking the local situation AgroBIG has given a strong focus on creating efficient and profitable value chains that is inclusive. At operational level the inclusion of vulnerable groups like people infected with HIV/AIDS or having disabilities is not an easy one, considering that much hard work is needed in the field. For AgroBIG some targeted interventions could be possible.

5.3. Climate Change Adaptation

Issues directly related to climate change adaptation and mitigation has not been high on the AgroBIG agenda. Soil conservation activities are for instance beyond the scope of the Programme. The activities undertaken by REILA can be seen as a support activity in that farmers, once they are secure on their land, are prepared to invest in land improvement including the planting of trees, which means being better prepared for hard times. Soil acidity is an issue in the area and there is limited focus for that and required intervention is almost nonexistent. Crop rotation practice decreased significantly which contributes for soil fertility decline and different pest and disease occurrence as result encouraging more chemical use. Organic fertilizer use and promotion is very much limited. Existing chemical purchase and use not led by professional which has an impact for important insects like honey bees and for human beings with the limited care for safety procedures.

Measures that have been taken by AgroBIG have included creating awareness of more efficient use of water in irrigation systems as well as considerations that have been identified during the Environmental Impacts Assessments that have been conducted. AgroBIG has taken serious measures to prevent and stop the wide and irresponsible use of chemicals that in the past have taken place in the past. Awareness and mitigation campaign was undertaken. Sprayer groups in the area created a responsible use of the chemicals. Study was undertaken to understand the acidity problem level in the area.

6. Constraints to be addressed

6.1. SWOT Analysis

Mecha Woreda Maize and value chain Strength, Weakness, Opportunities and Challenges/Threats identified and summarized below.

Strength

- There is experience and tradition of using improved seed and inputs
- Common seed and fertilizer supply is not a problem
- There is irrigation access
- Maize is one of the top commodity in government extension package
- ACSI and other financial institutes are working with voucher system and other possible new services
- Local use of maize for own consumption, Areke preparation and use of by-products for livestock development
- Road access to different corners of the country and near to the regional town for different input and services

Weakness

- Limited market sink options and significant market price fluctuation
- Soil fertility is very low and cropping pattern – now becoming grain after grain

- Seed quality due to management and genetic purity
- Seed suppliers capacity limitation (cleaning and other facilities)
- Bulk seed recommendation for the different market segments (for household use and other purposes)
- Shelling done manually which contributes for quality and post-harvest loss
- There is limited access for improved storage services
- Productivity still low for many smallholder farmers as compared to the potential and better performing practice in the Woreda
- Limited access for different chemicals and other farm tools
- Maize traders are not well organized for horizontal integration and service
- Transaction happen not in long-term business relationship and limited trust among the value chain actors and supporters
- Lack of cooperation between actors and stakeholders and limited awareness level in some of the sector potential and service required and common visioning
- Limited extension agent and farmers contact for practical commodity specific challenges
- Heavily dependent in nature

Opportunities

- Upcoming possible investments
- ACC - Agricultural Commercialization Cluster initiatives
- There are commercial farms started in the area for new product development and market access
- Many graduate students which can pick different service and input market provision

Threat

- Disease and pest, national level
- The engagement of private sector may take time and possible demand sink delay may discourage farmers
- Dependency in limited seed varieties and loosing choice for low input investment and other preferences (drought fear, taste, organic)

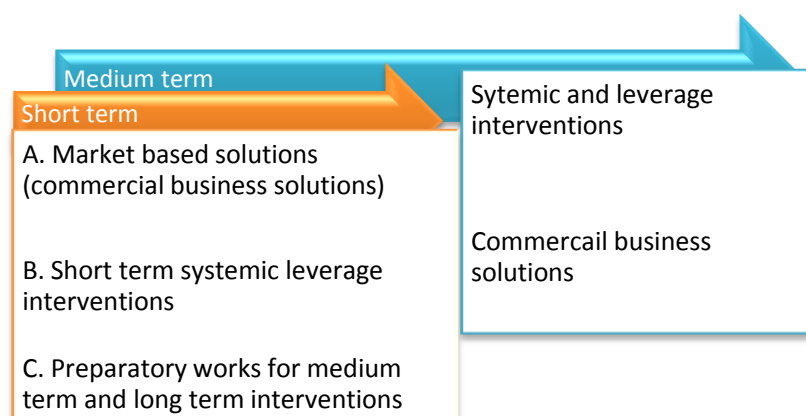
6.2. Agro-BIG Interventions

Upgrading and Interventions Choice

The common value chain upgrading strategies are process, product, function or chain upgrading. A combination of product, process, function and chain upgrading may be required for Mecha Maize value chain to make it more competitive taking the possible demand sink, local context, actors' strength and required time for transition.

To make the strategies more concrete, proposed interventions categorized in two main parts:

- (i) Quick wins and short term interventions: the next year project activities will be aligned to that



- ✓ Possible market based solutions (commercial business solutions) for some of the constraints
 - ✓ Short term systemic leverage interventions
 - ✓ Preparatory works for medium term and long term interventions
- (ii) Medium and long term interventions which are required for the value chain long term competitiveness and profitability

(i) Short term interventions

Improve post-harvest technology access and use

- Promotion of household level storage technologies – like HH storage sacks/super bags
- Community level store facilities establishment
- Warehouse service provision model development with warehouse receipt system
- Promotion of Maize shelling and other post-harvest technologies with appropriate business model

Productivity improvement

- Test feasibility, demonstrate and promote hand tillage and planting technologies and develop service provision model (agro-service providers group or cooperatives)
- Professional chemicals service provision service development - with appropriate chemicals and service providers (Chemical and other inputs service mobile business crew; professional agro-dealers for effective service and to reduce environment effect)

Seed quality improvement

- Seed cleaning service and facility service for seed supply companies – assess models for better technology seed cleaning service provision and facilitate investment
- Promotion of market segment based seed selection: engage with actors promote availing seed and other inputs/technologies options for the different market segments (i) Rural HH food consumption – QPM seeds and packages (ii) Existing dominant market – white maize better powder seeds

Market information service delivery system

- Market information board for informed decision of cooperatives, local traders not to depend in uninformed speculation

Maize product diversification

- Assess profitability and feasibility of baby corn production for small holder farmers and pilot in collaboration with commercial growers in Mecha

Cooperatives capacity in business management, storage capacity and working capital

- Building existing cooperatives purchasing capacity by facilitating working capital and market information service provision
- Build trading and cleaning capacity of cooperatives and their members – cleaning and packing to deliver packed maize to MU-WFP purchase or other buyers to reduce cost, minimize burden from MU and create employment opportunities at local level

(ii) Preparatory activities for medium term interventions

- Collaborate with ATA and other stakeholders to advocate for export ban lifting and stabilization action in high production seasons
- Encourage national maize products use, support promotion of existing products and product development – work with existing processing companies to promote products of snacks and breakfasts and refine products for the consumer tastes

- Link with cluster development (ACC-ATA) plan of the region; Collaborate with other projects for demand sink possibility expansion – AGP-AMDe, feed projects, LGP-LMD;
- Feasibility studies for starch, alcohol, snacks and breakfast products of different maize related processing facilities and technologies; Promote feasible business options/venture
- Assess possible women friendly household level technologies for existing Areke makers to reduce work/health burden of women and environment
- Link local Areke makers with industrial Alcohol beverage factories for quality test, improvement and refinement process development of existing Areke production in the area for medical and other alcohol purposes; if feasible develop business model and organize and engage women groups
- Link cooperatives with upcoming investment projects of industrial beverage factories that have plan to use maize
- Train and encourage other maize uses at HH level like improving farmers' knowledge and skill in preparing feed at HH level for livestock fattening
- Woreda Sector vision and strategy development with proper market segmentation and engagement of important actors; Sensitize and reengage actors with market driven and demand perspective joint action plan and follow-up for critical areas
- Encourage local traders' collaboration and access to central market information and buyers contacts
- Improve existing extension service quality and delivery method – training material package improvement/preparation and ToT in delivery and preparation of adult training material – critical practice with inclusion of business skill elements with well-structured adult training kits – model package

References

AGP-Livestock Market Development Project, (2013), Value Chain Analysis for Ethiopia: Meat and Live Animals, Hides, Skins and Leather, Dairy; Expanding Livestock Markets for Small-holder Producers, March 31, 2013.

AGRA;(<http://www.agra.org/what-we-do/adopting-hybrid-seed-and-changing-fortunes-in-ethiopia/?keywords=ethiopia>)

ATA, 2014, Maize Sector Development Strategy (Working Document 2013-2017)

Bedru Beshir, Dagne Wegary, (2014) Determinants of smallholder farmers' hybrid maize adoption in drought prone Central Rift Valley of Ethiopia, African Journal of Agricultural Research, Vol. 9(17), pp. 1334-1343, 24 April 2014

Berhanu Gebremedhin, Fernandez-Rivera S, Mohammed Hassena, Mwangi W and Seid Ahmed, (2007), Maize and livestock: Their inter-linked roles in meeting human needs in Ethiopia, Research Report 6. ILRI (International Livestock Research Institute), Nairobi, Kenya. 103 pp.

Boone, P.; Stathacos, J.D.C., Wanzie R. L., December 2008. Sub-Regional Assessment of the Maize Value Chain in West Africa. Bethesda, MD: ATP project, Abt Associates Inc.

CSA, Crop Survey report of 2014, 2013, 2012

Dawit Alemu, Mwangi, W., Mandefro Nigussie and David J. Spielman, (2008), The maize seed system in Ethiopia: challenges and opportunities in drought prone areas; CIMMYT, EIAR, IFPRI.

Dawit Alemu, Wilfred Mwangi, Mandefro Nigussie and David J. Spielman, April, 2008, The maize seed system in Ethiopia: challenges and opportunities in drought prone areas, African Journal of Agricultural Research Vol. 3 (4), pp. 305-314

Demeke M. (2012), Analysis of incentives and disincentives for maize in Ethiopia, Technical notes series, MAFAP, FAO, Rome.

Dereje Bacha and Abdissa Gemed, (2001), Maize Marketing in Ethiopia, Second National Maize Workshop of Ethiopia, 12-16 November, 2001

Ermias Abate (ed). (2010), Proceedings of the 3rd Annual Regional Conference on Completed Crop Research Activities, 1-4 September, 2008, Amhara Regional Agricultural Research Institute, Bahir Dar, Ethiopia.

Ermias, A., Akalu, T., Alemayehu, A.G., Melaku W., Tadesse, D., and Tilahun, T. (eds). (2007), Proceedings of the 1st Annual Regional Conference on Completed Crop Research Activities, 14-17 August 2006, Amhara Regional Agricultural Research Institute, Bahir Dar, Ethiopia.

FAO, (2012), Analysis of Incentives and Disincentives for Maize in Ethiopia, Draft version, October 2012

FAO FAOSTAT (2014)

FEWTS, (2013), Ethiopia Price Bulletin, November 2013

FEWTS, (2014), Production and Market Flow Maps: Ethiopia First Season Maize

IFPRI, (2010), Maize Value Chain Potential in Ethiopia, Constraints and Opportunities for Enhancing System, WORKING PAPER | July, 2010

IFPRI, (2010), Seed System Potential in Ethiopia Constraints and Opportunities for Enhancing Production, WORKING PAPER

Lone Badstue, (January 2013), Strategy for Integrating Gender in MAIZE, International Maize and Wheat Improvement Center, CIMMYT

Malede Birhan and Yilkal Manaye, (2014), Survey study on Feeding Strategies, Challenge and Marketing of Beef Cattle Production in Ethiopia, Middle-East Journal of Scientific Research 21 (4): 669-674.

Sina Marx, (2011), A Case Study of the Koga Irrigation and Watershed Management Project in Amhara Region, Ethiopia, Research report for the project "Re-thinking water storage for climate change adaptation in sub-Saharan Africa, IWMI.

Tassew Woldehanna, Alebel Bayrau, Kindie Getnet and Tsegabirhan Woldegiorigis, (2010), Ethiopian Development Research Institute, A Study on the Formulation of Policy Options and Strategies to Enhance the Participation of Producers, Traders and Processors in the Grain Market of the Ethiopia Commodity Exchange.

Twumasi-Afriyie, S., Demisew, A.K., Gezahegn B., Wende, A., Gudeta Nepir, Demoz, N., Friesen, D., Kassa, Y., Bayisa, A., Girum, A. and Wondimu, F. (2012), A decade of quality protein maize research progress in Ethiopia (2001-2011); Proceedings of the third national maize workshop of Ethiopia; CIMMYT.

WFP, (2013), Ethiopia Monthly Market Watch, January 2013.

Worku, M., Twumais-Afriyie, S., Wolde, L., Tadesse, B., Demisie G., Bogale, G., Wegary, D. and Prasanna, B.M. (Eds.) (2011), Meeting the challenges of global climate change and food security through innovative maize research; proceeding of the third national maize workshop of Ethiopia; CIMMYT, Mexico, DF.