

## Evaluation and Demonstration of Indigenous Fodder Trees and Shrubs in Alichowriro District, Siltie Zone

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### Abstract

Agroforestry is a system and/or practices which incorporates different component in the same piece of land to produce forage, crop product, wood product and so on. Forage is the major limiting factor in tropical specially, in Ethiopia, feed source is depends on natural grazing (green grass). This research is design to dig out or assess and evaluate the nutritive value of other feed source that can easily found during dry season, natural grazing is abandoned and to demonstrate. Primary and secondary data were used. Group discussion, key informant interview and questioner were tools to collect primary data and document and literature review were used to collect secondary data during surveying. Leaf sample of identified fodder tree species collected and send to laboratory for further evaluation of their nutritive value. According to the research 41-60, 20-40 year and >60 years having the percent coverage of 46.6%, 38.6% and 14.8% respectively age distribution. About 55.7%, 39.7% and 4.5% of respondents are illiterate and elementary and others respectively. Total family size per household 6-10, <5 and >10 that account 56.8%, 31.8% and 11.4% from the respondent. 87.5% of respondent have greater 1ha land and 64.4%, 25% and 10.2 % of respondent medium, poor and rich wealth level. From interviewed farmer 84% of them have livestock less than 10 and only 16% were have greater than 10. Dry occurred about for six month in a year with high fodder shortage in the study srea. The major feed source for animal in wet season is green grass and in dry season tree are leaf, crop residue and enset leaf. Bundelija polystachya, Yushanya alpin, Hygenia abysinica and Domoboya torrid are most frequently found fodder tree and feed source, which are naturally found around home, fence, and farm boundary and farm field. These fodder trees were more preferred by farmers because of their availability during dry season. Farmers use seedling to plant tree and pruning is most famer practices to provide forage/tree leaf for animal compared to other tending operation. Based on this we concluded that in the study area forage problem is high during dry season as the same time there are enough feed source with better nutritional value but not equally known or considered by all farmer. Therefore, indigenous fodder tree were recommended for best-feed source during feed shortage period and demonstration these indigenous fodder tree.

**Keywords:** Alichowriro, Agroforestry, Fodder tree, Indigenous, Livestock

### Introduction

Livestock are one of the major building blocks of agriculture sector, which take part in a potential pathway out of poverty for many smallholders in Ethiopia (Lijalem *et al.*, 2015). It contributes 15% - 17% of the national GDP and more than 50% of household income (Samson and Frehiwot, 2014). Livestock production is an integral component of smallholder farming system of the country in general and south region in particular. In many tropical countries, the shortage of fodder, particularly in the dry season, is a major constraint to animal production. The shortage of animal feed is a priority problem in the mountainous landscapes of Ethiopia (ICRAF 1990; Seyoum *et al* 2001). In the highlands of Ethiopia (2500–3000 meters above sea level), grasses and barley straw are major sources of animal feed.

In the tropical regions of Ethiopia, cattle frequently suffer significant weight losses during the dry season as fodder is not only limited in supply but is also of poor nutritive value. However, grasses and barley straw are characterized by low digestibility, low protein content, and poor mineral composition (Kabaija and Little 1987; Seyoum and Zinash 1989). In addition to grasses and crop residues, where few or no alternative feed resources are available, the foliage and flower bud of woody plants are important components of sheep and cattle diets. Farmers cut branches of trees and feed them to animals. Some farmers allow their animals to feed on fallen leaves under the fodder plants. Some farmers feed tree leave incorporating with salts (Kindu *et al* 2006).

In spite of the fact that increasing human populations and higher demand for food is enforcing farmers to extend the farming fields with the expenses of grazing areas (Mekuriaw *et al.*, 2011). Further, low quality and quantity of feed sources, disease poor management practices are the major constraint for livestock productivity of smallholder farmers (Beyene *et al.*, 2015). This in turn made the magnitude of animal feed problem even worse than ever before in mid and highland areas of the country. Hence, the livestock's inhabited in these areas are enforced to stick on natural pasture and crop residues where few or no alternative feed sources are available (Kindu *et al.*, 2009). These feed resources are characterized as low digestibility, protein content and mineral composition (Seyoum and Zinash, 1998).

Sustainable livestock production calls efficient utilization of available feed resources, and thus giving emphasis for indigenous fodder tree/shrub species is imperative for livestock productions and supporting the

rural livelihoods. Moreover, most fodder tree and shrub species have a multi-functional attributes such as fire wood, protect soil from erosion and provide shade. Hence, in many ways provision of fodder wasn't the primary use of fodder tree and shrub species (Franzelet *et al.*, 2013). Consequently, the scale of fodder tree planting and utilization undertaken by smallholder farmers in the country have shown uneven success rates and did not meet the required goals (Mekoya, 2008). Thus, paying attention to indigenous fodder tree species can have advantages over the exotic species in terms of adaptability to the local environment, resistance to pests and diseases, availability of local planting material and familiarity to the farmers (Kindu, 2007). Very scares studies have been done so far regarding the assessment and nutrient values of indigenous fodder tree/shrub species (abebe *et al.*, 2008; kindu *et al* 2009). This research gap calls to support the indigenous knowledges of the community with scientific basis.

Thus, the present study was initiated with the following objectives;

- To assess and identify the indigenous fodder tree/shrub species and their contribution as an alternative feed source for livestock's of the district
- To evaluate nutritive value of indigenous fodder trees and shrubs
- To demonstrate the use of indigenous fodder trees and shrubs

## Methodology

### Site description

This study carried out in Alicho Wiriro district of siltie zone, in Southern Nation and Nationality People of Republic Ethiopia. It located at southern 200km from Addis abeba. This area is 28 km west away from the zone capital city, worabe town, which is 172 km south of Addis Ababa. In terms of topography, alico woriro district has diverse topography that consists of undulated (75%), sloppy (20%) and plane (5%). The dominant agricultural activity is subsistence farming, where intensive multiple crop production is integrated with livestock production. The Woreda is composed of two farming systems: *enset* based and cerea based. The *enset* based faming system is the most complex one, and consists of a large number of crop components such as cereals, root crops, fruits and vegetables in intimate association with *enset* (*Ensete ventricosum*). Cereals, particularly barley and wheat are dominant and some pulse crops common. The main staple food crops in the *enset* based farming system.

### Research design

Multi-stage sampling method was used to select the district and PA's from the selected zon of each center. Both the district and two kebeles were chosen based on their experience and knowledge in the development and utilization of indigenous fodder trees and shrubs species. The present study was totally used 90 randomly selected household respondents Alicho Wriro. The kebele households' resident list was employed so as to make random selection of the present respondents. Focus group discussions were held with 11 members of the community whom with different local position, age and gender. These group discussants were selected purposively from each studied kebeles based on their knowledge about the subject in study and hence, they are representing the community. Totally four focus group discussions were held with two discrete groups from each kebele. These members of the community were selected through employing snow ball method.

Both primary and secondary data was collected through employing semi-structed questionnaires and checklists. The primary data were supplemented by information obtained from key-informants, making field checks at the time of survey and secondary data basically derived from Agriculture and Rural Development offices and written documents by other stakeholders. The collected both quantitative and qualitative data's were analyzed through employing Statistical Package for Social Science Studies (SPSS version16). For data organization microsoft excel spread sheet was also employed.

### Evaluation of fodder trees and shrubs

Indigenous fodder trees and shrubs were evaluated for quality, preference and availability. The fodder quality parameters like crude protein (CP), calcium, and dry matter, mineral matter.

### Demonstration of fodder trees and shrubs

The demonstration of indigenous fodder trees and shrubs be undertaken to exploit abundant and underutilized feed resources at hand. This research activity is a type of an action research/participatory technology development approach. The display on-farm trial were conducted with farmers to help refine the best bet fodder trees and/or shrubs that would fit into existing feeding circumstances.

The farmers were identify the different fodder trees and shrubs and rank them according to characteristics identified by the farmers themselves and researcher. We then will continue to study the "highly preferred" species, looking into propagation and nursery techniques, fodder production and cutting management.

### **Farmers' preferences for fodder trees and shrubs**

Farmers' preferences for certain fodder species will be based on feeding values (palatability and ability to fatten), tree growth characteristics (fast regrowth, ease of propagation and establishment) and tree management issues. For farmers it is important that the trees are tolerant of frequent cutting and the cut fodder is easy to handle. Farmers like to plant various different species as they say that animals do not like to eat the same fodder all the time, but prefer to consume mixtures of several species.

The palatability and digestibility of forage determine the amount of feed that an animal will consume and convert into products (Etgen and Reaves, 1978). Ruminants attempt to select a diet that promotes high level of feed intake (Cooper et al., 1996). Potential Intake Rate (PIR) is thus the best indicator of palatability (Kenney and Black, 1984).

Questionnaires will develop to assess the farmers' preferences for indigenous fodder trees and shrubs.

## **3. RESULT AND DISSCUTION**

The integration of trees into farming systems in the form of agroforestry promoted since the late 1970s as a strategy for sustainable land use particularly, in support of the rural poor farmers (King 1987, Young 1997, FAO 2005). The introduction of rural integrated development programs in the 1980s, smallholder tree growing regained recognition because of its potential role in mobilizing rural resources for the generation of a wide range of tree products, for both subsistence and commercial purposes, including timber, wood fuel, fruit, leafy vegetable, fodder, resin, oil, and medicine (FAO 1997).

### **3.1 Demographic characteristics**

According to Alichu Wriro district demographically characterized by, the age distribution more concentrated on the range of 41-60 years old followed by 20-40 year and >60 years having the percent coverage of 46.6%, 38.6% and 14.8% respectively. More than half of the respondent farmers /55.7%/ are illiterate account about and less than half of the respondent (39.7%) are at elementary level, the rest are writ and read, high school and college. Total family size per household 6-10, <5 and >10 that account 56.8%, 31.8% and 11.4% from the respondent. Farmers having the farm size of 1-1.5ha are about 46.6% and 1ha are 40.9 i.e. most of them have land size of <1.5ha and only only 12.5% have >1.5ha. About 64.4% of respondent categorize under medium wealth level and 25% poor but only 10.2 % is rich. From interviewed farmer 84% of them have livestock less than 10 and only 16% were have greater than 10.

Community of the study area have been experienced in keeping livestock species such as; cattle's, hors's donkey's and sheep's these could strengthen. Those livestock species have the most considerable important to the Gross Domestic Product of the country (Metaferia *et al.*, 2011). Moreover, cattle are the predominant species providing draught power, milk, manure and meat. They are also a means of storing capital, of buffering food shortages in years of poor crop harvests and of meeting the social and religious obligations of the farmers (Powell *et al.*, 2004).

### **3.2 Duration, the extent of fodder problem and source of fodder in wet and dry season**

#### **3.2.1 Duration, the extent of fodder problem**

Wet and dry season are two major seasons in a country particularly the study area those frequently appeared by rotating each other's. In Alichu Wuriro district, the two seasons mostly occurred once in a year. When we see their length or duration that covered in a year, from the total respondent 54.5% says dry season covers six(6) month followed by 19.3% and 9.1% those said five(5) month and seven(7) month respectively. Similarly about 53.4% of respondent agree on the length of wet season is six (6) and, 17% and 11.4% of interviewers says 7 (seven) and 5(five) respectively.

During dry season, there is problem of fodder; almost all interviewed farmers (95%) respond that during dry season only 4.5% not respond. The extent of this problem is major or serious that cover 64.8% of interviewer says followed by medium and less with covering 30.7% and 4.5% respectively.

The shortage of animal feed is a priority problem in the mountainous landscapes of Ethiopia (ICRAF 1990; Seyoum *et al* 2001). In the highlands of Ethiopia (2500–3000 meters above sea level), grasses and barley straw are major sources of animal feed.

#### **3.2.2 Feed source in wet and dry seasons**

Woody species (trees and shrubs) provide shade and are an important fodder source for both livestock and wildlife. Livestock owners have long recognized this. In humid regions, trees and shrubs provide high quality low-cost fodder that improves milk production of dairy animals and supports the growth of young animals. This can reduce dairy meal costs and improves meat production. In arid and semi arid zones, where the growth of herbaceous plants is limited, trees and shrubs provide the largest part of the protein and mineral supply during the driest months.

The study in Alichu wriro district shows that there are specific source of fodder for livestock at specific

season. In wet season, the major source of fodder for livestock in the study was fresh/green grass that account 89.8% from the total respondents and followed by hay, which records only 4.5% from the total respondents. This shows green grass is almost the primary preferred fodder source during wet season for the study area.

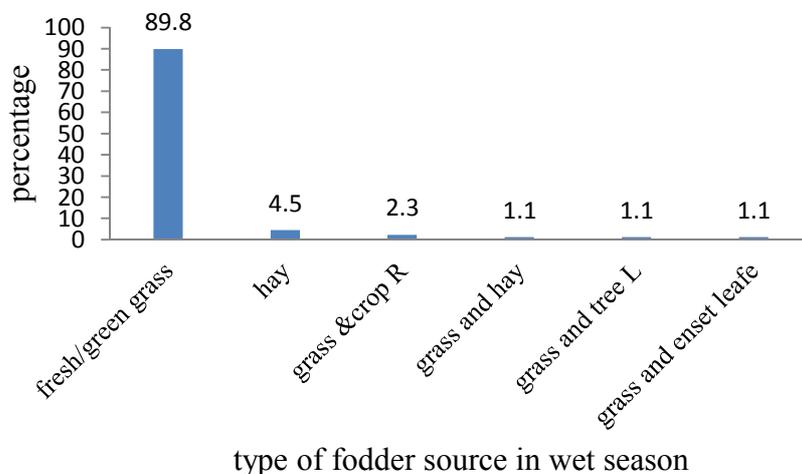


Figure 1 fodder source for livestock in wet season

On the other hand, the dry season major fodder source for livestock in the study area were other than green grass. According to this study, farmers in the study area use different material for fodder like crop residue, tree leaf and enset leaf. From the total interviewed farmers 39.8% use enset leaf and tree leaf followed by crop residue only, tree leaf only and tree leaf, enset and crop residue 22.7% 14.8% and 12.5% respectively based on their availability.

The study conducted by Hassen *et al.* (2010) they observed that leaves, pods, twigs and flowers are parts of the browse species utilized by livestock were. Leaves were the most utilized parts plant by livestock. The pods of *Acacia tortilis* and *Dichrostachys cinerea* were important feed resources for goats during the dry season. Dried leaves were found to be more palatable for cattle and goats than wet leaves from broad-leaved browse species like *Terminalia brownii*, *Boswellia papyrifera* and *Sterculia africana*.

According to Belay Beyene *et al.*, (2015), the assessment done Abay Choman and Jimma Ganati Districts, during the dry season 93.85% of the dairy producers were providing supplementary feeds to their animals in addition to grazing on field. However, during the wet season only 21.23% respondents stated that they were proving supplementary feed while 78.77% respondents were solely dependent on grazing. Out of the total respondents of the study, 84.45% were supplying crop residues as supplementary feeds.

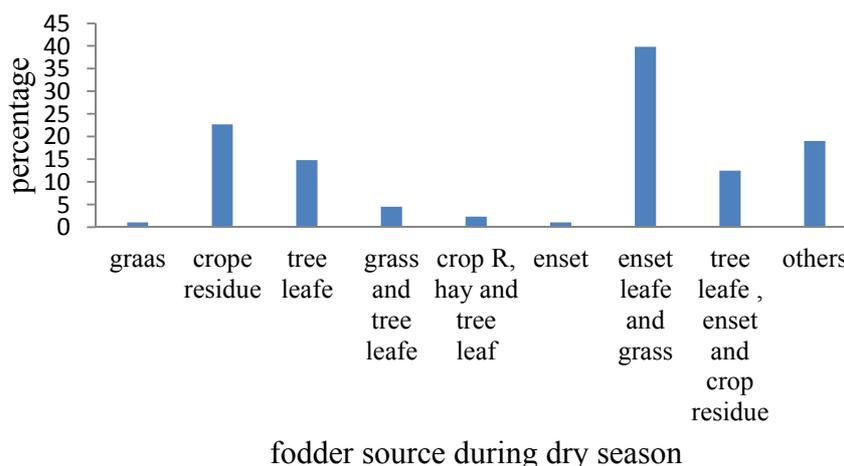


Figure 2 fodder source for livestock in dry season

Similar result reported from west shewa zone of oromia, i.e. during the dry season the major feed source for live stock were crop residue that are low in nutrient content and high in cell wall, unpalatable and indigestible (Seyoum Bediye1 and Fekede Feyissa, 2008). According to the herbaceous component become more abundant and nutritious during the wet season, cattle and sheep are less attracted to the browse species. However, during the dry season, the herbaceous components are less abundant and often become more fibrous. In this season cattle and sheep depend first on leaves and succulent twigs of browse species. As the dry season progresses,

however, livestock also browse less palatable species during the critical dry season. The key informants also indicated that the less palatable species and/or some dried or wilted plants, which are assumed to be poisonous, are eaten by livestock during the critical feed shortage time in dry season (B. Shenkute *et al.*, 2012).

### 3.3 Indigenous fodder tree and their niche

In the study area there different type fodder tree which area indigenously known. According to the present study, some majorly known fodder tree identified. Forage tree use for large remnants animals like, *yushanya alpin*, *domboya torrid* and *hygenia abyssinica*, at the same time *Bundelija polystachya*, *simbita\** and *dumbuka\** available for small remnant animals in alichu wriro wereda (table 3).

Table 1: analysis of frequency of respondent about the available indigenous fodder tree for forage source

Scientific name	Local mane	frequency and percentage from the total respondent	
		frequency	Percent (%)
<i>Bundelija polystachya</i>	Anfar	78	88.63
<i>Yushanya alpin</i>	Laemo	62	70.45
<i>Hygenia abyssinica</i>	Saeto	39	44.32
<i>Domoboya torrida</i>	Dagna	32	36.36
-	Simibita*	29	32.95
-	Merero*	10	11.36
others		14	15.91
total		264	

\*Unidentified species (local name “silitigna”)

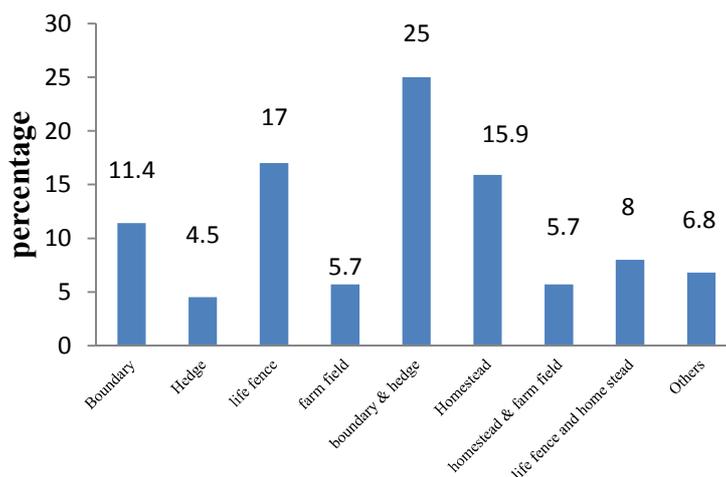


Figure 3 the niche of fodder tree and shrubs farm land

In other research site like chench, Semen-Ari, South omo, Adiyo and Mahsa district most of the aforementioned indigenous fodder trees are planted around homestead, farm boundary, and riverside /bamboo/, within farmland and as live fence.

This research was agreed with the research conducted in west shewa zone, central Ethiopia. Twenty-nine indigenous fodder tree species used by farmers were identified in Dendi and Jeldu Districts (Kindu *et al.*, 2006). In Burkina Faso, about 70 indigenous fodder tree species were identified, which does farmer in the area commonly use (Sibiri JO, *et al.*, 2000). Researchers identified 160 such species that farmers used for fodder in an area of eastern Kenya, among the 15 that farmers ranked highest in importance, only one, *Commiphora zimmermanii*, was planted and its main use appeared to be as a live fence (Roothaert, 2001).

Smallholder in the study area plant trees in farms and on farm boundaries, hedge, and homestead and life fence. Most of farmers use both boundary and hedge for planting or growing area and others use only homestead and only farm boundary (table 4). This result were agree with Pandey 2007, who identify some indigenously trees grown area in India like close association with village rainwater collection ponds, crop-fallow rotations, silvopastoral systems, trees within settlements, agroforests, community forests on farm boundary and in farm.

These niches are commonly known to plant or retain fodder tree by considering non-significance negative effect of trees on other crops. Boundary, life fence, hedge and homestead are most commonly niches of fodder tree. Mekonnen A. *et al.*, (2014) founded that home garden is rich in species or have higher diversity. In Managua and Nicaragua, ten different micro-zones and nine plant uses were identified. Fruit trees, shaded coffee

and ornamentals were the most important zones. Plant diversity was high, with a sample total of 324 species in home garden (mendeze, 2001). The list of forage browse species identified as locally important are presented in Table below are indicated. About 6 indigenous browse species were identified being used as feed sources by cattle, goats and sheep.

### 3.4 Knowledge of farmers in tree management and their preference criteria

#### 3.4.1 Farmer knowledge on tree management

Fodder is harvested in the natural environments through: (i) selective cutting of leafy parts, flowers and fruits of shrubs and trees. (ii) Pruning of shrubs and trees, which are suitable for livestock. (iii) Pollarding of tree crowns (Osemeobo 2006).

The present study shows the major known and practiced propagation techniques were seedling, direct sowing and rhizomes (table 5).

Table 2 different propagation technique of indigenous fodder tree and shrubs

Propagation techniques	Frequency	Percent (%)
Seedling	35	39.8
direct sawing	3	3.40
Rhizome propagation	1	1.13
Cutting	1	1.13
seedling and direct sowing	17	19.31
seedling and rhizomes	9	10.22
seedling and cutting	3	3.40
direct sowing and rhizomes	3	3.40
seedling, direct sowing and rhizome	6	6.81
I don't know	10	11.36
Total	88	100

There are different tending operation that practice in the area like pruning and coppicing based on 19.3% and 15.91% of respectively, but more major percent of the respondent not know any tending operation at all.

Table 3 different tending operation that practice by farmer in the study area

Tending operation	Frequency and percent of respondent	
	Frequency	Percent (%)
pruning	17	19.3
lopping	6	6.81
pollarding	1	1.13
coppicing	14	15.91
pruning & coppicing	5	5.70
coppicing & pollarding	5	5.70
Protection from disturbance	7	7.95
No management	33	37.5
Total	88	100

The traditional knowledge and management practices on fodder trees offer relevant techniques and insights for foresters and other relevant scientists. Root haert (2000) hypothesized that knowledge of individual farmers would be consistent enough to form a basis for selecting the most useful fodder species. In addition, farmer's preferences and cultural practices also need to be considered when species are screened for their appropriateness. Farmers in some parts of the world have some practical knowledge about the quality of fodder trees (Bayer 1990, Thapa *et al.* 1997).

#### 3.4.2. Farmers' preference criteria and most preferred multipurpose fodder trees

Farmers use fodder tree for forage source especially during dry season. Their preference based on availability fodder tree i.e. the fodder tree that can provide green leaves in dry season. According to the present study most of respondent preferred fodder tree, about 72 (81.85%).

Table 4 preference criteria and selection of indigenous fodder tree

Criteria	Frequency and percent of preference criteria	
	Frequency	Percent
Availability	72	81.85
Adaptability	3	3.4
Palatability	7	7.95
palatability and availability	4	4.5
palatability and adaptability	2	2.3
Total	88	100

Based on the group discussion consensus, in each location commonly agreed criteria were set to rank each MPFT. The parameters used to rate MPFT by farmers during the ranking exercise for each of the desired attributes are shown (Table 1).

The criteria's of the farmers to select the fodder trees are not depend on the specific characteristics of these indigenous tree spices. Their preference is mostly based on the availability in dry season and their palatability because of serious fodder problem in dry season for their livestock. Thus due to the shortage of fodder in dry season, farmers obliged to feed with the available feed source due to no option.

Taping this knowledge would be much faster and cheaper than carrying out elaborate analysis in laboratories, for screening the nutritive values of trees. However, previous studies in this field have shown variable correlation between farmer's knowledge and laboratory assessment (Thapa *et al.* 1997)

### 3.5 Land affordability to plant different fodder tree and available exotics fodder tree/shrubs

As we have seen above farmers in the study area have high interest to use different fodder tree for forage source. These show that farmers plant that indigenous fodder tree on their land. According to this study almost all interviewed farmer i.e., 93.5% have allow to provide land to plant and only 6.5% have no interest to afford land. Farmers in the study area have lower experience in using fodder tree especially exotics. The present study shows about 56.8% of interviewed farmer use only treelucern as fodder and about 38.7% of them have no any exotics fodder tree, but very few farmers start using susbania, desho grass and deccurence.

Table 5 introduced/exotic fodder tree, shrubs and grass found in the study area

Introduced fodder tree	Farmers that have exotics fodder tree/shrubs	
	Frequency	Percent
Treelucern	50	56.8
susbania susban	1	1.1
desho grass	1	1.1
Deccurence	1	1.1
treelucern and deccurence	1	1.1
None	34	38.7
Total	88	100

The introduction and promotion of exotic tree/shrub fodder species such as; *Leucaena leucocephala*, *Sesbania sesban*, *Gliricidia sepium* and *Calliandra calothyrsus* have been exercised in the highland areas for the last two-to-three decays. In some cases the genetic base and adaptation of the introduced species was found to be poor. In other cases, pests and diseases have threatened introduced species. For instance, the insect damage of *Leucaena* by psyllid (*Heteropsyllacubana* Crawford) has been a critical barrier to further dissemination and utilization of the tree species in the highlands (Kindu, *et al* 2009).

### 3.6 Fodder tree treatment and value adding

Although fodder from indigenous fodder tree species always fed fresh without treatment, some indigenous fodder tree species such as bitter leave tree (*vernonia amygdalina*) cassava leave and peels bitter and poisonous b/c of anti-nutritional compound. Farmers mostly used different additive that can increase feeding quantity. The present study also provides similar result, from the total respondent about 67 that are 76.6% are used additives for animals during feeding fodder tree. The common additive in the study area were mineral salt and bole, the common local name in the study area, they account 36(40.9%).

Table 6 farmers' use of additive during feeding fodder tree leaf and the type additive they use

Use of additive	Farmers interest to use additive	
	Frequency	Percent
yes	67	76.2
no	21	23.9
Total	88	100
Type of additive		
mineral salt	10	11.4
bole	20	22.7
both	36	40.9
none	22	25
total	88	100

### 3.7 Chemical composition of fodder tree species

The nutrient composition profile of indigenous and exotic fodder tree derived from laboratory analysis is shown below in Table. Mineral matter, crude protein and calcium have shows significance difference between the treatment, and dry matter have no significance difference. The mineral matter content of sampled fodder tree found the range b/n 18.5 and 5.7, which are *Yushanya alpin* and *susbania susban*. The crude protein (CP) content of individual samples of fodder tree in the study area was ranges from 26.9 to 14.6. The highest CP content was found in *dumbuka* followed by *Susbania susban* and *simbita* and the lowest was recorded in *bundelia polystachya*. similarly, *simbita* have highest calcium content followed by *Domboya torrida* and the lower mineral matter recorded on *Yushanya alpine*. On other hand, *Hygenia abyssinica* have significantly lower in mineral matter, crude protein and calcium.

Trees and shrubs are increasingly recognized as important components of animal feed, fodder tree leaves were found to be rich in protein, soluble carbohydrates, minerals and vitamins, and showed great potential as an alternate feed resource (Bakshi and Wadhwa, 2007; Atiyazimet *et al.*, 2011). Especially were found more profitable during alternative options were expensive (Hamer *et al.*, 2007). This is due to their deep root enables to maintain high protein especially during the dry season (Wambuguet *et al.*, 2011).

Table 7 chemical or nutritional composition of some selected indigenous and fodder tree/shrubs

species	N	Nutrient content of fodder trees (%)			
		mineral matter	crude protein	dry matter	calcium
<i>Yushanya alpin</i>	3	18.5±0.24a	20.9±2.19ab	95.3±0.78	1.5±0.20c
<i>Bundelija polystachya</i>	3	6.9±0.54d	14.6±1.67b	94.4±2.26	2.5±0.56bc
<i>Domboya torrida</i>	3	12.1±0.12bc	14.8±5.34b	95.9±0.38	3.6±0.44ab
<i>Hygenia abyssinica</i>	3	10.2±0.62cd	16±3.46b	93.6±0.89	2.3±0.45c
<i>Chamaecytisus palmensis</i>	3	5.7±0.42d	25.7±2.51ab	96.4±0.82	1.93±0.51c
Simbita*	3	14.7±0.42b	22.8±2.23ab	94.5±0.56	4.2±0.27a
Dumbuka*	3	11.6±2.45bc	26.9±7.28a	94.8±1.9	2.2±0.38b

Note: \* Local manes "siltigna language", which is unidentified species;

The nutrient composition of foliage of the browse fodders is consistent with previous reports on tropical and subtropical tree fodders and shrubs, Abebe Mekoya, (2008) on *susbania susban*, O.A. Olafadehan and S.A. Okunade, (2016) on *Azalia africana*, *Daniellia oliveri* and *Entada Africana* and Deribe Gemiyo, (2015) for different crop residue, grass species and indigenous browse species.

The chemical compositions of the tested indigenous tree were significantly differed in the nutrient composition. *yushania alpin* have significantly higher ash content than others indigenous fodder tree and shrubs. Though, trees and shrubs are increasingly recognized as important components of animal feed, fodder tree leaves were found to be rich in protein, soluble carbohydrates, minerals and vitamins, and showed great potential as an alternate feed resource (Bakshi and Wadhwa, 2007; Atiyazimet *et al.*, 2011). Especially were found more profitable during alternative options were expensive (Hamer *et al.*, 2007). This is due to their deep root enables to maintain high protein especially during the dry season (Wambuguet *et al.*, 2011).

All indigenous fodder tree species constitute high CP content as they were sampled during early dry season, and they have above the required level of CP for animals in the tropics (Kearl, 1982; Van Soest, 1994; Mlay *et al.*, 2006). Feeds with the CP level less than 7.5% inhibits voluntary feed intakes and the activity of microbial action declines, resulting in lower digestibility of roughages (Van Soest, 1994). The two indigenous fodder shrubs, which are locally known by feeding small ruminant, were have higher CP content as compared to other. The dry matter content of indigenous fodder tree high as compared to other similar work on other tropical fodder tree.

According to Kindu *et al.*, (2009) indigenous fodder tree and shrubs in highland area have provide good

forage access with having good nutritional composition during low feed source season. He found that most commonly available highland fodder tree have comparable nutrient content in their different part, foliage and flower.

#### 4. Conclusion and recommendation

According to the finding of the present study, we have concluded that

- ✓ Feed shortage in dry season is the determinant problem in the study area
- ✓ *Buddleia polystachya*, *Dombeya Torrida*, *Hagenia abyssinica*, *Yushania alpine*, and simbita and dumbuka, best fodder tree and shrubs in worabe
- ✓ This species were found in majorly in homestead, boundary of farm land as hedge, as life fence in all study area
- ✓ According our finding in study area there are plenty of fodder, in terms of tree and shrubs even if in dry season but the major problem with this is there is skill gape in management and utilization in most of farmer
- ✓ There are indigenouse tree that have enough nutritive quality compared with exotics, which have better productive value than crop residue and grass in dry season  
Then based on the above conclusion we recommended that
- ✓ The resource found around the home stead should be properly demonstrated for farmers to solve their feed shortage
- ✓ The knowledge and skill of farmer about fodder tree management need to improve
- ✓ Further works/ research is important on management, their interaction with crop and propagation methods

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