

Diversity, Regeneration, Structure and Uses of Some Woody Species in Borana Forests of Southern Ethiopia: The Case of Yaballo and Arero Forests

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Abstract

Studies on diversity, regeneration, structural and uses of some woody species in the Borana Forests, one of the Afromontane forests of Ethiopia, were made. In order to gather vegetation and environmental data from the study forest, a 900 m² (30 m x 30 m) quadrat was laid following the homogeneity of vegetation. Investigation of the seedling density and regeneration of target species has been carried out using the same quadrat size, 30 m x 30 m. In each of these quadrats, the numbers of all seedlings that are up to the height of 150 cm were recorded. Individuals attaining 150 cm and above in height but less than 10 cm thick were considered as sapling and counted. Interview was conducted for the investigation of the various pressures exerted on different species. A total of 355 plant species belonging to 78 families and three divisions were recorded from the Borana Forests. Of these 2 were gymnosperms and 9 were pteridophyta, while the remaining were angiosperms. Structural and regeneration studies of some woody species indicated that there are species that require urgent conservation measures. To provide a better management and monitoring as well as to maintain the biodiversity, cultural and economic values of the forest unsustainable utility of the forest would be controlled with the various conservation activities in place.

Keywords: Arero Forest, Borana Forests, Endemism, Regeneration, Structure, Yaballo Forest

INTRODUCTION

In many parts of the world, particularly in developing countries, natural forest vegetation cover is diminishing at an alarming rate. This, on its part, is resulting in an unprecedented loss of biological diversity. In addition, basic information on the extent, distribution, species diversity and the rate of deforestation in Ethiopia is very limited. According to Logan (1946), a wide spread deforestation had already devastated most of the forest areas and consequently, the remaining total extent of montane type of forest vegetation cover in the mid-1950s was not more than 16% (i.e. about 17 mill. ha) of the country's total land area. Such a devastating trend of deforestation continued unchallenged over the five decades that followed, and in the event, the remaining natural high forest vegetation suffered an ever more drastic loss (EFAP, 1994) to the extent that only 2.3–2.7% of the country's total land area (i.e. about 2.5mil. ha) was left with forest cover at the turn of the last century, though the land cover of the country is now on the increase. The need for fuel wood, arable land and grazing areas are the main causes of forest degradation, frequently leading to loss of forest cover and biodiversity, erosion, desertification and reduced water resources. Several studies focussing on forests or vegetation of specific regions in Ethiopia (Hedberg, 1957; Mooney, 1963; Gilbert, 1970; Coetzee, 1978; Friis et al., 1982; Zerihun, 1985; Sebsebe, 1988; Uhlig, 1988; Zerihun et al., 1989; Uhlig & Uhlig, 1990; Zerihun & Backeus, 1991; Haugen, 1992; Mesfin, 1992; Mieke & Mieke, 1994; Menassie and Masresha, 1996; Zerihun and Sileshi, 1998; Demel, 2000; Fayera and Demel, 2003; Kumelachew and Taye, 2003; Teshome and Sebsebe, 2002; Teshome et al., 2004;) have been carried out. Moreover, the vegetation resources of Ethiopia, including forests, woodlands and bush lands, have been studied by several scholars (Woldemichael, 1979; Logan, 1946; Pichi-Sermolli, 1957; von Breitenbach, 1961, 1963; Westphal, 1975; Chaffey, 1979; Tewolde, 1986, 1988; Friis, 1986, 1992; Friis and Mesfin, 1990; EFAP, 1994; Ensermu and Teshome, 2008; Teshome et al., 2011; Fekadu et al., 2011 & 2012; Adugna et al., 2013; Teshome, 2013; Teshome and Ensermu, 2013a & 2013b; Teshome and Ensermu, 2014; Mohammed et al., 2014) who have employed different methods of vegetation classification. Almost all the aforementioned studies have made a pencil note about the intractable loss of this natural resource. In Ethiopia at the moment, owing to the current climate change scenario, there has been growing realisation of the severity of resource degradation both by the public and the government. In line with the realisation of forest degradation, the government of Ethiopia disclosed its support for the development of National Conservation Strategy (NCS) under which the first sectorial development program for the Ethiopia Forestry Action Program was prepared (EFAP, 1994). Despite, such commitment and awareness, not enough is being done to avert the situation, and there remains a wide gap at government level between problem awareness and the action to combat the problem. It is therefore, imperative and urgent to study the biodiversity, ecological status and regeneration potentials of the various forests in general and that of Borana in particular so as to device management systems thereby mitigating this alarming situation. In view of the aforementioned facts, the present study aims at assessing the status,

regeneration and diversity of woody species in Borana Forests of southern Ethiopia.

Location of the study area

The Borana Forests are found in the present Guji and Borana Zones of Oromia Regional State (see Fig. 1). The specific forest site is a Regional Forest Priority Area called Yaballo-Arero Forest Priority Area. These forests are within what is called the Somalia-Masai Regional Centre of Endemism of White (1983). Borana Forests are located on the southern parts of the country occupying certain patches in Yaballo and Arero areas ranging from 1300 -2250 m a.s.l. Most of these forest areas lie between 1400 to 2200 m a.s.l. The native people in the forested areas are the Oromos with some settlers residing in the towns adjacent to the forests. According to Daniel Gammachu (1977), the southern parts of the country belong to Type II rainfall regime that experience two rainy seasons characterised as bimodal pattern. Yaballo belong to this class having the highest rain in April and October.

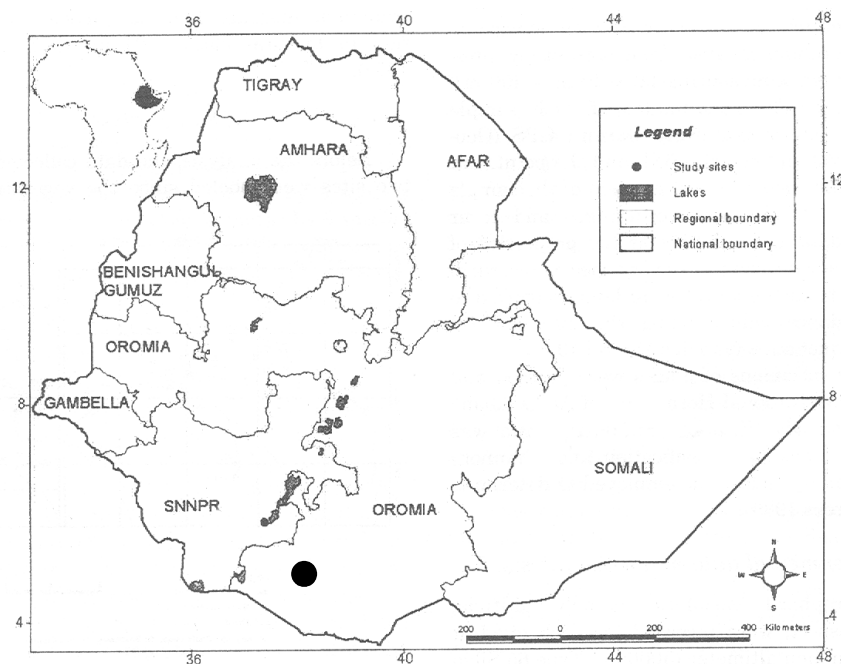


Fig. 1 Location of the study area

With regard to soil, a generalised account on the Nature and Management of Ethiopian Soils was in Mesfin (1998), with particular references to their genesis, classification, distribution and sound management aimed at their sustainable utilisation. Others like Logan (1946), Murphy (1958), Westphal (1975), and EMA (1988) also made descriptions and surveys of Ethiopian soils. Based on that, in Sidamo-Borana psammitic schists and hardened sandstone are predominant in the Basement complexes between the Magado Forest and Mega, with the large exposures of such rocks at Yaballo and Gara Fulli. From 2 km east of Dawa River, east wards to the Mesozoic escarpment at Nagelle, isoclinally folded rocks are predominantly formed of chlorite schist, mica schist, concretionary limestone and phyllite (Mohr, 1971). Furthermore, Mohr (1971) reported the occurrences of carbonatite north of Yaballo and gneiss north of Nagelle.

MATERIALS AND METHODS

Sampling Design

Initially, the survey crew made reconnaissance survey of the separate forests so as to obtain an impression and visual description of the general vegetation physiognomy and hypothesize vegetation-environment relationships such as altitude, slope and aspect. Discussion germane to forest resources was conducted with the local people (particularly the beneficiaries of the forests) and responsible personnel from the representatives of Farm-Africa, SOS-Sahel in the respective study areas. Both the staff of Farm-Africa and SOS-Sahel officials had already delineated their respective forests into different Forest patches which made the sampling easier. In Yaballo Forest the visited forest patches were Yubdo Qaqerramsso Forest Block, Gombo Guddo Forest Block and Nyaro Forest Block, while in Arero Guto Hirmaye, Oblo-Cafa, Bobella-Guto and Haro Dimtu-Mata Gafarsa were visited.

Vegetation and Environmental Data

In order to gather vegetation and environmental data from the study forests, a 900 m² (30 m x 30 m) quadrat was laid following the homogeneity of vegetation. Sample plots were selected through preferential means in such a

way that the various conditions encountered represented in the study forest. Woody species were counted. Additional tree and shrub species within 10-m distance from the plot boundaries were recorded as present. Diameter at Breast Height (DBH) and height of all woody species that are above 150 cm high and more than 10 cm thick were recorded. DBH was measured using a meter tape and height of individuals was measured using Clinometer. Investigation of the seedling density and regeneration of target species has been carried out using the same quadrat size, 30 m x 30 m. Partitions were made within the big quadrat so as to make seedling counts easier. In each of these quadrats, the numbers of all seedlings that are up to the height of 150 cm were recorded. Individuals attaining 150 cm and above in height but less than 10 cm thick were considered as sapling and counted.

Interview was conducted for the investigation of the various pressures exerted on different species. The local people particularly the elders who are more likely to know plant vernacular names and their detailed uses were interviewed. The information on vernacular names and the various uses of species were gathered from the informants via repeated field interviews as described in Maundu (1995); Kamatenesi-Mugisha et al. (2002) and Kakudidi et al. (2002). Plant specimens were identified at the National Herbarium and in the field. All voucher specimens that were in flowering and/or fruiting stages were brought to the National Herbarium of Addis Ababa University and deposited. Nomenclature of plant taxa follows Hedberg and Edwards (1989, 1995) and Edwards et al. (1995, 1997 and 2000).

Data Analysis

The vegetation and environmental data gathered from the field were fed into a computer for the subsequent analysis of the data. The vertical structure of the forests were described following the International Union for Forestry Research Organisation (IUFRO) classification scheme (Lamprecht, 1989) that categorise the vertical structure as upper, middle and lower storeys. The population structures of some selected species were analysed for the interpretation of the pattern of population dynamics in the forest.

RESULTS AND DISCUSSION

Biodiversity (Phytodiversity) of the Study Forests

Analysis of the diversity of plant species occurring in Borana Forests indicated that there are a total of 355 species belonging to 78 families. Of these diverse species only two Gymnosperm species were recorded, namely the elegant *Juniperus procera* and *Podocarpus falcatus*. The remaining 9 species belong to pteridophyta and the other 345 species belong to the angiosperms as indicated in Figure 2 below.

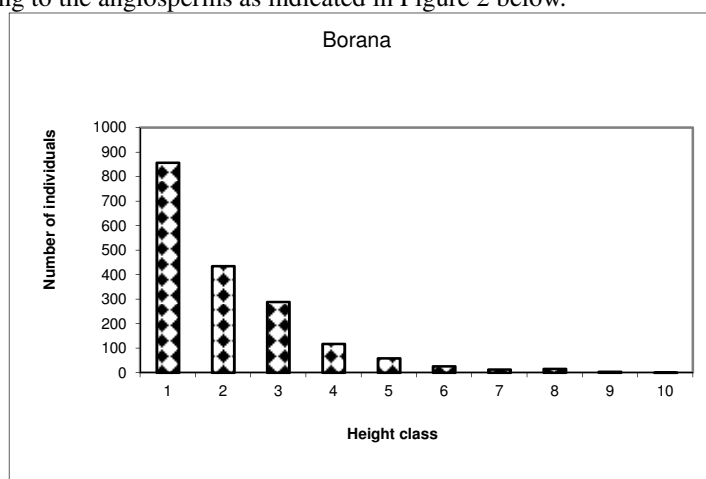


Fig. 2 Proportions of angiosperm, gymnosperms and pteridophytes in Borana Forests.

As indicated above the total families of plants recorded from Borana Forests make up 78 all together. Of these families, family Fabaceae is the most dominant family and is represented by 42 species making 11.8 % of the total species in the list. The second dominant is Asteraceae, which is represented by 27 species. Families Poaceae and Rubiaceae are represented by 19 species each. A complete list of the species recorded from Borana Forests is found in Appendix 1.

Floristic

The vegetation in Borana belongs to the Dry-single dominant Afromontane Forest type. Juniper is, for example, found in all the Forest blocks with different degrees of abundance, threat and regeneration potentials. In Yubdo Qaqeramso Forest Block (Yaballo Forest), the following species could be encountered: *Croton macrostachyus*, *Calpurnea aurea*, *Psudrax schimperiana*, *Acacia tortilis*, *A. seyal*, *A. senegal*, *Combretum molle*, *Podocarpus*

falcatus, *Olea europaea*, *Teclea simplicifolia*, *Gardenia ternifolia*, *Faurea speciosa*, *Olinia rochetiana*, *Maytenus arbutifolia*, *Schrebera alata*, *Osyris quadripartita*, *Myrsine africana*, *Ficus vasta*, *Dichrostachys cinerea*, *Bersama abyssinica*, *Phoenix reclinata*, *Justicia heterocarpa*, *Scadoxus multiflorus*, *Hypoestes forsskaolii*, *Hyparrhenia hirta* are among others. At 2200 m above sea level around Dhaga Koba, *Tarchonanthus camphoratus* seems to dominate as a shrub and with some sedge in the field layer. Gombo Guddo Forest block has more or less similar species composition but with better land cover when compared to Yubdo Qaqeramso and Nyaro blocks. One interesting observation in Gombo Guddo block was that, the east facing sample plots showed the predominance of the forest by *Juniperus procera* in the upper layer and the west facing sampling stands showed the predominance of *Podocarpus falcatus* in the upper layer of the forest. Such aspect-based predominance might be due to the direction of the incoming rain. Other species in Gombo Guddo block include the widely distributed *Scolopia theifolia*, *Teclea simplicifolia*, *Commiphora africana*, *Olea europaea*, *Psydrax schimperiana*, *Euclea divinorum*, *Acokanthera schimperi*, *Rhus natalensis*, *Nuxia congesta*, *Myrsine africana*, *Olyra latifolia*, *Pentas lanceolata*, *Achyranthus aspera*, *Scadoxus multiflorus*, *Solanum incanum*, *Commelina africana*, *Hypoestes forsskaolii* and *Commelina latifolia*. In Nyaro Forest block, Juniper is still the species seen on the upper layer. However, Nyaro block is the block closer to Yaballo town (about 7 km) that experienced intense extraction of *Juniperus procera*, particularly for the purposes of timber, construction and hive making. Other species in this block includes *Scherebera alata*, *Scolopia theifolia*, *Tarchonanthus camphoratus*, *Psydrax schimperiana*, *Euclea divinorum*, *Dodonea angustifolia*, *Rhus vulgaris*, *Olea europaea*, *Acacia brevispica*, *Myrsine africana*, *Teclea simplicifolia*, *Acokanthera schimperi*, *Calpurnea aurea*, *Achyranthes aspera*, *Ruttya fruticosa*, *Olyra latifolia*, *Hypoestes forsskaolii* and *Commelina africana* are among others. Of all the forests in Borana, the Arero Forest is the forest in a better land cover with the exception of one of its patches, Haro-Dimtu Meta Gefersa. This patch is closer to the Arero town and experienced intense exploitation similar to Nyaro block of Yaballo Forest. This vividly entails that more degradation is prevalent in patches closer to towns that are accessible to dwellers. In Guto and Guto Hirmaye Forest Block (Arero Forest), the floristic is almost similar. *Juniperus procera* and *Podocarpus falcatus* always occupy the upper layer in both blocks. Some other species of these blocks include *Teclea simplicifolia*, *Olea europaea*, *O. capensis*, *Scolopia theifolia*, *Psydrax schimperiana*, *Prunus africana*, *Olinia rochetiana*, *Acokanthera schimperi*, *Canthium lactescens*, *C. pseudosetiflorum*, *Calpurnea aurea*, *Scherebera alata*, *Ficus vasta*, *F. thonningii*, *Acacia brevispica*, *Zanthoxylum usambarense*, *Commiphora terebinthina*, *Cluttia abyssinica*, *Olyra latifolia*, *Asparagus africana*, *Commelina africana*, *Hypoestes forsskaolii*, *Galium spurium* and *Pentas lanceolata*. On the other hand, in Haro-Dimtu Meta Gefersa Forest block Juniper still occupy the top layer. Some other species of this forest block include *Olea europaea*, *Acokanthera schimperi*, *Rhus natalensis*, *Acacia brevispica*, *Osyris quadripartita*, *Combretum molle*, *Acacia tortilis*, *Dichrostachys cinerea*, *Scherebera alata*, *Pappaea capensis*, *Steganotaenia araliacea*, *Commiphora terebinthina*, *C. africana*, *Lannea rivae*, *Terminalia brownii*, *Ozoroa insignis*, *Psydrax schimperiana*, *Grewia bicolor*, *Ocimum urticifolium*, *Justicia diclipteroides*, *J. heterocarpa* and *Barleria eranthemoides* having some characteristic species of *Combretum-Terminalia* woodland.

Vertical Structure

The vertical structure of the woody species occurring in the Borana Forests was analyzed using the IUFRO classification scheme as cited in (Lamprecht, 1989). The scheme classifies the storey into upper, where the tree height is greater than 2/3 of the top height; middle, where the tree height is in between 1/3 and 2/3 of the top height and the lower storey where the tree height is less than 1/3 of the top height. The top height here is considered as 45 m.

In Borana Forests, the upper storey of the forests is either *Juniperus* or *Podocarpus* or predominated by both emergent species. In most of these forests, the middle storey is dominated by species like *Olea europaea*, *O. capensis*, *Scolopia theifolia* and *Allophylus abyssinicus*. The lower storey of the forests is largely composed of small trees and shrubs such as *Myrsine africana*, *Teclea nobilis* and *Bersama abyssinica*.

Density

Density of a given species is expressed as number of stems per hectare. With regards to density, the highest density of species in Borana Forests was recorded for *Scolopia theifolia* (197.2 individuals per hectare) followed by *Haplocoelum foliolosum* (142.8 individuals per hectare) and *Teclea simplicifolia* (71.6 individuals per hectare). The least density was recorded for species like *Ficus thonningii* and *F. vasta* both accounting less than an individual per hectare.

DBH and Height Profile

Summary of information on the frequency distribution of individuals in the various diameter and height classes of Borana Forests is presented in Figures 3 and 4 respectively. It can be seen from these Figures that with an increase in the DBH class size there is a decrease in the number of individuals. The highest proportion of

individuals in the second DBH class has been contributed by *Scolopia theifolia*. As seen from these Figures, about 89% of the number of individuals was contributed by DBH classes 1, 2, and 3. This shows that the individuals belonging to this proportion are between 10-80 cm thick in size. More over, the data suggested that the forest is dominated by small sized individuals.

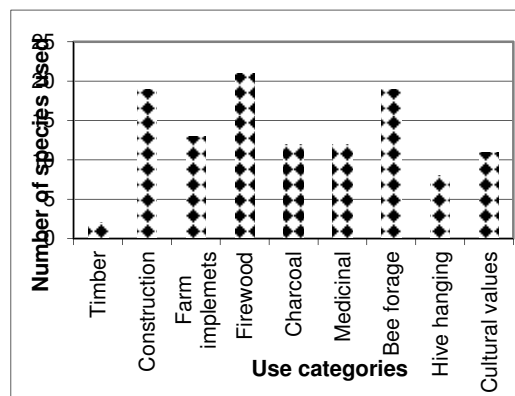


Fig. 3 DBH classes versus number of individuals in Borana Forests.

Legend: 1=10-20 cm, 2=20.1-50 cm, 3=50.1-80 cm, 4=80.1-110 cm, 5=110.1-140 cm, 6=> 140 cm.

On the other hand, the frequency distribution of height classes of trees and shrubs in Borana Forests revealed a trend where the distribution of individuals decreased from the small height classes to the bigger height classes (see Fig. 4).

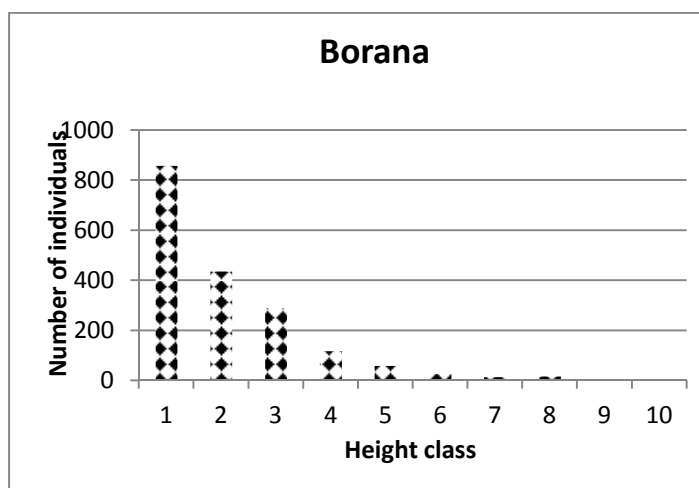


Fig. 4 Height classes versus number of individuals in Borana Forests.

Legend: 1=1.5-6 m, 2=6.1-9 m, 3=9.1-12 m, 4=12.1-15 m, 5=15.1-18 m, 6=18.1-21 m, 7=21.1-24 m, 8=24.1-27 m, 9=27.1-30 m, 10=> 30m.

Most trees and shrubs of the Borana Forests belong to lower height classes. As seen from the Figure, about 96.5% of the individuals investigated for height are below 18 m, while the remaining 3.5% are above 18 m tall.

Population Structure of Some Species

The population structure of 37 trees and shrub species occurring in Borana Forests was investigated. The population structure of these species revealed four general patterns. The first pattern (Fig. 5a) is formed with a species entailing a more or less even frequency distribution in the respective DBH classes. *Scherebera alata* belongs to this group. This pattern is similar to the first pattern identified in Borana Forests and the pattern could be explained in similar interpretation thereof.

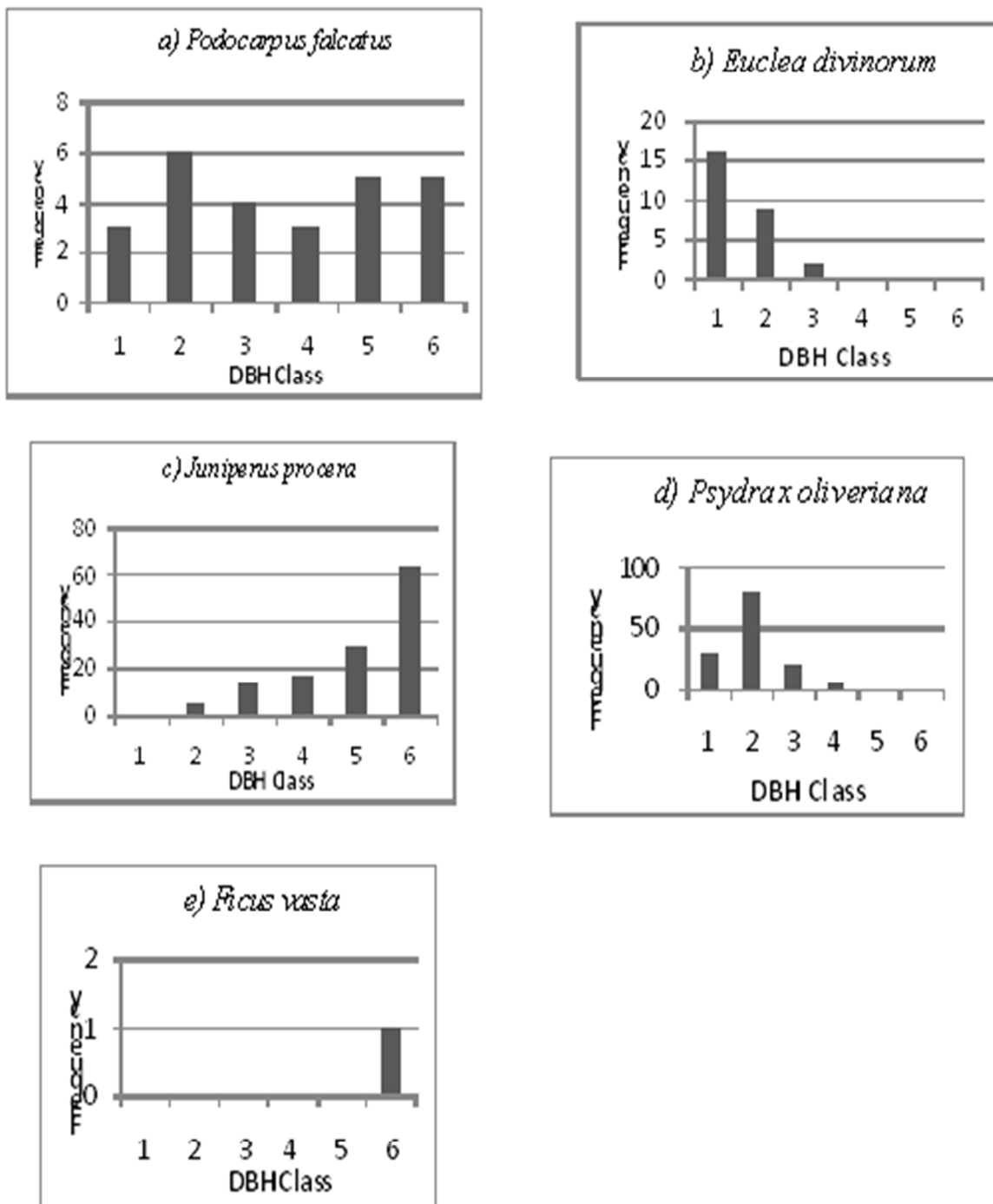


Fig. 5 a-e Five representative patterns of woody species over the DBH classes in Borana Forests. The second pattern (Fig. 5b) is formed by species with the highest frequencies in the lower DBH classes. *Prunus africana*, *Pavetta abyssinica*, *Oncoba routledgeii*, *Maytenus arbutifolia* and *Rhus natalensis* belong to this pattern. The third pattern (Fig. 5 c) is formed by *Juniperus procera* where more individuals are found in the higher DBH classes. In a better land cover as in Arero Forest where disturbances have been relatively low, younger *Juniperus procera* individuals were not encountered. It seems likely that this particular species require a cleared space or an open canopy to reproduce and recruit it self in the forest. Furthermore, the older mother trees might not be reproductively active. The fourth pattern (Fig. 5d) is formed where the frequencies of individuals of a species is lower in the lowest DBH class, followed by increment of individuals in subsequent classes and then decreases gradually towards the higher classes. *Psydrax schimperiana* and *Apodytes dimidiata* belong to this pattern. The last pattern (Fig. 5e) is formed by individuals of a species represented in certain classes and absent in others. Besides *Ficus vasta*, *F. thonningii* and *Fagaropsis hildebrandtii* belong to such pattern.

Regeneration Status of Some Woody Species

The regeneration status of thirty-seven woody species occurring in Borana Forests was analyzed. From the information in the figure below, the seedling, sapling and tree/shrub status of some selected species was presented in as Figure 6. As seen from the result some species were not represented in the seedling stage. These include *Euclea divinorum*, *Teclea nobilis*, *Ficus thonningii*, *F. vasta*, *Acacia brevispica*, *Canthium lactescens*, *Combretum collinum*, *Rhus natalensis*, *Fagaropsis hildebrandtii* and *Olinia rochetiana*. Others like *Podocarpus falcatus* and *Oncoba routledgei* were not represented by the sapling stage. Different patterns of seedling, sapling and tree/shrub distribution could be exhibited by different species depending on several factors among others, the ability of a species to reproduce in a forest and the extent of pressure on that particular species that could threaten it. With different parameters in mind some species are highly represented by their seedlings, while others take the contrary position. The highest number of seedling was recorded for *Haplocoelum foliolosum* followed by *Scolopia theifolia*. However, the highest number of seedling recorded for *Haplocoelum foliolosum* was not a general trend in the forest; rather it was a record from certain blocks only. The highest number of sapling was recorded for *Scolopia theifolia* followed by *Teclea simplicifolia*. The highest tree/shrub was recorded again for *Scolopia theifolia* followed by *Teclea simplicifolia*. This may suggest that *Scolopia theifolia* is a species that perform well under the existing conditions.

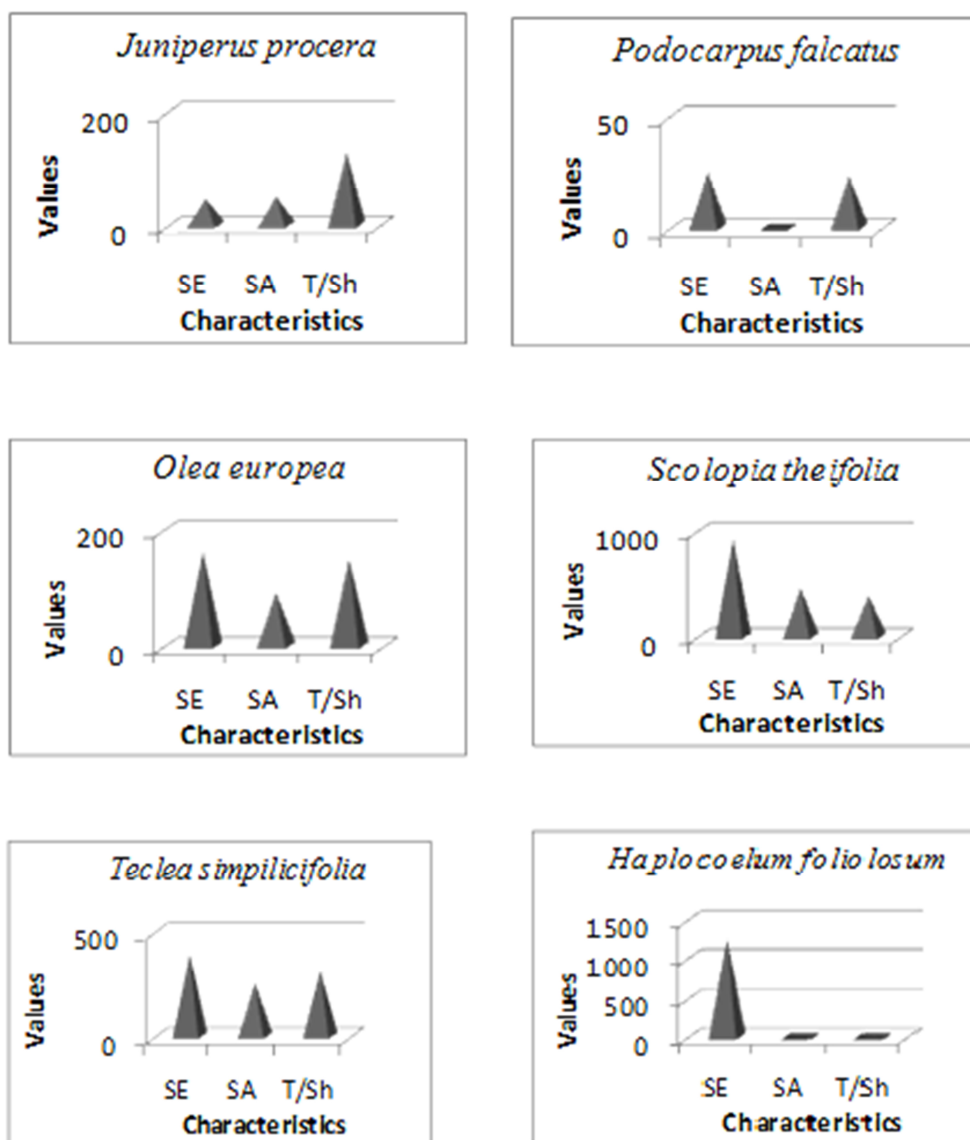


Fig. 6 Seedlings, saplings and tree/shrub distribution of some selected species occurring in Borana Forests.

Use Values of Some Selected Species

An interview on the uses of some major plant species was made so as to deduce the extent of pressure on a

particular species. The participants have pointed out the major uses of wood products and non-wood products extracted from the forest. The use of plants by the local people can be grouped into a number of non-restrictive categories. For the purposes of simplicity, the following use categories of the plants were considered here: timber, construction, farm implements, firewood, charcoal, spices, medicinal, bee forage, cultural values and for hive hanging purposes. Of the 39 species included in the interview, 30 species are used for firewood, 27 species for bee keeping purposes, 20 species for construction, 11 species for cultural purposes, 13 species for farm implements, 12 species for charcoal production and 12 species are used for medicinal purposes (see Figure 7). It is important to note here that many species could serve different purposes and seem to be over exploited.

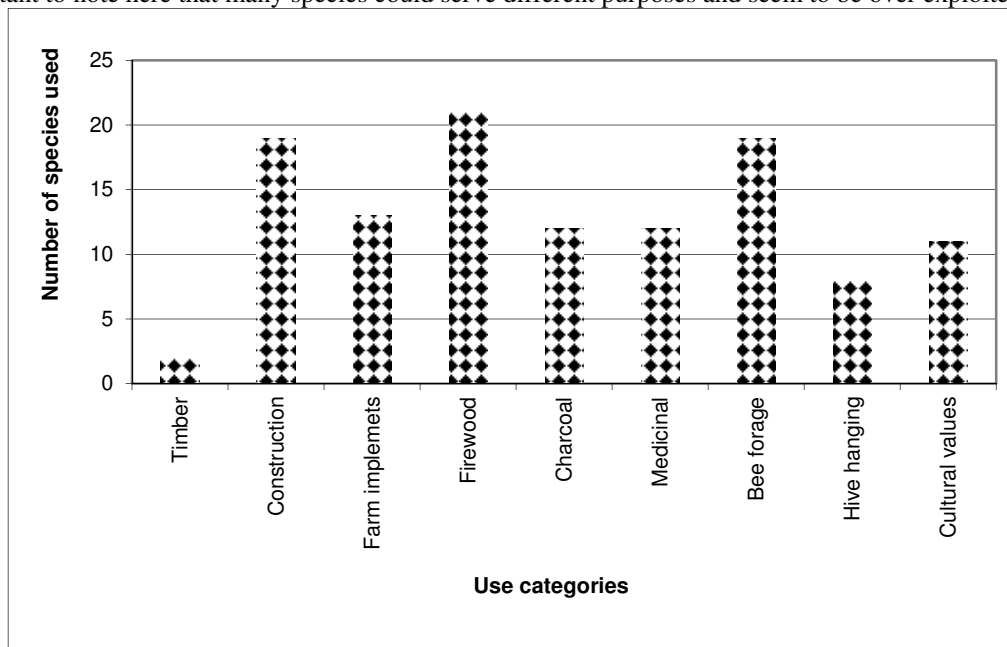


Fig. 7 Use categories and the number of species used in Borana Forests

Endemism

There are a number of flowering plant species in the forests investigated that are endemic to one of the forests. Information on the endemic flowering plant species of Ethiopia and the levels of threat to them has been published in Ensermu et al. (1992), and Vivero et al. (2005). Based on the published Flora volumes and the lists of species in the three forests, the endemic species and the levels of threat on each taxon are given in Table 1, below.

Table 1 Endemic species occurring in Borana Forests

No.	Scientific name	Status	Family
1	<i>Aloe yavellana</i>	EN	Aloaceae
2	<i>Asystasia ammophila</i>	VU	Acanthaceae
3	<i>Bidens zavattari</i>	EN	Asteraceae
4	<i>Ceropegia convolvuloides</i>	NT	Ascepiadaceae
5	<i>Conyza abyssinica</i>	LC	Asteraceae
6	<i>Conyza megaensis</i>	CR	Asteraceae
7	<i>Cyphostemma niveum</i>	LC	Vitaceae
8	<i>Dombeya aethiopica</i>	LC	Sterculiaceae
9	<i>Gladiolus negeliensis</i>	CR	Iridaceae
10	<i>Justicia diclipteroides subsp. megaensis</i>	CR	Acanthaceae
11	<i>Leucas abyssinica</i>	LC	Lamiaceae
12	<i>Melhania beguinotii</i>	EN	Sterculiaceae
13	<i>Melhania zavattari</i>	VU	Sterculiaceae
14	<i>Thunbergia mauginii</i>	EN	Acanthaceae
15	<i>Tinnea somalensis</i>	LC	Lamiaceae

Table 1 show that 15 endemic species have been recorded from Borana Forests. Based on the IUCN Criteria of level of threat, 3 species are critically endangered (CR), 4 are endangered (EN) and 2 species have been

evaluated as vulnerable (VU). The three critically endangered taxa are restricted to the most threatened forests calling utmost attention for conservation of these species. The remaining one species has been under near threatened (NT) while five species were found to be categorized as species of least concern (LC).

Status of Some Selected Species

Some woody species of the Borana Forests are used for many purposes. Moreover, these species are not represented (if represented by few individual) by the various stages of development. It is then pretty clear that such species that have been over utilized and lack replacement would eventually disappear from the forest. For example, *Ficus vasta* and *Combretum collinum* (see Table 2) are not represented by either seedling or sapling stages, showing that these species are those that need immediate conservation measures. Contrary to this fact, some species though over utilized are represented by better individuals (e.g., *Scolopia theifolia*) at different stages. Species that are used for various purposes and yet bearing pattern I type of population structure are those that have good reproduction and recruitment. Such species are those that don't need urgent conservation attention.

Table 2 Status of some selected species of the Borana Forests. Note that the structure of these species is the one discussed under population structure previously.

Species	SE	SA	T/Sh	Number of uses
<i>Acacia brevispica</i>			1	4
<i>Acocanthera schimperi</i>	310	22	89	4
<i>Canthium lactescence</i>			4	1
<i>Combretum collinum</i>			1	1
<i>Dodonea angustifolia</i>	62	4	12	5
<i>Eculea divinorum</i>			27	6
<i>Juniperus procera</i>	46	50	129	6
<i>Maerua triphylla</i>			3	1
<i>Olea capensis</i>	1		101	2
<i>Olea europea</i>	162	91	150	5
<i>Podocarpus falcatus</i>	25		23	6
<i>Psydrax schimperiana</i>	205	130	136	5
<i>Scherebera alata</i>	13	10	10	1
<i>Scolopia theifolia</i>	933	457	385	3
<i>Strychnos mitis</i>	157	56	141	4
<i>Teclea simplicifolia</i>	393	251	312	4
<i>Trimeria grandifolia</i>			7	3
<i>Zanthoxylum usambarense</i>	11	3	4	2

CONCLUSION AND RECOMMENDATIONS

The study has revealed that the forests in Borana are at different levels of status and utilisation. They also have different combinations of factors – both climatic and socio-economic factors. However, combinations of the different factors are forcing the inhabitants of all the forests to move into the forest areas and encroachments on the forests come from both the inhabitants and those living in nearby urban centres. In the Borana Forests, there are also differences in the health status of the forests at Yaballo and Arero. Arero forest is at a better level of utilisation and shows a better healthy status as compared to that of Yaballo. However, there are also tangible differences even among forest blocks and forest patches, within the same forest area. For example, a healthy situation has been observed in Gombo Gudo Forest Block where the highest number of woody and herbaceous plant species was recorded. Nyaro forest block is the closest block to Yaballo town and it shows the least healthy situation where the diversity of both woody and herbaceous flora has been under sever situation. The dominant tree species, *Juniperus procera* has been seriously affected; the wood being extracted for firewood and construction and the bark for the construction of hats and beehives. Timber extraction has also affected the survival of the species throughout Yaballo Forest, with Nyaro forest block the most affected one in the area. In Arero Forest, except for the highly affected Mata Gefersa Forest Block, which is situated close to Arero town, the other forest blocks have a better relatively healthy status. However, felling of mature *Juniperus procera* trees just for the collection of wild honey and peeling off the bark for the construction of beehives and hats have been observed. In general the following points could be taken into consideration.

Yaballo Forest

- Enrichment plantation of species like *Juniperus procera*, *Euphorbia adjurana*, *Olea europaea* in Nyaro and Yudbo Qaqerramso (also *Podocarpus falcatus* for this block),

- Enhance controlled Eucalyptus plantation around Yaballo town for reducing pressure on the forest species, particularly *Juniperus procera* that is used for construction and fuelwood heavily,
- Rotational grazing pattern that is practised in Arero and Gombo Guddo will also be adopted,
- Assist in the propagation and the distribution of seedlings of plants whose uses are already wide spread in the area and which are threatened, e.g. *Juniperus procera*, *Podocarpus falcatus*, *Euphorbia adjurana*, *Olea capensis* etc.
- Teach modern animal husbandry so as to reduce the number of livestock that pose pressure on the forest resources and introduce modern beehives in the area.

Arero Forest

- Although there are relatively better concentrations of *Juniperus procera* in Arero forest, there is a strong pressure on the existing individuals from felling for wild honey collection, peeling barks for hives and hat construction. Thus peeling of barks for such purposes should be avoided as much as possible,
- Remove dead-standing trees of *Juniperus procera* and (other tree species) and other canopy disliking species,
- Assist in the propagation and the distribution of seedlings of plants whose uses are already wide spread in the area and which are threatened, e.g. *Juniperus procera*, *Podocarpus falcatus*, *Prunus africana*, *Olea capensis*, etc.
- In Meta Gefersa, introduce enrichment plantation of *Juniperus procera* and other important indigenous trees like *Olea europaea* and also introduce controlled *Eucalyptus* plantation for reducing pressure on the remnant indigenous trees and for income generation,
- Introduce modern beehives,
- Teach modern animal husbandry and encourage rotational grazing.

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Appendix 1: A complete list of species collected from Borana Forests

Scientific name	Afaan Oromoo	Family	Habit
<i>Abutilon figarianum</i> Webb		Malvaceae	Shrub
<i>Acacia albida</i> Del.	Ambo	Fabaceae	Tree
<i>Acacia brevispica</i> Harms	Hammarreessa	Fabaceae	Shrub/tree
<i>Acacia drepanolobium</i> Harms ex Sjostedt	Fulleessa	Fabaceae	Shrub/tree
<i>Acacia mellifera</i> (Vahl) Benth.	Sabansa	Fabaceae	Shrub/tree
<i>Acacia nilotica</i> (L.) Willd. ex Del.	Burquqqee	Fabaceae	Tree
<i>Acacia senegal</i> (L.) Willd.	Bokossaa	Fabaceae	Tree
<i>Acacia seyal</i> Del.	Waaccuu	Fabaceae	Tree
<i>Acacia sieberiana</i> DC.		Fabaceae	Tree
<i>Acacia tortilis</i> (Forssk.) Hayne	Dhaddacha	Fabaceae	Tree
<i>Acalypha volkensii</i> Pax		Euphorbiaceae	Shrub
<i>Achyranthes aspera</i> L.		Amaranthaceae	Herb
<i>Acokanthera schimperi</i> (A.DC.) Schweinf.	Qaraaruu	Apocynaceae	Shrub/tree
<i>Actinopteris dimorpha</i> Pichi-Serm.		Adiantaceae	Fern
<i>Adiantum incisum</i> Forssk.		Adiantaceae	Fern
<i>Adiantum pedatum</i> L.		Adiantaceae	Fern
<i>Aerva lanata</i> (L.) Juss. ex Schult.		Amaranthaceae	Herb
<i>Ageratum conyzoides</i> L.		Asteraceae	Herb
<i>Albuca abyssinica</i> Jacq.		Hyacinthaceae	Herb
<i>Aloe yavellana</i> Reynolds	Hargeessa	Aloaceae	Herb
<i>Amaranthus caudatus</i> L.		Amaranthaceae	Herb
<i>Amaranthus hybridus</i> L.		Amaranthaceae	Herb
<i>Amorphophallus gomboczianus</i> Pichi-Serm.		Araceae	Herb
<i>Anagallis arvensis</i> L.		Primulaceae	Herb
<i>Androcymbium striatum</i> Hochst. ex A.Rich.		Colchicaceae	Herb
<i>Aneilema hockii</i> De Wild.		Commelinaceae	Herb
<i>Aneilema johnstonii</i> K. Schum.		Commelinaceae	Herb
<i>Anthospermum herbaceum</i> L.f.		Rubiaceae	Herb
<i>Aristida adscensionis</i> L.	Seerricha	Poaceae	Grass
<i>Asparagus africanus</i> Lam.	Sariitii	Asparagaceae	Climber
<i>Asparagus racemosa</i> Willd.	Sariitii	Asparagaceae	Shrub
<i>Aspilia mossambicensis</i> (Oliv.) Wild	Adaa	Asteraceae	Shrub
<i>Asplenium aethiopicum</i> (Burm.f.) Bech.		Aspleniaceae	Fern
<i>Asplenium theciferum</i> (Knuth) Mett.		Aspleniaceae	Fern
<i>Asystasia ammophila</i> Ensermu	Arabdoo Teessa	Acanthaceae	Herb
<i>Balanites aegyptiaca</i> (L.) Del.	Baddana	Balanitaceae	Tree
<i>Barleria eranthemoides</i> R.Br. ex C.B. Clarke	Qilxiphee/Mogoree	Acanthaceae	Shrub

Scientific name	Afaan Oromoo	Family	Habit
<i>Barleria hildebrandtii</i> S. Moore	Dhallaa	Acanthaceae	Shrub
<i>Barleria spinisepala</i> E.A. Bruce	Qilxiphee	Acanthaceae	Shrub
<i>Bersama abyssinica</i> Fresen.	Gaddaa	Melanthaceae	Shrub/tree
<i>Bidens pilosa</i> L.		Asteraceae	Herb
<i>Bidens zavattari</i> Cuf.		Asteraceae	Herb
<i>Blepharis maderspatensis</i> (L.) Roth		Acanthaceae	Herb
<i>Bulbine abyssinica</i> A.Rich.		Asphodelaceae	Herb
<i>Calpurnia aurea</i> (Ait.) Benth.	Ceekkata	Fabaceae	Shrub/tree
<i>Canthium lactescens</i> Hiern	Korboo	Rubiaceae	Shrub/tree
<i>Capparis tomentosa</i> Lam.	Ogoraa Gaalaa	Capparidaceae	Shrub
<i>Carissa spinarum</i> L.	Dhagama	Apocynaceae	Climber/shrub
<i>Catha edulis</i> (Vahl) Forssk. ex Endl.	Jimaa	Celastraceae	Tree/shrub
<i>Caucanthus auriculatus</i> (Radlk.) Niedenzu		Malpighiaceae	Climber
<i>Caylusea abyssinica</i> (Fresen.) Fiech. & Mey.	Aramaa	Resedaceae	Herb
<i>Centrus ciliaris</i> L.		Poaceae	Grass
<i>Ceropegia convolvuloides</i> A.Rich.		Asclepiadaceae	Climber
<i>Ceropegia cufodontis</i> Chiov.		Asclepiadaceae	Climber
<i>Chaemacrista hildebrandtii</i> Vatke		Fabaceae	Herb
<i>Chascanum gillettii</i> Mold.		Verbenaceae	Herb
<i>Chascanum hildebrandtii</i> (Vatke) Gillett		Verbenaceae	Herb
<i>Chenopodium ambrosioides</i> L.		Chenopodiaceae	Herb
<i>Chenopodium schraderianum</i> Schult.		Chenopodiaceae	Herb
<i>Cissus petiolata</i> Hook.f.	Araayyee	Vitaceae	Climber
<i>Cleome gynandra</i> L.		Capparidaceae	Herb
<i>Cleome hirta</i> (Kl.) Oliv.	Onnonnuu	Capparidaceae	Herb
<i>Cleome monophylla</i> L.	Obeessa	Capparidaceae	Herb
<i>Cleome usambarica</i> Pax		Capparidaceae	Herb
<i>Clerodendrum myricoides</i> (Hochst.) Vatke	Halakoo Ajoo	Lamiaceae	Shrub
<i>Clutia abyssinica</i> Jaub. & Spach.	Harcumme Mormaa	Euphorbiaceae	Herb
<i>Coccinia grandis</i> (L.) Voigt	Burii	Cucurbitaceae	Climber
<i>Combretum collinum</i> Fresen.	Lu'oo	Combretaceae	Tree
<i>Combretum molle</i> R.Br. ex G. Don	Rukkeessa	Combretaceae	Tree
<i>Commelina africana</i> L.	Qaayyoo	Commelinaceae	Herb
<i>Commelina benghalensis</i> L.		Commelinaceae	Herb
<i>Commelina foliacea</i> Chiov.		Commelinaceae	Herb
<i>Commelina latifolia</i> Hochst. ex A.Rich.		Commelinaceae	Herb
<i>Commelina petersii</i> Hassk.		Commelinaceae	Herb
<i>Commelina reptans</i> Brenan		Commelinaceae	Herb
<i>Commiphora africana</i> (A.Rich.) Engl.	Hammeessa Dhiiroo	Burseraceae	Shrub/tree
<i>Commiphora habessinica</i> (Berg) Engl.	Callaanqaa	Burseraceae	Shrub/tree
<i>Commiphora serrulata</i> Engl.	Hammeessa	Burseraceae	Shrub/tree
<i>Commiphora terebinthina</i> Vollesen	Sangaa Igguu	Burseraceae	Tree
<i>Conyza abyssinica</i> Sch. Bip. ex A. Rich.		Asteraceae	Herb/shrub
<i>Conyza aegyptiaca</i> (L.) Ait.		Asteraceae	Herb
<i>Conyza hochstetteri</i> Sch. Bip.		Asteraceae	Herb
<i>Conyza megaensis</i> F.G. Davies		Asteraceae	Herb
<i>Conyza pedunculata</i> (Oliv.) H. Wild		Asteraceae	Herb
<i>Conyza pyrropappi</i> Sch. Bip. ex A. Rich.		Asteraceae	Herb/shrub
<i>Conyza schimperii</i> Sch. Bip. ex A. Rich.		Asteraceae	Herb
<i>Conyza stricta</i> Willd.		Asteraceae	Herb
<i>Cordia africana</i> Lam.	Waddeessa	Boraginaceae	Tree
<i>Cordia gharaf</i> (Forssk.) Aschers.		Boraginaceae	Tree/shrub
<i>Crabbea velutina</i> S. Moore	Kubdhaa	Acanthaceae	Herb
<i>Crassula alsinoides</i> (Hook.f.) Engl.		Crassulaceae	Herb
<i>Crassula schimperii</i> Fisch. & Mey.		Crassulaceae	Herb
<i>Crassula vaginata</i> Eckl. & Zeyh.		Crassulaceae	Herb
<i>Craterostigma smithii</i> S. Moore		Scrophulariaceae	Herb
<i>Crinum abyssinicum</i> Hochst. ex A. Rich.	Buttee Waraabessaa	Amaryllidaceae	Herb
<i>Crossandra mucronata</i> Lindau		Acanthaceae	Shrub
<i>Crotalaria cylindrica</i> A.Rich.	Sayisa	Fabaceae	Herb

Scientific name	Afaan Oromoo	Family	Habit
<i>Crotalaria fascicularis</i> Polhill		Fabaceae	Herb/shrub
<i>Crotalaria laburnifolia</i> L.		Fabaceae	Herb
<i>Crotalaria lachnocarpoides</i> Engl.		Fabaceae	Herb/shrub
<i>Crotalaria oligosperma</i> Polhill		Fabaceae	Shrub
<i>Crotalaria succulata</i> Chiov.		Fabaceae	Herb
<i>Croton macrostachyus</i> Del.	Makkanniisa	Euphorbiaceae	Tree/shrub
<i>Croton schimperiana</i> Muell. Arg.		Euphorbiaceae	Shrub
<i>Cucumis aculeatus</i> Cogn.	Burii	Cucurbitaceae	Herb
<i>Cucumis prophetarum</i> L.		Cucurbitaceae	Herb
<i>Cussonia holstii</i> Harms ex Engl.	Abrattuu	Araliaceae	Tree
<i>Cyanotis barbata</i> D.Don		Commelinaceae	Herb
<i>Cyathula cylindrica</i> Moq.		Amaranthaceae	Herb
<i>Cynium erectum</i> Rendle		Scrophulariaceae	Herb
<i>Cynodon dactylon</i> (L.) Pers.		Poaceae	Grass
<i>Cyperus comosipes</i> Mattf. & Kuk		Cyperaceae	Herb
<i>Cyperus dubius</i> Rott.		Cyperaceae	Herb
<i>Cyperus rubicundus</i> Vahl		Cyperaceae	Herb
<i>Cyphia glandulifera</i> Hochst. ex A.Rch.		Lobeliaceae	Herb
<i>Cyphostemma adenocaula</i> (A.Rich.) Wild & Drummond	Cophii	Vitaceae	Climber
<i>Cyphostemma cyphopetalum</i> (Fresen.) Wild & Drummond	Cophii	Vitaceae	Climber
<i>Cyphostemma niveum</i> (Hochsat. ex Schweinf.) Desc.		Vitaceae	Climber
<i>Cyphostemma serpens</i> (Hochst. ex A.Rich.) Desc.		Vitaceae	Climber
<i>Dichrocephala integrifolia</i> (L.f.) O. kuntze		Asteraceae	Herb
<i>Dichrostachys cinerea</i> (L.) Wight & Arn.	Jirimee	Fabaceae	Shrub/tree
<i>Dioscorea quartiniiana</i> A. Rich.	Baroodaa	Dioscoreaceae	Climber
<i>Diospyros abyssinica</i> (Hiern)F. White	Lookoo	Ebenaceae	Tree
<i>Diplolophium africanum</i> Turcz.		Apiaceae	Herb
<i>Dodonaea angustifolia</i> L.f.	Dhittacha	Sapindaceae	Shrub/tree
<i>Dolichos luticola</i> Verdc.		Fabaceae	Herb
<i>Dolichos sericeus</i> E.Mey		Fabaceae	Climber
<i>Dolichos trilobus</i> L.		Fabaceae	Climber
<i>Dombeya aethiopica</i> Gilli	Daannisaa/Sililaacha	Sterculiaceae	Tree
<i>Dorstenia barnimiana</i> Schweinf.	Rarii	Moraceae	Herb
<i>Dregea schimperi</i> (Decne) Bullock		Asclepiadaceae	Climber
<i>Drimia altissima</i> (L.f.) Ker-Gwal.	Miirtuu	Hyacinthaceae	Herb
<i>Dyschoriste multicaulis</i> (A. Rich.) O. Kuntze		Acanthaceae	Herb
<i>Dyschoriste radicans</i> Nees	Raphachoo	Acanthaceae	Herb
<i>Echinops angustifolius</i> S. Moore	Bursii	Asteraceae	Herb
<i>Echinops hispidus</i> Fresen.		Asteraceae	Herb
<i>Echiochilon lithospermoides</i> (S.Moore) I.M. Johnston		Boraginaceae	Herb
<i>Ehretia cymosa</i> Thonn.	Ulaagaa	Boraginaceae	Shrub
<i>Eleusine floccifolia</i> Spreng.	Coqorsa	Poaceae	Grass
<i>Eleusine intermedia</i> (Chiov.) S.M. Phillips		Poaceae	Grass
<i>Eragrostis capitulifera</i> Chiov.	Lolloqaa	Poaceae	Grass
<i>Eragrostis olivacea</i> K.Schum.		Poaceae	Grass
<i>Erianthemum dregei</i> (Eckl. & Zeyh.) Tiegh.	Adda Kaarroo	Loranthaceae	Semi-parasite
<i>Eriosema nutans</i> Schinz		Fabaceae	Herb
<i>Erythrococca abyssinica</i> Pax	Hirqaqamuu	Euphorbiaceae	Shrub
<i>Euclea divinorum</i> Hiern	Mi'eessaa	Ebenaceae	Shrub/tree
<i>Euphorbia adjurana</i> Bally & Carter	Adaammaa	Euphorbiaceae	Tree
<i>Euphorbia crotonoides</i> Boiss.		Euphorbiaceae	Herb
<i>Euphorbia depauperata</i> A.Rich.		Euphorbiaceae	Herb
<i>Euphorbia inaequilatera</i> Sond.		Euphorbiaceae	Herb
<i>Euphorbia lophiosperma</i> S. Carter		Euphorbiaceae	Herb
<i>Euphorbia nubica</i> N.E. Br.		Euphorbiaceae	Shrub
<i>Euphorbia schimperiana</i> Scheele		Euphorbiaceae	Herb
<i>Euphorbia tirucalli</i> L.	Angayyaa	Euphorbiaceae	Shrub/tree
<i>Fagaropsis hildebrandtii</i> (Engl.) Milne-Redh.	Gaddaa	Rutaceae	Tree
<i>Faurea speciosa</i> Welw.	Daansee	Proteaceae	Tree
<i>Ficus thonningii</i> Blume	Danbii	Moraceae	Tree/shrub

Scientific name	Afaan Oromoo	Family	Habit
<i>Ficus vasta</i> Forssk.	Qilxaa	Moraceae	Tree
<i>Galium spurium</i> L.		Rubiaceae	Herb
<i>Gardenia ternifolia</i> K. Schum. & Thonn.	Gambella	Rubiaceae	Tree
<i>Gladiolus candidus</i> (Rendle) Goldblatt	Qorsa Bofaa	Iridaceae	Herb
<i>Gladiolus negeliensis</i> Goldblatt		Iridaceae	Herb
<i>Gloriosa superba</i> L.	Hoomaa	Colchicaceae	Climber
<i>Gnidia somalensis</i> (Franch.) Gilg.	Aarsaa	Thymelaeaceae	Herb/shrub
<i>Gnidia stenophylla</i> Gilg.	Aarsaa	Thymelaeaceae	Herb/shrub
<i>Gomphocarpus stenophyllus</i> Oliv.		Asclepiadaceae	Herb
<i>Gomphrena celosioides</i> Mart.		Amaranthaceae	Herb
<i>Grewia kakothmnos</i> K.Schum.	Dheekkaa/Xoqonuu	Tiliaceae	Shrub
<i>Grewia similis</i> K.Schum.	Bungaala	Tiliaceae	Shrub
<i>Grewia trichocarpa</i> Hochst. ex A.Rich.	Harooressa	Tiliaceae	Shrub/tree
<i>Grewia villosa</i> Willd.		Tiliaceae	Shrub
<i>Guizotia scabra</i> (Vis.) Chiov.		Asteraceae	Herb
<i>Haplocoelum foliolosum</i> (Hiern) Bullock	Canaa	Sapindaceae	Tree
<i>Harpachne schimperii</i> Hochst. ex A. Rich.		Poaceae	Grass
<i>Helichrysum gerebrifolium</i> (Sch.Bip.) A.Rich.	Hancabbii	Asteraceae	Herb
<i>Helichrysum glumaceum</i> DC.	Tambo Beeraa	Asteraceae	Herb
<i>Heteromorpha arborescens</i> (Spreng.) Cham. & Schldl.	Aliyaanquu	Apiaceae	Shrub
<i>Heteropogon contortus</i> (L.) Roem. & Scult.		Poaceae	Grass
<i>Hibiscus aponeurus</i> Sprague & Hutch.		Malvaceae	Herb
<i>Hibiscus crassinerius</i> A.Rich.		Malvaceae	Herb
<i>Hibiscus flavifolius</i> Ulbr.		Malvaceae	Herb
<i>Hibiscus fuscus</i> Garcke		Malvaceae	Herb
<i>Hibiscus vitifolius</i> L.		Malvaceae	Herb
<i>Hippocratea goetzei</i> Loes.		Celastraceae	Climber
<i>Hyparrhenia anamesia</i> W.D.Clayton		Poaceae	Grass
<i>Hyparrhenia hirta</i> (L.) Stapf	Luuccolee/Gaaguroo	Poaceae	Grass
<i>Hypericum annulatum</i> Moris		Clusiaceae	Herb
<i>Hypericum quartianum</i> A.Rich.		Clusiaceae	Shrub/tree
<i>Hypoestes aristata</i> (Vahl) Roem. & Schult.		Acanthaceae	Herb
<i>Hypoestes forskaolii</i> (Vahl) R.Br.		Acanthaceae	Herb
<i>Hypoxis angustifolia</i> Lam.	Qorsa Bofaa	Hypoxidaceae	Herb
<i>Hypoxis villosa</i> L.f.		Hypoxidaceae	Herb
<i>Indigofera amorphoides</i> Jaub. & Spach.		Fabaceae	Herb
<i>Indigofera arrecta</i> Hochst. ex A.Rich.		Fabaceae	Shrub/herb
<i>Indigofera brevicalyx</i> Bak.f.		Fabaceae	Herb
<i>Indigofera schimperii</i> Jaub. & Spach.	Agaggaroo Harree	Fabaceae	Herb
<i>Indigofera spicata</i> Forssk.		Fabaceae	Herb
<i>Indigofera stipulosa</i> Chiov.		Fabaceae	Herb
<i>Indigofera volkensii</i> Taub.		Fabaceae	Herb
<i>Ipomoea sinensis</i> (Desc.) Choisy	Obbee	Convolvulaceae	Climber
<i>Isoglossa somalensis</i> Lindau		Acanthaceae	Herb
<i>Jasminum abyssinicum</i> Hochst. ex DC.	Qalamii	Oleaceae	Climber
<i>Juniperus procera</i> Endl.	Hindheessa	Cupressaceae	Tree
<i>Justicia calyculata</i> Deflers		Acanthaceae	Herb
<i>Justicia diclipteroides</i> L. subsp. <i>megaensis</i> Hedren		Acanthaceae	Herb
<i>Justicia diclipteroides</i> Lindau subsp. <i>nierensis</i> (Mildbr.) Hedren		Acanthaceae	Herb
<i>Justicia flava</i> (Vahl) Vahl		Acanthaceae	Herb
<i>Justicia heterocarpa</i> T.Anders.		Acanthaceae	Herb
<i>Justicia striata</i> (Kl.) Bullock		Acanthaceae	Herb
<i>Kalanchoe citrina</i> Schweinf.	Bosoqqee	Crassulaceae	Herb
<i>Kalanchoe laciniata</i> (L.) DC.	Bosoqqee	Crassulaceae	Herb
<i>Kleinia grantii</i> (Oliv. & Hiern) Hook.f.		Asteraceae	Herb
<i>Kleinia odora</i> (Forssk.) DC.	Ol Gabbis	Asteraceae	Shrub
<i>Laggera alata</i> (D. Don) Sch.Bip. ex Oliv.		Asteraceae	Herb
<i>Lannea rivae</i> (Chiov.) Sacl.		Anacardiaceae	Shrub/tree
<i>Lannea schimperii</i> (A.Rich.) Engl.	Andaraka Baddaa	Anacardiaceae	Tree

Scientific name	Afaan Oromoo	Family	Habit
<i>Lannea schweinfurthii</i> (Engl.) Engl.		Anacardiaceae	Tree
<i>Lantana camara</i> L.	Midhaan Durbaa	Verbenaceae	Shrub
<i>Lantana viburnoides</i> (Forssk.) Vahl		Verbenaceae	Herb
<i>Launaea intybacea</i> (Jacq.) Beauv.	Quba Itti-dhayi	Asteraceae	Herb
<i>Ledebouria revoluta</i> (L.f.) Jessop		Hyacinthaceae	Herb
<i>Leucas abyssinica</i> (Benth.) Briq.		Lamiaceae	Herb
<i>Leucas martinicensis</i> (Jacq.) R.Br.		Lamiaceae	Herb
<i>Lobelia holstii</i> Engl.		Lobeliaceae	Herb
<i>Maerua triphylla</i> A. Rich.	Dhumasoo	Capparidaceae	Tree/shrub
<i>Maytenus arbutifolia</i> (A.Rich.) Wilczek	Fonkolcha	Celastraceae	Shrub/tree
<i>Maytenus buchananii</i> (Loes.) Wilczek		Celastraceae	Shrub/tree
<i>Maytenus senegalensis</i> (Lam.) Exell		Celastraceae	Shrub/tree
<i>Melhania beguinotii</i> Cuf.		Sterculiaceae	Herb
<i>Melhania zavattari</i> Cuf.	Ibidoo	Sterculiaceae	Herb
<i>Mimusops kummel</i> A.DC.	Qolaatii	Sapotaceae	Tree
<i>Momordica foetida</i> K.Schum.	Gaarmalee	Cucurbitaceae	Climber
<i>Monechma debile</i> (Forssk.) Nees		Acanthaceae	Herb
<i>Monsonia longipes</i> Knuth		Geraniaceae	Herb
<i>Myrsine africana</i> L.	Qacama	Myrsinaceae	Shrub
<i>Mystroxydon aethiopicum</i> (Thunb.) Loes.		Celastraceae	Shrub/tree
<i>Nicandra physaloides</i> (L.) Gartn.		Solanaceae	Herb
<i>Nuxia congesta</i> R.Br. ex Fresen.	Muka Daalacha	Loganiaceae	Tree/shrub
<i>Ocimum urticifolium</i> Roth	Urgoo Loonii	Lamiaceae	Herb
<i>Oldenlandia herbacea</i> (L.) Roxb.	Saattuu	Rubiaceae	Herb
<i>Olea capensis</i> L. subsp. <i>macrocarpa</i> (C.A. Wright) Verdc.	Gagamaa	Oleaceae	Tree
<i>Olea europaea</i> L. subsp. <i>cuspidata</i> (Wall. ex G. Don) Cif.	Ejersa	Oleaceae	Tree
<i>Olinia rochetiana</i> A. Juss.	Daaluu Darmii	Guddoo/Ejersa Oliniaceae	Tree
<i>Oncoba routledgei</i> Sprague	Fullaasa	Flacourtiaceae	Shrub/tree
<i>Oncocalyx glabratus</i> (Engl.) M. Gilbert		Loranthaceae	Semi-parasite
<i>Oncocalyx schimperi</i> (A. Rich.) M. Gilbert		Loranthaceae	Semi-parasite
<i>Opuntia ficus-indica</i> (L.) Miller	Gamboora	Cactaceae	Shrub/tree
<i>Ormocarpum trichocarpum</i> (Taub.) Engl.	Buutiyyee	Fabaceae	Shrub/tree
<i>Osyris quadripartita</i> Decne		Santalaceae	Shrub/tree
<i>Oxalis anthelmintica</i> A.Rich.	Xaaxayitoo	Oxalidaceae	Herb
<i>Oxalis corniculata</i> L.	Xaaxayitoo	Oxalidaceae	Herb
<i>Oxalis obliquifolia</i> A.Rich.		Oxalidaceae	Herb
<i>Oxygonum sinuatum</i> (Meisn.) Dammer	Mogorree	Polygonaceae	Herb
<i>Ozoroa insignis</i> Del.	Garrii	Anacardiaceae	Tree/shrub
<i>Pachycarpus petherickianus</i> (Oliv.) Goyder		Asclepiadaceae	Herb
<i>Panicum ruspolii</i> Chiov.		Poaceae	Grass
<i>Pappea capensis</i> Eckl. & Zeyh.	Biiqqaa	Sapindaceae	Tree
<i>Pavetta abyssinica</i> Fresen.	Korkorree	Rubiaceae	Shrub
<i>Pavetta oliveriana</i> Hiern		Rubiaceae	Shrub/tree
<i>Pavonia gallaensis</i> Ulbr.		Malvaceae	Shrub
<i>Pelargonium multibracteatum</i> Hochst. ex A.Rich.		Geraniaceae	Herb
<i>Pellaea calomelanos</i> (Schwartz) Link		Adiantaceae	Fern
<i>Pellaea doniana</i> Hook.		Adiantaceae	Fern
<i>Pellaea longipilosum</i> Bonap.		Adiantaceae	Fern
<i>Pellaea viridis</i> (Forssk.) Prantl		Adiantaceae	Fern
<i>Pennisetum setaceum</i> (Forssk.) Chiov.	Buuyoo/Halaloo	Poaceae	Grass
<i>Pentanisia auranogyne</i> S.Moore	Illamsa	Rubiaceae	Herb
<i>Pentas lanceolata</i> (Forssk.) Deflers	Gaadalla	Rubiaceae	Herb/shrub
<i>Peucedanum harmsianum</i> Wolff		Apiaceae	Herb
<i>Phoenix reclinata</i> Jacq.	Meexxii	Arecaceae	Tree
<i>Phyllanthus rotundifolius</i> Willd.		Euphorbiaceae	Herb
<i>Phyllanthus sepialis</i> Muell.Arg.	Dhirrii	Euphorbiaceae	Shrub
<i>Pimpinella schimperi</i> Abebe		Apiaceae	Herb
<i>Pistacia aethiopica</i> Kokwaro	Jirirsa	Anacardiaceae	Tree
<i>Pittosporum viridiflorum</i> Sims	Raawwaa	Pittosporaceae	Tree

Scientific name	Afaan Oromoo	Family	Habit
<i>Plectranthus xylopodum</i> Lukhoba & Paton	Barbaarressa	Lamiaceae	Herb
<i>Podocarpus falcatus</i> (Thunb.) Mirb.	Birbirs	Podocarpaceae	Tree
<i>Polygala sphenoptera</i> Fresen.		Polygalaceae	Herb
<i>Premna oligotricha</i> Engl.		Lamiaceae	Shrub
<i>Premna schimperi</i> Engl.		Lamiaceae	Shrub
<i>Protea gaguedi</i> J.F.Gmel.		Proteaceae	Shrub/tree
<i>Prunus africana</i> (Hook.f.) Kalkm.	Muka Gurraacha	Rosaceae	Tree
<i>Pseudarthria hookeri</i> Wight & Arn.		Fabaceae	Herb
<i>Pseudognaphalium oligandrum</i> (DC.) Hilliard & Burt		Asteraceae	Herb
<i>Psychotria kirkii</i> Hiern		Rubiaceae	Shrub
<i>Psydrax parviflora</i> (Afz.) Bridson		Rubiaceae	Shrub/tree
<i>Psydrax schimperiana</i> (A.Rich.) Bridson	Gaallee	Rubiaceae	Shrub/tree
<i>Pterolobium stellatum</i> (Forssk.) Brenan	Qajimaa	Fabaceae	Climber
<i>Pyrostria phyllanthoides</i> (Baill.) Bridson		Rubiaceae	Shrub/tree
<i>Rhoicissus tridentata</i> (L.f.) Wild & Drummond	Hoobane/Xaruu	Vitaceae	Climber/shrub
<i>Rhus natalensis</i> Krauss	Daboobessa Baddaa	Anacardiaceae	Shrub/(tree)
<i>Rhus ruspolii</i> Engl.		Anacardiaceae	Shrub/(tree)
<i>Rhus tenuinervis</i> Engl.		Anacardiaceae	Shrub
<i>Rhus vulgaris</i> Meikle		Anacardiaceae	Shrub/(tree)
<i>Rhynchosia densiflora</i> (Roth) DC.		Fabaceae	Climber
<i>Rhynchosia malacophylla</i> (Spreng.) Boj.		Fabaceae	Climber
<i>Ricinus communis</i> L.	Qobboo	Euphorbiaceae	Tree like herb
<i>Rosa abyssinica</i> Lindley		Rosaceae	Climber/shrub
<i>Ruellia prostrata</i> Poir.	Gaalee	Acanthaceae	Herb
<i>Ruttia fruticosa</i> Lindau	Xuuxiyee	Acanthaceae	Shrub
<i>Scadoxus multiflorus</i> L.	Abraasaa	Amaryllidaceae	Herb
<i>Schrebera alata</i> (Hochst.) Welw.	Dhamee	Oleaceae	Tree/shrub
<i>Scolopia theifolia</i> Gilg	Muka Diimaa	Flacourtiaceae	Tree
<i>Scolopia zeyheri</i> (Nees) Harv.		Flacourtiaceae	Tree
<i>Senna petersiana</i> (Bolle) Lock		Fabaceae	Shrub/tree
<i>Sesbania sesban</i> (L.) Merr.	Arxumme	Fabaceae	Shrub/tree
<i>Setaria trinervia</i> Stapf & C.E. Hubb.		Poaceae	Grass
<i>Sida ovata</i> Forssk.		Malvaceae	Herb/shrub
<i>Sida schimperiana</i> A.Rich.		Malvaceae	Shrub
<i>Sideroxylon mascatense</i> (A.DC.) Penn.	Maxaaxee	Sapotaceae	Shrub/tree
<i>Solanum denekense</i> Dammer		Solanaceae	Shrub
<i>Solanum incanum</i> L.	Iddii Loonii	Solanaceae	Shrub
<i>Solanum lanzae</i> Lebrun & Stork		Solanaceae	Shrub
<i>Solanum nigrum</i> L.	Hadhaawaa	Solanaceae	Herb
<i>Spermacoce pusilla</i> Wall.		Rubiaceae	Herb
<i>Spermacoce senensis</i> Klotsch		Rubiaceae	Herb
<i>Sporobolus panicoides</i> A.Rich.		Poaceae	Grass
<i>Sporobolus pellucidus</i> Hochst.		Poaceae	Grass
<i>Sporobolus piliferus</i> (Trin.) Kunth		Poaceae	Grass
<i>Sporobolus discosporus</i> Nees		Poaceae	Grass
<i>Stachys argillicola</i> Sebsebe		Lamiaceae	Herb
<i>Steganotaenia araliacea</i> Hochst. Ex A.Rich.	Luqaanluqqee	Apiaceae	Tree
<i>Striga gesnerioides</i> (Willd.) Vatke		Scrophulariaceae	Herb
<i>Struthiola thomsonii</i> Oliv.		Thymelaeaceae	Shrub
<i>Strychnos mitis</i> S.Moore		Loganiaceae	Tree
<i>Tagetes minuta</i> L.	Sunkii	Asteraceae	Herb
<i>Talinum caffrum</i> (Thunb.) Eckl. & Zeyh.		Portulacaceae	Herb
<i>Tapinanthus heteromorpha</i> (A.Rich.) Dammer	Qincoo	Loranthaceae	Semi-parasite
<i>Tarchonanthus camphoratus</i> L.	Adaaddoo	Asteraceae	Shrub
<i>Tarenna graveolens</i> (S.Moore) Bremek.		Rubiaceae	Shrub/tree
<i>Teclea simplicifolia</i> (Engl.) Verdoorn	Hadheessa	Rutaceae	Shrub/tree
<i>Tephrosia emeroides</i> A.Rich.		Fabaceae	Herb
<i>Tephrosia hildebrandtii</i> Vatke		Fabaceae	Herb
<i>Tephrosia holstii</i> Taub.		Fabaceae	Herb
<i>Tephrosia interrupta</i> Hochst. & Steud. ex Engl.		Fabaceae	Shrub/herb

Scientific name	Afaan Oromoo	Family	Habit
<i>Terminalia brownii</i> Fresen.	Birreessa	Combretaceae	Tree
<i>Themeda triandra</i> Forssk.		Poaceae	Grass
<i>Thunbergia mauginii</i> Chiov.		Acanthaceae	Climber
<i>Tinnea somalensis</i> Gurke		Lamiaceae	Shrub
<i>Tragia brevipes</i> Pax.	Doobboo	Euphorbiaceae	Climber
<i>Triumfetta flavescens</i> Hochst.	Gurbii Hoolaa	Tiliaceae	Herb
<i>Trimeria grandifolia</i> (Hochst.) Warb.		Flacourtiaceae	Tree
<i>Vangueria apiculata</i> K.Schum.		Rubiaceae	Shrub/tree
<i>Vangueria madagascariensis</i> Gmel.		Rubiaceae	Shrub/tree
<i>Vangueria volkensii</i> K.Schum.		Rubiaceae	Shrub/tree
<i>Verbascum sinaiticum</i> Benth.	Gurra Harree	Scrophulariaceae	Herb
<i>Vernonia lasiopus</i> O. Hoffm.		Asteraceae	Shrub
<i>Vernonia popeana</i> C. Jeffery		Asteraceae	Herb
<i>Vigna membranacea</i> A.Rich.	Dirroo	Fabaceae	Climber
<i>Viscum tuberculatum</i> A. Rich.		Viscaceae	Semi-parasite
<i>Withania somnifera</i> (L.) Dunal	Iddii Xirooftuu	Solanaceae	Herb
<i>Xysmalobium heudelotianum</i> Decne		Asclepiadaceae	Herb
<i>Zanthoxylum usambarense</i> (Engl.)Kokwaro	Gaddaa	Rutaceae	Tree
<i>Ziziphus spina-christi</i> (L.) Desf.	Qurquraa	Rhamnaceae	Shrub/tree
<i>Zornia apiculata</i> Milne-Redh.	Mar'imaan	Fabaceae	Herb

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