

# Ethnobotany of Spice and Condiment Plants and the Associated Indigenous Knowledge on Management, Utilization and Conservation of them in and around Home Gardens in Loma and Gena Bosa Districts (Weredas) of Dawuro Zone, Southern Ethiopia

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**Abstract** – This paper documents the traditional management, conservation and use of plant diversity focusing on spices and condiment plants found in and around home gardens along with the indigenous biological knowledge in Loma and Gena Bosa Woredas of Dawuro Zone, Southern Ethiopia. Data was collected from September 2006-March 2007 to get relevant information and plant specimen of different seasons. The ethnobotanical information was gathered from 32 spices and medicinal plants vendors (from market observation and interviewing 16 men and 16 women). Home garden owners and traditional healers were also asked for assurance of information. Samples of 100 home gardens (HGs) were considered and data on 214 plant species were collected from 300 plots each 5mx10m. The data were analyzed using SPSS computer software. The procedure for preference ranking and Shannon diversity index were also applied. About 43 species of spice and condiment plants were recorded both in the market and home gardens of the study area that were distributed in 16 families. Family *Lamiaceae* contains 13 species (30.23%), *Asteraceae* with six species (13.95%), *Apiaceae* four species (9.3%), and *Zingiberaceae* with three species (6.97%) cover 60.47% and the rest families contain 17 species and accounts for 39. 53% of the species of spices and condiments both from HGs and markets. Out of the spices and condiments recorded in the plots of home gardens sampled, *Capsicum annuum* recorded in 62 HGs, *Ocimum americanum* in 53, *Ruta chalepensis* in 51 and *Capsicum frutescens* in 47 HGs. Establishing botanical gardens with community-based conservation, encouraging the use of home gardens for cultivation of multipurpose plants and finding markets for potential home garden products needs to be followed up.

**Keywords** – Biodiversity, Condiments, Dawuro, Home Garden, Indigenous Knowledge, Loma and Gena Bosa Districts, Spices.

## I. INTRODUCTION

Ethiopia is one of the biodiversity rich countries in Africa well endowed with a diverse range of agroecological systems that has resulted in having unique species of plants, animals and microorganisms (7; 20; 29; 33; 41; 46). The use of the plant resources among the diversified ethnic groups and cultural groups in Ethiopia shows the rich cultural diversity (1). The collection of useful plants and animals from the wild has gradually led

to small-scale plant and animal husbandry and the continued intensification resulted in the emergence of full-scale agriculture in gardens and fields (9;43). Home garden is the farming around the home in which different types of plants are cultivated for the different needs of families like food, medicinal plants (26;41), spices, condiments, and dyes (9; 27). The process of plant domestication whereby societies select as useful species from the wild is still currently taking place in some traditional agricultural systems (44). The special arrangement of the crops in home gardens may be related to the various uses of the crops micro-environmental adaptation and their habit.

Spices and condiments are plants that are used as seasonings (13). A spice is an aromatic, fragrant substance while a condiment is sauce or relish combining vegetable and or spices with other ingredients (34). Spices and condiments are plants or plant products that are used to flavour foods or beverages before, during or after their preparation (Jansen, 1981). Therefore, 'spices' are plants or plant products that are usually added during the cooking or preparation while 'condiments' are plants or plant products that are added at the table to already prepared food.

The records of spices and condiments may date far back as the pyramid age in Egypt, approximately 2600 to 2100 B.C. (32). It was not until the first century A.D. in Rome that there was for the first time a notable increase in the utilization of spices as condiments in food (34). Medieval Europeans tried to obtain highly valued spices to flavor their food, and to provide fragrance, and aromas (32).

It is thought that the use of spices started as medicinal agents before their role for flavoring food was realized. For example, according to (32), onion and garlic were fed to the one hundred thousand laborers who toiled in the construction of the great pyramid, as medicinal herbs to preserve their health. In ancient time they were valued as basic ingredients of incense, embalming preservatives, ointments, perfumes, antidotes against poisons, cosmetics, and medicines, and were used only to a limited extent in the kitchen. When they became essential ingredients in the embalming process, cassia and cinnamon were imported to Egypt from China and SE India (34). To appease the Gods of death the bodies of important personages were preserved against decay by embalming, which involved cleansing the anterior of the abdomen and rinsing it with

fragrant spices, including cumin, anise, cassia and cinnamon. In ancient civilizations no sharp distinction was made between food plants used for flavoring, spice plants, medicinal plants and sacrificial plants (34).

The spice trade has had a decisive effect on politics and was the main reason for the beginning of the European interest in Africa and Asia (3). Even nowadays, it still occupies an important place among foodstuffs, beverages and technical raw materials.

Ethiopia has diversified agro- ecological zones that favor the growth of spices and condiments. Ethiopia hosts a number of indigenous and exotic species of spices and condiments (7; 8). It is believed that spices and condiments have been in use since time immemorial back to or earlier than 160 BC in Ethiopia (47).

Some of widely used spice and condiments used to flavour foods or beverages in Ethiopia include *Aframomum corrorima*, *Piper longum*, *Brassica nigra* and *Lepidum sativum* and are among the widely grown indigenous spices (21; 40; 47). The first three are growing along with *Coffea arabica* in the Southern and Southwestern tropical high forest of Ethiopia (25;47). Some such as *Aframomum corrorima* are also found in the wild state while others are cultivated.

In Ethiopia there is traditional farming system and high traditional use of spices, less production in small plots as mixed intercropping. These spices and condiments are cultivated in the different regions, mostly by small-scale farmers on their plots, near to their vicinity using traditional way of cultivation (manually or using oxen plough). In most parts of the country, they are grown mixed with other crops. For example ginger and pepper, korarima, and garden cress are grown with or among maize, coffee, and teff in that order. The spice market is predominantly domestic (46) and the role of Ethiopia in the spice export trade is at its initial stage (8). According to (47), it is believed that the improvement of spices through research can play a big role in increasing the

income of the small farmers and can be a good source of foreign exchange.

According to (21), in most of the cultures, the production and preparation of spices and condiments is restricted to women. Women grow several condiment plants, spices and vegetables in the home garden so as to ensure the continuous availability and continual harvesting of fresh materials close to the kitchen (27; 39). These plant species are needed every day in the preparation of traditional foods.

The present study was developed to contribute to the documentation of the traditional knowledge of Dawro people in Loma and Gena Bosa Districts (Woredas) in the management, utilization and conservation of plants used as spices and condiments in home gardens of these areas and to preserve the indigenous knowledge of the useful plants in general and that of spice and condiment plants in particular.

## II. MATERIALS AND METHODS

### Description of the Study Area

Dawro zone is one of the 14 Zones in Southern Nations, Nationalities and Peoples Region (SNNPR) of Ethiopia. The study covered two drought stressed Woredas, Loma and Gena Bosa of the 5 woredas that constituted the zone (Fig. 1). The study area consists of sub-humid types of agroecological zones containing deciduous woodland with elevation 550 – 2600 m. The vegetation varies from semi- desert types in lowland areas to broad-leaved evergreen forest types in the highlands.

The soil in the study area has good physical properties and uniform profile, porous from clay to clay loam in texture which have agricultural potentialities (5). The annual rainfall of Loma woreda ranges from 1401 mm to 1800 mm but it is from 1201 - 1600 mm in Gena Bosa District. The mean annual temperature in the study area ranges between 15.1°C- 27.5°C in both Districts.

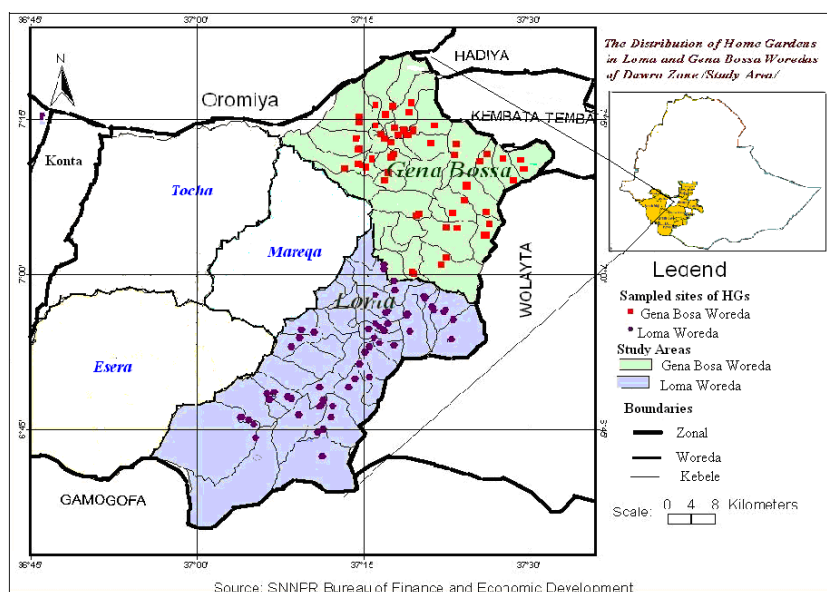


Fig.1. Location of the study area in Dawro Zone and the sampling sites

The area has rugged topography and the terrain of the land is sloppy in nature. The mountains and high plateaus have cool temperature moderated by the altitude and abundant rainfall. In contrast, the lowlands near the Omo and Gojeb rivers are dry and hot. The areas near the rivers' gorges were not inhabited due to their unfavorable climatic conditions such as drought and due to the prevalence of diseases like malaria and trypanosomiasis. The majority of the population was engaged in subsistence agricultural activities combining both crop production and livestock rearing (mixed farming). Dawuro Zone was commonly characterized by high population density sustained by high yields of enset (*Ensete ventricosum*) from small plot of land.

People in the study area were the Dawuro people and have unique cultural practices and social structure. The word "Dawuro" means an impregnable, powerful and heroic people (15; 37). Dawuro belongs to the family of the Omotic peoples in the Southern Ethiopia. The language, which is locally called "Dawurootsuwa or Dawuro k'aalaa", uses a Latin script (Anon, 2005a) and it is classified as a dialect of the central Omotic languages along with Gofa, Gamo, Wolayta, Konta, and others (15; 26;37).

#### *Data Collection*

Qualitative and quantitative approaches were applied using the research techniques known as guided field walk, use value matrix, free listing, priority ranking and preference-ranking (14;23) to gather data sets.

The ethnobotanical information was collected from a randomly sampled 100 households (home garden owners); from 112 traditional healers as informants on medicinal plants and from randomly encountered 32 vendors of spices, condiments and medicinal plants, selected systematically and conveniently from the two study sites based on their availability, willingness and practical knowledge. The selection of knowledgeable people was based on unstructured interviews with the randomly encountered members of the society. Informant selection was made with the help of local administrators, local people including elderly persons and Non-Governmental Organization (NGO).

Semi- structured interviews were administered and conducted with single informant and that allowed expressing personal viewpoints freely without being interrupted following Martin (23). Individuals informed as knowledgeable, traditional leaders and elder men and women were asked questions to tell the name of plants and their uses independently. It was tried to confirm the authenticity of information by comparing it with other information given by other informants on the same topic. In addition to this, indigenous people who have strong ties to the forest were used to confirm the local names of species and their ethnobotany.

The maximum effort was exerted to minimize giving different local names for the given species counted or taken for identification.

Guided field walk technique was used after taking information through semi-structured interview. The home garden owner was asked for permission to make a study tour in his/ her garden, with him / her and with the field assistant. The observation was made; species counted and recorded after laying quadrant at appropriate sites within the home garden, occasional interaction was made by using unstructured interview, raising some questions and taking notes.

Participant observation technique was used to add new information and strengthen information collected through interview, observation and discussion. The important information and conditions that became difficult to jot down at a time was taken in the form of images. Thus, observation and survey on plant use, social activities, and ecosystems, and using image of volunteer informants' complemented information gathered in other ways.

Unstructured interviews were also administered and conducted posing questions to Institute of Biodiversity Conservation staff members of Ethiopia in order to know the activities and the status of biodiversity conservation specially spice and medicinal plants.

Specimen data were collected from September 2006 to March 2007. A 5 m x 10 m quadrant was made in three directions, left, right and hind sides around the house. A total of 300 quadrants were made in the home gardens during the field study. The collected plant was pressed, dried and voucher specimens brought to Addis Ababa University, National Herbarium (ETH) for identification and documentation of the species.

#### *Data Analysis*

Ethnobotanical data was analyzed using both qualitative and quantitative methods following Martin (23); Cotton (14) and the Statistical Program for Social Sciences (SPSS) computer software programme. The spreader excel sheet was also used to feed data. Preference ranking was analyzed based on Martin (23), by entering in data matrix the responses of the key group of informants, arranged, ranked and summed for all respondents.

### **III. RESULT AND DISCUSSIONS**

#### *Emic Categorization Systems and Practices in the Study Area*

#### *Emic categorization of landscape based on its services and vegetation cover in and around home gardens*

The Dawuro people have their own system of classifying the environment and its components like landscape, climatic zones, vegetation, agricultural practices and the biotic components. Based on the purpose that the land serves and its vegetation cover, the local people classify their surroundings in to ten categories (Table 1).

**Table 1: Emic categorization of landscape based on its services and vegetation cover in and around home gardens**

Dawro Name	Equivalent Name	Description
Daaddaa/Emeriyaa	Home garden	Spice, condiment and medicinal plants, vegetables, fruits and others are grown near/around home
Osoo Gadiya	Crop field	Cereal and other crops are grown in wide range some distance away from home
Hentsasa/Hentsa gadiya	Grazing land	Cattle and other domestic animals are grazing
Wora	Intact forest	Natural forest with closed canopy
Kariya /Zaguwa /Dubusha	The front immediate/few meters away from the home/Traditional celebrating field	With grasses and one or two shade trees in front of the house
Kaluwaa/Daara	Open land- hillside bush- or/and grassland/fenced land	Land left aside by the community for commonal use for browsing and grazing of domestic animals/ for management or feeding of them
C'ariya/C'affiya	Marshland	Water logging area for grazing and roof thatch
Kare acha/Ketsa yushuwa	Residential land /nearby land	Including home garden and some distance away from it where calf is kept
C'ooraa	Riverine banks	The river course with some reserves of water
Zangara	Gorge	Lower area with series of forests and their patches on the sides of river

*The Spatial arrangement of plants in the home gardens (Daaddaa/Emeriyaa) of the study area*

The type of home garden (*Daaddaa/Emeriyaa*) in relation to living house observed from sampled home gardens varies in size, structurally both vertically and horizontally. Home gardens also vary in composition or diversity of plants based on ecological, socio economic,

personal preference, the distance and availability of market. In average, most of the inspected home gardens have typical zonations.

In home gardens, for the purpose of management, plants were categorized into different groups based on their use. These plants were planted on different sides of the house (Table 2).

**Table 2: Plants in the horizontal arrangement of home gardens in the study area**

Plant category	Place of cultivation	Plants cultivated
<i>Kariyaa aalek'k'uwaa</i> (Ornamental)	Planted in front of the house at the two sides of the house	<i>Rosa abyssinica, Rosa richardii, Thymus schimperii, Tropaeolum majus, Coronopus didymus, Tagetes erecta, Cynodon transvaalensis, Zantedeschia aethiopica, Canna indica, Pelargonium zonale, Commelina albescens, Vinca rosea, Canna indica</i> and others
<i>D'aliyaawaanne sawuwawa</i> (Medicinal and spices)	Planted very close to the house and in the edges on either side of the path on the way to the house	<i>Tagetes minuta, Hibiscus cannabinus, Santolina chamaecyparissus, Amaranthus caudatus, Ruta chalepensis, Artemisia absinthium, Artemisia afra, Cymbopogon citratus, Foeniculum vulgare, Artemisia annua, Artemisia abyssinica, Chenopodium ambrosioides, Lippia adoensis var kosoret</i> and others
<i>Utawaa</i> (Vegetables, fruits and coffee)	Close to the house; next to spices and medicinal plants	<i>Brassica oleracea, Phaseolus lunatus, Rhamnus prinoides, Musa paradisiaca, Citrus spp., Capsicum spp., Dioscorea spp, Gossypium sp., Solanum melongena, Curcuma domestica</i> and others
<i>K'umawaa</i> (Enset and other tubers)	Planted close to the manure heap, usually most dependent as staple food	<i>Coffea arabica, Ensete ventricosum</i> and <i>Colocasia esculenta</i> and others
<i>Shaluwawaa</i> (Commerical plants)	Planted near the margins of the garden	<i>Manihota esculenta, Catha edulis, Saccharum officinarum, Sorghum bicolor, Moringa stenopetala, Plectranthus edulis, Coffea arabica, Ensete ventricosum</i> and <i>Colocasia esculenta</i>
<i>Dirssaawaa</i> (Live plants)	Planted as live fence for demarcation and protection of garden plants	<i>Jatropha curcas, Erythrina abyssinica, Agave sisalana, Balanites aegyptiaca, Maesa lanceolata, Buddleja polystachya, Caesalpinia decapetala, Withania somnifera, Glycine max</i> and <i>Arundo donax</i>
<i>Kuwawaa</i> (Shade trees)	Planted in front of the house usually outside the fenced area for provision of shade, as ornamentals and for other multiple purposes	<i>Senna petersiana, Azadirachta indica, Albiza schimperiana, Cordia africana, Ficus vasta, Ficus sycomorus, Syzygium guineense subsp. guineense, Juniperus procera, Cupressus lusitanica, Thuja orientalis, Tamarindus indica, Casuarina equisetifolia</i> and <i>Schinus molle</i>

In the hierarchical arrangement of species, in height from home to outwards, the lower layer was rich in species diversity than the middle and the upper layers. Similarly, the lower sides of home in horizontal arrangements were rich in species diversity than the hind and upper side of home. Spices and medicinal plants with small height and those needs less manure relatively were grown in the upper side of the house. From the fact and closely observation, household wastes were hipped and spreaded near to the house on the lower side and hind of the house and sometimes on the upper side of the house if possible. Therefore, plants those need manure for their growth both cultivated and non-cultivated types tend to appear there and increase the species diversity besides the culture of people to grow diversified plants around their home. The general pattern within the mature home gardens of the study area showed that diversity was highest near homes and plant size increases with distance from the house. Thus, species number generally decreases away from the house, while number of individuals of single species increases. A similar pattern is reported in Kefa (42) and some area in Dawuro zone in southern Ethiopia (27).

The indigenous knowledge of using spices to flavour food, treat illness and for other purposes helped to conserve and compose these plant resources in the home

gardens for centuries. In order to compensate for land shortage, they plant annuals like spices, and vines (climbers) to hang up on live fences for immediate access.

*Spice and Condiment Preparations, their Uses and Production Potential in the Study Area*

*Diversity of spice and condiment plants in and around home gardens of the study area*

There were 43 species of spices and condiments recorded both in the market and home gardens of the study area that were distributed in 16 families. *Lamiaceae* 13 species (30.23%), *Asteraceae* with six species (13.95%), *Apiaceae* four species (9.3%), and *Zingiberaceae* with three species (6.97%) cover 60.47% and the rest families contain 17 species and accounts for 39. 53% of the species of spices and condiments both from HGs and markets (Table 3). About 33 spices were cultivated and/or allowed to grow for spice, condiment, medicinal and other purposes in the home garden. It was reported that most of spices were also served as medicinal plants in rural Home Gardens in Ethiopia (41) and in some areas of Dawuro zone (26). Out of the spices and condiments recorded in the plots of home gardens sampled, *Capsicum annum* recorded in 62 HGs, *Ocimum americanum* in 53, *Ruta chalepensis* in 51 and *Capsicum frutescens* in 47 HGs.

Table 3: The growth form, parts used and number of uses of spice and condiments in Loma and Gena Bosa Woredas of Dawuro Zone

Scientific name	Ha	Part used	Use	Hf	IC	%	Rank
<i>Aframomum corrorima</i> *	H	Fruit	B,Bu,Ch,M,Sa	WC	31	96.88	2
<i>Allium cepa</i>	H	Bulb	D,Hb,M,Sa	C	26	81.25	7
<i>Allium sativum</i>	H	Bulb	D,Hb,M,Sa	C	32	100	1
<i>Artemisia absinthium</i>	H	Leaf	Hb,M,P,R,Sa	C	32	100	1
<i>Artemisia abyssinica</i>	H	Leaf	Hb,M,P,Sa	C	9	28.13	18
<i>Artemisia afra</i>	H	Leaf	Hb,M,P,R,Sa	C	15	46.88	14
<i>Artemisia annua</i>	H	Leaf	Hb,M,P,Sa	C	4	12.5	22
<i>Brassica nigra</i> *	H	Seed	D,M	C	7	21.88	20
<i>Capsicum annum</i>	H	Fruit	DHb,M,Sa	C	32	100	1
<i>Capsicum frutescens</i>	H	Fruit	D,Hb,M,Sa	WC	24	75	9
<i>Chenopodium ambrosioides</i>	H	Fruit, leaf	D,Hb,M,Sa	C	11	34.38	17
<i>Cinnamomum verum</i> *	H	Bark	Fr,M,Sa	C	6	18.75	21
<i>Coriandrum sativum</i>	H	Fruit, Leaf	B,D,Hb,M	C	21	65.63	11
<i>Coronopus didymus</i>	H	Seed, leaf	D,M	C	16	50	13
<i>Cuminum cyminum</i> *	H	Seed	Sa	C	6	18.75	21
<i>Curcuma domestica</i>	H	Rhizome	B,M,Sa	C	11	34.38	17
<i>Cymbopogon citrates</i>	H	Leaf	Cl,Hb,M,P,R	C	25	78.13	8
<i>Cyperus articulates</i>	H	Root	Hb,M	C	15	46.88	14
<i>Foeniculum vulgare</i>	H	Leaf, seed	Hb,M	C	30	93.75	3
<i>Lepidium sativum</i>	H	Seed	D,M,Sa	C	32	100	1
<i>Lippia adoensis</i>	H	Leaf	Bu,Ch,Cl,Hb,M,Mk,P,R	C	32	100	1
<i>Mentha longifolia</i>	H	Leaf	Cl,Hb,M,P,R,Sa	C	16	50	13
<i>Mentha spicata</i>	H	Leaf	Ch,Hb,M,Mk,R,Sa	C	19	59.38	12
<i>Nigella sativa</i>	H	Seed	B,Br,M,Sa	C	32	100	1
<i>Ocimum americanum</i>	H	Leaf	D,Hb,M,P,R,Sa	C	29	90.63	4
<i>Ocimum basilicum var.basilicum</i>	H	Leaf	Ch,D,Hb,M,Mk,P,R,Sa	C	24	75	9
<i>Ocimum basilicum var.thyrsiflorum</i>	H	Leaf	Bu, Ch, Cl, D, Hb, M, Mk, P, R, Sa	C	27	84.38	6

<i>Ocimum canum</i>	H	Leaf	Cl,Hb,P	WC	14	43.75	16
<i>Ocimum urticifolium</i>	H	Leaf	M,P	WC	19	59.38	12
<i>Pimpinella anisum</i> *	H	Seed	Hb,M	FO	16	50	13
<i>Piper capense</i> *	H	Fruit	Hb,M,Sa	WC	30	93.75	3
<i>Piper nigrum</i>	T	Seed	M,Sa	Cu	27	84.38	6
<i>Plectranthus ornatus</i>	H	Leaf	Hb,M	C	22	68.75	10
<i>Rhamnus prinoides</i>	S	Leaf	Br,M	WC	19	59.38	12
<i>Rosmarinus officinalis</i>	H	Leaf	Hb,M,Sa	C	8	25	19
<i>Ruta chalepensis</i>	H	Leaf	Ch,Hb,M,Mk,P,R,Sa	C	32	100	1
<i>Santolina chamaecyparissus</i>	H	Leaf	Hb,M,P	C	7	21.88	20
<i>Satureja pseudosimensis</i> *	H	Leaf	Cl,Hb,M,P,R	W	14	43.75	15
<i>Tagetes minuta</i>	H	Leaf	Cl,Hb,M	WC	12	37.5	16
<i>Thymus schimperi</i>	H	Leaf	Bu, Ch, D, Hb, M, P, R, Sa	C	32	100	1
<i>Trachyspermum ammi</i> *	H	Seed	B,Br,M,Sa	C	28	87.5	5
<i>Trigonella foenum – graecum</i> *	H	Seed	B,M,Sa	C	28	87.5	5
<i>Zingiber officinale</i>	H	Rhizome	Bu,D,Hb,M,Sa	WC	32	100	1

Note- \* not recorded in the sampled home gardens but from other HGs, wild and/or market observation

Where For **use**: **B** for local bread; **Br** = beverage; **Bu** = butter; **Ch** = cheese; **Cl** = cleaning; **D** = daathaa (common condiment); **F** = fragrance; **Hb** = haytsaa bunnaa (leaf coffee sauce); **M** = medicinal; **Mk** = milk; **P** = perfume; **R** = ritual; **Sa** = local sauce (like *Wos's'iyaa*);

For **Ha** = for **habit/Habit/growth** form: **H** = herb; **S** = shrub; **T** = tree, For **Source/Harvested from**= **Hf**: **C** = cultivated; **W** = Wild and **WC** = wild and cultivated, **IC** = informant consensus;

The present study showed that, though there was variation in size of home gardens, number of home gardens sampled, agro-ecology and farming systems, the study area people use diverse group of spices and condiments in and around home gardens. This was because; the traditional management, cultivation and harvesting, the culture of selling fresh herbs and fruits, diversifying diet with spices (culture of diversifying table meal), treating some illness for humans and domestic animals, celebrating some traditional ceremonies like 'ocha kasha' and 'geyuwa' with lots of spices and the need for easy access by the involvement of women. *Lamiaceae*, *Asteraceae*, *Apiaceae* and *Zingiberaceae* were the common plants taxa serving the livelihood of the local people in different aspects including income generation.

*Capsicum annum*, *C. frutescens*, *Ocimum americanum* and *Ruta chalepensis* were found almost in all sampled home gardens. This was due to the fact that people in the study area use those most frequently as spices and condiments. It was confirmed from market survey that most of the vendors interviewed were from rural Kebeles, selling diversified spices and herbs. In contrast, from observation and data collected from plots of sampled home gardens, home gardens near the market and roadside were with less diversity of spices. This was because; they involve in large-scale preproduction of one or two species away from their home gardens in order to supply the nearby market (ginger and wormwood). Hence, the market access, the demand of neighbouring Woreda and Zones were reasons for the limited diversity observed in home gardens close to market sites. Unless conservation measures are taken and awareness is raised, this type of commercialization may leave those biological resources to be vulnerable.

#### *Growth forms and parts of spice and condiment plant species used in the study area*

About 95.35% (41) herb species, one shrub and one tree species (2.33%) each was recorded. About 48.84% (21)

with leaves take the top use followed by 18.6% (8) seed, 9.3% (4) fruit, 4.65% (2) bulbs and rhizomes each and 2.33% (one) root and bark each in that order. About 9.3% (4) species were whose different parts are used. About 76.74% (33) species were cultivated, eight (18.6%) of them were both cultivated and wild relatives, one (2.33%) was harvested from wild and one (2.33%) is from other woredas of the Zone. Out of the cultivated and practiced spices and condiments of the areas, 41 (95.35%) of them were recorded from plots of sampled HGs. Some multipurpose plants like *Ensete ventricosum*, *Ficus sur* and *Cordia africana* are allowed to grow or planted to provide good environment (fertility and shade) for spices and condiment plants.

The people of the study areas prefer to grow herbaceous spices and condiment plants than trees and shrubs. This is because; these were easy to harvest for women and children and can serve as ornamental and be accessible for immediate use as medicine in addition to creating a favourable environment of home garden which in turn supplies manure/house wastes regularly. The people of the study area use herbs and leaves. This was because the condiments (like *daatha* and *haytha bunnaa*) and some food preparations (like *tepela* and *hawuzuwa*) need fresh leaves of herbaceous spice and condiment plant species where the local people use different leaves together in the preparations.

#### *The uses and preparation of spice and condiment plants in the study area*

##### *The use of spice and condiment plants in and around home gardens*

There were about 66 general use reports on plants of the study area. Of the recorded plant species (214) in the plots of the sampled 100 home gardens, about forty-three (43) spices were recorded with 13 uses in and around home gardens: to spice local bread (6 species), butter (5), cheese (7), milk (5), local drink/beverage (3), cleaning utensil (6), local/common condiment (Daatsaa) (14), leaf coffee sauce

(haytsaa bunaa) (30) and local sauce (Wos's'iyaa) (28), as medicine (40), as fragrant (1) and perfume (16) and for ritual purposes (12). *Ocimum basilicum* var. *thyriflorum* with the maximum uses (10) takes the first rank followed by *Thymus schimperi*, *Lippia adoensis* and *Ocimum basilicum* take the second rank having each eight uses. *Ruta chalepensis* was the third in rank having seven important uses. *Mentha longifolia*, *Mentha spicata* and *Ocimum americanum* each with six uses and *Aframomum corrorima*, *Zingiber officinale*, *Artemisia absinthium* and *Artemisia afra* each with five uses took the fourth and fifth ranks respectively. For the other species 1-4 uses were recorded (Table1). *Thymus schimperi*, *Lippia adoensis* var. *kosoret*, *Ocimum basilicum* var. *thyriflorum*, *Zingiber officinale* and *Aframomum corrorima* were mainly used in that order in order to spice cooking butter and keep it longer with its fresh taste and smell and then turmeric (*Curcuma domestica*) was used to give it the desired colouration in addition to feeding mother cow with special plants for this purpose.. Most of spices and condiment plants recorded in the study area have more than three uses. In the average, the most frequently recorded spices in the home gardens have more uses. For example, *Ruta chalepensis* was recorded in 51 home gardens and *Ocimum americanum* was recorded in 53 home gardens. People who were using plant in various ways were benefited from the constituents it has as people in elsewhere were reported in western Kenya (24).

The categorization of flavouring plants as spices (Sawuuwaa) and condiments (Dok'k'uwaa/ Tushuwaa) is based on the manner of application. The term "Sawuuwaa" meaning plant products that were making the food delicious/sweet while the term "Dok'k'quwaa/Tushuwaa" meaning touch the food with (after cooking the food, touch it with the prepared fresh leaves and fruits before eating otherwise put the prepared fresh leaves and fruits on to that prepared food, sauce and other preparations). The former refers when it was used during cooking, with food while the latter was used for after cooking especially when fresh leaves and fruits were used. Hundred percent of the informants recognize the usable value of *Capsicum annum*, *Allium sativum*, *Zingiber officinale*, *Lepidium sativum*, *Nigella sativa*, *Ruta chalepensis*, *Artemisia absinthium* and *Thymus schimperi* as spices, condiments and medicine to treat some diseases. *Aframomum corrorima*, *Foeniculum vulgare*, *Ocimum americanum* also follow from second to fourth by having 97%, 94%, 91 % consensus of informants in that order. *Piper capense* is also found at higher rank. They usually categorize *Ruta chalepensis*, *Artemisia absinthium*, *Artemisia afra*, *Ocimum americanum*, *Lippia adoensis* var. *kosoret*, *Foeniculum vulgare* and *Thymus schimperi* as condiment especially in boiled leaf coffee though they were used as spice in some occasions but the others were used as both spice and condiment.

#### *Preparation of spice and condiment plants in the study area*

The preparation of spices and condiments is by milling, pounding, smashing and cooking otherwise simply by adding or mixing. Provision of food for the whole family

is the women's work. The main meals were injera and bread. The fresh or dried, powdered or the needed parts of spices (*Sawuuwaa*) are added in to the main dishes before or/and during cooking while condiments (*Dok'k'uwaa/ Tushuwaa*) are prepared from fresh leaves and fruits and add or used to other food's after cooking in order to make them more tasty and enjoyable. They also help easier to eat and sometimes used as part of nutrition. The food is taken and touches on prepared condiment then after eaten. Such a category is unique to the study area compared to (Jansen, 1981), no more differences in between the two. The main condiments were *Dathaa*, *Awaaziya* and *Kuubuuwa*. *Datsaa* is mainly prepared from fresh vegetable, which is with high water activity. It is prepared by grinding fresh fruits of pepper (*Capsicum annum*) or birds's eye chilies (*Capsicum frutescens*) (mainly), garlic (*Allium sativum*), genger and leaves of coriander (*Coriandrum sativum*) and sweet basil (*Ocimum basilicum*). 'Awaaziya' is also another liquid form of bird's eye chilies/'mis'imis'uwa' and pepper/'bambbariya' used for stimulating appetite, to eat raw meat and the likes, the liquid used is local beverages such as 'harak'iya'/alcohol and 'essaa'/teji. Other spices are also mixed with bird's eye chilies and pepper to prepare 'awaaziya'. *Awaaziya* is prepared from powdered chilies/*Dillihyaa* and other powdered spices like fenugreek (*Trigonella foenum-graecum*), coriander, Ethiopian caraway/bishop's weed (*Trachyspermum ammi*), black cumin (*Nigella sativa*), cloves, Cinnamon (*Cinnamomum verum*), korarima and then after mixed together with milk and/or milk products.

Traditionally, the people prepare a lot of sauces (like Kuubuwa), soups (like Eretsa/C'aba) and drinks (Haytsa-Bunaa) from spices and condiments for medicinal purposes (26). 'Kuubuwa'- is a local sauce prepared mainly from garlic, garden cress, mustard, long pepper, pepper or birds's eye chilies, kebercho. Others were prepared with cheese and butter, eaten every morning with local bread (Ukkitsaa). It is eaten for medicinal purpose occasionally to protect a lot of diseases. It is eaten especially during the transitional months of rain and dry seasons (October and May). 'Dillihya' ('Mitin'- in Amharic) is another preparation of spice and condiment plants, prepared from the best quality of dried and cleaned pepper (pedicel and calyx removed) and ground/ pound, or mixed with fresh garlic, basil, and ginger. It is ground again without or with some water. Then the mixture is dried in the sun. Other ground spices like fenugreek, coriander, Ethiopian caraway, black cumin, cloves, Cinnamon, korarima, salt and red onions (*Allium cepa*) were mixed, slightly roasted, ground to a fine powder, and then added to the other mixture. Some water is added until a semi-fruit substance is obtained, called 'dillihya'. This can be stored very long time and used to flavor raw meat 'k'ayye ashuwaa', 'ashuwaa uttaa' and the likes. Most of the time 'Dillihya' is ground alone and sold in the local market and the user then mix it with other spices as the procedures indicated above. It has some similarity with report of else where in Ethiopia (Siegenthaler, I. E., 1963).

There were common materials and equipment for food in Dawuro culture (Table 4). preparation of spices and condiments, for ease of eating

Table 4: Equipment used for preparation of spices and condiments in the study area

Equipment	Equivalent name	Description	Purpose	Product
<b>Bashyaanne Shaasha-mitsa</b>	A griddle disk shaped plate; mover	Locally made from brick of clay; a tip curved stick made from bamboo/ other plants or from metal	For heating, roasting and cooking; for moving and mixing spices on the plate	Dry or/and crushed spices ready for grounding, cooking and other process
<b>Lugumanne Mook'aa /Shaatanne Mook'aa</b>	A dish/pail shaped small dish ; a spoon	Small dish locally made from brick of clay; traditional spoon made from horn of cattle	For cooking; for mixing/moving	For" kuubuwa "medicinal and other dish preparation
<b>Oyiidyaanne Muuylaa; Mashsha</b>	Woodplate ; grinder/round shaped stone; knife	Made from strong and heavy trees ; small all rounded stone; traditional knife	Plate for rolling and chopping; stone for rolling and grounding; knife for chopping/ decreasing size of fresh herbs and fruits on	Condiments like <i>Datsaa</i> and <i>Kuubuuwa</i>
<b>S'aaruwa/Ottuwa</b>	A pot	Made from clay	Boiling leaf coffee in water	Leaf coffee/ <i>haytsa bunaa</i>
<b>Satatiyanne Sire-mitsa /Disttiyanne Sire-mitsa</b>	A dish/large pot	Made from clay; stirring stick	For cooking and paddling respectively	<i>Wos's'iyaa/Wot</i>
<b>Udulaanne udula-mitsaa</b>	Mortar; pestle	Is a hand hewn made from strong and heavy trees like <i>Cordia africana</i> , <i>Hagenia abyssinica</i> , <i>Prunus africana</i> , <i>Terminalia schimperiana</i> and <i>Gardenia ternifolia</i>	To break up any large pieces (pulverized) /for pounding	Powdered spices / <i>Sawuuwaa</i> like <i>dillihiyaa</i> and dry leaf coffee/ <i>haytsa bunaa</i>
<b>Wos'aanne maydiyaa</b>	Local milling stone (the upper small; the lower large)	Made from basement rock or igneous rock	Grinding/milling	Powdered spices like <i>dillihiyaa</i> and <i>Awaaziyyaa</i>
<b>Wos'aanne Muuylaa</b>	Special grinding stone (the lower; the upper)	Made from up flattened basement rock; small all rounded stone	Grinding by rolling fresh herbs and fruits on	For Condiments ( <i>Doqquwaa/Tushuwaa</i> like <i>Dathaa</i> and <i>Kuubuuwa</i> ) preparation

People drunk 'absinthe' of wormwood/ *Artemisia absinthium* reported that they suffered from serious mental disturbance, seizures and sometimes led to death; so that its use in local "arek'e" is discouraged (28). However, the study area people were adapted to use it mainly for drinking (flavouring) boiled coffee leaf and also used/chewed for stomachache, severe abdominal pain and hypertension/blood pressure for generations (26).

The processes and recipes vary on the availability of herbs and spices and when available it is in the condition that they prepare or use. Most herb spices were relatively fresh and unprocessed. The main dish consists of 'Sooluwaa/Injera' and 'Wos's'iyaa/Wot'- spiced sauce, 'Ukitsaa'/local bread, 'Hawuzuuwaa', 'Aybizaa', 'Teppelaa', 'Shendderaa' and other local preparations

(Table.5). The major use of spices and condiments was in the preparation of 'Wos's'iyaa/Wot' (spiced sauce) and traditional alcoholic beverages, such as, 'Parssuwaa/Tella', 'Eessaa/Tedj', and 'Harak'iyaa/Katikala'. Some others are also used to flavour butter, milk, coffee, tea, raw meat and other local dishes. Some of the names of spices and other plants given in the study area were to indicate their use. For example, *Thymus schimperi* recorded in 13 home gardens has eight uses (leaf coffee preparation, butter, cheese making, Daatsaa/condiment, medicinal, fumigating, ritual and sauce). However, its use was directly related with the local name 'Oyisa maataa' meaning herb of butter. So that, they used and still were using *Thymus schimperi* mainly for this (butter) and other purposes.



**Table 5: Various food preparations from enset products**

<b>Local Uses</b>	<b>Description</b>
<b>Ukitsaa</b>	<i>Ukitsaa</i> products prepared in the form of bread
<b>Komppuwa</b>	A bread substitute prepared from ' <i>Unc'c'aa</i> ' by wrapping in Utha leaves and baked in coals
<b>Saretsaa</b>	The special type of bread prepared from ' <i>Unc'c'aa</i> ' by mixing with flour of teff, sorghum, maize, wheat and others
<b>Bashumaa</b>	The special type of bread prepared from ' <i>Unc'c'aa</i> ' by mixing with flour of teff, sorghum, maize, wheat and others, and if the mixture is cooked after one day
<b>K'iis's'aa</b>	If different flours are mixed together or not, without ' <i>Unc'c'aa</i> ', and cooked immediately on the clay plate
<b>Baac'c'iraa</b>	Chopped ' <i>Unc'c'aa</i> ' is used to prepare a dish; the finely chopped ' <i>Unc'c'aa</i> ' is placed on the locally made clay plate and roasted. This is mixed into butter, cheese, salt, garlic, onions, black cumin, bishop weeds and other spices. This dish is usually prepared when important friends or dignitaries visit and wholly days especially on the leap year ('Laysalaamiyaa') and 'Mesk'ala'. There is a traditional song phrase at this ceremony "Baalaa baac'c'iraa oyssa xalalaa." The preparation with more of butter (till the food soften and suspend in it)
<b>Koosiyaa</b>	Made from the finely chopped ' <i>Unc'c'aa</i> '. ' <i>Unc'c'a</i> ' is placed on the locally made clay plate and roasted roughly with chopped cabbage or moringa leaves and then after rolled by compressing using hand to eat with milk and milk products, 'haytha bunaa'/leaf coffee and condiments. It is usually eaten for diarrhea, as appetizer with condiments.
<b>Teppelaa</b>	Is culturally restricted to women. Cabbage leaves are cut and roughly cooked; dry cut ' <i>Unc'c'a</i> ' is added in to pot with frequent mixing then after the hot food is eaten with condiment/ <i>dok'k'uwaa</i> or <i>tushuwa</i> . It is usually eaten for constipation and as appetizer with condiments.
<b>Hawuzzuwa/ Aybizaa</b>	Prepared from dry ' <i>Unccaa</i> ' alone or the mixture of undried and repined seeds of pulses like horse bean, pea, bean and others are cooked and then after eaten with condiment ( <i>Dok'k'uwaa</i> or <i>tushuwa</i> ), some times with butter.
<b>Shendderaa</b>	A Porridge prepared from ' <i>Unccaa</i> '; Softely cut and finally processed ' <i>Unccaa</i> ' is cooked in a pot/dish with water and then eaten with any kind of condiments/' <i>Dok'k'uwaa</i> or <i>tushuwa</i> ' which is with or without butter or cheese. It can be prepared from flour of cereals (maize, teff, sorghum and pounded and dried tuber of cassava). If soft Shendderaa is eaten with flavoured (spiced and mixed with condiments) cheese and butter, it is called as ' <i>Siilisuwa</i> ' and when eaten with the mixed fresh chopped meat, cheese and butter, it is called as ' <i>Sulssuwa</i> '.
<b>Sooluwa</b>	Is injera, a traditional food made from ' <i>Unc'c'aa</i> ' or usually from teff, maize, wheat, barley, millet and pounded and dried tuber of cassava and eaten with local sauce/' <i>Wos's'iya</i> ' or with any kind of condiments/' <i>Dok'k'uwaa</i> or <i>tushuwa</i> ' which is with or without butter or cheese.
<b>Doysaa/ Salkkiyaa</b>	There are more than 50 varieties of <i>Utsaa</i> of which there are special types cultivated for their corm edible portion (example, the varieties <i>Arkiya</i> and <i>Kekeriya</i> in Dawuro language). After avoiding the root, the corm is cut or split in to pieces and then cooked with fresh leaves of cabbage and pumpkin or/and fruit of pumpkin; then after eaten with different kinds vegetables, fruits, milk and condiments.

There is special preparation of herbs of plants mainly using coffee leaf as basic component for ease of eating food, which is locally called as '**Haytsa Bunaa**' (Table 6). The roasted, brewed bean is a luxury to many people of the area, especially boiled for strangers and guests. However, drinks prepared from parts of the coffee plant, which have no commercial value in the area, are often substituted. This was used as a part of diet for ease of eating local bread (*ukitsaa*, *Booruwaa*, *Bashumaa*, or *K'is's'aa*) and other foods especially in lowlands. The

highland and middle altitude people of the area use leaf coffee (*haytsa bunaa*) with butter mainly for common cold, rheumatism, arthritis, nursing mother and sometimes as part of diet if there is no other condiment and spice or other items for ease of eating food. It is drunken using local equipment called "Buudaa/k'eeeri-bac'a"- a small whose tip part is horizontally and carefully' cut, and "haluuwa"- a small vertically and carefully' cut, Cucumber fruit

**Table 6: Special traditional preparations of herbs mainly using coffee leaf as basic component**

Local Uses	Description	Main components	Additional components as condiment
<b>Haytsa Bunaa</b>	<b>Haytsaa</b> –meaning leaf while <b>Bunaa</b> -meaning coffee. `Haytsa Bunaa`-is the boiled drink mainly made from coffee leaf -as the name indicates, it literally means leaf coffee. Dawuro people use other parts of coffee plant other than the usual coffee bean.	The coffee leaves are crused, dried/mosit and boiled in water. Garlic, rue, sweet basil, rosmery, ginger, green pepper, worm wood, lemon grass and salt are added	Some additional herbs like <i>Cyperus articulatus</i> (root), leaf and stem of <i>Plectranthus ornatus</i> , fruit of <i>Piper capense</i> and either <i>Artemisia afra</i> , <i>Artemisia abyssinica</i> , <i>Tagetes minuta</i> , <i>Ocimum basilicum</i> var <i>thyrsoflorum</i> or <i>Mentha spicata</i> and <i>Satureja pseudosimensis</i> and <i>Foeniculum vulgare</i> are added at the end.
<b>C'amo/C'egeeraa haytsa Bunaa</b>	They need bitter (c'amo haytsa Bunaa) preparation of it because of its stimulating character and their belief that it helps to withstand hungry. It is possible to use it again by boiling, after adding some herbs (or without) in to water and salt. The first wise is C'egeeraa (bitter) which is with a lot of herbs as mentioned in <i>haytsa bunaa</i>	The bitterness comes from <i>Artemisia absinthium</i> in it. That is why <i>Artemisia absinthium</i> is cultivated widely and expensive when compared to other herbs in the study area	<i>Artemisia afra</i>
<b>Danjjaa</b>	The second wise, the remaining <i>c'egeeraa haytsa bunaa</i> after consumption (the poor and children)	Water and salt is added in to it and then heated	Boiled with or without adding some fresh herbs (Condiments)
<b>Dashuwa or C'alaaliya</b>	The third wise, whose bitterness is lost; and retained <i>C'egeeraa</i> or <i>Danjjaa haytsa bunaa</i> and then after used/drunk by mixing the contents well without boiling (children).	Water and salt is added in to it	Some herbs like <i>Ocimum americanum</i> are added otherwise without herbs (condiments)

### *Production potential and market conditions of spice and condiment plant species in the study area*

Women and children were responsible for cultivating and selling the fresh product of spices and condiment plants. But, those widely has seen in the local markets and for the demand of other Woredas and neighbouring Zones, like ginger, pepper (*Capsicum annum*) and wormwood (*Artemisia absinthium*) were cultivated some distance away from the house by men. Pepper, rue (*Ruta chalepensis*) and sweet basil (*Ocimum basilicum*) were produced almost in all home gardens. Apart from this Esera and Tocha Woredas including some forests and river basins of Marekaa Woreda were known in both cultivated and wild *Gingiber officinale*, *Piper capense* and *Aframomum corrorima*.

The products were for home consumption and income generation (for demand of middleman and neighbouring Zones ('Bale and Bombe' market in Wolayta, 'Hadaro' market in Kambata and Tambaro) and Jimma markato. Fifteen local markets from Loma and 17 from Gena Bosa Woredas were visited. The known markets of spices were Angela, Wangada, Duga, Samara, Yallo, Gasa, Dodi, Shota, Disa, Sayki, Hala, Malditi and Yeli. Out of the interviewed 32 vendors of spices and medicinal plants, 81.25% were women whose ages were above 18 and the rest were boys below 18 years. They take fresh herbs and

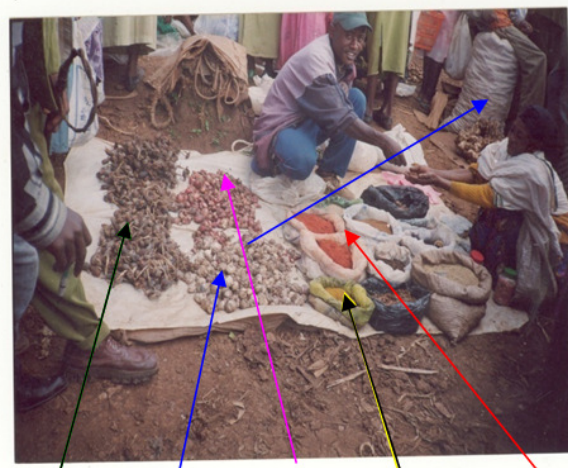
fruits to local market (Fig. 2a) but men rarely take dried ones, usually of different types of spices (Fig. 2b) there (Fig.2). If men take the fresh spices and condiment herbs to local market, it was taboo that indicates the poorness of individual. There was variation in price using different local measurements.

The widely produced home garden spices in the study area of Dawuro for both house consumption and local market income generation were *Zingiber officinale*, *Capsicum annum*, *Capsicum frutescens* and *Artemisia absinthium*. *Zingiber officinale* and *Aframomum corrorima* were also found in the wild of the study area as similar report from southwest of Ethiopia (25). The Kebeles of the two study Woredas around Omo River were known in producing pepper, ginger, sweet basil and rue. However, Seri-Bala and Malditi-Mashuncha were well known in producing ginger and warmwood respectively. The chilies were almost in every home garden and others (*Zingiber officinale* and *Artemisia absinthium*) in home garden and in the farmlands especially near the local market. The remaining spices and herbs were produced for home consumption and to some extent for local market rarely very close to the house for quick and easy access and due to limited market access as reported to Gamu people (9).



Korrorima

Fresh spices and condiments in Angela market (2a)



Garlic Shallot Turmeric Chilies

Dried spices in the Gasa market (2b)

Fig.2. Fresh and dried spices in the market of the study area

Spices were sold separately or in the various mixtures. Usually all markets were remarkably well supplied with indigenous and imported spices in all seasons of the year. Currently, Ethiopian spices Extraction Factory is the leading industry that collects spices produced by large and small farmers, processes and supplies the export demand (8).

There were also produced and practiced home garden spices like rue, coriander, turmeric, bishop's weed, mustard seed, rosemary, garden cress, thyme, shallot, black pepper and fenugreek which waits for market access. Most of the home garden spices were intercropped among enset, coffee, pulse, maize, sorghum and others, and harvested at different time, which plays a positive role in agroecological, agroecosystems and conservation.

The widely produced spice and condiment plants (based on assessment, informants' consensus and economically important frequently recorded in the sampled home gardens were described below.

### 1. *Yenjeeluwa/Zinjibil/ginger -Zingiber officinale* Rosc.

The local names are Yenjeeluwa (in Dawuro language), 'zinjibel', 'jinjibel' (Amharic); 'ginjebela', 'zenjibil' (Oromo language) and common English name is ginger. *Zingiber officinale* is herb with a thickened, fleshy, perennial, subterranean rhizome and with one or more aerial leafy stems (Jansen, 1981). In study sites ginger was often seen cultivated under sub optimal conditions, for instance at altitudes 1000-2030 m.

**Production potential:** It was cultivated for both home consumption and for market as cash crop (as recorded in plots of 17% HGs and as seen in crop fields of sampled and non-sampled HGs). It was cultivated widely in home gardens as well as in out fields of Kebeles around Omo River especially Seri-Bala, Dachi-Danaba, Zaba-Dilba, Angala-Dube, Garada-Bachire, Garada-Entala, Dasha-Aja, Samara-Minata, and Buri Kebeles from Gena Bosa Woreda; Zima-Waruma, Danaba-Bola, Yallo-Worbati,

Lala-Ambe, Subo-Tulema, Yeli-Chawula, Malditi-Mashuncha, Mogiti, Disa-keera, and Olo-Woyide Kebeles from Loma Woreda. It is collected from Wild in the Afuqi Sore, Shota Chawula, Sayiki Boho, from Loma Woreda; Baza Shota Kebele, from Gena Bosa Woreda.

Woman cultivates it around house in the home garden for their immediate use; home consumption while man cultivates it in the outfield. The field is prepared well by ploughing two to three times. Rhizome is dropped after plough and then after the soil is covered, do not use manure or fertilizers because of the natural fertility of soil. And hence, the product with good quality is harvested and stored quite long time. Farmers saw it from January 1-30 or March 1-30 but not in February (if so it will be rotten). The January sowed ginger germinates in March and cultivated/hoed every 15 days after germination up to June; then after, it was left until next January. Its leaves drop from October - January rain is waited for cultivation after its leaf appearance and weeding without cultivating in August is not to be forgotten. Cultivation in every 15 days is for 1 year and 10 time; six time in the second year. In the first year, it is intercropped among maize but in the second year not possible because it propagates itself and occupies large space (so that it is left for 2 years). Its growth is a 2, 4, 8, 16, 32, and 64 manner of progression. Seri-Bala Kebele is known in its Ginger Production in Lowlands of Dawuro Zone, from Gena Bosa Woreda study sites. The Wolayita people in Ethiopia plant ginger in carefully prepared holes, which are filled with a mixture of soil and pulverized wood-ash. The Gumuz people usually grow ginger on newly cleared land and women tend the crop. Dawuro people do not follow the same practices as Wolayta and Gumuz.

**Market Conditions:** The produced ginger were taken on donkey back as there was a great demand for the local market and for neighbouring Zones markets Hadaro in Kambata, and Bombe, Bale and Sodo in Wolayta Zones. Products from Esera were taken to Chida, Konta special

Woreda and Jimma but it was sold with out trade name. It contributed quality for whole salers of Jimma (25). It is known by its constitutants of fewer fibers in it, with yellowish colour and good smell similar to its wild relatives there. The price varies depending on the harvesting season. For example, during harvesting time, the price drops and at other time the price rises. There was similar report about south west Ethiopia (25). Many farmers also stated that they would sell their production at any price because otherwise they would lose it and it would get rotten. Besides, they wanted to earn money quickly, so they didn't want to wait for traders who would offer better prices or for a better season. A similar report for south-west Ethiopia spice price determination (25).

**Uses:** Ginger was used as a flavoring in the preparation of several foods and beverages. The fresh ginger was washed and scraped, chopped into small pieces, pounded to a pulp and used either immediately or after drying. For example, in study area, ginger was a popular spice and was used together with other spices as a food spice in 'wos's'iya' as (21) described. People of the area use the washed and grounded rhizomes by mixing with pounded coffee leaf and garlic and then boil/heat it to drink ('haytsa bunaa'). It also used as "Daatsaa"-chopping and ground peppers, ginger, and other spices to eat with "Ukitsa"/processed and cooked enset bread. In addition to flavoring, ginger has medicinal use, commonly chewed for stomachache and dingetegna, chopped and pounded and applied in to nose for leech expel from cattle. Chewing ginger with or without seeds *Lepidium sativum* and *Allium sativum* was believed to reduce the suffering from stomachache, and internally in treatments against fever and influenza. The powder of dried ginger was used with boiled coffee leaf/ "haytsa bunaa" or tea to treat a common cold as (2) report. The fresh rhizome was chewed to cure an infection uvula (35) and used to treat different diseases of human and domestic animals (26).

2. "Bambbariya"/K'ariya/hot papper-*Capsicum annuum* L. and "Mis'imis'uwa"/Mitmita/Chilies-*Capsicum frutescens* L.

**Production Potential:** There is probably no spice as popular as *capsicum*, and no spice has become such an indispensable ingredient of the daily food of the study area people similar to (21) described. Out of the spices and condiments recorded in the plots of 100 home gardens sampled, *Capsicum annuum* recorded in 62 HGs, and *Capsicum frutescens* in 47 HGs. *Capsicum* grows at altitudes of 1000-2500m on small plots near the farmer's house and applied cattle manure, especially on the lower plot/part of the home garden. The farmers do this because this culture requires much manual labor. One month after flowering starts, farmers begin picking of green fruits known as 'c'ork'k'aa' (Dawuro). This can be the basic reason that farmers harvest both green peppers 'c'ork'k'aa'-umatured and red pepper 'bambbariya'-ripened fruit from the same plant. They distinguish three kinds of *capsicum* spices: 'c'ork'k'aa' (green fruit), 'bambbariya' red mature pungent fruits and 'mis'imis'uwa'/'daabusiya' the small sized extremely pungent fruits. There were wild chilies in Baza Shota

kebele of Gena Bosa Woreda, near the joining point of Gojeb and Gibe Rivers (the initial point of Omo River) at 823-826 m a. s. l.

**Market Conditions:** Most of highlands and almost all of home gardens in the middle and lowlands of the zone are productive for both consumption and local market. Both the ripened and the green fresh pepper are sold in the market. Pepper sold in three forms: c'ork'k'aa (green pepper), kashikashuwa (red or dried pepper), and dillihya (powdered). Females and children sell the fresh pepper and bird's eye chilies while the dried ones by both male and females. Red/Dried pepper was sold in estimation, three fruits for 20 cents but for out of the Zone/local markets mat was prepared, sewed and bales of it was sent/taken to Bale market (Wolayta Zone) and Jimma and sold there by trade name "Dawuro Bambbariya". They sell "Dillihya" in the local market using local measurements. Though there was production potential in the area, there was no factory/machinery for grounding and packaging it in Zone. Thus, the packed, processed chilies were imported from other Zones.

**Uses:** People of the study area use it as spice in "wos'iyaa"; "daatsaa/ dok'k'uwa or tushuwa" eaten with injera and "Ukitsaa"/local bread of enset in the area. *Capsicum annuum* is also used as a traditional medicine. It was used against amoeba infection and intestinal worms. For example, people who eat raw meat with 'daathaa' believe that *Capsicum* kills dangerous microorganisms in the meat and stomach as a similar report elsewhere in Ethiopia (21). It also used as medicine to expel leeches from cattle throat and to treat eye disease and diarrhea in humans. *Capsicum frutescens* was also used to treat various (5) diseases (Mathewos A. *et al.*, 2013a)

3. Naatiruwa/Ariti/Wormwood- (*Artemisia absinthium* L.)

*Artemisia* was a large, diverse genus of plants with between 200-400 species belonging to the family *Asteraceae*. *Artemisia absinthium* was erect, perennial herb, 30-60 cm high. It blooms from July to October (48). It was native to the Mediterranean region but widely cultivated in the temperate world for the active ingredient used in alcoholic drink absinthe and essential oils (48). Widely cultivated at the altitudes of 1700-2350m (-2440m) especially in the northern and central parts of the flora area for its aroma and widely applied in these areas for its aroma and in ritual called 'adbar' and in flavoring a locally distilled alcoholic drink called 'areki'- in Amharic (28). However, in study areas, it was seen starting from 1500 m.a.s.l. The leaves and flowers are usually dark green, or sometimes blue in colour and very bitter, with a characteristic odour, resembling that of thujone. The root has a warm and aromatic taste. The herb also contains the bitter glucoside *absinthin*, absinthic acid, together with tannin, resin, starch, nitrate of potash and other salts (48).

In Russian culture, the fact that *Artemisia* species are commonly used in medicine and their bitter taste is associated with medicinal effects, has caused wormwood to be seen as a symbol for a "bitter truth" and often deals with the loss of illusory beliefs in various ideologies (48). The aromatic leaves of many species of *Artemisia* were

medicinal, and some were used for flavouring. In the Bible, there are up to eight further references showing that wormwood was a common herb of the time and its awful taste was known, as a drinkable preparation applied for specific reasons (48).

**Production potential:** It grows better in the middle and high altitudinal gradients of the Zone in five Woreda. However, it was cultivated in wide range in Malditi-Mashuncha, Disa K'era, Wasara S'alo and Sayiki-Boho Kebeles of Loma Woreda. Wormwood likes a shady situation, and was easily propagated by division of roots in the autumn, by cuttings, or by seeds sown in the autumn soon after they were ripe. No further care was needed than to keep free from weeds, each apart about 2 feet away from each other. It was weeded and soil was hipped around in every 15 days. It was cut for harvesting, cutting every three months by leaving some for next to get it alive and for the sake of next harvesting. In other word *Artemisia absinthium* harvested cutting alternatively, which serves continuously for long time without destructing the plant. Such activities have ecological advantage reduce degradation of the soil by covering the soil.

**Uses:** in the study area, it is gathered through out the year as leaves were matured even before flowering which was different from a report of Grieve (48), the whole herb - leaves and tops are harvested in July and August, when the plant was in flower and dried. People drunk absinthe suffered from serious mental disturbance, seizures and some times led to death; so that its use in local 'areqe' should be discouraged (28). However, in the study area, people use it for flavouring boiled coffee leaf ('haytsa bunaa'-coffee leaves wae pounded and heated in water of pot/dish with a lot of spices; then after heating and withdrawing it from heating place two or more sticks of wormwood are added as condiment on to it). It was also used as medicines, commonly chewed for stomachache, severe abdominal pain and chopped and half of a cup of it was drunk for blood pressure/hypertension. In addition to these food crops such as *Colocasia esculenta*, *Ipomoea batatas*, *Zea mays*, *Phaseolus vulgaris* and *Brassica spp.* that contribute to the daily diet of the family are also common in almost all home gardens. *Solanum capsicoides* was widely cultivated plant in the home gardens. It was drought tolerant whose leaves were used as cabbage for food and fruits were for medicine. Other crops that are widely grown in the area include *Persea americana*, *Musa paradisiaca*, *Mangifera indica* and *Zingiber officinale*. There was a similar report about widely grown fruits for Gamo (9), Wolayta (36) and for some areas of Dawuro (27).

**Market condition:** It was cultivated in large amount in the area and taken to markets of the area especially to Disa market every Saturday on donkey or women's back (it was females and children to take fresh leaves, fruits, roots and tubers to local markets). *Artemisia absinthium* cultivated as they were in great demand for the local market of Disa K'era in Loma Woreda, peoples of dry areas from the Woreda and for neighbouring Zone (Bale market in Wolayta, and K'ucha and Malo market in Gamo Gofa). Merchants from lowlands/dry areas of the Loma and Gena

Bosa Woredas of the Zone and from Kucha and Malo buy it/ taken to there.

The perennial crops such as *Ensete ventricosum* and *Coffea arabica* were among the dominant plant species existing in almost all sampled home gardens in the study area. This was because; these plant species serve as the main economic and food source of the livelihood of the farmers. From production and continuous cultivation of these plant species, the study area was expected to be the centre for exporting of fruit and root crops in the near future. The two most frequently recorded species (*Ensete ventricosum* and *Coffea arabica*) of the home garden with products that were important in traditional uses and economic importance and based on informants consensus were discussed below.

#### *Utsaa/Enset –Ensete ventricosum (Welw.) Cheesman*

It is a giant herbaceous perennial monocarpic crop plant belonging to the Musaceae family. It was related to and resembles the banana plant but can be distinguished from banana, among others, by its giant size, single-pseudostem structure, dilated bases and erect leaves. It was cultivated at the altitudinal ranges starting from 1000m.a.s.l which agrees with (22) that was 1000m and grows to 12 metres height and reaches full maturity in 3 to 10 years.

**Uses and processing of *Ensete ventricosum*:** *Utsaa/Enset* was a perennial monocarpic crop cultivated widely as a staple food plant by Dawuro people. The species was cultivated mainly for its edible pseudotrunk and corms which are cut up, pounded and fermented in leaf-lined pits for several weeks after which the resulting material was further processed for eating as indicated in Lye and Edwards (22) reported. The activities of processing were restricted to women. Men involve only in propagating and cultivating it. The selection criteria for processing vary based on the product to be used (for home consumption, strangers, market, pool work, pregnancy/birth, wedding, death, Holidays and other social ceremonies).

The first stage involves removing the leaf stalks and grading of the corm ('Pook'etsa'). Starting from the fourth year enset can be harvested for food in Dawuro. The poor harvests it just at its earlier stage before it reaches full maturity between four to five years interval while the rich leave it to mature up to seven or more years. The best of others in maturity, colour, size and duration of fermentation was selected; then after, leaf and its stalks were removed and the corm was graded.

In the second stage, the fibres are separated and the pulp was crushed to extract the starch. The corm and pulps of pseudostem were scarped into strips in order to have 'Unc'c'aa'. The pulps ('K'ashinchchaa') of pseudostem were scarped with a bamboo scraper (*Maylliya*). These parts were laid on a slanting board (*Otetsaa*), one end of which was placed over an open hole in the ground that has been lined with 'Utsaa' leaves in which the 'K'ashinchchaa' scraping is collected in this case it was called as 'Golaa' (a starch but a synonyms with fibre). The 'Golaa' was then placed on a sloping area that has been covered with 'Utsaa' leaves above a trench and the woman squeeze as much juice out of the 'Unc'c'aa' as possible.

This juice runs in to the trench below. Along with the juices caught in the trench was the best quality of 'Unc'c'a' called 'Itimaa'. The liquid was called 'Sissinaa' which was used as detergent for washing cloth. *Itimaa* was a pure white, flour like material and can be used to bake a bread (*ukitsaa*), to make injera (*'Soolluwa'*), or as Porridge (*'Shendderaa'*). It also can be used as medicine for broken body bone. Itimaa food was prepared for Holidays ceremony, guests, nursing women, elders above 70, mutilated Youngs, and for mechanically hurted individuals. The remaining 'Golaa'/scraped starch was placed in a hole ('Pisaa') that has been lined with 'Utsaa' leaves in order to have 'Unc'c'aa'. At the same time, the underground part of the stem was pounded separately ('Goodiyaa') and placed in the hole on top of the strips or cut pseudostem ('Golaa'). In the preparation process, plant species ('*gamma maataa*') like *Crassocephalum vitellinum*, *Vernonia urticifolia*, *Satureja paradoxa*, *Satureja pseudosimensis*, *Spilanthus mauritiana* and *Lagdera pterodonata* are smashed, mixed rubbed on the inner wall of underground part/corm and lined there with. The underground part/corm was pounded by using local material produced from bamboo base or carefully produced curved special wood locally known as "*kok'a*". Then after, the inner portion of pseudostem (pulp of 'Utsaa') that is retained purposefully was chopped before covering it and it was known as 'Gamma' that will be used after its rotting for fermenting 'Golaa' and 'Goodiyaa' in the future. After mixing the two ('Golaa' and 'Goodiyaa') well, the rotten and well fermented; previously chopped pseudostem that kept in the pounded corm hole ('Gamma') is lined or spread over the mixture. This was covered and allowed to ferment for three up to fifteen days. At this stage it was known as 'Unc'c'aa'.

The third stage is to put the extract in a pit about 1.5 m deep and 1 m diameter (varies on the size of the enset scarp), wrapped airtight with *Uthaa* leaves before being packed down with stones. It was then allowed to ferment - a process, which lasts for about 3-4 months. The pit was opened at regular intervals to allow aeration, and the new *Utsaa* leaves are replaced. This was done in order to prevent the bad smell of 'Unc'c'aa', locally known as 'Pooguwa'. The hole was then opened and 'Unc'c'aa' was thoroughly mixed. The hole was covered again and the 'Unc'c'aa' was left to ferment for another three to fifteen days. This was repeated until the desired fermentation quality is reached or the fermented product is needed for food or other purposes. If it was taken for use before well fermented it was called as 'K'aye' 'Unc'c'aa' and 'Mal'o/Ka'o' 'unc'c'aa' if it passes the whole processes required. Finally, the fermented starch ('Unc'c'aa') was dried and treated as flour. 'Unc'c'aa' was used by chopping it and can be used to prepare different types of traditional foods of Dawuro people like '*Soolluwa*' (injera), '*Ukithaa*' (bread) and '*Ushshaa*' (alcoholic drinks) by adding other grains, vegetables and protein rich products like pulses and milk, vegetables, spices and condiments to it that add nutritional value of the meal and make it ease of eating. '*Utsaa*' products are prepared in various forms.

It is also used as feeding of cattle. The leaves were the most widely used of all wrapping material particularly for butter and other products that need to be kept cool and moist. They were also used as umbrella during rain season in the absence of it; used as lentil material for food eating; used as bed material too. The fiber of the plant iwa also widely used for making bags and ropes and for basketry, for tightening materials either in the form of bales or other; house construction; mat making, and others.

**Production potential:** Enset was widely distributed staple food and the main stay/ cash crop of highland and middle altitude peoples of the study area. There were about 50 and more varieties practiced in the study area. The production of enset was already practiced in almost all home gardens (in 95 sampled HGs) in all agro-ecological zones in the study area, households for both home consumption and market. The studies in Wolayta (36), Gurage (45), Hadiya, Kambata, Gamo and Sidama (12; 38; 45) and in some areas of Dawuro (27) revealed that it was cultivated and used in wide range in these areas.

**Propagation** is done vegetatively from October-November and in February of the year. The corm of an immature enset of 3-4 years is dug out and the pseudostem is cut in to halves with the corm ('*haluwaa*'). The center of the corm, which is the base of the inflorescence, is completely cut out to remove the growing bud ('*humu'uwaa*'). Then the corm is buried in a hole and covered with ash and other house wastes (manure) and soil. The suckers, which emerge in 4 to 12 weeks, are left to grow for about a year. The corm is then dug out, the suckers ('*unkkuwa*') separated from emerged seedlings ('*haluwaa*') and transplanted in a well-prepared land. After a year or two, some of these plants ('*shak'aa*') were thinned out and transplanted in another place. Starting from the third year it is rethinned ('*gardduwaa*') and transplanted in to the final place to be harvested after its maturation. Also it is at this time, it will be the pseudostem is cut/ taken for 'haluwa'. Starting from the fourth year enset can be harvested for food in Dawuro. The poor harvests it just at its earlier stage, before matured enough within four to five years interval while the rich leave it to mature up to seven and more years. Some of the techniques of propagating it have similarity with observations reported to Wolayta area (36)

##### 5. *Bunaa/Tukiyaa/Buna/Coffee- Coffea arabica L.*

Coffee belongs to the family *Rubiaceae*, which is widely distributed throughout the tropical region. There are many species of coffee, but the only two commercially important ones are *Coffea arabica L.* and *Coffea canephora* Froener (31). *Coffea arabica*, which is the only self-fertile tetraploid species of the genus *Coffea*, produces superior quality of coffee. Coffee is the most important commercial crop in the national economy of Ethiopia, contributing 60-85% of its foreign exchange earnings and nearly 25% of Ethiopian population depends, directly or indirectly on coffee for a livelihood by involving in the production, processing, and marketing of coffee as the major contribution to the development of the rural and the national economy (4; 8; 30). The best inherent quality, its

naturalness and potential of production in the country made the coffee known in the world and caused as the source of earning the foreign currency (16; 17; 31).

*Production potential:* Coffee is produced in South West, East and some areas of Northern parts of Ethiopia. The major coffee producing areas were Oromia, SNNPR and Gambella. Dawuro is one of the potential areas for coffee production in SNNPR. In the study area, coffee was found both under cultivation and in the forest. The potential for coffee production in Dawuro was related to the presence of suitable altitude, ample rainfall, optimum temperature and fertile soil. The production of coffee is already practiced in almost all home gardens (in 84 HGs) in all agro-ecological zones, households for both home consumption and market. It was the main stay/ cash crop of lowlands and middle altitude peoples of the study area. However, some of it was severely affected by coffee berry disease, coffee leaf rust, brown eye spot, and coffee wilt disease which were caused by different fungi and bacteria rarely as reported (31), and (11) for Oromia, SNNPR and Gambella.

#### *Management Practices related to Spices and Condiment Plants in and around Home Gardens in the Study Area*

The Dawuro people manage the home garden biodiversity by employing various production and conservation practices. Women manage home gardens: cultivate spices, condiments and medicinal plants around the home, for immediate accessibility for flavouring food and treatment of the health problems of children in the home as well as for traditional ceremonies. Similar report for most of Ethiopian areas (21), Dheeraa Town, Arsi people in Ethiopia (39) and some areas in Dawuro zone, southern Ethiopia (27). They regularly manure home garden plants with house wastes including cowdung, as required in needed amount. They are also responsible to carry and sell fresh herbs and seeds in the nearby market. Men involve in the cash crop cultivation and carrying its dried products to market.

The management and conservation practices related to home garden crops (spices, condiments, medicinal plants and others) include following traditional calendar, intercropping and thinning for spacing, harvesting and storing mechanisms, selection of crop varieties, selective harvesting and planting plants in the grave/on the tombs and in the traditional ceremony places. It was observed that the graves and tombs planted with at least two to three trees. 14 spice and condiment plants were also found on the tomb of woman of Baza Koysa Kebele of Gena Bosa district, symbolizing the effort made by women to grow spices in home gardens. Plants on graves and tombs are never cut for usage. Relatives and families visit the graves and weed them to make sure of their growth and survival. This makes sure of the conservation of the species. The people of the study area have their own traditional farming calendar by referring seasons, soil and rainfall conditions as well as the growth of indicator plants. They also refer the moon appearance and days for some farming practices and collecting plant materials for

different purposes. Such indigenous knowledge has positive effect for conservation of plant biodiversity

#### **IV. CONCLUSIONS AND RECOMMENDATIONS**

The study area people developed their home garden to satisfy their need for home consumption (for quick and easy access to foodstuffs) and for income generation. They collected different plants in home gardens to get medicines, spices, condiments and for other multipurposes. The structure of home garden and the farming practices allowed the maintenance of a considerable number and variety of useful species actively or passively. Some spices were intercropped among other crops. The most important spices, condiments and medicinal plants grown in and around home gardens include pepper, rue, sweet basil, thyme, ginger, wormwood, korerima and others. The study area has potential in production and continuous cultivation of these plant species. They also produce groundnet, *Jatropha curcas* and *Ricinus communis* potentially which is waiting for linking market.

Traditional agricultural activities currently have been affected by the shift to improved seeds that were commercially important. Due to the increasing human population and the subsequent agricultural expansion, spices and condiment plants in the wild were under threat. Thus, home gardens provide opportunities for the growth of wild plants in and around.

In their home gardens, some spices, condiments and that give fragrance (*Lippia adeonsis* var. *koseret*, *Foeniculum vulgare* and rue) and taller in size were planted in the lower side of house in order to protect individuals from urine odour from domestic animals. Other spices, condiments and medicinal plants with relatively small height (*Thymus schimperi*) are planted on the front or in the upper side of the house.

People in the study area adapted to use different plants suggested as toxic in nature. Eventhough they use them by mixing the ingredients, further immediate pharmacological studies on their common spices and condiment plants using this ethnobotanical information become the most important assignment of researchers, institutions, individuals, organizations and those who are interested in these issues.

Training farmers with new expensive varieties those coping up the drought stress and quantity and quality production as well as market linkage seems to be crucial for alleviating poverty life of some farmers in the study area.

Based on the results of the study the following recommendations were given:

- Before cultural transformation destroys the traditional system, greater effort should be devoted to surveys, documentation and conservation of the agrobiodiversity and the associated indigenous knowledge in the remaining districts of Dawuro Zone and other areas to have a better understanding in the wealth of the information available.

- Pharmacological and biological activity testing of most popularly used spice and condiments as well as traditional medicinal plants like wormwood is important.
- Encourage home gardening for plant biodiversity conservation and management (for cultivation of spices and condiments)
- Awareness creation of the local population and training on the sustainable utilization and management of plant resources is crucial.
- Find regional, national and international markets for those already organized like for ginger cooperatives and encourage the potential producers and traditional healers to be in a local cooperative association.
- Give more attention to training and education of farmers and local experts on spice production that can be an important additional livelihood strategy.
- Further study on adaptive reasons or the side effects on use of wormwood/*Artemisia abysthenium*, in the study area is recommended.

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## AUTHOR'S PROFILE



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**2. Educational background:** Primary Education Grades 1-6 from 1976-1981 at Mari Elementary School; Grades 7-8 from 1982-1983 at Waka Elementary and Junior Secondary School; Secondary Education- Grades 9-12 from 1984-1987 at Waka Senior Secondary School; Higher Education-Diploma in Biology from 1988-1989 at Kotebe College of Teacher Edu; B Sc. Degree in Biology from 1999-2003 at Addis Ababa University; M Sc. Degree in Biology (Dryland Biodiversity) from 2006-2008 at Addis Ababa University

**3. Current occupation-**Currently I am the lecturer, researcher and community services provider of Wolaita Sodo University starting from November 2012.

**4. Work experience:** Teaching biology for 17 years at high school (preparatory) level from 1990-2006; Served as department head of biology at high school level from 2003 – 2006; Served as deputy director at high school level from 2001-2002; Served as the school supervisor at high school level from 2003-2006; Served as unit-leader at high school level from 2003-2005; Lead environmental club and HIV/AIDS as coordinator from 1996-2006; Worked for four years from 2009 to 2012 as expert of Biodiversity conservation and Environment protection in Natural Resources Management and Environment Protection Section under Dawuro Agriculture Department Sector

### 5. Others-

**Trainings-**Certificate in computer training; Certificate for the training and participation in environmental workshop; Certificate for the training and participation in HIV/AIDS workshop; Certificate for the training and participation in Water Shade Management workshop;

**Research-Thesis** -Ethnobotany of Spices, Condiments and Medicinal Plants in Loma and Gena Bosa woredas of Dawuro Zone, Southern Ethiopia; with very good result/presentation; Research work on "spice and medicinal plants market chain analysis: Opportunity for Spice Marketing from South West Ethiopia" starting from south-west the NTFPs project area to international markets from May 2007 to August 2007; Worked a research on 'Assessing on Conservation and Utilization of Medicinal Plants and their Associated Indigenous Knowledge in Dawuro Zone: An Ethnobotanical Approach'; **Ongoing** two researches (one lab and one field) and one community service (awareness creation on plant biodiversity utilization and management focusing on plants with medicinal value-for traditional medicinal plant users/practitioners).

**Publications-**Ethnobotany of Medicinal Plants in Loma and Gena Bosa Districts (Woredas) of Dawuro Zone, Southern Ethiopia. *Topclass Journal of Herbal Medicine* Vol. 2(9) pp. 194-212.; Indigenous Knowledge On Management Of Home Gardens And Plants In Loma And Gena Bosa Districts (Weredas) Of Dawro Zone, Southern Ethiopia: Plant Biodiversity Conservation, Sustainable Utilization And Environmental Protection. *International Journal of Sciences: Basic and Applied Research (IJSBAR)*(2013) Volume 10, No 1, pp 63-99.

The information I have provided here is true, complete and correct