

Indigenous Knowledge of Enset (*Ensete ventricosum* (Welw.) Cheesman) Cultivation and Management Practice by Shekicho People, Southwest Ethiopia

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Abstract: Enset is a multipurpose crop of which every part is thoroughly utilized, cultivated as a food and fibre crop only in Ethiopia, particularly in the southern and south western parts of the country. This research was conducted with objective of exploring distribution, cultivation method and farmers' traditional management system of ensets cultivars in Sheka Zone, Southwest Ethiopia. The study kebeles were selected using purposive sampling method and the simple random method was employed to select household informants based on the proportion to the size of total enset growing households in selected kebeles, accordingly 270 households were used for this study. The data were collected using open and close ended questionnaires, key informant interview, field observation and focus group discussion. Then the data was analysed using SPSS 20.0 Software and Microsoft Excel. In the present exploration 68 enset local varieties (cultivars) have been identified. Maximum enset varieties were recorded (24 per household) from Masha District. Farmers select and maintain these local varieties that best meet their needs using their indigenous knowledge. The farmers cited resistance to pest and disease (25.09%), size of the plant (22.88%) and taste or quality of enset product (19.34%) as important criteria to categorize and select different varieties of enset. Enset local varieties; 'Gudiro', 'Nobo', 'Yobo' and 'Cherallo' were claimed to be widely adaptable and disease and pest resistant varieties of enset by most farmers in the area. Farmers cultivate enset in home garden (25.49%) and in main field (21.64%) or both home garden and main (41.67%) as mono-crop (63.71%) or intercropped (36.29%) mode of cultivation. Enset is cultivated mainly for food (78.82%) in the Zone where the corm and the pseudostem are the most important sources of food. The types of food from these parts are 'Kocho', 'Bulla or Etino' and 'Amicho or Utto'. Despite the facts that enset remained staple crop for Sheka zone for centuries, little research and development attention have so far given. As such potential of enset for food security and income generation has not been fully exploited. The traditional farming system and associated traditional wisdom that contributed for the availability of present day diversity need to be maintained and developed further, farmers should be supported and encouraged to continue the on-farm conservation activities. Enset processing is carried out by women using traditional tools and the process is laborious and tiresome. This indicates future research area in processing technology development.

Keywords: Enset, Indigenous Knowledge, Landraces

1. Introduction

Enset (*Ensete ventricosum* (Welw.) Cheesman) is a major multi-purpose crop in Ethiopia, which has been identified as the center of origin and diversity of enset [5, 11]. Enset is a

perennial, herbaceous and long broad leaves endemic root crop plant to Ethiopia, which belongs to a Family Musaceae. Enset is a multi-purpose root crop and nearly every part of the plant has somewhat use. The crop is widely grown in the home gardens of central, south and Southwestern part of

Ethiopia for its food, forage, fiber, and medicinal uses. This crop contributes to food security (a traditional staple food crop) for more than 20% of Ethiopia's population notably southern and southwestern parts of Ethiopia [9, 4, 28].

Enset is grown and distributed at altitudes between 1600 and 3000 meter above sea level with an average annual rainfall of 1100 to 1500 mm and it is chiefly propagated vegetatively [26]. Enset based farming system is an indigenous and sustainable agricultural system that covers large hectares of land assumed to be covered with enset cultivation in Ethiopia. It is one of major economic and socio-cultural importance crop for a wide range of smallholder households in the country's population as staple and co-staple food, and also used as a traditional medicine [18]. Enset has been known to play a role of a barrier food deficit for human and feed for animals during the dry spell and recurrent drought due to its resistance to fluctuating rainfall patterns after establishment.

Each plant takes four to five years to mature, at which time a single root will give about 40 kg of food. Due to the long period of time from planting to harvest, plantings need to be staggered over time, to ensure that there is enset available for harvest in every season. Enset will tolerate drought better than most cereal crops [14]. Wild enset plants are produced from seeds, while most domesticated plants are propagated from suckers. Up to 400 suckers can be produced from just one mother plant. Enset can be intercropped with sorghum, maize, and coffee. As stated by Addis *et al.*, [1] and Muluaem and Walle [20], enset cultivation is suitable for sustainable agricultural systems due to its contribution to soil fertility, long storability, its multiple uses, accessibility at any time, and relatively high productivity depending on edaphic factors, altitude, cultural practices and varietal differences.

The crop can withstand relatively long period of drought (about 5 months). It is noted for its tolerance to environmental fluctuations, storability, and for its multiple uses that play a pivotal role in preventing famine. Such uses coupled with cultural values make enset attractive to the people in the enset agro-ecology of the country particularly south and southwest parts [4]. Sizes of Enset plants vary depending upon management, the Enset type/*cultivar*, soil type and fertility, amount and distribution of rainfall, and altitude of the area. It reaches up to 10.3m in height and the girth at the fattest point can be up to 4m. The corm and the leaf sheathes are the main sources of human and animal feed. The major foods obtained from enset are *Kocho* and *bulla*, which are obtained from pseudo stem and leaf petioles and the other type is *amicho* obtained from the underground corm that is eaten boiled [2, 14]. It is a traditional food major crop, although often supplemented with cereal crops, amongst the indigenous people to southern and southwestern Ethiopia [25].

Despite the ecological and yield potentials, currently the crop is severely affected by disease and pests which gravely devastating cultivar diversity. The resulting losses are evolutionary consequence of crops grown in single variety monocultures and the continuing evolution of new

varieties of pest and pathogens that are able to overcome resistance genes introduced by modern breeding [14]. In the traditional agriculture, farmers have a wealth of knowledge in tackling varieties selection and cultivations, pest and diseases management which are generally well adapted to their socioeconomic and environmental conditions. Since Enset is an indigenous crop, almost all production and processing practices are based on farmers' experiences. The use of indigenous knowledge in propagation, transplanting, inter-cropping, harvesting/processing, protection from pests and diseases are valuable. As the first cultivators and experts, their knowledge have profound importance for both the recent and the future sustainable use and conservation of enset cultivars or varieties. The exploitation of these farmers' traditional knowledge in association with their center of crop origin has a good sense to analyze the diversity of traditional crop varieties and the disease management strategy. Therefore, this study was conducted to explore the distribution, local varieties selection, cultivation and traditional management system of enset cultivars by farmers in Sheka Zone, Southwest Ethiopia.

2. Materials and Methods

2.1. Description of the Study Area

This study was conducted in Masha and Anderacha districts of Sheka zone in the year 2015/2016. Geographically, the Sheka Zone lies between 7°24' to 7°52' N latitude and 35°13' to 35°35' E longitude. The altitudinal range of the district falls between 900 and 2700 meter above sea level and it receives high amounts of rainfall, with an average of 1800–2200mm annually. The study area receives highest rainfall in July and the lowest in February with mean annual average temperature between 21°C to 29°C [3, 7]. The study area is mountainous with green vegetation which has attractive scene. The topography of the area comprises different land features are flat area, rugged topography, plateau and steep slopy areas and high biodiversity and the forest in the area included in UNESCO as Sheka biosphere reserves since 2012 [22]. The soil of the area is characterized by Acrisol with sub surface layer of accumulated Kalonitic clay in the order Oxisol, low Cation exchange capacity, low base saturation and low pH values [6].

2.2. Selection of Study Sites

A reconnaissance survey has been done on October, 2015 in Masha and Anderacha Districts of Sheka Zone. This observation indicated that the two Woredas farmers are leading their life with enset based farming system. Masha and Anderacha district consist of 19 and 16 kebeles, respectively. Ten kebeles were selected purposely from the two districts based on the enset cultivation potential. The selected kebeles were Masha (Beto, Wello, Keja, Degele, Abelo and Gatimo) and Anderacha (Getiba, Modi, Echi and Goja).

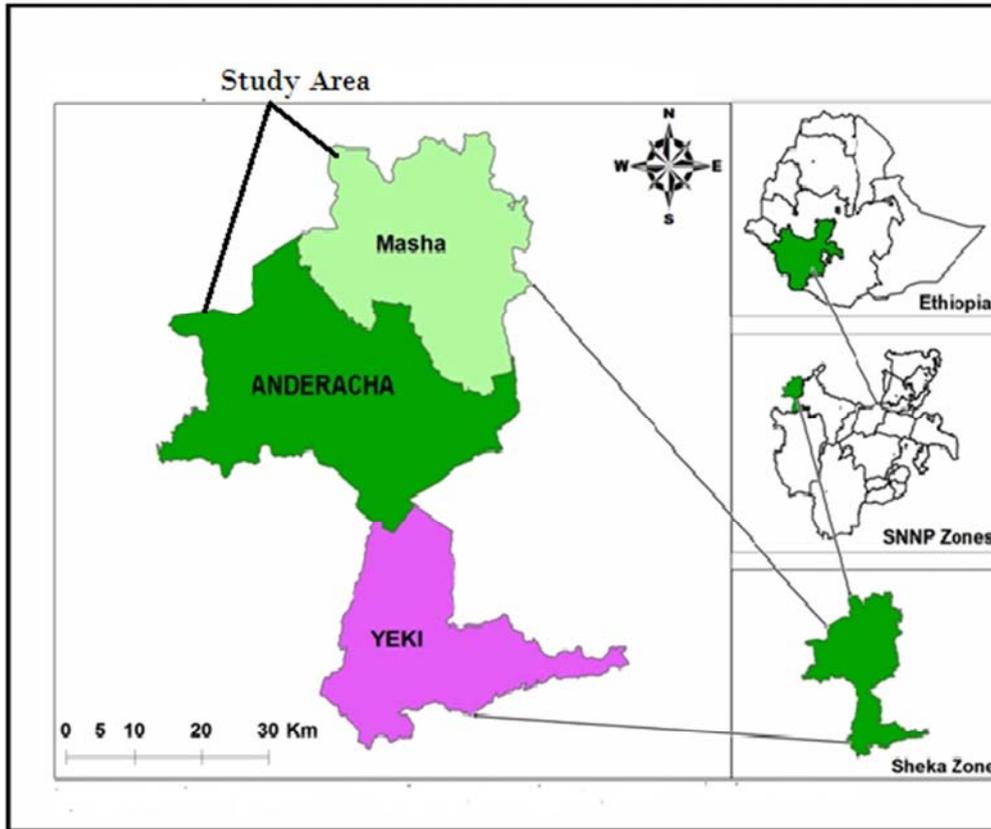


Figure 1. Map of study area.

2.3. Sample Size

All enset growers from each purposively selected Kebele, were used as study population with the help of District agricultural experts (DA). Informants were included both sexes and elders to get good traditional knowledge. To determine the sample size of the study, the formula provided by [27] was applied. A simplified formula was used to calculate sample sizes. A 95% confidence level and the estimated proportion of an attribute that is present in the population ($P = 50\%$) and acceptable sampling error ($e=5\%$). Due to different factors, the total number of informants was reduced to 270.

2.4. Data Collection Methods

Data collection was carried out between December, 2015 and May, 2016 in Masha and Anderacha Districts. Data collection were performed through questionnaires, semi-structured interviews, field observations, focus group discussions

In each selected Kebele and village, respondent households that include both sexes and different ages groups (above 20 years old) were selected randomly and interviews was carried out with the help of a local translator. Farmers were asked to list (vernacular names) all their perceived related to enset production, varieties, cultivation system, harvesting method, constraints and management in their area. Afterward, household informants were asked to list the name

of cultivar and memorize the different types of enset diseases and pests they know about. Farmers' knowledge of the pests and diseases (type and nature of damage or symptoms, severity, traditional management practices or control measures, etc.) was recorded.

Field observation was done to identify the type of enset varieties (cultivars), cultivation method, constraints that reduce products and traditional management system of the local farmers in the home garden and farm land. Field notes and photographs of plants representing the different local varieties (landraces), cultivation method, and infected enset plant with pests and diseases were recorded. Finally, focus group discussion with eight discussants in each group was carried out to triangulate data collected from household survey.

2.5. Data Analysis

The collected data were analysed using SPSS 20.0 Software and microsoft excel software. And also the data was analyzed using descriptive statistics that include the use of frequency distribution and percentages, tables, bar charts, graphs and figures.

3. Result and Discussions

3.1. Distribution and Abundance of Enset

Enset is multipurpose root crops which is a staple food in

many parts of the country, being the source of most of the daily carbohydrate intake for large populations. These crops are grown as traditional foods or are adapted to unique ecosystems and are little importance to world food production [8, 10, 15, 19]. Enset is endemic in Ethiopia and widely distributed edible root crops in southern and southwest of the country. Cultivation of enset is important in the study area because they met local food preferences, providing an important part of the diet as they produce more edible energy per hectare per day than any other crop groups which play an important role in food security, nutrition and climate change adaptation. Despite their importance investment in enset has been much lower than in the cereal crops. Enset have been neglected compared to other crops which are grown elsewhere [13]. On the other hand, the non-edible enset were distributed in the minor case in both Masha and Anderacha Districts which were adapted in the wild (forest). For instant, wild enset (*Ensete ventricosum*) called 'Echo' claimed to be the origin of the edible domestic enset widely distributed in sheka forest.

Based on the information gained from informants and field observation indicated in the Table 1, distributions of enset across the two District of the sheka zone were different. Enset was predominantly produced in almost all kebeles, of the study Districts' of Sheka zone which accounts more than halve percentage compare to other crops. The variation on distribution and abundance of enset crops in different kebeles was mainly the presence of other alternatives crops and ecological factors like soil, climate, and little information on varieties selection based on disease resistance and adaptability of enset. In the community of Shekicho enset has also social value, wide range and number of enset measures the richness or poorness of the farmers that considered as representative

for all circumstances.

Table 1. General characteristics of enset.

Characteristics	Enset
Growth form of plant	Perennial
Habit	Herb
Agro-ecological cultivation	Midland and highland (1500-2250masl)
Habitat nature	Home garden and main field
Drought resistance	Yes
Fertilizer requirement	Low requirement
Compost requirement	High
Growing habit on swampy, water-logged soil, Planting material	No
Maturity period	3-5 years
Storage time in ground	Short
Postharvest storage life	Long



Figure 2. Representative type of enset plants in the farmland, Beto kebele.

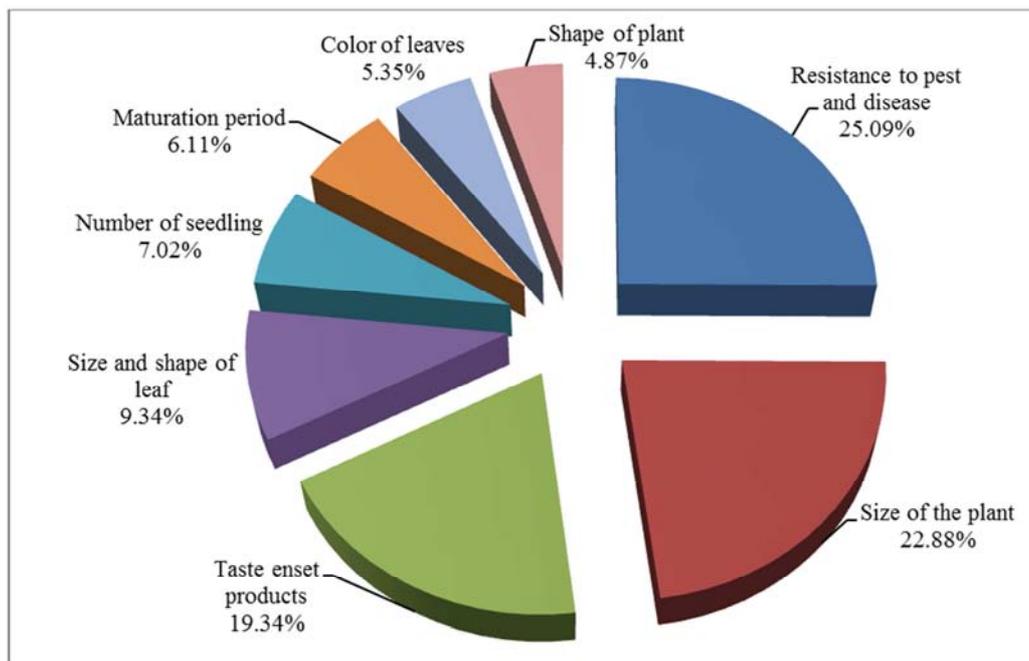


Figure 3. Farmers' criteria to select the varieties of enset crops.

3.2. Local Varieties/Landraces of Enset (*Ensete ventricosum*)

Farmers select and maintain the local varieties that best meet their needs using their indigenous knowledge. Regarding the abundance and distribution of enset, there are different varieties (landraces) in the study area depending upon the climatic conditions or agro ecological characteristics (i.e. highland, midland and lowland). For example, the maximum varieties (landraces) recorded from Sheka zone was around sixty eight varieties. On the other hand, maximum number of varieties per household were recorded from Masha district; around twenty four varieties per household. But the maximum varieties recorded from Anderacha district were only sixteen varieties per household. Therefore, these two Districts of Sheka zone were shown different number of individuals and landraces (varieties) of enset that they adopted in their farm lands for major and minor staple food purposes. In each kebele there was a variation in varieties, types and numbers of enset plant which displayed the maximum number of landraces reported in this study. The local farmers were trying to adopt their traditional variety selection methods that they cultivated and propagated on their farm land or home garden accordingly on the bases of productivity, adaptability, constraint resistance and cultural value of enset from generation to generation. These traditional management practices have been exercised for centuries and contributed for the availability of the present day local varieties.

As mentioned in the above (Figure 3), the main parameter used to categorize and adapted different varieties of Enset by local farmers were on the basis of resistance to pest and disease accounted (25.09%) and followed by size of plant (22.88%) and taste of enset product (19.34%). Whereas least considering the shape of the plant (4.87%). Using the above criteria of indigenous knowledge of farmers, for instance 68 enset varieties were recorded from Masha and Anderacha Districts.

To mention some of the local varieties like Gudiro, Gemo, Beradi, Berasho, Boso, Yeko, Shimo, Areko, Nobo, Tefero, Atero, Meso, Kekero, Betato, Omi, Yebo, Chikaro, Yobo, Cherallo, Shuri, Genjo, Chechero, Bedo, Shundi, Ado, Ametako, Qawo, Yeto, Wango and etc are some of the local varieties of enset that investigated from the area (Appendix 1). Depending on the production (quality and quantity), maturation time and size of enset, the indigenous farmers classified enset varieties traditionally as a category of male and female types. Among these enset varieties, the local farmers selected the most common diseases resistance using the their indigenous knowledge were 'Gudiro', 'Nobo', 'Yobo' and 'Cherallo' which are again approved by the District agricultural office of Sheka zone. The most tasty and preferable varieties of enset were Yeko and Gudiro. Regarding the types of varieties; male enset used by the indigenous people of Sheka Zone were 'Gudiro', 'Gemo', 'Beradi', 'Berasho', 'Boso', 'Nobo', 'Tefero',

'Ataro', 'Meso' and etc. and female varieties include 'Yeko', 'Shimo', 'Areko', 'Kekero', 'Betato', 'Omi', 'Yebo', 'Chikero', 'Cherallo', 'Shuri' and etc. (Appendix 1 and Figure 4). These varieties of enset were known by majority of the local farmers and also registered and approved in agriculture and rural development office of the Sheka zone and Wereda.



Figure 4. Representative Enset local varieties from Masha & Anderacha districts.

3.3. Cultivation of Enset

Enset is cultivated as a food and fibre crop only in Ethiopia, particularly in the southern, south western and western parts of the country [21, 25]. Even though the distribution and abundance of enset varies in terms of cultivars and productivities from kebele to kebele of the study sites, almost all of the farmers cultivate it for their staple food in addition to grains. As the farmers responded, they cultivate enset mostly in their homegarden (25.49%), main field (21.64%) and both home garden and main (41.67%) (Figure 5). Hence, enset was cultivated in both home garden and main field. This result in line with finding of Magule, *et al.* [18] and Maryo *et al.* (21), who report enset production is both in home garden and main field.

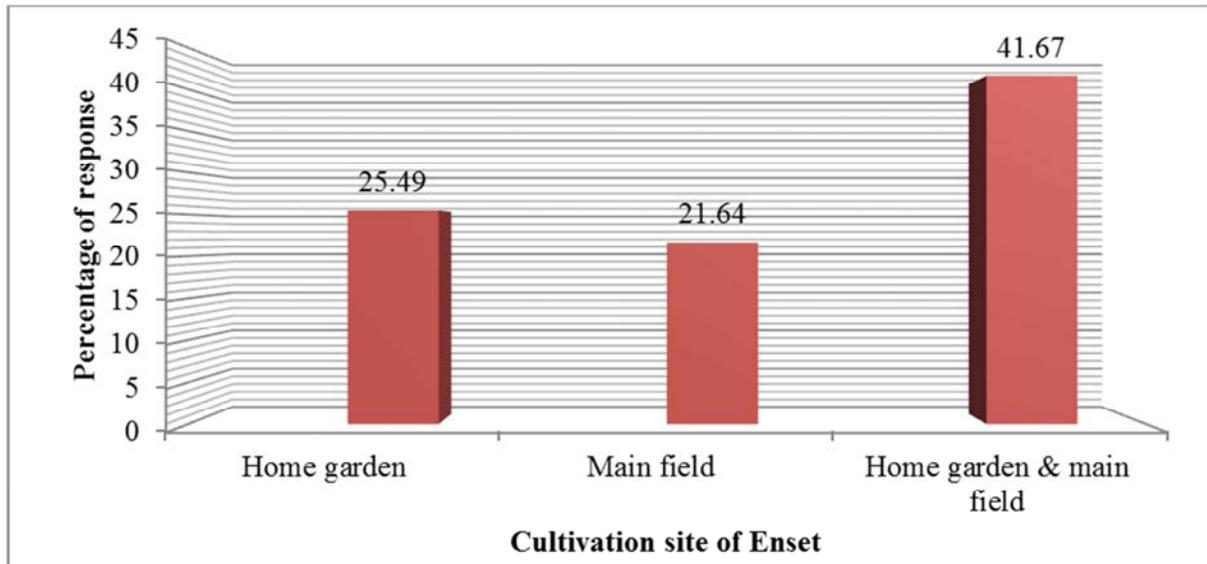


Figure 5. Cultivation site of Enset by local farmers in Masha &Anderacha.



A. Main fieldhome garden crops



B. Home garden

Figure 6. Main field and home garden enset crops cultivation practice, Degele kebele.

The farmers grow different type of enset varieties crops in different manner of association. Based on the information obtained from the respondents as indicated below (Figure 7), most of the farmers highly practiced mono-culturing (63.71%) growing and followed by intercropping (36.29%) mode of cultivation. This is associated to the belief that some of the enset varieties grow better in the absence of shade or

any association and if there are other plants around it, it does not give a good yields and its corm and Pseudostem (false stem) may be affected during harvesting of other nearby crops. Most of the time the enset grown in the main field were monoculture whereas in the home garden it was intercropped association with different root and tuber crops and cereal crops.

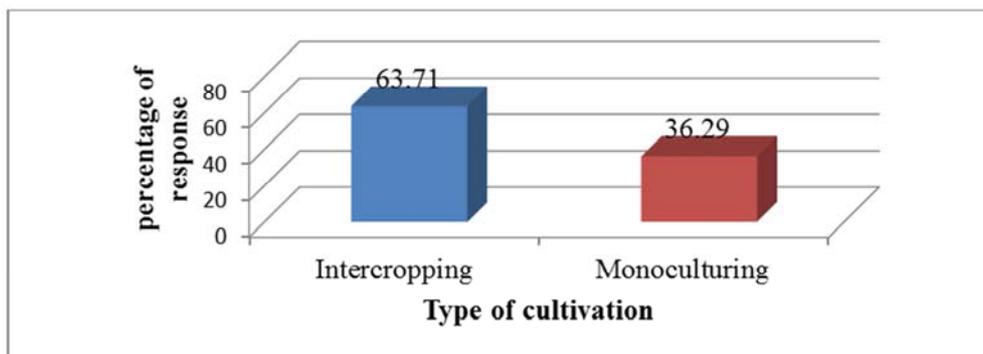


Figure 7. Type of enset cultivations in the study area.

As aforementioned in (Figure 7), the local farmers assumed the reason for using intercropping enset crops with other grains or tubers were to enhance the fertility of soil due to the remains of these crops in the farmland or home garden and possibly get good product or yield of the crops for the next season production. Farmers in the study area practice intercropping of enset with Maize, Taro, Cabbage, Bean,

different fruits like mango, avocado, coffee and etc. in their home gardens and main fields as well (Figure 8). This result is in agreement with the report of Magule *et al.* [18] that showed the most common crops intercropping with enset were maize, cabbage, bean and godere in Wolaita area, Southern Ethiopia.



Figure 8. Typical intercropping enset cultivation in the study area.

3.4. Propagation System of Enset

The use of indigenous knowledge in propagation, transplanting, inter-cropping, harvesting/ processing, protection from pests and diseases are valuable. Farmers cannot travel long distances and buy expensive exotic technologies for their small patches of farms. It is worthy to note that the root and tuber crops occupy a strategic position among cultivated crops and the positions they occupy vary in the different agro-ecological zones in the study area. While in the Southwest part of the country enset occupied the first position leading the staple food that solves the problem of food insecurity. Because enset can be cultivated using simple traditional technology that possibly gives product and it is high drought resistance [12, 17]. Enset can be propagated by suckers of stem and seed after well prepared the farmland. Suckers are usually produced from the two- to three year-old corms (10 to 20centimeters in diameter) and the true stem. These mother corm pieces are obtained by harvesting healthy plants, cutting off the pseudo stems, removing the roots, and removing out the center or apical bud. Once the apical bud is removed, these lateral buds form suckers around the periphery of the mother corm piece. 20 to 200 suckers will be obtained per corm piece. These suckers are usually allowed to grow for one year before transplanting.

The majority farmers of Sheka zone used compost (manure) fertilizer and remains of straw for cultivation of enset crops to get good products while the few number of farmers used inorganic fertilizers in their farmland. The reason behind why the farmers prefer organic compost was due to high productivities (yields) of enset growth. And some

informants have replied that inorganic fertilizers are expensive to buy from market or provided by the government. Observations in areas that have been planted with enset for many years suggest that native soils have been altered positively by the long-term application of manure. Enset's perennial canopy of leaves and the abundant accumulation of litter also reduce soil erosion. Because enset production improves soils, particularly with adequate manure, many enset fields have been in continuous production for decades, if not centuries. Because of the multiple roles that manure plays in improving soils biologically, chemically, and physically properties. Enset affects the physical environment around houses where it is most commonly grown [12].

3.5. Maturity, Harvesting and Storage of Enset

The farmers use different indicators to check whether each root and tuber crops are matured or not. The maturity, harvesting time and storage place were different from place to place and various types of enset in the study area that cultivated by local farmers. Some of the indicators associated with the maturity of enset for harvesting in the study area used by the indigenous farmers are; firstly the size of an individual plant could be used as indicator of maturity of enset in associated with its calendar i.e. by its years (3-4/5 that the plant is ready to eat or matured to eat) (Appendix 1). Secondly, farmers check whether the corm (locally known as *Utto* or *Amicho*) is developed above the ground or not. And thirdly, a matured enset bear inflorescence but this is not necessarily indicator of maturity.

The local farmers of the study area used their indigenous knowledge to harvest and store their enset products after maturation. After the maturity of enset corm and then harvested in the appropriate time and store place to extend the shelf life of the crops. The local farmers', store enset products (e.g. *Kocho* and *Bula*) by wrapping and covering them in deep pits for further supply of food. In fact, Enset is a flexible-harvest crop in that households have the option to utilize it at any time after maturity i.e. a mature Enset plant becomes a mini household food security system available for harvesting and processing immediately or it can be 'held in reserve' for another 5 to 10 years and it continues to grow and mature [20].

3.6. Processing of Enset Products for Consumption

Even though every part of enset is usable, the corm and the pseudostem are the most important sources of food. The types of food from these parts are known as 'Kocho', 'Bulla or Etino' and 'Amicho or Uto'. Amicho/Uto is boiled corm of young enset plants known for best quality of corm. Enset plants may be uprooted for preparing meals quickly if the amount of enset harvested is insufficient or for special occasions. The corm is boiled and consumed in a manner similar to preparation methods for other root and tuber crops [21]. Certain clones are selected for their amicho production by the farmers. For example, local variety such as *Areko* is preferred for amicho purposes by the shekicho people but it is susceptible for diseases.

Kocho is the bulk of the fermented starch obtained from the decorticated (scraped) leaf sheathes and grated corm. As described by the local people in the area Bulla is obtained by squeezing out the liquid containing starch from scraped leaf sheathes and grated corm and allowing the resultant starch to concentrate into white powder having a number of procedures: - 1) scraping the leaf sheath, peduncle, and grated corm into a pulp; 2) squeezing liquid containing a starch from the pulp; 3) allowing the resultant starch to concentrate into a white powder; and 4) rehydrating with

water. It is considered as the best quality enset food and is obtained mainly from fully matured enset plants. Enset products are available throughout the year and can be stored in pits for long periods of time without spoiling as stated by Maryo *et al.* [21] and Tesfaye and Kebede [24]. Fiber is the by-product of enset that is left after decorticating the leaf sheathes. Its strength is claimed to be equivalent to the important fiber crop *Musa texstalis* (abaca). Fiber is used for making bags, ropes, twines, cordage, mats, etc where the variety, the age of the plant, and the way in which the fiber is extracted and stored determine its length and quality.

Enset processing is carried out by women using traditional tools and the process is laborious and tiresome. This indicates future research area in processing technology development. Since enset is an indigenous crop, it is demanding much more from the Ethiopian researchers for its improvement. Even with existing processing problem Enset-based farming systems play an important role in food security in Ethiopia. The exact role and value relative to other farming systems cannot be addressed without examining enset production and consumption in relation to the concept of food security. Some of the densest rural populations of Ethiopia are located in regions practicing enset-based farming in the southwestern highlands. These observations indicate that the human carrying capacity (i.e., the number of people per unit of land area that can be adequately fed by the food produced on the same land area) of enset and enset-based farming systems is high and is likely greater than other crops and cropping systems for the same agro ecology and inputs [25]

3.7. Socio-Cultural Use of Enset

Ensets are a type of root and tuber crops that used mainly for human food (as such or in processed form), for animal feed and for medicine, for fibers and the like[13, 16]. These crops are the main source of carbohydrates in the southern and southwest Ethiopia.

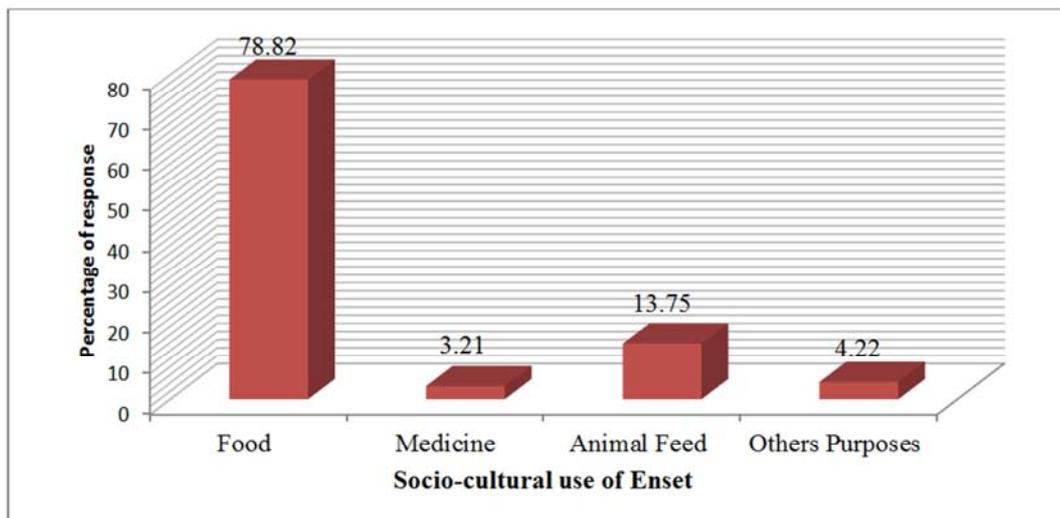


Figure 9. The traditional uses of Ensets in the study area.

From the above (Figure 9), the indigenous farmers used enset crops most of the time for food accounts (78.82%) and followed by animal feed (13.75%), medicine (3.21%) and for others purposes (4.22%). Here the use of enset crops for other purposes means for example enset for mat, bake bread and Kocho, fibers and shade. For example, enset is an important multipurpose subsistence crop where every part of the plant is used. Besides serving as a food plant, enset provides economic, cultural and environmental services, including medicine, animal fodder, rope and string, mulching, shade and prevention of soil fertility and moisture. Enset is more productive and drought tolerant perennial crop as compared to annuals, which functions as a staple food for most people in the Southwestern parts of Ethiopia particularly Sheka Zone. Similarly enset uses as home medication for instance variety Shuri used for abortion cases in Shekicho people (Appendix 1). It is claimed that taking kocho or Bula after taking traditional medicine minimizes the side effect. In the area enset products also used during wedding, holydays, Sunday and etc. widely prepared food for guests and families for celebration of festivity in the Shekicho community. As noted in field observation enset field that partially encompasses the homestead was observed aesthetically desirable; enset beautifies the landscape by its thick, dark green foliage.

4. Conclusion and Recommendations

The study described and analyzed the cultivation and management practices of enset crops by farmers in Sheka Zone. According to the result obtained, there was high diversity of local varieties (landraces) of enset and a good traditional knowledge about the use, cultivation, propagation and managements which is still maintained among the elder local people of the area. As the farmers responded, they cultivate enset in their home garden (25.49%) and in main field (21.64%) or both home garden and main (41.67%) as mono-crop (63.71%) or intercropped (36.29%) mode of cultivation. Enset is a multipurpose crop of which every part is thoroughly utilized. Enset is cultivated mainly for food (78.82%) in the Zone where the corm and the pseudostem are the most important sources of food. The types of food from these parts are known as 'Kocho', 'Bulla or Etino' and 'Amicho or Utto'. As described by the local people in the area, Kocho is the bulk of the fermented starch obtained from the decorticated (scraped) leaf sheathes and grated corm whereas Bulla is obtained by squeezing out the liquid containing starch from scraped leaf sheathes and grated corm and allowing the resultant starch to concentrate into white powder. Apart from their regular uses as food, the crop also has cultural

and medicinal value. Fiber is the by-product of enset that is left after decorticating the leaf sheathes. Its strength is claimed to be equivalent to the important fiber crop *Musa textilis* (abaca). In the present exploration 68 enset local varieties (cultivars) have been identified. Maximum enset varieties per household were 24 recorded from Masha District. Farmers select and maintain these local varieties that best meet their needs using their indigenous knowledge. The farmers cited different criteria to categorize different varieties of enset; resistance to pest and disease accounted (25.09%) and followed by size of the plant (22.88%) and taste of enset product (19.34%). Whereas least considering the shape of the plant (4.87%). Using the above criteria of indigenous knowledge for instance 'Gudiro', 'Nobo', 'Yobo' and 'Cherallo' were claimed to be adaptable and disease and pest resistant varieties of enset by most farmers in the area. As farmers portrayed their enset varieties decreased through time, the reason cited by farmers for the decline in enset variety were displacement by other crops such as potato in case of Masha and coffee in Anderacha case. Moreover, young generation show lack of interest to cultivate and manage enset as elders, the traditional knowledge on the plants might be eliminated in the near future unless proper cultivation and management is made. Despite the facts that enset remained staple crop for Sheka zone for centuries, little research and development attention have so far given. As such potential of enset for food security and income generation has not been fully exploited. Taking into account the roles of enset in traditional agricultural system and people's culture, better attention need to be given by all actors to fully utilize their food and fiber production potential. The indigenous knowledge and traditional farming system that contributed for the availability of present day diversity need to be maintained and developed further, farmers should be supported and encouraged to continue the on-farm conservation activities. However, enset processing is carried out by women using traditional tools and the process is laborious and tiresome. This indicates future research area in processing technology development.

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Appendix

Table A1. List of authenticated Enset varieties (landraces) with the types, adaptable in disease resistant, maturation time (years) and importance of enset that identified traditionally by Shekicho people in Masha and Anderacha Districts, 2016.

S.N	Varieties of Enset (Shekign)	Types (Male/Female)	Disease Resistant nature	Maturation time to yield food (years)	Significance
1.	Ado	Male	No	4	Food, source of fibers, leave as a mat
2.	Ametako	Female	No	3	Food, source of fibers, leave as a mat
3.	Areko	Female	No	3	Food (Good for Amicho production than others), source of fibers, leave as a mat
4.	Atefaro	Male	No	4	Food, source of fibers, leave as a mat
5.	Atero	Male	No	4	Food, source of fibers, leave as a mat
6.	Atirako	Female	No	3	Food, source of fibers, leave as a mat
7.	Baradiboso	Male	No	4	Food, source of fibers, leave as a mat
8.	Batato	Female	No	3	Food, source of fibers, leave as a mat
9.	Bedio	Male	No	4	Food, source of fibers, leave as a mat
10.	Bedo	Male	No	4	Food, source of fibers, leave as a mat
11.	Belawso	Male	No	4	Food, source of fibers, leave as a mat
12.	Beradi	Male	No	4	Food, source of fibers, leave as a mat
13.	Berasho	Male	No	4	Food, source of fibers, leave as a mat
14.	Betato	Female	No	3	Food, source of fibers, leave as a mat
15.	Binasho	Male	No	4	Food, source of fibers, leave as a mat
16.	Boso	Male	No	4	Food, source of fibers, leave as a mat
17.	Buso	Female	No	3	Food, source of fibers, leave as a mat
18.	Chechero	Female	No	„	Food, source of fibers, leave as a mat
19.	Chegacho	Male	No	4	Food, source of fibers, leave as a mat
20.	Cekaro	Female	No	3	Food, source of fibers, leave as a mat
21.	Chelello	-	No	3-4	Food, source of fibers, leave as a mat
22.	Cherallo	Female	High disease resistance	3	Food, source of fibers, leave as a mat
23.	Cheri	Male	No	4	Food, source of fibers, leave as a mat
24.	Chikero	Female (Old)	No	3	Food, source of fibers, leave as a mat
25.	Choro	Male	No	4	Food, source of fibers, leave as a mat
26.	Dole	Female	No	3	Food, source of fibers, leave as a mat
27.	Gajiboso	Male	No	4	Food, source of fibers, leave as a mat
28.	Gandi	Male	No	4	Food, source of fibers, leave as a mat
29.	Gemo	Male	No	4	Food, source of fibers, leave as a mat
30.	Genjo	Male	No	4	Food, source of fibers, leave as a mat
31.	Geno	Male	No	4	Food, source of fibers, leave as a mat
32.	Gillo	Male	No	4	Food, source of fibers, leave as a mat
33.	Gini	Female	No	3	Food, source of fibers, leave as a mat
34.	Gubo	Male	No	4	Food, source of fibers, leave as a mat
35.	Gudiro	Male	high disease resistance	Above 4	Food, source of fibers, leave as a mat
36.	Gushiro	Male	No	4	Food, source of fibers, leave as a mat
37.	Kafiacho	Female	No	3	Food, source of fibers, leave as a mat
38.	Kekero	Female	No	3	Food, source of fibers, leave as a mat
39.	Ketano	Female	No	3	Food, source of fibers, leave as a mat
40.	Machadami	Female	No	4	Food, source of fibers, leave as a mat
41.	Meshengi	Female	No	3	Food, source of fibers, leave as a mat
42.	Meso	Male	No	Up to 10	Food, source of fibers, leave as a mat
43.	Nobo	Male (Oldest)	High disease resistance	Above 4	Food (Rigid with much fibrous and less tasty), source of fibers, leave as a mat
44.	Omi	Female	No	3	Food, source of fibers, leave as a mat
45.	Pecho	Female	No	3	Food, source of fibers, leave as a mat
46.	Qawo	Female	No	3	Food, source of fibers, leave as a mat
47.	Shehi	Female	No	3	Food, source of fibers, leave as a mat
48.	Shido	Female	No	3	Food, source of fibers, leave as a mat
49.	Shimo	Female	No	3	Food, source of fibers, leave as a mat
50.	Shisho	Female	No	3	Food, source of fibers, leave as a mat
51.	Shuki	Female	No	3	Food, source of fibers, leave as a mat
52.	Shundi	Male	No	4	Food, source of fibers, leave as a mat

S.N	Varieties of Enset (Shekign)	Types (Male/ Female)	Disease Resistant nature	Maturation time to yield food (years)	Significance
53.	Shuri	Female	No	3	Food, source of fibers, leave as a mat, use during delivery medicinal value
54.	Tao	Female	No	3	Food, source of fibers, leave as a mat
55.	Tefero	Male (Old)	No	4	Food, source of fibers, leave as a mat
56.	Teyo	-	No	4	Food, source of fibers, leave as a mat
57.	Topocho	Female	No	3	Food, source of fibers, leave as a mat
58.	Tuti	Female	No	3	Food, source of fibers, leave as a mat
59.	Wago	Male	No	4	Food, source of fibers, leave as a mat
60.	Wango	Male	-	4	Food, source of fibers, leave as a mat
61.	Yahoo	Male	No	4	Food, source of fibers, leave as a mat
62.	Yebo	Female	No	3	Food, source of fibers, leave as a mat
63.	Yeko	Female	No	3	Food (The most sweet and preferable for consumption), source of fibers, leave as a mat
64.	Yeto	Female	No	3	Food, source of fibers, leave as a mat
65.	Yirio	Female	No	3	Food, source of fibers, leave as a mat
66.	Yobo	Male	High disease resistance	4	Food (More rigid than Nobo and less tasty), source of fibers, leave as a mat
67.	Yoro	Male	No	4	Food, source of fibers, leave as a mat
68.	Yoto	Female	No	3	Food, source of fibers, leave as a mat

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