



**ETHNOBOTANICAL STUDY OF MULTIPURPOSE AND FRAGRANT PLANTS ON THE FARMING SITES IN GOZAMIN DISTRICT, AMAHARA REGION, ETHIOPIA.**

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**Abstract:** An ethnobotanical study aimed at documenting indigenous knowledge on multipurpose and fragrant plants maintained in the farming sites was carried out in Gozamin District located in western Ethiopia. Six kebeles were selected from the altitude range between 1500-3200 m a s l. A total of 45 plant species were collected from five farming zones centering the house and moving away from it. Sixty household heads were systematically selected from 120 household heads having well established homegardens and farm fields. The ethnobotanical data were collected through interview, guided field walk, group discussion, semi-structured interview and participant observation. Ten key informants were involved in the interview to recover more in-depth ethnobotanical information focusing on multiple purposes and for fragrance. The market utility values of desired fragrant plants were further analyzed by paired comparison and 10 multipurpose plants were further evaluated by using direct matrix ranking. The plants were grouped as multipurpose plants (39), both multipurpose and fragrant (1), fragrant and medicinal plant (4), and only fragrant plant (1). It was observed that farmers evaluate the plant based on different criteria acquired through accumulated experience in a different way than people trained in modern agriculture. Evaluation of the plants by farmers of the study area using different criteria has resulted in some species tolerated, others managed and/or cultivated by households. Farmers must be consulted before deciding on the usefulness of any plant in their environment.

**Key words:** Multipurpose plant, farming zone, gozamin district, fragrant plant

**Introduction:** The reliance of humans on plants to fulfill their basic needs began since time

immemorial. The millennia-old reciprocal relationship between plants and local people for diverse life activities resulted in rich and nuanced botanical traditions (Voeks, 2011). Formal documentation of indigenous plant uses were started with the expedition of European explorers, in search of 'green gold', to lands occupied by indigenous people (Cotton, 1996).

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Such expeditions were icebreakers to encounter important plant use knowledge, followed by the subsequent transfer of useful species and their associated use knowledge to different countries (Mann, 2011).

The world we live in today is biologically, economically and culturally a living legacy of earlier plant and associated knowledge discoveries, and transfers (Voeks, 2011). Knowledge on plant use is the result of many years of human interaction with and selection of the most desirable plants present in the immediate environment at a given time (Rindos, 1984). This has resulted in a wealth of indigenous knowledge associated with the utilization of plants as food, medicine and other cultural activities. However, traditional knowledge on plant use will be lost in the absence of continuous cultural interaction (Winter & McClatchey 2008) as a result of which very little of this knowledge has been recorded, yet it represents an immensely valuable database that provides humankind with insights on how numerous communities have interacted with their changing environment including its floral and faunal resources. In reality, the demographic, economic, socio-political, ecological, religious and cultural entities co-existing in a community are key drivers of traditional knowledge development in a given community (Cetinkaya, 2009) and also a key entry point to conserve nature.

The usage of plants usually relate to peoples conceptualization of the importance of plants including their use for food, medicine, cosmetics, dyeing, textiles, for building, tools, clothing, ritual and music (Balick and Cox, 1996). Therefore, plants which are familiar and recognized by the local people as having a beneficial use can be domesticated and cultivated on a large scale. Management and conservation of plants began with endeavor of prehistoric humans domesticating wild plants. Domestication developed out of food gathering, which almost imperceptibly led to cultivation. It is a long and complex process and many plants

are found at various stages of domestication as a result of human selection (FAO, 1999).

Studying the relationship between people and plants and the significance of plant use knowledge towards the wellbeing of the community is extremely important (Martin, 1995; Cotton, 1996). Through ethnobotanical study it is possible to find out how people have traditionally used plants, for what purpose and how they are still doing so (Ford, 1978).

### Study Area and Methods

#### Study Area

**Description:** A reconnaissance survey was conducted between September and November 2009 to select study sites. Accordingly, Gozamin Woreda (District) was selected based on the existing diverse Agroclimatic Zone leading to different types of crop farming practices, natural resource management, indigenous knowledge, and practices associated with conservation and use of plants in their yard and farm field. Gozamen District is one of the 18 districts in East Gojjam Zone and 151 Districts in Amahara National Regional State located  $10^{\circ} 1' - 10^{\circ} 36' N$  and  $37^{\circ} 24' - 37^{\circ} 55' E$  with an altitudinal range 1000-3500 meter above sea level.

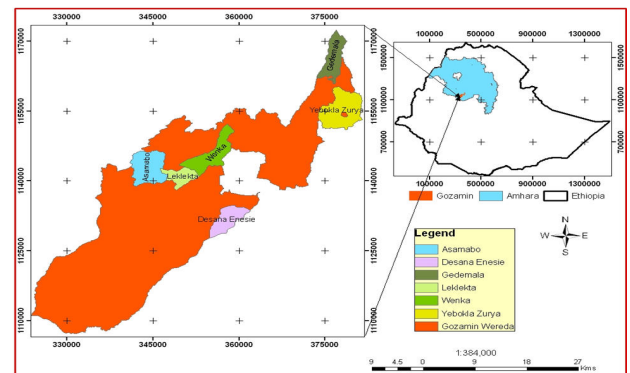


Figure 1: Map of Ethiopia showing the study area with the sampling sites

The 10 year data taken from the nearest weather station (Debre Markos) recorded from 1999-2008 indicated that the mean annual maximum and minimum temperatures in the study area are

26°C and 8.6°C respectively, whereas the mean annual rain fall distribution is 1342 mm.

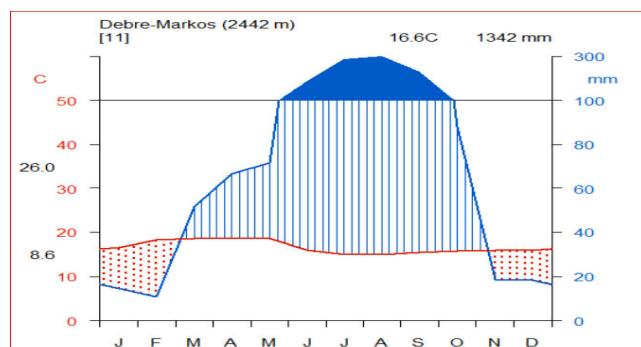


Figure 2. Climadogram showing the mean monthly rainfall and temperature distribution records of the study area taking 10 years (1999-2008) data of National Metrological Service Agency (NMSA).

The District has a population size of 133,656 of which 66,875 males and 66,981 females: 2,583 (1.93%) of the population are urban dwellers which is less than the Zonal average of 9.88 % (CSA, 2007), moreover with an estimated area of 1,218.07 square kilometer, it has an estimated population density of 109 people per square kilometer which is also less than the Zonal average of 179.96. The ethnicity of the District population is Amhara and Amharic is every body's language. Sedentary rainfed agriculture is practiced and the economy of the people is primarily based on mixed cereal agriculture with the farmers growing TEFF (*Eragrostis tef*), finger millet (*Eleusine coracana*), sorghum (*Sorghum bicolor*), maize (*Zea mays*), barley (*Hordeum vulgare*), wheat (*Triticum spp.*), as well as pulses, oil crops, vegetables and fruits. Due to high anthropogenic effect in the study area, forests have been lost but remnant plants around holy places, inaccessible areas, and tree species retained for shade and on grazing lands are observed. Some of the vegetation types include *Juniperus procera*, *Hagenia abyssinica*, *Podocarpus falcatus*, *Acacia abyssinica*, *Cordia africana*, *Ficus sycomorus*, *Erythrina brucei*, *Eucalyptus camaldulensis*, *Calpurnia aurea*, *Prunus africana*, *Carissa spinarum*, *Rosa*

*abyssinica*, *Dombeya torrida*, *Maytenus arbutifolia*.

### Methods:

The District was selected purposely due to its wide range of altitude between 1000-3500 meters above sea level to look the existence of multipurpose and fragrant plants at different farming zone from November 20, 2009 to May 1, 2010. Six kebeles were selected from 26 Kebeles after stratified in to elevation. The study sites were Dessana Enessie, Leklekita, Assamaboo and Wenka kebele which represents the Weyna Dega agroecology (1500-2500 meter above sea level) and Yebokla zuria and Gedemalla kebele which represent the Dega agroecology (2500-3500 meter above sea level). The name of the household leaders having all faming zone in and around homegarden and representativeness of the main cropping agroecological zone of the District were alphabetically listed and equal proportion of informants totally 60 house hold leaders were selected systematically. From 60 household heads, 10 key informants or local experts' i.e. local people who possess and share a profound indigenous knowledge of a particular aspect of local culture were selected randomly from among the owner of houses that have well organized homegarden and field crops in their farming zones.

A pre-tested semi-structured data collection tool containing open and close-ended questions were administered to collect data on knowledge on use and management of useful plants found in and around homegarden as described in Martin (1995), Alexiades (1996) and Cotton (1996). The techniques were group discussion, semi-structured interviews, field observations, preference ranking and direct matrix ranking. Useful plant species encountered in the farming site during the study were recorded and voucher specimens of the species were collected, pressed, dried, identified and deposited at the National Herbarium (ETH), Addis Ababa University. Additional references (Azene

Bekele, 1993 and Dawit Abebe *et al.*, 2003) along with Flora of Ethiopia and Eretria were used for facilitating the identification process.

Direct matrix ranking was used to rank top ten multipurpose plant items using a numerical scale in which the highest number will be equal to the “best” item and the lowest number to the “worst” by taking notice of 10 use attributes at a time. Market utilities of the six desirable fragrant plants were analyzed and the best marketable fragrant plants were identified.

All plants were rated as plants need low, medium and high level of management based on authors specified criteria in the defined farming zones.

**Results and Discussions**

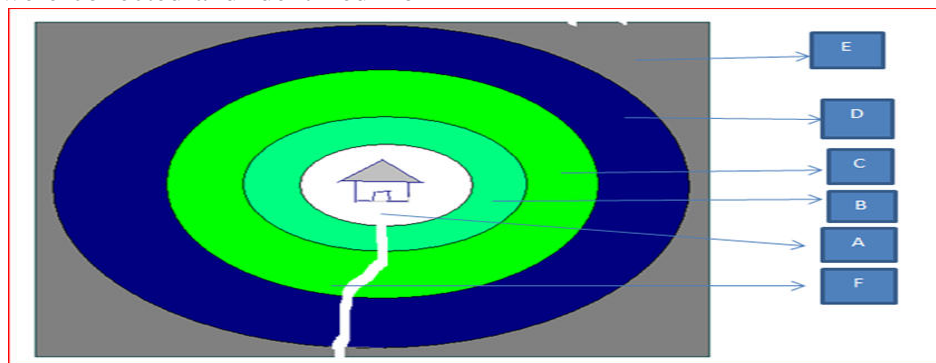
**Diversity of multipurpose and fragrant plants**

A total of 45 multipurpose and fragrant plant species (23 tree, 17 shrubs, 5 herbs,) distributed in to 24 different families were collected. Fabaceae (15.55%), Asteracea (8.88%), Poaceae (8.88%) and Myrtaceae (8.88%) were accounted 42.22 % of the total plants identified. These plants were collected and identified from

five farming zones centering the house and moving away from it. The plants were grouped as multipurpose plants (39), both multipurpose and fragrant (1), serve as both fragrant and medicinal plant (4), and fragrant plant (1).

**Farming zone:**

The spatial arrangement of Plants were followed certain pattern. The patterns with reference to the living house were mapped as follows. Livestock and family members easily went in and out on the dawn hill side of the house and a channel is cut in the ground to take the urine and droppings out and dumped to the nearest side (F). Zone B, C and D in the sampled study sites are considered as GUARO (homegarden). The last zonation E is considered as MASSA (farming fields) and mainly cereals, pulses, oil crops and trees that constitute the agroforestry system are present. The farming fields and homegardens are separated by live fences at which multipurpose plants are mainly grown. Number of species of useful plants in these two farming site from different status of cultivation on major use category is presented on [Table 1].



- Where: A= Open space  
 B=Spices, Fragrant and Medicinal plants  
 C= Fruits and Vegetables in differing proportions  
 D=Stimulants and different Trees and Shrubs  
 E=Farming Fields (MASSA)  
 F=Channel (Path)
- Homegarden (GUARO)

Figure 3: Diagrammatic model showing crop zonation in the farming site of the study area

**Multipurpose and fragrant plants in the farming site ('GUARO' & 'MASSA')**

Local people in the study area has given due attention for those plants deliberately cultivated or planted in their farming site and those plants that can be grown spontaneously in the farming site. The plant that can be grown spontaneously in the farming site should be evaluated by farmers based on their use. These outlooks contribute for plant diversity in the study area. Forty five multipurpose and fragrant plants were collected in the study area due to the extended management activities done by the farmers. These plants have been giving different services to the farmer. The detailed descriptions of these plants were presented in [Appendix 1].

**Multipurpose and fragrant Plants that need low level of management**

The plants that can be classified in this management level are those plants their status of management is very low. However, due to their use the farmers tolerate them not to clear or weed from their homestead (GUARO) and farm field (MASSA). These groups of plants have no well-defined procedure to cultivate, they have limited use, they also considered as weeds by some farmers. A total of 8 plant species that can be distributed to 8 different genera were tolerated by farmers at their homestead (4), farm field (1) and in both homegarden and farm field (3).The people were tolerated these groups of plants mostly for their medicinal application. Sixty two and half % of the listed plants in this level of cultivation can serve for traditional medicinal application [Appendix 1].

**Multipurpose and fragrant Plants that need Medium level of management:**

The criteria for grouping the collected plants under this level of management were 1. A plant protected by human, 2. People participate as seed dispersal agent, 3. People bring seedlings from the natural habitat and plant in their farming complex, 4. If farmers get the seedling on their farming site, they will give special protection. Based on the above selection criteria, the ordinary informants in the study area were grouped large number of plants in this level of management than the first. A total of 37 different plants distributed to 35 different genera and hence 17 different plants grown on homegarden, 3 different plants grown on farm field and 17 different plants grown on both homegarden and farm field [Appendix 1] were assigned on this level of management. Different plants that make agroforestry in the study area were grouped in this level of management.

**Multipurpose and fragrant plants that need high level of management**

In this level of management, plants were need proper management during pre-harvest, post-harvest season or throughout its phonological cycle. Due to this, multipurpose and fragrant plants were not grouped under this level of management rather food crops and majority of spices were grouped under this level of management in the farming zone. Please note that the list of crops cultivated in the area were not included in this study.

Table 1: Use category and level of management of multipurpose plants and fragrant plant

Major use	level of management in the farming zone							
	Low				Medium			
	Total	Hg	Fie	Both	Total	Hg	Fie	Both
Multipurpose plants	7	4	1	3	32	13	3	16
Fragrant and medicinal plant					4	4		
Fragrant and multipurpose plant					1			1
Fragrant plant	1			1				
Total	8				37			



**a. Fragrant plants**

People have used these groups of plants for changing the smell of the surrounding or the object /material that can be used for household utensils or they were used in place of commercially made perfumes. The method of utilization and list of this group of plants is presented in [Appendix 2].

Pair wise comparison was conducted to determine the highest market utility among the six (6) most fragrant plant species collected in the study area. Analysis of responses had indicated that *Olea europaea* subsp. *cuspidata* and *Otostegia integrifolia* takes the highest market utility. People in the study area were

believed that fumigation of the house by leafs and stems from the above two plants remove bad sprit from the house and they frequently fumigate their house. In addition, frequently used house hold utensils for example pots that store water and milk can be fumigated by leafs and dried chopped stems of *Olea europaea* subsp. *cuspidata*. Because of these reason it has the highest market utility. Others like *Cymbopogon citratus*, *Artemisia absinthium* and *Myrtus communis* were served for spiritual and cultural ceremonies unless and otherwise their market utility is reduced. Their statuses of market utility are presented in [Figure 4].

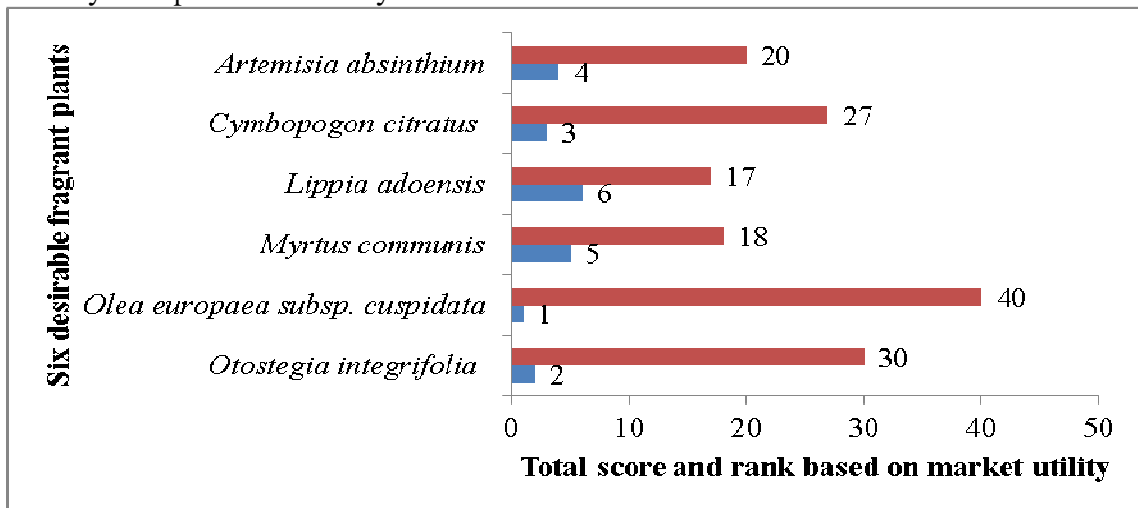


Figure 4: Results of ten key informants’ pair wise comparison on six fragrant plants based on their market utility.

**b. Multipurpose plants**

In this paper multipurpose plants are plants cited for more than two different uses by the respondents. Thirty three different plants were considered as multipurpose by the informants but one plant was used as both fragrant and multipurpose. These plants were collected from farm site (3), homegarden (13) and homegarden and farm field (17). All of the listed plants were managed by the study area informants under medium level of management. Among the

multipurpose plants ten top plants based on their use were selected for direct matrix ranking. In the direct matrix ranking, the informants were told to give score of 10 for the use which they considered the best, 1 for the least and 0 for the uses not known for a specific use criteria. From the direct matrix raking, it was found that *Eucalyptus globules*, *Eucalyptus camaldulensis*. and *Cordia africana* were top of the list. The rests were presented in [Table 2].

Table 2: Direct matrix ranking of 10 multipurpose plant species

No	Scientific name	Use diversity										T	R
		Ch	Hc	Fr	Fo	Fi	Fr	M	S	Lf	Fw		
1	<i>Acacia abyssinica</i> Hochst. ex Benth.	59	67	0	48	60	42	0	72	62	30	440	7
2	<i>Albizia gummifera</i> (J. F. Gmel.) C. A. Sm.	57	78	0	37	84	30	0	84	69	64	503	4
3	<i>Arundinaria alpina</i> K. Schum.	0	94	0	70	55	95	0	50	69	48	481	6
4	<i>Cordia africana</i> Lam.	48	88	47	84	55	100	0	42	26	36	526	3
5	<i>Croton macrostachyus</i> Del.	67	36	0	0	20	63	81	73	69	90	499	5
6	<i>Cupressus lusitanica</i> Mill.	60	69	0	49	61	72	0	62	21	19	413	9
7	<i>Eucalyptus camaldulensis</i> Dehnh.	92	99	0	14	88	86	0	47	56	81	563	2
8	<i>Eucalyptus globulus</i> Labill	100	100	0	14	98	89	61	37	55	96	650	1
9	<i>Juniperus procera</i> Hochst. ex Endl.	58	65	0	40	59	60	0	73	30	24	409	8
10	<i>Senna singueana</i> (Del.) Lock	32	59	0	0	62	24	70	57	60	24	388	10

Where, Fi= Farm implement, Fr =Fruit, Lf=Live fence, Fw= Fire wood, Ch=Charcoal, Fo= Forage/ Fodder, Hc= House construction, Fr= furniture, M =Medicine, Shade=S, T=total, R=rank

### Conclusions

The indigenous knowledge of farming communities in the study area was highly valuable to conserve different useful plants in different farming zones. The status of management outlined by the authors was indicated after assessing the selected informant farming sites i.e., Homegardens and crop fields. From the total multipurpose plants collected in the study area (45 plants); 37 plants were managed under medium level of management. Out of these plants, 45.94 % plants were found exclusively in homegardens, 8.12 % were found exclusively in crop fields and the remaining 45.94 % were found in both homegardens and crop fields. In this assessment, scaling up the size of homegardens in the near future is an

opportunity to conserve different multipurpose plants along with food crops. Fragrant plants were considered important items for generating income by selling in the nearby market let alone diverse ecological importance. Exploring the plant use and sharing its knowledge for the larger public are of critical importance to conserve the plants, protect people's culture and the environment.

### Recommendation:

Crop interaction with multipurpose plants found in the farming zones demands further research for possible enhancement of agroforestry in the farming zones.

### Acknowledgments:

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**Appendix 1: Complete list of plants collected in the study area at different status of cultivation**

Where, Fi=Farm implement, F=Food, Lf= Live fence, Fw=Fire wood, Ch=Charcoal, Fo = Forage/ Fodder, Hc= House contraction  
Fr= Furniture, M = Medecine, S= Shade, Hg= homegarden, Fie= Field. , Mp= Multipurpose use, Fra=Fragrant, Fra+M= Both Fragrant  
and Medicinal

No	Scientific name	Family name	Vernacular (Amharic) name	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation place	Major use classification
1	<i>Acacia abyssinica</i> Hochst. ex Benth.	Fabaceae	GRAR	T	Stem /Leaf	Fi, Lf, Fw, Ch, Fo, Hc, Fr, S	HR-002	2330	10 <sup>0</sup> 21.260'N, 37 <sup>0</sup> 41.150'E	Medium & Fie.	Mp
2	<i>Acacia decurrens</i> Willd.	Fabaceae	YEFERENJGRAR	T	Stem /flower	Lf, Fw, Fo, Hc, S	HR-046	2307	10 <sup>0</sup> 21.111'N, 037 <sup>0</sup> 41.028'E	Medium & Hg, Fie	Mp
3	<i>Acacia melanoxylon</i> R. Br.	Fabaceae	OMEDLA	T	Stem	Lf, Fw, Ch, Hc, Fr, S	HR-140	2307	10 <sup>0</sup> 21.111'N, 037 <sup>0</sup> 41.028'E	Medium & Hg	Mp
4	<i>Albizia gummifera</i> (J. F. Gmel.) C. A. Sm.	Fabaceae	SESA	T	Stem	Fi, Lf, Fw, Ch, Fo, S, Hc	HR-058	2196	10 <sup>0</sup> 20.580'N, 037 <sup>0</sup> 41.362'E	Medium & Hg, Fie	Mp
5	<i>Artemisia absinthium</i> L.	Asteraceae	SERET	S	Leaf /Stem		HR-098	2307	10 <sup>0</sup> 20.974'N, 037 <sup>0</sup> 40.972'E	Medium & Hg	M+ Fr
6	<i>Arudinaria alpina</i> K. Schum.	Poaceae	QERQAHA	H	Stem/ Leaf	Lf, Fw, Fo, Hc, Fr, S	HR-047	3291	10 <sup>0</sup> 32.717'N, 037 <sup>0</sup> 52.580'E	Medium & Hg	Mp
7	<i>Arundo donax</i> L.	Poaceae	SHEMBEQO	H	Stem/ Leaf	Lf, Fw, Fo, Hc, Fr,	HR-075	2367	10 <sup>0</sup> 20.954'N, 037 <sup>0</sup> 40.972'E	Medium & Hg	Mp
8	<i>Buddleja polystachya</i> Fresen.	Loganiaceae	ANFAR	S	Stem	Lf, Hc, Fw	HR-099	2200	10 <sup>0</sup> 20.116'N, 037 <sup>0</sup> 55.381'E	Medium & Hg	Mp
9	<i>Calpurnia aurea</i> (Ait.) Benth.	Fabaceae	DGTA	S	Stem	Fi, Lf, Fw, Ch, M, S	HR-095	1856	10 <sup>0</sup> 14.818'N, 037 <sup>0</sup> 42.693'E	Medium & Fie.	Mp
10	<i>Capparis</i>	Capparidaceae	GUMERO	S	Spine/Root	Lf, M	HR-	1856	10 <sup>0</sup> 14.818'N,	Low & Hg	Mp

No	Scientific name	Family name	Vernacular (Amharic) name	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation & place	Major use classification
	<i>tomentosa</i> Lam.	e					116		037°42.693'E		
11	<i>Carissa spinarum</i> L.	Apocynaceae	AGAM	S	Spine /Root	Lf, M	HR-138	1856	10°14.818'N, 037°42.693'E	Low &Hg	Mp
12	<i>Cordia africana</i> Lam.	Boraginaceae	WANZA	T	Leaf/stem/flower	Fi, Lf, Fw, Ch, S, Fr, Fo, Hc.	HR-064	1856	10°14.818'N, 037°42.693'E	Medium &Hg, Fie	Mp+ fra
13	<i>Croton macrostachyus</i> Del.	Euphorbiaceae	BSANA	T	Stem	Fi, Lf, Fw, Ch, M, S, Hc, Fr	HR-022	2219	10°20.804'N, 037°33.472'E	Medium Hg, Fie	Mp
14	<i>Cupressus lusitanica</i> Mill.	Cuperessaceae	YEFERENJTSD	T	Stem/ Leaf	Lf, Fw, Ch, Fo, Hc, Fr, S	HR-142	2330	10°21.260'N, 037°41.150'E	Medium &Hg, Fie	Mp
15	<i>Cymbopogon citratus</i> (DC.) Stapf	Poaceae	TEJESAR	H	Leafd		HR-108	2216	10°19.391'N, 037°37.309'E	Medium & Hg	Fra + M
16	<i>Dracaena steudneri</i> Engler	Dracaennaceae	MARKO	T	Leaf	M, S, Lf	HR-096	2311	10°20.986'N, 037°41.029'E	Medium &Hg	Mp
17	<i>Dombeya torrida</i> (J. F. Gmel.) P. Bamps	Sterculiaceae	WLKFA	T	Flower/Stem	Lf, Fw, Fo, Fr, S	HR-094	2599	10°26.985'N, 037°052.861'E	Medium &Hg Fie	Mp
18	<i>Erica arborea</i> L.	Ericaceae	ASTA	T	Stem	Fw, Ch, Hc	HR-084	3296	10°32.717'N, 037°52.592'E	Low &fie	Mp
19	<i>Erythrina brucei</i> Schweinf.	Fabaceae	KORCH	T	Leaf/Stem	Lf, M,	HR-039	2200	10°20.986'N, 037°41.029'E	Medium & Hg, Fie	Mp
20	<i>Eucalyptus camaldulensis</i> Dehnh.	Myrtaceae	KEY BAHRZAF	T	Stem/flower	Fi, Lf, Fw, Ch, S, Fr, Fo, Hc.	HR-050	2190	10°20.804'N, 037°33.472'E	Medium & Hg, Fie	Mp

No	Scientific name	Family name	Vernacular (Amharic) name	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation & place	Major use & classification
21	<i>Eucalyptus globules</i> Labill	Myrtaceae	NECHBAHRZAF	T	Leaf /Stem/flower	Fi, Lf, Fw, Ch, S,M, Fr, Fo, Hc.	HR-028	2190	10 <sup>0</sup> 20.804'N, 037 <sup>0</sup> 33.472'E	Medium Hg, Fie	Mp
22	<i>Euclea divinorum</i> Hiern	Ebenaceae	DEDEHO	T	Stem	Fw, Ch, Hc, S	HR-104	1856	10 <sup>0</sup> 14.818'N, 037 <sup>0</sup> 42.693'E	Medium Hg, Fie	Mp
23	<i>Euphorbia abyssinica</i> Gmel.	Euphorbiaceae	KULQUAL	S	Steam exudate	Lf. M	HR-006	2215	10 <sup>0</sup> 19.780'N, 037 <sup>0</sup> 37.310'E	Medium Hg	Mp
24	<i>Ficu sur</i> Forssk.	Moraceae	SHOLA	T	Stem	Fi, F, S	HR-008	2196	10 <sup>0</sup> 20.580'N, 037 <sup>0</sup> 34.362'E	Medium Hg, Fie	Mp
25	<i>Hagenia abyssinica</i> (Brace) J. F. Gmel.	Rosaceae	KOSO	T		Lf, M, S	HR-137	2605	10 <sup>0</sup> 26.627'N, 037 <sup>0</sup> 53.495'E	Medium Hg	Mp
26	<i>Juniperus procera</i> Hochst. ex Endl.	Cupressaceae	YEABESHATSDE	T	Stem	Lf, Fw, Hc, Ch, Fr, S	HR-143			Medium &Hg, Fie	Mp
27	<i>Justicia schimperiana</i> (Hochst ex Nees.) T. Anders.	Acanthaceae	SMIZA	S	Stem / flower	Lf, Few, M, Of	HR-055	2307	10 <sup>0</sup> 21.111'N, 037 <sup>0</sup> 41.028'E	Medium Hg	Mp
28	<i>Lippia adoensis</i> Hochst. ex Walp.	Verbanaceae	DAMAKESE	S	Leaf / Stem	M, Lf, Few	HR-009	2307	10 <sup>0</sup> 20.974'N, 037 <sup>0</sup> 40.972'E	Medium &Hg	Mp
29	<i>Maesa lanceolata</i> Forssk.	Myrsinaceae	KLAMBO	S	Leaf / Steam	Few, S, for covering ;INJERA	HR-113	3296	10 <sup>0</sup> 32.721'N, 037 <sup>0</sup> 52.592'E	Medium Fie	Mp
30	<i>Maytenus</i>	Celasteraceae	ATAT	S	Stem	Lf, Fw, S	HR-	2311	10 <sup>0</sup> 20.986'N,	Medium &	Mp

No	Scientific name	Family name	Vernacular (Amharic) name	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation & place	Major use classification
	<i>arbutifolia</i> (A. Rich.) Wilczek						012		037°41.029'E	Hg, Fie	
31	<i>Morus alba</i> L.	Moraceae	YEFERENJ ENJORI	T	Fruit	F, Lf, S	HR-038	2307	10°20.954'N, 037°40.972'E	Medium & Hg	Mp
32	<i>Myrtus communis</i> L.	Myrtaceae	ADES	S	Leaf		HR-105	2599	10°26.985'N, 037°52.861'E	Medium & Hg	Fra+M
33	<i>Ocimum lamiifolium</i> Hochst. ex Benth.	Lamiaceae	KESE	H	Stem /Leaf	M, Few, Lf	HR-011	2215	10°19.780'N, 037°37.320'E	Low & Hg, Fie	Fra
34	<i>Olea europaea</i> L. subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif.	Oleaceae	WEYRA	T	Leaf /stem	Lf,S	HR-053	3296	10°32.721'N, 037°052.592'E	Medium & Hg	Mp
35	<i>Opuntia ficus-indica</i> (L.) Miller	Cactaceae	BELES	S	Fruit	F, Lf,	HR-079	2602	10°27.006'N, 037°52.874'E	Medium & Hg	Mp
36	<i>Otostegia integrifolia</i> Benth.	Lamiaceae	TNJT	S	Stem / Leaf		HR-090	2188	10°20.037'N, 037°35.516'E	Medium&Hg	Fr+M
37	<i>Phytolacca dodecandra</i> L'Herit.	Myrtaceae	ENDOD	S	Leaf/ Fruit	M ,Lf, Laundry	HR-049	2188	10°20.073'N, 037°35.516'E	Low & Hg, Fie	Mp
38	<i>Podocarpus falcatus</i> (Thunb.) R. B. ex Mirb.	Podocarpaceae	ZGBA	T	Stem	Fi ,Few, Ch, Hc, Fr, S	HR-139	2330	10°21.260'N, 037°41.150'E	Medium & Hg, Fie	Mp
39	<i>Prunus africana</i> (Hook. f.) Kalkm.	Rosaceae	HOMA	T	Stem	Fi, Lf, Few, Ch, Hc, S	HR-010	2307	10°20.954'N, 037°40.972'E	Medium & Hg, Fie	Mp
40	<i>Rubus steudneri</i>	Rosaceae	ENJORI	S	Fruit	Lf, F,	HR-117	2605	10°26.627'N, 037°53.495'E	Low & Hg, Fie	Mp

No	Scientific name	Family name	Vernacular (Amharic) name	Habit	Parts used	Use	Coll. No.	Altitude	Location	State of cultivation & place	Major use & classification
	Schweinf.										
41	<i>Senna singueana</i> (Del.) Lock	Fabaceae	GUFA	T	Stem, Stem bark	Fi, Lf, Few, Ch, S, M	HR-100	1856	10 <sup>0</sup> 14.818'N, 037 <sup>0</sup> 42.693'E	Medium & Hg, Fie	Mp
42	<i>Sesbania sesban</i> (L.) Merr.	Fabaceae	SASBANIYA	S	Leaf/steam	Fi, Lf, Fw, Ch, Fo, S	HR-027	2330	10 <sup>0</sup> 21.260'N, 037 <sup>0</sup> 41.150'E	Medium & Hg, Fie.	Mp
43	<i>Solanecio gigas</i> (Vatke) C. Jeffery	Asteraceae	BOZ	S	Stem, Leaf	Lf, Few, compost	HR-144	2852	10 <sup>0</sup> 28.070'N, 037 <sup>0</sup> 52.112'E	Low & Hg	Mp
44	<i>Urtica simensis</i> Steudel	Urticaceae	SAMA	H	Leaf	F, Lf, M	HR-030	2307	10 <sup>0</sup> 21.111'N, 037 <sup>0</sup> 41.028'E	Low & Hg	Mp
45	<i>Vernonia amygdalina</i> Del.	Asteraceae	GRAWA	T	Leaf/Stem	Fi, Lf, Fw, Ch, M, S	HR-021	2311	10 <sup>0</sup> 20.986'N, 037 <sup>0</sup> 41.029'E	Medium & Hg	Mp

### Appendix 2. List of fragrant plants collected in the study area and their method of application

No	Scientific Name	Family name	Local (Amharic) Name	Habit	Plant part	Method of utilization	Place of cultivation
1	<i>Artemisia absinthium</i> L	Asteraceae	ARITI	H	leaf	Households cut and put twigs of the plant in boxes which contain clothes and after few days, the clothes get the special aroma/ fragrance of the plant (the plant is used as perfume)	Homegarden
2	<i>Cymbopogon citratus</i> (D C.) Stapf	Poaceae	TEJESAR	H	leaf	Blades of this aromatic grass are cut and spread on the floor of the house during spiritual and social ceremonies. It can also be used to fumigate honey bee hives.	Homegarden
3	<i>Myrtus communis</i> L	Myrtaceae	ADES	S	Leaf	The leaf of this plant is dried, ground in to powder and eventually mixed with butter. The butter treated as such is used as hair	Homegarden



						ointment/conditioner for women.	
4	<i>Lippia adoensis</i> var. <i>adoensis</i> Hochst. ex Walp.	Verbanaceae	KESSIE	S	Leaf	Young twigs of this plant are cut and placed on the floor of the house for 16 days from August 1-16 during fasting time by the followers of Ethiopian Orthodox religion.	Homegarden
5	<i>Olea europaea</i> L. subsp. <i>cuspidata</i>	Oleaceae	WEYRA	T	Leaf/Stem	Leaves and dried chopped stems of this plant are burned in a small pot and used to fumigate water and or milk pots regularly. In addition, people also fumigate their houses with the smoke to remove house flies and to ward off bad spirits	At fence site and farm field
6	<i>Otostogia integrifolia</i> Benth.	Lamiaceae	TUNJUT	S	Leaf/Stem	The stems and leaves of this plant are burned in a small pot. The smoke raised from the pot gives a pleasant fragrance to the house, gets rid of house flies and chase out bad spirits.	Homegarden