Forage Seed System Assessment: The Case of Eastern Zone of Tigray, Ethiopia

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Abstract
This survey study in titled with the "Forage Seeds System Assessment'' had the objectives to assess the overall forage seed system and to find out its opportunities and constraints in eastern zone of Tigray by taking Atsbi-wenberta and Kilte-Awulaelo districts as sample representative of the zone. The data was collected on Dec, 2014, from 151 sample household heads. For every responsible body to upgrade the status of the farmer on skill, training and means of wealth accumulation systems such as introducing market oriented improved inputs that could upgrade the livestock production and productivities, introducing the improved forage seeds at fair price.
Keywords: Improved forage seed, Eastern Zone of Tigray, Ethiopia.

1. Introduction

1.1 Background

Ethiopia is one of the fastest growing economies in sub-Saharan Africa with growth rates averaging 11 percent over the last 7 years as reported in MoFED (2011).Based on CSA (2013), the country's livestock population is estimated to be 53 million Cattle, 25.5 million Sheep and 22.7 million Goats 1.9 million Horses, 305, 026 Mules, 6.75 million Donkeys, 915,518 Camels, 50.38 million poultry and 5.21 million Beehives.

Livestock husbandry is also the main integral part of farming systems in Tigray. In rural areas of the region, livestock serve as a source of draught power, cash income and food supply to farming households, animal dung for fuel and land fertilization and serve to transport goods and people. According to CSA (2013) livestock census, Tigray region has about 4.07 million cattle, 1.38 million sheep, 3.19 million goats, 2,412 Horse, 4,690 Mules, 692,179 Donkeys, 52,541 Camels, 5.24 million poultry and 229,625 Beehive.

Introduction, popularization and utilization of improved and exotic multipurpose forage crops and trees such as Sesbania spp., Leucaena leucocephala, Calliandra spp. and Chamaecytisus palmensis through integration with food crops cultivation in the mixed crop-livestock system in Ethiopia started in the 1970s to supplement the roughage feed resources (EARO, 2002 and Alemayehu, 2014).

The rising demand for high quality animal products both for the domestic and export markets calls for more inputs into the production process, particularly in the provision of improved level of feeding. This becomes even more important in view of the need in Ethiopia for gradual transformation of the predominantly low-input and subsistent agriculture towards one of market-oriented to increase the contribution of livestock resources to the livelihood of their owners, and hence to the national economy. The challenge is to identify and develop viable options for increased production and utilization of quality feeds in the major production systems (Alemayehu, 2002).

The adoption of agricultural innovation in developing countries attracts considerable attention because it can provide the basis for increasing production and income. Small scale farmers' decisions to adopt or not adopt agricultural technologies depend on their objectives and constraints as well as cost and benefit accruing to it (Million and Belay, 2004). Hence, modeling farmers' response to agricultural innovations has, therefore, become important both theoretically and empirically.

1.2 Stetment of the problem

Crop and livestock production in Ethiopia is constrained by low soil fertility and by low quality and quantity of feed resources (Kruseman et al., 2002). Feed shortages can be attributed to factors such as conversion of grazing land to cropland, overgrazing, high price and lack of feed concentrates, scarcity of feed during the dry season, and generally low quality of available pasture and crop residues.

Forages are effective in increasing milk yields by as much as 50%. Additionally the use of improved forages would reduce the pressure on natural pastures, improve soil fertility and erosion on marginal lands, improve carbon sequestration to mitigate climate change, support system sustainability, and enhance natural assets and system resilience (ILRI, 2009).

Despite these theoretical benefits, of forages uptake among smallholders has been slow in Ethiopia. One reason for this may be the lack of a ready supply of good quality planting material at affordable prices. Further reason suggested could be lack of knowledge to specify and articulate demand for forage seeds, limited technical know-how about seed, and lack of rigorous certification have led to very variable and/or low demand for seed among smallholders. There for, Stimulating forage seed supply could be one way of addressing the feed scarcity

problem in Ethiopia (Ibid).

New agricultural technologies are put to use on the basis of their potential to increase income. Often new technologies are not taken by farmers, either because they do not meet the intended objectives or simply unforeseen constraints prevent their adoption. The questions of technology adoption are vital concerns to researchers, extension specialists, planners, and rural development policy makers. In Developing Countries such as Ethiopia, it is necessary to find out the reasons why new technologies have not been adopted widely by farmers as expected (Mulugeta 2009).

Though there have been various empirical studies conducted to assess the status of the seed system of crop in Ethiopia, to the best of the author knowledge, there were no forage seed studies undertaken in the study area. Moreover, since seed system is dynamic, it is imperative to update the information based on the current status of forages adopted by farmers.

1.3 Research Question

- ✓ What are the strength and weakness
- ✓ Treats and opportunities in the forage seed system?

1.4 Objectives of the Study

The general objective of the study is to assess the forage seeds system in Eastern zone of Tigray with specific objectives of:

- to assess the overall status of the forage seed system
- to identify opportunity and challenges of the forage seed system

1.5 Scope and Limitations of the Study

Time and financial resource limitations have dictated to limit the scope of the study to two of the seven districts of Eastern zone of Tigray regional state. It is also understood that the quality and reliability of data collected by administering questionnaires depend on the appropriateness of the questions and the willingness of the respondents to respond truthfully.

In this case, efforts were made, as much as possible; to incorporate all relevant questions and necessary training were given to enumerators before the field survey. However, as the study is based on one-time survey information, one cannot safely say that all rooms for bias are closed.

Eventually, the study is being location specific in nature due to the nature of agricultural production and farming systems in the country are pursued within diversified agro-ecological, socioeconomic, cultural, and institutional environment. However, the recommendations and policy implications of the study can be used as a basis for further studies in other areas of similar context.

1.6 Significance of the Study

The purpose of the research was to analyze demand, identify organizational, institutional and policy options to facilitate demand-driven and knowledge-based smallholder forage seed development in the country. Specifically, the analysis has pointed out the contextual statues of opportunities and necessities, the patterns of interaction and coordination mechanisms of forage seed system; and the subsector development policy and strategy.

Therefore, the output from this study helps livestock producers, business enterprises, traders and marketing agents to make informed decisions, The findings of this study are also help full to serves as a reference document for researchers to embark on studies of the same or related kinds in other parts of the country And, provides an insight to policy makers, planners and administrators in the formulation of appropriate rural development strategies.

2. Research Methodology

2.1 Descriptions of the Study Area

Eastern Zone is one of the six zones of Tigray National Regional State, with a total area of 13,268.99 km2 (5,123.19 M2). It is bordered on the east by Afar Region, on the south by South Eastern Zone, on the west by Central Zone and on the north by Eritrea. Its highest point is Mount Asimba with 3,250 meters high. The mean annual temperature ranges from 15 to 190c. The climate of the zone is classified in to three agro climatic resources: High land representing 73.4 %, Midland 12.6% and low land 14%. The altitudes of the area ranges from 1500 – 3200 Meter above sea level and the average annual rainfall of eastern zone ranges from 400-800mm.

In the zone there are two administrative towns (Adigrat and Wukro) and seven districts (Atsbi-Wenberta, Ganta-Afeshum, Gulomakeda, Hawzen, Irob, Kilte-Awulaelo and Saesi-Tsaedaemba). Based on Census conducted by the Central Statistical Agency of Ethiopia (CSA), Eastern Zone has a total population of 755,343, of whom 359,638 are men and 395,705 are women; 146,064 or 19.34% are urban inhabitants. This zone is endowed with livestock potential, as CSA reported in 2013 there are 418,656 Cattle, 601,412 Sheep, 217,262Goats, 443Horses, 113,680 Donkeys, 717Mules, 763,542 poultry and 49,374 Beehives.

2.2 Type, Sources and Methods of Data Collection

The relevant quantitative and qualitative data were collected from primary and secondary sources. The primary data was collected through semi-structured questionnaire using face to face interview of the sample households. The questionnaire was pre-tested to check its appropriateness for gathering all the required information. The information includes the overall socioeconomic characteristics of farmers and individuals involved in this business using survey schedule.

In addition, an informal survey was employed to gather qualitative information from different development actors. The study had also used secondary sources such as district and zonal agriculture and rural development offices regarding forage seed production and distribution, researchers in Mekelle agricultural research centers, CSA, ILRI (LIVES regional coordination office), Tigray Agricultural Research Institute (TARI) and NGOs.

2.3 Sampling Technique and Sample Size Determination

In this study, a three-stage sampling technique was employed to draw an appropriate sample. In the first stage, sample of two districts were randomly selected based on agro-ecological zonation and their access to improved forage seeds. In the second stage, in selecting representative sample kebeles from those who have access to improved forages seed was randomly selected, from the randomly selected two districts of the zones considering the probability proportional to size sampling technique. Eventually, 151 sample households from the selected kebeles were randomly selected (Table 3). The sample size was determined using a simplified formula provided by Yamane (1967) to determine the required sample size at 90% confidence level and level of precision at 8%.

$$n=\frac{N}{1+N(e)^2} \qquad (1)$$

Where, n = sample size, N = HH population size study wored, e = level of precision. Hence, the sample size obtained using the formula is about 151(Table 1).

Table 1: Summery of sample respondent selection procedures based on population ratio.

	District			Tabiya			Total HH	
	N	**n**	**%**	**N**	**n**	**%**	**N**	**n**
Eastern Zone of Tigray		K/Awlaelo			Genfel		788	25
					T/A/Kisandid		846	27
					Aynalem		622	20
		A/wenberta			G/naele		810	26
					Hayelom		909	29
					Barka		736	24
Total	7	2	33	19	6	32	4711	151

Source: District office of Agriculture reports

2.4 Methods of Data Analysis

The data were analyzed using software STATA version 11 and SPSS version 16.Appropriate techniques and procedures were used in the analysis to identify the influence of Demographic characteristics, socioeconomic status, situational characteristics and institutional variables of the sample households. Descriptive statistics such as mean, percentage, frequency of occurrence and standard deviation are used to describe the forage seed system of the study area and to characterize the farmers.

3. Results and Discussion

Ethiopian agriculture, as back bone of the economy, through those all years most of the agricultural improved inputs have been introduced for free, nevertheless it is not yet habituate by smallholder farmers of Ethiopia to adopt and use these improved inputs in the intended speed because the phenomena of adoption behavior is determined by different issues such as demographic, economic, attitude and so on. for this reason this study have attempted to examine the existing status forage seed system in eastern zone of Tigray, Ethiopia.

3.1 Descriptions of Demographic, Socio-Economic, and Situational Characteristics

This study was carried on in eastern zone of Tigray in two selected districts (Districts) Atsbi wonberta and Kilte Awlaelo Districts. Three Kebeles from each district and a total 151 households were used for this survey research. The selected households' demographic, socio-economic, and situational characteristics of sample respondents is described as follows using mean standard deviation, percentage and frequency tabulation using STATA 11- computer soft ware program.

Table 2: Summery statistics of the variables

Variable	Obs	Mean	Std. Dev.	Min.	Max.
Age of interviewee	151	47.17	12.64	24	78
Sex of interviewee	151	0.59	0.49	0	1
Education level	151	2.70	2.98	0	10
Farm experience	151	4.38	5.22	0	20
Total farm size	151	0.70	0.46	0.01	2.63
Livestock holding in	151	3.89	2.26	0.29	10.59
Family size	151	3.16	1.56	1	9
Total farm income	151	11107.04	7709.46	1000	40000
off/none farm participation	151	0.42	0.50	0	1
Extension contact	151	27.15	22.45	0	72
Distance to nearest market	151	54.52	40.99	3	150
Distance to input supply	151	49.99	34.50	3	120
Access to credit service	151	0.74	0.44	0	1

Source: own survey 2014 result.

3.1.1 Sample respondent households' demographic characteristics

The respondent households who have participated in this survey were selected randomly and almost 98% of the respondents HH age ranges from 24 to 71 years (table 2). Among the respondents from both districts, about 33.77% and 21.85% of them are in the age range of 36-47 and 48-59 years old which is in the most suitable ages for farming practice, which make it suitable for the study. It is also constituent with 79.47% married, 9.93 divorced and 7.28 widowed, most of the married respondents. Concerning the sex of the respondents, out of the total 151 respondents 59% (89) are male and 41% (62) are female headed households. Education level of the respondent is one of the important factors for household heads to adopt improved forage seeds, as supported by literatures, the summery result in table 5 also showed that the average education level is around grade 3. Likewise, farming Experience is one of the sources of knowledge in agricultural business. In this study farmers with different farming experience were included from zero to 20 years farm experience, with average experience of 4.38 years (table 2) with standard deviation 5.22 in forage planting.

The extensive farming systems mainly enrolls on the advantage of availability of manpower, in line with this the farming system in Tigray though it is now on the progress of modernizing the system to use improved method of farming that could minimize use of manpower it still relay on man power. In the study area the households' family size ranges between 0.7 and 8.5 in man equivalent (Table 5).

3.1.2 Descriptions of household resource endowment

Table 3: the distribution of land and livestock holding of the respondents

Total farm size owned	Livestock holding category during 2013/14 in TLU			
	0.1-4.5	**4.6-9**	**9.1-13.5**	**Total**
0.001 to 1	82	34	3	119
	54.30	22.52	1.99	78.81
1.001 to 2	11	15	1	27
	7.28	9.93	0.66	17.88
2.001 to 3	1	4	0	5
	0.66	2.65	0.00	3.31
Total	94	53	4	151
	62.25	35.10	2.65	100.00

Source: own survey 2014

Land holding is mandatory for farmers for livestock husbandry in relative to their livestock holding, this is rearing of livestock needs some space for their housing, feeding and if possible for grazing. For this reason, it was compulsory to consider both explanatory variable land and livestock holding for the study of adoption and willingness to pay of small holder farmers for forage seed. In lined with this, the survey summery result in table 5 indicates that, the farm size of respondents' ranges from 0.01 to 2.63ha and in average they owned 0.70 ha. likewise, the livestock holding ranges from 0.29ha to 10.589 most of the respondents about 54.30 (82) and 22.52%(34) owned farm size of 0.001 to 1 Ha and livestock holding of 0.1 to 4.5 and 4.6 t0 9 TLU respectively. Generally, most of the farmers 78.81% (119) owns 0.001 to 1 ha land and 62.25% (94) of them owns 0.1 to 4.5 TLU of livestock. Some of them about 17.88% (27) also own 1.001 to 2 ha land and 35.10% (53) of them owns 4.6 to 9 TLU of livestock (Table 3).

The resource ownership was also tried to be considered in both the selected districts. The farm size and livestock holding of the study area is in the range of 0.011 to 2.625 hector and 0.29 to 20.59 TLU respectively (table 5). The summary result in table 13 shows us that in 82.19% (60) in Kilte-Awulaelo and 75.64(59) from Atsbi-Wenberta, the land holding distribution lies on the ranges 0.001 to 1 ha. Similarly for the livestock holding distribution the survey (Table 3) found out (67.12% and 30.14%) respondents from Kilte-Awulaelo and (57.69% and 39.74%) respondents from Atsbi-Wenberta owns 0.1 to 4.5 and 4.6 to 9 TLU of livestock respectively.

Income is one of the main resources of a household that describes the decision of a farmer to participate in farming activities and to use improved farm inputs. As the data summarized in table 2, respondents have got an annual income ranges of 200 to 15700 birr per annum in the period of 2013/14 from off/none farm activities, 1000 to 40000 birr from farm activates and 1000 to 49000 from all activities done with the average annual income of 4872.27 and 11107.04 birr from off/non farm and farm activity respectively.

3.1.3 Descriptions of situational characteristics of the sample respondents

Situational character of the households includes the institutional arrangements who deliver services that could have effect on the forage seed system; these are extension service credit access and access to market. Their status is summarized by sub topics as follows.

In the study are farmers have got a mean annual contact days of 27 with Extension bodies at a minimum of no contact to a maximum of 72 days contact with extension, and 12 days for forage purpose in the year 2013/14 (Table 2). In addition, Distribution of respondents by access to credit Credit service as one of the building blocks of developmental institution, its status was also investigated and most of the respondents, about 83.51%(111) had said there is access to credit service, 71.23% (52) from Kilte-Awulaelo and 75.64% (59) respondents from Atsbi-Wenberta also respond like wise to credit service access.

Table 4: Borrowing Agency and purpose of credit in livestock enterprise of respondents.

Attributes	Level	Freq.	Percent	Cum.
Did you use credit for livestock purpose during2013/14?	no	87	78.38	78.38
	yes	24	21.62	100.00
	Total	111	100.00	
if you used for livestock for what purpose	Feed	3	12.00	12.00
	To buy farm implements	4	16.00	28.00
	To buy animal	16	64.00	92.00
	To buy livestock and farm implements	1	4.00	96.00
	forage and fertilizer	1	4.00	100.00
	Total	25	100	
borrow agency	Cooperatives	3	7.14	7.14
	Dedebit	39	92.86	100.00
	Total	42	100.00	

Source: Own survey data, 2014

The respondents from those who had access to credit service, 21.62% (24) used the money borrowed from different institution for the livestock enterprise for different purposes. Most of them about 64% (16) used the credit to buy animals, some of them about 16% (4) and 12% (3) of them also used the credit to buy farm implements and feed for livestock. Most of them about 92.86 % (39) of the households who borrowed money took the money from Dedebit micro finance and 7.14% (7) of them from Cooperative (Table 4). Eventually, the major problems in getting loan were also assessed and most of the respondents from both districts pointed out three major reasons in getting loan, these are shortage of capital, high interest rate and Bureaucracy of credit institutions.

The distance to the nearest market and input supply have got also systematic relationship with the Adoption status of household b/c of those households near to these institutions would have better chance of getting market for their products and inputs for their farm in lesser cost and with better information. For this reason these variablesas summarized in table 2, indicates household from Kilte-Awulaelo and Atsbi wonberta had to walk for 57.26 and 51.96 minutes in average to reach to the nearest market and 57.4 and 43.05 minutes to the nearest input supply from their homestead in the consecutive district.

3.2 Forage Seed System Assessment of the study Area

The seed system as 'the sum of physical, organizational and institutional components, their actions and interactions that determine seed supply and use, in quantitative and qualitative terms' Van Amstel et al. (1996). That's why this assessment would try to show the detailed information of the study area, about the Regulations and Constraints affecting improved forage seed system, and the Production, Marketing and utilization of

livestock and improved forage seed supported by data gathered from regional, Zonal, District BoARD of Tigray and sample respondent for further recommendation and better future on livestock enterprise.

3.2.1 Forage seed policy (regulations and planning on production)

During the assessment of the forage seed system, different responsible bodies such as Regional, Zonal and district livestock experts, agricultural researchers and experts from LIVES project were consulted and relevant information were gathered on the existing forage seed system of the study area. Based on the information gathered from district experts of the study districts, Kilte-Awulaelo and Atsbi district the forage seed system mainly follows the contractual agreement system, especially on the issues of producing quality forages seed, and repaying back the forage seed taken by farmers from the extension office. This contractual agreement between producer farmers and BoA serves as a governing buy low for quality amount and timely delivery control of forage seed. On this process a team of experts is established to perform the task of giving technical back up to the producer farmers with the collaboration to agricultural researchers and supporting.

3.2.2 Production assessment of improved forage seed in the study area.

In order to support the seed demand of the community, improved forage seeds were introduced and being promoted in the study area. This study was carried on two mandate district of the project (LIVES), these are K/awlaelo and A/wenberta. In both study district, the forage types are prioritized as follows based on their volume of production and mostly introduced.

K/Awlaelo

1st Elephant Grass
4th Alfalfa
2ndVetch 5th Rhodos
3rd Sesbania 6th LuceniaA/Wenberta
1st phalaris 4rd Sesbania
2nd Elephant grass 5th Vetch
3rd Alfalfa 6th Trilurcern

Different Forage seeds are produced in different strategic places in the study Area such as, investors and farmers' field in the contractual form and Forage Multiplication sites and FTCs.The forage seeds are introduced by BoA, MARC, NGOs and farmers. From different sources such as BoA, Own saved seed, Market, Neighbor, Other fellow farmers, MARC and NGO. Though, the improved forage seeds did not yet cover the desired area in the zone, the attempts done in introducing the forages could be observed in Back yards, irrigation sites, integrated water shades, grazing lands, forests, gullies, and bare lands. as summarized in Table 32 below forage trees are 16,424,630 in different strategic places in the seven districts of eastern zone in 2013/14.

Table 5: Planting forage trees in different strategic places 2013/14

District	Backyard		irrigation site		Gorges	integrated water shade	Grass lands	water shade
	Yearly	No of farmers	Yearly	No of farmers	Yearly	Yearly	Yearly	Yearly
Gulomekeda	508000	9500	80000	890	5195000	0	0	0
SaesieTsaeda-Emba	130000	2136	0	0	564546	766334	0	0
Erob	25000	250	0	0	275000	110000	0	2438598
Hawzen	68500	2283	1740	58	0	0	474900	0
Atsbi-Wenberta	961820	8520	39799	438	97982	0	496185	511796
Kilte-Awulaelo	574380	1479	0	0	156093	37981	32010	0
Ganta-Afeshum	1017217	2623	70988	0	173760	1617001	0	0
Total	3284917	26791	192527	1386	6462381	2531316	1003095	2950394

Source: BoARD, Tigray region annual report 2014

Based on the two year forage seed production report of BoARD Tigray presented In Table 33 below, a total of 3015 farmers have produced a volume 361.39ql forage seed in 161.8 ha of land in eastern zone of Tigray. In

Addition to the forage seed production, feed is conserved and improved from forages and crop residues.

Table 6: Forage seed Production data of Eastern zone of Tigray

District	Forage seed production					
	2005/6 E.C			2013/14 E.C		
	land size (in Ha)	seed Yield (in Ql)	No of farmers	Land size In Ha	Seed Yield in Ql	No of farmers
Hawzen	64.285	193.95	1730	38	99.17	200
Kilte-Awulaelo	14.75	14.75	1	32.875	23.9	408
Atsbi Wenberta	1.25	0.87	17	6	7.2	487
Saesie-Tsaeda-Emba	1.75	4	0	1.5	6	1
Erob	0.216	1.22	4	0.5	3.8	82
Ganta-Afeshum						
Gulomekeda	0.1704	0.16	0	0.5	6.37	82
Total	0.1704	0.16	0	0.5	6.37	82

Source: BoARD, Tigray region annual report 2014

In the last two cropping seasons a total of 2138794.5 quintal feed from different strategies of forage and 3024973 from crop residues were conserved by 86143 and 721701 beneficiaryfarmers in 2005/6 and 2629524 quintal feed from different strategies of forage and 3598274.8 quintal from crop residues were also conserved by 103203 and 27330 beneficiary farmers consecutively in 2013/14 in the zone (Table 6).

Table 7: Forage and feed conservation and improvement

District	(2005/6)				(2013/14)			
	Forage conservation from different strategies		Crop residue		Forage conservation from dft strategies		Crop residue	
	Ql	No of farmers	Ql	No of farmers	Ql	No of farmers	Ql	No of farmers
KilteAwlaelo	343500	19400	673500	21744	353500	22450	695800	
Atsbi Wenberta	759280	15000	291600	12000	306220	22620	428550	20660
Hawzen	226420	9056	640750	642680	375800	16320	782570	13420
SaesieTsaedaEmba	187500	4200	453500	27000	280820	15673	458431	
Gulomekeda	345808.5	16900	350623	16000	624684	16800	737807	11820
GantaAfeshum	276286	21587	615000	2277	291000	9340	481393	15510
Erob					397500		13723.8	
Total	2138794.5	86143	3024973	721701	2629524	103203	3598274.8	27330

Source: BoARD, Tigray region annual report 2014

These livestock resource are dependent on different sources of feed, and these feeds are available in different months of the year. As the survey result in Table 36 indicated the most of the households from Kilte-Awulaelo and Atsbi wonberta about 115(76%) of them use crop residue as primary source of feed for their livestock and hay and grazing are also the second and third sources of feed for livestock.

Table 8: types of feed, sources of feed, availability of feed etc.

Rank	Source of feed	Unit	Study District: Kilte-Awulaelo	Atsbi-Wenberta	Aggregate
Primary	Crop residues	Obs.	55	60	115
		Freq.	36.42	39.74	76.16
secondary	Hay	Obs.	54	44	98
		Freq.	35.76	29.14	64.90
tertiary	Grazing	Obs.	46	30	76
		Freq.	30.46	19.87	50.33

Source: own survey result 2014

Though forage as one of the feed sources of the study area, Most of the respondents about 64.24% of them complain on the insufficient availability and 70.86% of them on late supply of the improved forage sees (Table 9).

Table 9 : Availability of forage seed on time and at near proximity of study area.

	Level	Freq.	Percent	Cum.
Are the improved forage seed available	No	97	64.24	64.24
	Yes	54	35.76	100.00
Timely availability and at near proximity	No	107	70.86	70.86
	Yes	44	29.14	100.00
	Total	151	100.00	

Source: own sarvey data 2014

The availability of the feed resources of the study area were also assessed and as presented in Table 10 though there is no a month with abundant feed availability through out the year, as most of the respondents evaluated the months the six months starting from September to February are with sufficient feed availability, three months (march to may) with moderate shortage and the last three months (June to August) with serious shortage of feed form most of the respondent farmers for their livestock.

Table 10: Feed availability/over the year

Feed availability	September		October		November		December		January		February	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Abundant	41	27.15	35	23.18	14	9.27	30	19.87	37	24.50	30	19.87
Sufficient	48	31.79	66	43.71	104	68.87	91	60.26	91	60.26	81	53.64
Moderate shortage	45	29.80	36	23.84	32	21.19	30	19.87	21	13.91	38	25.17
Serious shortage	17	11.26	14	9.27	1	0.66			2	1.32	2	1.32
Total	151	100	151	100	151	100	151	100	151	100	151	100
	March		April		May		June		July		August	
	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%	Obs.	%
Abundant	26	17.22	7	4.64	1	0.66			3	1.99	15	9.93
Sufficient	41	27.15	25	16.56	16	10.60	4	2.65	11	7.28	18	11.92
Moderate shortage	75	49.67	101	66.89	99	65.56	70	46.36	27	17.88	46	30.46
Serious shortage	9	5.96	18	11.92	35	23.18	77	50.99	110	72.85	72	47.68
Total	151	100	151	100	151	100	151	100	151	100	151	100

Source: own survey data 2014

3.2.4 Forage and feed utilization

Concerning to the feed utilization status of the study area, different forage types and leaves (green fodder), agroindustry byproducts and grass have been utilized in each districts of eastern zone. Based on the data compiled from 2005/2014 E.c annual report of BoA of Tigray in Table 39, **!The Formula Not In Table** farmers had used**!The Formula Not In Table** quintal of different forages for their **!The Formula Not In Table** number of livestock,**!The Formula Not In Table** farmers had used **!The Formula Not In Table**2 quintal of different green leaves for their **!The Formula Not In Table** number of livestock, **!The Formula Not In Table**farmers had used **!The Formula Not In Table** quintal of agroindustry byproducts for their **!The Formula Not In Table**number of livestock, and **!The Formula Not In Table**farmers had used **!The Formula Not In Table**quintal of grass for their **!The Formula Not In Table**number of livestock,

In order to utilize those feeds Partial zero grazing, Model Cut and carry and fully zero grazing methods of feeding livestock were practiced. Most of the farmers about 31956 beneficiary farmers had practiced Partial zero grazing on 233,488 livestock, about 17710 farmers also used Model Cut and carry system for their 95916 flocks and 63023 farmers had practiced fully zero grazing on 356025 numbers of livestock (BoARD 2014). This methods of feeding indicates us that, the farmers are adopting better methods of feeding and tells how much the farmers are give attention to conserve and manage their environment b/c the traditional way of feeding livestock through free grazing on these years is the least option, it is also the main factor for environmental deterioration and even worthless for effective livestock production and productivity.

Table 11: Method of feeding livestock 2005/6

District	Partial zero grazing		Model Cut and carry		Fully zero grazing	
	No of Livestock	No of farmers	No of Livestock	No of farmer	No of Livestock	No of farmers
KilteAwlaelo	11300	2100	0	0	21250	5200
GantaAfeshum	35512	11501	0	0	74727	12136
Gulomekeda	3295	875	3390	920	25138	8736
Atsbi Wenberta	27758	5291	2502	198	61902	9026
Hawzen	148000	3920	1250	933	61000	9750
SaesieTsaedaEmba	0	7013	80338	14627	80000	14627
Erob	7623	1256	8436	1032	32008	3548
Total	233488	31956	95916	17710	356025	63023

Source: BoARD, Tigray region annual report 2014

3.2.5 Marketing of improved forage seed

3.2.5.1 Marketing system of the study area

The issue of forage seed marketing is one of the main factors for the development of livestock sector, based on the demand and supply theory, on the presence of suitable market for improved forage seed farmers would adopt the behavior of accessing what is supplied and tend to feed their livestock with better feed so as they could compute on the livestock business. In the study area most of the respondents about 37.75% of them had received improved forage seeds from BoA, and about 21 % of them used their own saved seed and some of them have used from neighbor farmer, MARC and NGOs (Table 12).The seed system is also facilitated by different middle men such as BoA (DA), kebele Administrators, MARC and Traders. These middle men have served the forage seed system by buying forage seeds, Communicating and create linkages between farmers, seed suppliers, NGO and buyers as presented in table 12 below.

Table 12: source and middle men and their role in improved forage seed system

Attributes	Level	Freq.	Percent	Cumulative
Source of improved forage in 2013/14 cropping season	BoA	24	15.89	15.89
	BoA and MARc	1	0.66	16.55
	BoA and Neighbor farmer	3	1.99	18.54
	BoA and own saved seed	29	19.21	37.75
	Own saved seed	1	0.66	38.41
	Own saved seed and kidstemariam(NGO)	2	1.32	39.73
	MARC	5	3.31	43.04
	Neighbor farmer	2	1.32	44.36
	NOT used improved forage seed	84	55.63	100
	Total	151	100.00	
Who are the middle men on the issues of improved forage seed system	BoA	5	3.31	
	DA	12	7.95	
	DA and kebele Administrators	2	1.32	
	MARC	1	0.66	
	Traders	1	0.66	
	Do not have information	130	86.09	
	Total	151	100.00	
The role of middle men on the issues of improved forage seed system	Communicate with farmers, seed supplier and NGO	10	6.67	
	Create linkage b/n producers and traders	4	2.67	
	Create linkage B/n producer and buyers	3	2.00	
	Facilitate, farmers to use improved seeds for free in collaboration with NGO	3	2.00	
	They buy seed/cutting of forage by agreement	1	0.67	
	I do not know	130	86.67	
	Total	150	100.00	

Source: Own survey data, 2014

3.2.5.2 Profitability of production of improved forage seed

Before considering the profitability of improved forage seed of the study area, it is better to have information how the seeds are delivered to beneficiary farmers. As mentioned in the seed source part in table 12, the biggest seed supplier body, BoA supply the forage seeds to the farmers by Buyingthe forage seeds produced by farmers of the area by contractual agreement and from by introducing from other areas. The trend shows that most farmers were not paying for the improved forage but they are expected to pay back the seeds on kind. Considering this, information most farmers are not on the business of selling forage seeds but sowing the seed and utilizing the forages, for this reason the data from the respondents in table 14 indicates almost 96% of the respondents did not sold forage seeds before, this result conforms the timely and important to study willingness to pay for the improved forage seed so as to help in establishing better marketing system of forage seed. The price for the forage type considered for this study as presented in table 13, it is almost similar to the mean willingness to pay for the improved forage seeds result of the Econometric model used in this study. That is the price for Alfalfa, Elephant grass and Vetch for the cropping year 2013/14 in the study area was 300-400birr/kg, 20-60 birr/kg and 50-80 cents/30cm consecutively (Table 13).

Table 13: Price of improved forage seed in the study district

Improved forage Seed	Measurement	Price of seed or cutting in 2013/14 E.C in	
		Atsbi-Wenberta	Kilte-Awlaelo
Alfalfa	Kg	300-400 birr	300 birr
Vetch	Kg	50-60 birr	20 birr
Elephant Grass	Cutting (30 cm)	50 cent	50-80 cent

Source: own survey data, 2014

In the situation where most farmers receive the improved forage for free, though it is not clear to see the trend of price for the forages, but most of the farmers 85% of them have perceived the price trends as constant across years, but some of them 9.93% observed increasing and 4.64% decreasing trend of price (Table 14). Based on the status of profitability of forage seed production in Table 14, 40% of the respondents have information on how much the improved forage seed production is profitable. But the rest 60% of respondents even did not have clue weather it give profit or not, the probable reason for this could be, farmers of the study area got the forage seed for free, most did not sold forage seed forage and they just utilize the forage with out waiting to reach on the period to give seed. With these preconditions it is hared for them to predict its profitability. When we see the perception for the 40% feasible respondents for this data, they perceived the profitability as Very Low (15.89%), medium (11.92%) and Low (6.62%), (Table 14).

Table 14: Price fairness and Profitability of improved forage seed production

Attributes	Level	Freq.	Percent	Cum.
Is The price received from sold forage seed/cutting fair	yes	2	1.32	1.32
	no	4	2.65	3.97
	I did not sold forage	145	96.03	100.00
	Total	151	100.00	
price trend Observation of respondents	increasing	15	9.93	9.93
	decreasing	7	4.64	14.57
	constant	129	85.43	100.00
	Total	151	100.00	
Perception of the Profitability of seed Production in the study area	Very Low	24	15.89	15.89
	Low	10	6.62	22.52
	medium	18	11.92	34.44
	high	8	5.30	39.74
	Very High	1	0.66	40.40
	I did not know	90	59.60	100.00
	total	151	100	
Whom is main buyers of improved forage seed	BoA	5	3.31	3.31
	did not sold	146	96.69	100.00
	Total	151	100.00	

Source: Own survey data 2014.

3.2.6 Constraints of forage seed system and issues forwarded by the respondents

Livestock Experts form BoA of both study districts were consulted on the existing constraints of the forage seed system of the area. As mention by the experts the forage seed systems have got the following constraints.

- Lack of Awareness of farmers in producing forage with market oriented objectives.
- Poor Farmers forage type selection (most farmers select forage types for their Biomass not for their nutritional quality and seed)
- Seed supply problems (lack of enough amount of seed)
- The Cut and carry system is not coherent with the carrying capacity of livestock
- (Number of livestock is greater than the available forage)
- Communal lands have got problem of securing their sustainability- for this reason the feed and forage are exploited dynamically

On this issue the respondents have also identified three major constraints of livestock production these are Lack of feed, Scarcity of water and Livestock Disease. Among the major livestock enterprise constraints lack of feed is the main one (Table 15).

Table 15: Major constraints on livestock production.

Rank	Constraints in livestock production	Unit	Kilte-Awulaelo	Atsbi-Wenberta	Aggregate
Primary	Lack of feed	Obs.	33	21	54
		Freq.	21.85	13.91	35.76
secondary	Scarcity of water	Obs.	25	22	47
		Freq.	16.56	14.57	31.13
tertiary	Livestock Disease	Obs.	30	19	49
		Freq.	19.87	12.58	32.45

Source: Own survey data, 2014.

To see the forage seeds systemconstraints of the study area in detail, lack supply of improved forage seed is set the main constraint by 59.6% (90) of the respondents, shortage of land as second major constraint and followed by lack of awareness, lack of credit and lack of quality as the major problems of forage seed system of the study area (Table 16). In addition to this, most of the respondents about 73.51% (111) of them did not face any problem on the currently introduced improved forages seeds. But, some of them about 26.49% (40) of the respondents had faced problems on the improved forages currently introduced (Table 16). Among the problems, faced the major once are quality problem, supply shortage and frost sensitivity in all the forage types and few others (Table 16).

Table 16: Major constraints of forage seed system of the study area.

Attributes	Level	Rank	Occurrence of problem	
			Freq.	Percent
Major Constraints of the forage seed system	lack of supply	1	0	0
	Shortage of land	2	48	0
	Lack of Awareness	3	48	0
	Lack of credit	4	96	0
	Lack of quality	5	192	0
any problems with the currentlyintroduced improved forage seeds	No		111	73.51
	Yes		40	26.49
	Total		151	100.00
In which forage and what type of problem?	Alfalfa is attacked by pest		1	0.68
	all the forages are frost sensitive		10	6.76
	both Elephant grass and vetch took land		4	2.70
	livestock got diseased when they eat to much Elephant grass		1	0.68
	quality in all		5	3.38
	supply shortage in all		16	10.81
	there is a problem of water access		1	0.68
	No market for forage seed, no one buys		1	0.68
	we are not aware of using it		1	0.68
	No problem		108	72.97
	Total		148	100.00

Source: own survey result 2014.

Within the mentioned constraints, different stockholders are contributing and working to solve the existing problems and their support and activities are observed by the farming society. For this reason, on this study most 66.89% (101) respondents have evaluated the contribution of the stockholders in forage seed system as faire and19.87% (30) of them set it as poor, 7.95% (12) good & 1.99% (3) of the very good (Table 17).

Table 17: Stockholders contribution on the improved forage seed system

Attribute	Rank	Freq.	Percent	Cum.
Evaluation of STHContribution on the forage seed system	Very good	3	1.99	1.99
	Good	12	7.95	9.93
	Fair	101	66.89	76.82
	Poor	30	19.87	96.69
	very poor	5	3.31	100.00
	Total	151	100.00	

Source: own survey result 2014.

4. Conclusion and Recommendations

4.1. Conclusion

This survey study was initiated based on the countries development policy to strengthen the livestock center in the country, and the existing improved forage seed system of the study area which is in a minimum speed of in lining with the in tended goal of livestock sector. For this reason, this survey was aimed at supporting the policy makers by assessing the statues of the forage seed system of the study area and gives some policy recommendations on the production and productivity of livestock.

Eastern zone as one of the zone which have introduced improved forage, this study have carried on in its two wereda Kilte-Awulaelo and Atsbi-wenberta. From these districts, 151 sample households were randomly taken from six peasant associations and 18 kushets based on population proportion consideration. Each sample households were interviewed by using structured questioner for the improved forage seed for the cropping years of 2013/14 E.c.

The data collected were coded and entered to spss and exported to STATA Version 11 for the data analysis. Theanalysis was done by using simple descriptive statistic. The assessment result indicates that the study area mainly follows a contractual agrrement seed system, and the main forage types suitable for the mid land are Elephant Grass, Alfalfa, Vetch, Rhodos, Sesbania and Lucenia; similarly for the high land the forage known as phalaris, Sesbania, Elephant grass, Vetch, Alfalfa and Trilurcern are the most adopted types in orderly fashion. These forages have been introduced by BoA, MARC, NGOs and farmers.

Though, the improved forage seeds did not yet cover the desired area in the zone, the attempts done in introducing the forages could be observed in Back yards, irrigation sites, integrated water shades, grazing lands, forests, gullies, and bare lands. In addition, crop residue, hay and grazing are also the the sources of feed for livestock in the study area. Different feeding thcniques were used to utilize those feeds, such as Partial zero grazing, Model Cut and carry and fully zero grazing. The last three months (June to August) are known as serious shortage of feed for most of the respondent farmers for their livestock. The trend shows that most farmers were not paying for the improved forage but they are expected to pay back the seeds on kind. Considering this, information most farmers are not on the business of selling forage seeds but sowing the seed and utilizing the forages.

Considering the constraints, lack supply of improved forage seed is set the main constraint, shortage of land as second major constraint and followed by lack of awareness, lack of credit and lack of quality as the major problems of forage seed system of the study area. Within the mentioned constraints, different stockholders are contributing and working to solve the existing problems and their support and activities are observed by the farming society. For this reason, on this study most respondents have evaluated the contribution of the stockholders in forage seed system as fair.

4.2 Recommendation

The assessment result indicates that the study area mainly follows a contractual agrrement seed system, for this reason it is recommended for the policy makers to design a thcniqu for the farmers to come to the forage seed business so that it could run by it self as other business.specialyy to those forage type chich are highly adapted such as Elephant Grass, phalaris, Alfalfa, and Vetch.

In tackling the main constraints such as lack of the supply of improved forage seed and shortage of land, the best practices on Partial zero grazing, Model Cut and carry and fully zero grazing are also recommended to be carried out strongly because these could avoide the forage scarcity and the fluctuation of feed availability across a year.

the policy makers are recommended to fine tune on the delivery system of inputs in the near proxy to farmers homestead so as to access easily, it is also expected if necessary trainings and experience sharing are given before supplying these improved forages so as the farmers would gain experience and understand their advantages and utilization mechanisms.

it would be also batter if improved species of livestock are introduced that could be reproduced quickly and trainings and experiences need to be shared for better livestock husbandry and feeding system so as the demand improved forages for the sack of their livestock productivity will increas.

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