BIOCULTURAL SIGNIFICANCE OF PLANT DIVERSITY IN THE AFADJATO COMMUNITY FOREST CONSERVATION AREA

THIS THESIS IS SUBMITTED BY

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DECLARATION

I, the undersigned, Dogor Gilchrist Faith Kwaku., author of this thesis, do hereby declare that the work presented in this thesis "BIOCULTURAL SIGNIFICANCE OF PLANT DIVERSITY IN THE AFADJATO COMMUNITY FOREST CONSERVATION AREA" was done entirely by me under the supervision of Prof. Alfred Oteng – Yeboah of the Botany Department, University of Ghana, Legon, from August, 2010 to July, 2012. This work has never been presented, either in part or in whole, for any degree of this University or elsewhere.

……

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DEDICATION

This work is first and foremost dedicated to Almighty God. 'But by the grace of God I am what I am, and His grace toward me was not in vain' (1 Corinthians 15: 10).

Secondly to my parents, Silvanus and Christiana Dogor.

Thirdly, to my brothers, Emmanuel, Hopeson, Michael, Francis, Seth, and Isaac.

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Abstract

The study was undertaken in the Afadjato Community Forest Conservation Area between August 2010 and June 2011 with the following objectives:

1. To document and analyse the diversity of plants in the Afadjato Community Forest Conservation Area.
2. To undertake a quantitative ethnobotanical study of traditional knowledge and plant use among local people living in the study area.
3. To explore the relationship between plant diversity and use; and
4. To determine the conservation and ecotourism implications of the study on the future of Afadjato as a conservation and ecotourism site.

The ethnobotanical information was collected through semi-structured questionnaire interviews administered to 133 informants (age range 40-80 years, mean age of 55 years). The interviews were conducted in the informant's homes thereby covering a total of 28 households out of the 159 households in the three communities studied. The questionnaire sought for information on age and gender of the respondents, which plant parts are harvested and used, where they are collected, and cultivation status of the plants. This data was analysed using the following parameters: Informant Consensus Factor (F_{ic}), Use-Value (UV), and Fidelity Level (FL) of the species.

Sampling points of 100 m apart from the bottom of the hill to the summit were established along three transects. At each point, plots measuring 25m x 25m, 5m x 5m, and 1m x 1m were demarcated giving 96 plots in all. Trees with Girth at Breast Height (GBH≥10cm) were identified, counted and heights determined in

the 25m x 25m plots. Shrubs with (GBH≥3cm) were recorded in the 5m x 5m plots, and herbs were recorded on the 1m x 1m plots. The data obtained was analysed using the following parameters: Density, Relative density, Frequency, and Relative frequency. Species diversity was expressed as Shannon diversity index and Shannon diversity index.

A total of 166 plant species belonging to 53 families were identified as mostly used by the people in the following use-categories: Building (25.2%), Human food (23.3%), Household items (19.9%), Fuelwood (15.8%), and Medicine (15.8%). The plant families Fabaceae, Apocynaceae and Euphorbiaceae provided most of the plant parts used by the communities around the study site. Trees were the most widely used group. The stem was the plant part mostly used by the people. The F_{ic} values of the present study ranged from (0.52-0.68) indicating that there was a high agreement in the use of plants in all the use-categories under consideration among users. Out of the 169 reported plants species, 99 of them had the highest fidelity level (FL) of 100%. The most important species according to their use-values was *Khaya* species (0.86).

A total of 269 species (trees 100, shrubs 96, and herbs 73) were present in a total of 96 plots **(**25m x 25m (30), 5m x 5m (33), and 1m x 1m (33)**)** established along 3 transects. The Fabaceae family had the most represented species in the trees, shrubs and the herbs. The mean stand density of all the species present in the study site was 3.38 ±0.09.

The Shannon diversity was lower in the herbs (0.81) than the shrubs (0.86) but decreased again in the trees (0.81). In a similar vein the Simpson's diversity for the herbs, shrubs, and trees was (-0.05), (3.48), and (1.06) respectively inferring

that the study site has relatively high plant species diversity. There was a decrease in diversity of herbs, shrubs and trees with altitude in all the three transects. This trend was also seen in the westwards to eastwards direction. Herbaceous species that occurred in all the 3 transects include: *Griffonia simplicifolia, Phaulopsis parviflora* and *Smilax longiflora*. Shrubs that occurred in all the 3 transects include: *Byrsocarpus coccineus, Chromolaena odorata, Lophira lanceolata, Mallotus oppositifolia, Olax subcorpioides, Pterocarpus malbraedii, Sterculia tragacantha* and *Carpolobia lutea*. It was observed that 65 tree species were relatively small and had a Girth at Breast Height of between 10cm-70cm. They included: *Albizia sp, Argocoffeopsis rupestris, Securidaca longiflorum*, and *Sterculia sp*. The range of tree species count per 25m x 25m plot was from 6 to 16 and the mean tree height recorded in this study was 19.12m. Twenty-two tree species occurred in all the 3 transects studied and included: *Albizia spp, Baphia pubescens, Bridelia ferruginea, Cola spp, Crossopterix febrifuga, Dacleodes kleineana* and *Dialium guineense* among others.

It is suggested that the plant families Fabaceae, Apocynacece and Euphorbiaceae should be closely monitored to guarantee their sustainable use in the light of their intense utilization by the people of the study area. This monitoring exercise can provide insights for the development of policies and practice that may help to prevent comparable levels of forest loss and degradation elsewhere in the country through unsustainable use.

CHAPTER ONE

1.0 Introduction and Literature Review

1.1 Introduction

The forests of West and Central Africa probably originally covered a combined area of about 3 million km^2 (Ellis & Ramankutty, 2008). However, the area relatively undisturbed and genuinely represnting wild forest is small. The remaining forest areas have been used for a range of ecosystem services such as provision of food, herbs for medicine, timber, fibre and fuel for a human population in excess of 200 million individuals. In fact, the whole of the West African forests particularly those in Ghana, are intimately linked with the lives and livelihoods of the local people (Tallis & Kareiva, 2006). This inevitably means that forest biodiversity is a popular and cheaper resource for the people and must never come under threat from forest loss, degradation and fragmentation. The local communities must never be deprived of their livelihoods.

Biodiversity regions, particularly forests and landscape conservation sites in Ghana are little understood in terms of their use by the local people (Ekpe, 2002). Understanding how biodiversity responds to use by humans is clearly pivotal for conservation efforts in Ghana. Unfortunately, limited scientific work has been conducted on biodiversity in human-modified forest landscapes in Ghana (Ekpe, 2002). Ghana Government in conjunction with Non - Governmental Organizations are making conscious efforts to support Community Based

Conservation Areas by enacting byelaws on the use of resources in these areas, but beside these, little work has been done to address the traditional environmental knowledge particularly knowledge about plant use and how this plant use affects their diversity in the landscape.

The Afadjato landscape features prominently as an important tourist site primarily for its unique topography, cool climate and as the highest mountain in Ghana.

The Afadjato landscape as a conservation area was identified and established in 1998 to check the degradation which was mainly through farm encroachments in the protected area, unsustainable felling and hauling of trees, wildfires and other human disturbances such as infrastructural development, unsustainable harvesting of economic/medicinal species especially in commercial quantities, unsustainable fuelwood collection and charcoal making in the area posing a serious threat to the ecological functions, socio-economic and cultural values of the forest. There is a dearth of information on how this degradation activity has affected and/or is affecting the conservation area so as to benefit from useful conservation and eco-tourism advice. It is within this context that the study was undertaken. The study site which is the Afadjato Community Forest Conservation Area in the Hohoe municipality of the Volta Region is considered a "Priority" area for plant conservation. It is hoped that the study will provide crucial information for the promotion of sound management policy that is aimed both at nature conservation and at improving the livelihood of the local communities within the conservation area and other national parks and forest reserves elsewhere. Specific research

question of the present study are: (1)Which plants are utilized by the community?, (2)Which plant parts are used and for what purpose?, (3)Where are the plants collected from?, (4) Which use-categories are most important?, (5) Which species should have conservation priority?, (6)What is their (ie. the species) relative importance for the local communities based on use-value index?, (7) How do factors such as species density in the site affect plant use?.

1.2 History of the Communities That Constitute the Study Area

The communities that inhabit the Afadjato area are the Gbledi people. They are of the Ewe tribe and are believed to have come from Notsie in the then Togo (now the Republic of Togo). This migration was as a result of a Great Exodus of Ewes from Notsie during the rule of a cruel king called 'King Agorkoli in the 18th Century (Dorm-Adzobou, 1999). During this migration, the Gbledi people moved along with Dawurotu (made up of Kpele Tutu and Akata people) who are still part of the Republic of Togo and Nkonya and Sabi Gabi people who are presently in Ghana.

During their stay at Horlporme, their leader Togbe Vorxnu sent a delegation to their previous settlement at Akata and Kpele Tutu to retrieve his wife's belongings. While waiting for the delegation, Nkonya and Sabi Gabi people moved further westwards under the leadership of family heads leaving the chief and the rest behind. When the messengers came back to enquire about the rest of the people, the chief replied "wogblemidi", meaning "they have left us behind".

Togbe Vorxnu, the messengers and the people who were left behind became known as the Gbledi people who have settled presently at the base of the Afadjato. According to Togbe Adabra VI, one of the chiefs of the area, the mountain resembles a yam mound and hence was named after a very popular yam cultivated in the area called "water yam' (Afadze). The mountain was therefore called "Avadzeto" meaning yam Mound Mountain. This name, however, has been corrupted and has now become known as Afadjato.

1.3 Vegetation of the Study Area

The vegetation cover of the mountain is dry semi-deciduous forest (Hall & Swaine, 1981) surrounded by savanna and savanna woodland (Ghana Wildlife Society, 1998). Dry semi-deciduous forest occupies the western slopes and the eastern slope which is very steep and rocky is dominated by savanna, tree steppe and grasses. The presence of several scattered, remnants of semi-deciduous forest tree species such as *Lecaniodiscus cupanoides, Morus mesozygia, Baphia pubescens, Antiaris toxicaria, Monodora myristica* and *Cola mellinii* is an indication that the area once supported moist semi-deciduous (rain) forest. However, this change of the area from moist semi-deciduous forest to dry semi-deciduous forest has been attributed to anthropogenic disturbances (farming, logging, burning etc) (Hall & Swaine, 1981).

The forest generally is characterized by multi-layered structure. Grasses found in the understorey of the eastern slope includes *Smilax kraussiana, Olyra latifolia,*

Justicia flava, Pavetta corymbosa, Panicum phragmitoides, Thaumatococcus danielii, Leptaspis cochleata, Cyatula prostrata, Oplismenus boomenii, Setaria gayanus and *Phaulopsis parviflora*. Along the upper slopes of the mountain, closed canopy forest persists until within 20m of the crest. The forest vegetation is then quickly replaced by savanna and scrub towards the summit (G W S, 1998).

1.4 Geology and Soils

Two major geological features are identified: the folded Precambrian rocks in the southern part and the west and eastern margin which stretched from the south-west to north-east and the level-bedded late Precambrian to early Paleozoic (Voltarian) rocks of the northern center, which lie on the Precambrian basement. Smaller areas of more recent sediments cover the extreme south-east and south-west corners (Hall & Swaine, 1981). The Dahomeyan rocks are also found from the basement of the mountain up to 400 m high (Ghana Geological Services Department, 1999).

The landscape developed from Buem-Togo rocks consists of steep-sided ridges ranging in altitude from 300 m in the south of the hill to 800 m in the north, dominated by quartzite's and sandstones, alternating with narrow valleys cut in the softer shales. The hill-slopes and small valleys on the ranges to the east of the Volta Lake bear Dry Semi-deciduous forest; the broader valley is usually covered by savanna.

The soil consists of shallow brushy loamy sand to sandy loams on the steeper slopes. On the flanks and the summit are orange brown, silty clays with very few brash, pale yellowish brown shallow and brushy sandy loams to sandy clays on the upper to middle slopes, Pale-yellowish brown silty clay loams on the lower slopes and deep yellowish grey silty clay loams to silty clays on the valley bottoms (Ghana Geological Services Department, 1999).

1.5 Climate

The climate is typically of the dry semi-deciduous type interspersed with the moist semi-deciduous type which is characterized by a single-peak of rainfall between April and October with the months of June, September and October having higher precipitations. The annual rainfall of the area ranges between 1650 mm to 1750 mm (Hohoe District Meteorological Services Department, 2000).The prevailing winds is north-south in direction. The average relative humidity is 90%.

Temperature variations are rather slightly high; the mean monthly maximum in the hottest month (Feb-March) is 29^{o}C - 31^{o}C and the mean monthly minimum in the coldest month (Dec-Jan) is 19^{o}C - 23^{o}C. The mean temperature on the summit of the mountain may be 3-5^{0}C lower than those of the surrounding villages and communities. (Hohoe District Meteorological Services Department, 2000).

1.6 Literature Review

It is important to undertake both qualitative and quantitative analyses in the study of ethnobotanical knowledge and attempt to apply the findings of the results to the management and conservation of natural resources (Hanazaki *et al.*, 2000; Diegues & Arruda, 2001; Fonseca-Kruel & Peixoto, 2004). There has also been an increase in the number of reports on the use of plants in recent years (Savithramma *et al.*, 2007; Pattanaik *et al.*, 2008; Kosalge & Fursule, 2009; Namsa *et al.*, 2009; Upadhyay *et al.*, 2010).

The reports from previous studies on use and knowledge of plants indicate that knowledge about local plants is concentrated in the older people signifying that this knowledge is diluted among younger people, probably due to greater influence of external information on this section of the population (Lima *et al.*, 2000; Galeano, 2000; Hanazaki *et al.*, 2000). Galeano (2000) noted that the knowledge of the Afro-American community surveyed had a significant risk of disappearing as their life-styles have been changing over the years, principally among the young people who do not show much interest in the forest nor agricultural activities. Others who have studied the use and knowledge of plants by people in a community and for which there is a body of knowledge included Begossi *et al.*, (1993) in Buzios Island of Brazil; Phillips & Gentry (1993) in Tambopata of Peru; Rossato *et al.*, (1999) in Atlantic Forest Coast of Espirito Santo State, Brazil; Zschocke *et al.*, (2000) in Papua New Guinea; França (2001) in São Carlos; Almeida (2003) in Salvador.

In Ghana, notable ethnobotanical studies have been done by; Adu –Tutu *et al* (1979); Annan (1980); Darko (1981); Addey (1982); Asamoah (1985); Abbiw (1989); Yidana (1994); and Wallace-Bruce (1995).

These studies showed that strong anthropogenic pressure on the ecosystem have led to the loss of extensive forest areas, as well as to the loss of cultural traditions in the communities inhabiting those areas who must depend on the local natural resources for their livelyhood. It was however, accepted that studies concerning management of forest resources in the communities are important implementing strategies for socio-biodiversity conservation. Studies on habit and plant parts used in a community found that frequent use of a particular habit of plant (Tree, Shrubs, Herbs etc.) is the result of the abundance and more knowledge on the use of that habit of plant in their environment (Tabuti *et al.*, 2003). Other works have also reported on the usefulness of trees and shrubs over the herbaceous plants, lianas and climbers (Berlin, 1992; Moerman, 1994; Pardo-de-Santayana *et al.*, 2006). Also the most frequent plant parts cited as useful in a study can be influenced by the type of use-category under study (Ayyanar & Ignacimithu, 2005; Uniyal *et al.*, 2006; Ragupathy *et al.*, 2008; Giday *et al.*, 2010).

Studies on the most commonly used species (use-value) by Irulas tribal families in Thanjavur district of Tamil Nadu, India, found that the most commonly used species in the community is the one that has the highest use-reports cited by the highest number of informants in many use-categories. In other words, a plant with highest use-value means that it has many uses and is recognized by all the

informants as such (Ignacimithu *et al.*, 2008; Ragupathy & Newmaster, 2009; Upadhyay *et al.*, 2010). Elsewhere, Albuquerque *et al.*, (2006) observed that widely used plants in the community are the ones most cited by the informants. This observation came from various transect studies conducted on forests at different elevations, and by identifying the most important plant families in the surveyed forest as well as detecting changes in the family composition of plants between different elevations and geographical positions. Other studies worth discussing include the structure and floristic composition studies of plant diversity in dry semi-deciduous forests of Mount Kinabalu in Borneo by Kitayama, (1992); Aiba & Kinayama, (1999); and Aiba *et al.*, (2005). In Lore Lindu National Park, Central Sulawesi by Kessler *et al.*, (2005). In Papua New Guinea Forest by Wright *et al.*, (1997). In the Forest of Eastern Ghats, India by Reddy *et al.*, (2008), and the Phytosociological Study of Tropical Dry Deciduous Forest of Boudh District, India by Sahu *et al.*, (2007).

Studies in Amazon forest by Ellis & Ramankutty (2008) found that the forest is intimately linked with the lives and livelihoods of local people, providing food, fuel, fibre and a range of ecosystem services for a population of 20 million. Elsewhere, an assessment was conducted on how biodiversity might fit into an increasingly multi-functional view of human-modified landscapes (Naidoo *et al.*, 2006; Kareiva *et al.*, 2007; Norris, 2008).

Species diversity in the tropics varies from place to place. Compared to other tropical forest types, dry semi deciduous forests are among the most exploited and

endangered ecosystems of the biosphere (Murphy & Lugo, 1986; Jansen, 1988; Gentry, 1992).

Among the factors responsible for species composition, dispersion, and diversity along disturbance gradient in a dry semi-deciduous forest regime include: (1) Anthropogenic activities and edaphic factors (Ehrlich & Wilson, 1991; Bahuguna, 1999; Bhat *et al.*, 2000). (2) Environmental factors e.g. rainfall, climate, temperature, sunlight, and wind intensity (Linder, 1991; Sheil, 1999). (3) Habitat destruction, excessive extraction of economic/medicinal species, pollution, species introduction and other human recurrent interventions (Pandey & Shukla, 1999; UNDP, 2001). (4) Destruction by lopping, burning, overgrazing and for cultivation (Jha & Singh, 1990). (5) Ecological requirements of these species, altitude and geographical positions (Aiba & Kitayama, 1999; Pandey & Shukla, 1999; Bhat *et al.*, 2000). (6) Increasing rocky and steep nature of the landscape (Sundarapandia & Swamy, 1997). And (7) Shading effect of the trees over the shrubs and the herbs (Cody, 1986; Linder, 1991; Bhat *et al.*, 2000).

The disturbance created by these factors determines forest dynamics and tree diversity at the local and regional scales (Sumina, 1994; Burslem & Whitmore, 1999; Hubbel *et al.*, 1999.

The Afadjato Community Forest Conservation Area is a dry semi-deciduous forest. This study which involves aspects of species diversity which are influenced by factors that control species composition, dispersion and diversity,

the focus on the community's use categories of the resources and field observation has been found to be very significant.

1.7 *Objective of the study*

The objective of the study is to document plant diversity and use by the people of Afadjato Community Forest Conservation Area in order to provide some recommendations on the sustainable use of plant resources and promote sustainable ecotourism.

The Specific Objectives are:

1. To document and analyse the diversity of plants in the Afadjato Community Forest Conservation Area.
2. To undertake a quantitative ethnobotanical study of traditional knowledge and plant use among local people living in the study area.
3. To explore the relationship between plant diversity and use; and
4. To determine the conservation and ecotourism implications of the study on the future of Afadjato as a conservation and ecotourism site.

Chapter Two

2.0 Materials and methods

2.1 Study Area

The study area is the Afadjato (Fig 1.2) which is located in the Hohoe district (Fig 1.1b) of Ghana (Fig 1.1a). It is the highest mountain in Ghana with the highest peak measuring 885 m above sea level (Ghana Geological Services Department, 1999). It lies within longitude $0^{o}15'$E and 0^{o} 45'E and latitude 6^{o} 45'N and 7^{o} 15' N. The Hohoe district is bordered on the east by the Republic of Togo, on the west by Kpando district, on the north-west by Jasikan District and on the south by Ho District. The communities that formed the focus of the study are located at the foot of the mountain and they included: Gbledi, Chebi and Dzigbordi (Fig 1.1b). These three communities which constitute Gbledi Traditional Area occupy an area of ca.1172 km^2. Recently, they have begun promoting the surrounding natural features of the mountain including biodiversity to develop the tourism sector. The mountain, however, remains at risk due to the pressures from farming, logging and bush burning. In 1998, the Gbledi Traditional Area and the Ghana Wildlife Society (GWS) established the Afadjato Community Forest Conservation Area, which became Ghana's first community-based reserve managed solely by the local people (GWS, 1998).

Seven families from these three communities provided 12 km^2 of land to the Ghana Wildlife Society to establish the Afadjato Community Forest Conservation Area, with the hope of protecting their forest and wildlife, increasing tourism

potential, and generating income (and on record these families now receive 50% of tourism revenues).

The Ghana Government and the Government of the Netherlands provided funds towards the establishment of this project.

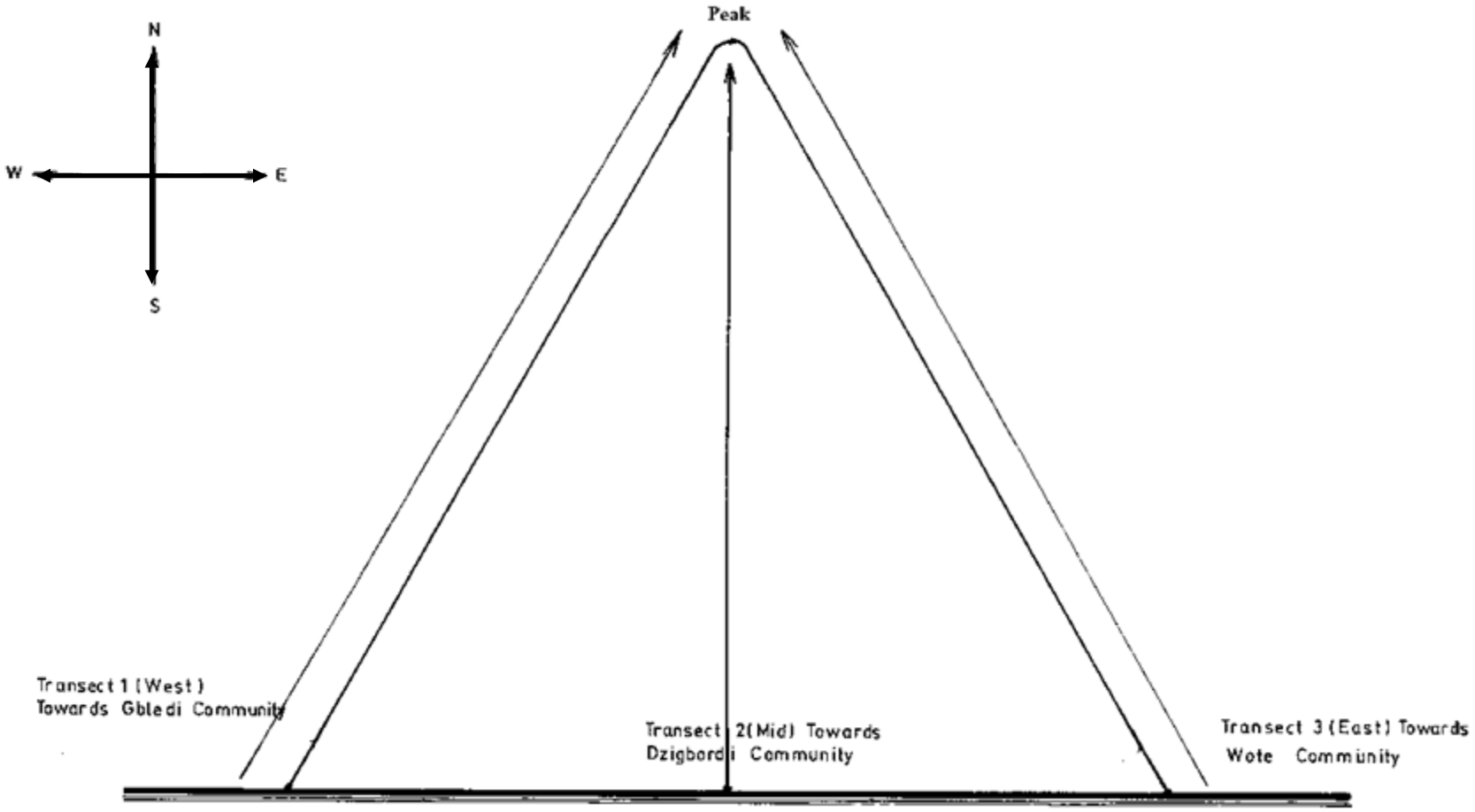

Fig 1.3: A Sketch of the line transect from the bottom to the peak of the mountain

2.2 Methods

2.2.1 Ethnobotanical Study

Ethnobotanical study was undertaken between August 2010 and March 2011 to document the knowledge of plants that were found and used in the Afadjato community Forest Conservation Area.

Information was obtained through semi-structured, questionnaire (see appendix) (Viertler, 2002) administered to 90 people (within the age range of 40-80 years with the mean age of 55 years).The questionnaire were administered in the informant's homes thereby covering a total of 28 households out of 159 households in the three communities studied. The questionnaire sought information about age and gender of respondents, which plant parts are harvested and used, where they are collected, and cultivation status of the plants.

There were both individual interviews and group interviews. Key informants (2 from each community) selected by the community members themselves (on the basis that they have a sound traditional knowledge of useful wild plants of the area) at my first meeting with them were interviewed in their homes.

Special groups of people (mainly 8-charcoal producers, 8-local building contractors,8-people who produce household items for sale,10-foodstuff sellers etc.) were chosen from the three communities by indications of the community members themselves in a meeting in which the study proposal was presented. These people were interviewed on separate days at Gbledi (the traditional capital town) to determine information about plant

materials used in the various use-categories and from which sources they came. Thus bringing the total number of people interviewed for this study to 133. The local names of the plants were established by collecting samples of the plants and showing them to the informants who could confirm their identification and their mode of use. Three local specialists (one from each community) were chosen to participate in the plot inventory. These people also provided local names of the plants identified in the inventory studies as recommended by Martin (1995). The scientific names of the plants were determined by comparing with literature (Hawthorne & Gyakari, 2006) and this was supported by the technician during the plot inventory study. The choice of use-categories was modified from Galeano (2000).

The ethnobotanical data collected was analyzed using the following parameters:

2.2.2 Informant Consensus Factor (F_{ic})

The informant consensus factor (F_{ic}) was used to see if there was agreement in the use of plants in the various use-categories between the plant users in the study area. The F_{ic} was calculated using the following formula (Heinrich *et al.*, 1998):

$$F_{ic} = \frac{Nur - Nt}{Nur - 1}$$

Where N_{ur} refers to the number of use-reports for a particular use-category and N_t refers to the number of taxa used for a particular use-category by all informants. The product of this factor ranges from 0 to 1. A high value (close to 1.0) indicates that relatively few

taxa are used by a large proportion of the informants. A low value indicates that the informants disagree on the taxa to be used within the category of use.

2.2.3 Use Value (UV)

The relative importance of each plant species known locally to be used for Food, Fuelwood, Building, Medicine, or for making Household items is reported as use value (UV) and it was calculated using the following formula (Phillips *et al.*, 1994):

$$UV = \frac{\sum U}{n}$$

Where UV is the use value of the species, U is the number of use-reports cited by each informant for a given plant species and n is the total number of informants interviewed for a given plant. The UV is helpful in determining the plants with the highest use (the most frequently indicated).UVs are high when there are many use-reports for a plant and low when there are few reports related to its use.

2.2.4 Fidelity

To determine the most frequently used plant species for a particular use-category by the informants of the study area, fidelity level (FL) was calculated. The FL was calculated using the following formula (Friedmen *et al.*, 1986):

$$FL\ (\%) = \frac{Np}{N} \times 100$$

Where N_p is the number of use-reports cited for a given plant species for a particular use-category and N is the total number of use-reports cited for any given species. Generally, high FLs are obtained for plants for which almost all use-reports refer to the same way of using it, whereas low FLs are obtained for plants that are used for many different purposes (Srithi *et al*., 2009).

2.2.5 Plot inventory

A floristic inventory was undertaken at the Afadjato Community Forest Conservation Area between December 2010 and April 2011 to provide the basis of determining a detailed analysis of plant biodiversity patterns and the impact of local people on collecting useful plants at the study site for discussions about conservation priorities.

Sampling points of 100 meters apart from the bottom of the hill to the summit were established along three transects. At each point, plots measuring 25m x 25m, 5m x 5m and 1m x 1m were demarcated. In all, a total of thirty 25m x 25m plots, thirty three 5m x 5m plots and thirty three 1m x 1m plots were studied. In the 25m x 25m plots, trees with GBH ≥10cm were identified, counted and heights determined. In the 5m x 5m plots, shrubs with GBH ≥ 3cm were recorded, and in the 1m x 1m plots, herbs and lianas were identified. The GBH measurements were done using the surveyors tape whiles the altitude and geographical positions of the plots was also determined using Global Positioning System (Garmin GPS 12).

The density and frequency of the species occurring at the study site were calculated using the formulae:

$$\text{Density} = \frac{Number\ of\ individual\ species}{Area\ Sampled}$$

$$\text{Relative density} = \frac{Number\ of\ trees\ of\ species}{total\ number\ of\ trees\ of\ all\ species} \text{ x } 100$$

$$\text{Frequency} = \frac{Number\ of\ plots\ in\ which\ the\ species\ occurred}{Total\ number\ of\ plots\ sampled}$$

$$\text{Relative frequency} = \frac{Numder\ of\ time\ species\ occurs}{total\ number\ of\ species} \text{ x } 100$$

Analysis of variance (ANOVA) was used to compare plant diversity along transects and altitudes. The species diversity expressed as the Shannon diversity index H′ (Magurran 1988) and Simpsons Diversity index (Begossi *et al.*, 2002) were calculated to evaluate the level of diversity of plant species at the study site and compare it with other plant diversity studies.

CHAPTER THREE

3.0 RESULTS

3.1.0: Ethnobotanical Study

This ethnobotanical study shows the inter-relationships between plants and people around the study area in the area of ecological, cultural and botanical dimensions, and is designed to analyze the relative importance of plants to the people by elaborating on the informant consensus factor, use-value, and fidelity levels of these plants. This will provide a basis of helping to preserve the environment and also help to reintegrate humans and their cultural diversity.

3.1.1: Socioeconomic Background of Respondents and Traditional Knowledge

The respondents in the survey from Dzigbordi comprised of 5 males and 6 females, from Chebi were 30 males and 29 females while those from Gbledi were made of 29 males and 34 females. The age distribution of these respondents is presented in Fig 3.1.

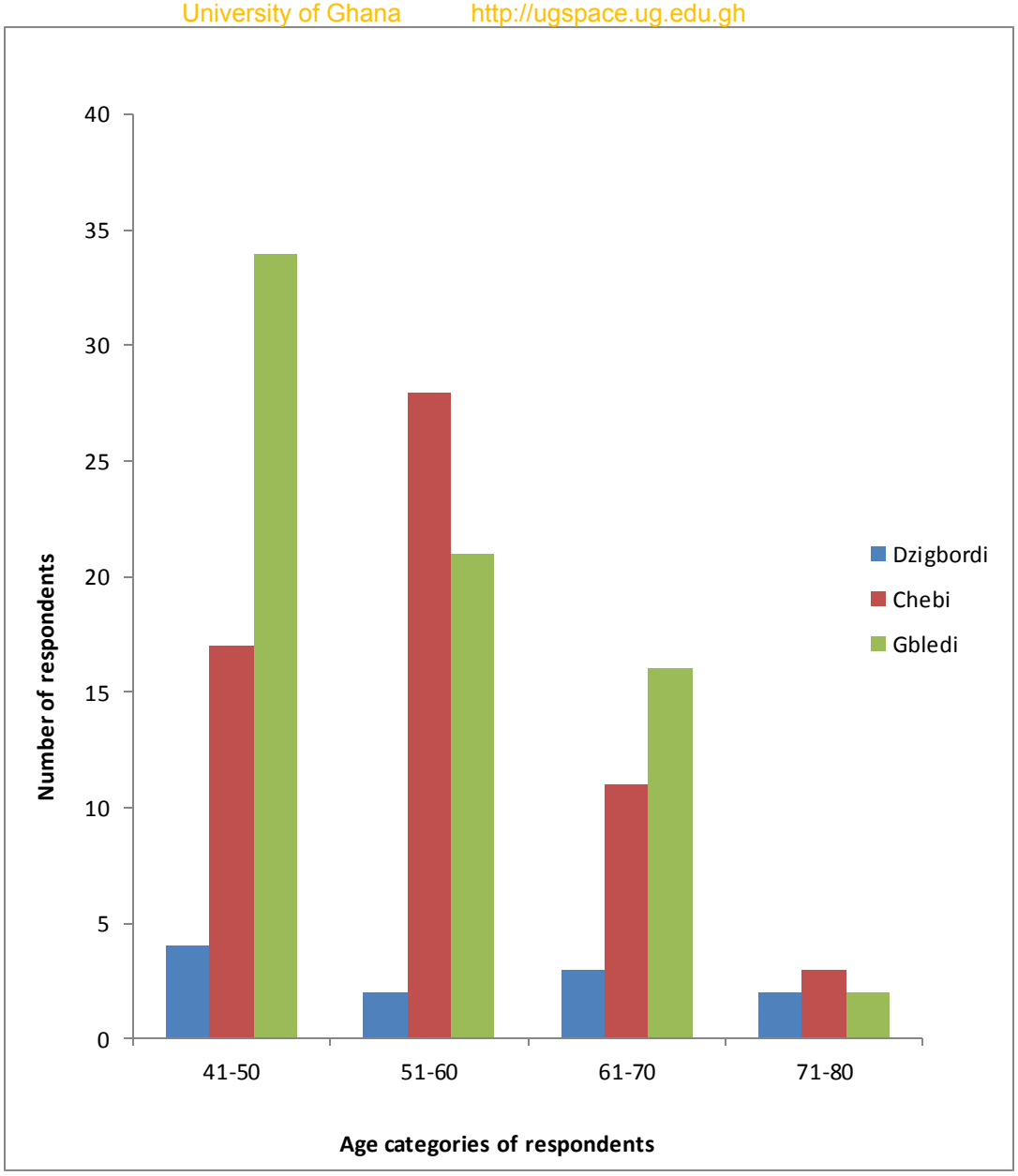

Fig 3.1: The age classification of respondents from the three communities.

3.1.2. The Plant Species Used by the People

The study revealed 166 species of plants belonging to 53 families as those used by the communities living around the Afadjato Community Forest Conservation Area.

The list of species, with information on their local names, cultivation status and places of their collection are presented in Table 3.1

Out of the reported plant species, 109 of them had the highest fidelity levels of 100%. These species include *Justicia flava, Phaulopsis falcisepala, Cyatula prostrata, Lannea acida, Lannea welwitchii, Annona senegalensis, Monodora myristica, Monodora ternuifolia, Alstonia boonei* and *Baissea multiflora* among others (see Table 3.1). The maximum FL for the species indicated a 100% choice of the interviewed informants for use in the all the use-categories under consideration.

The Use – Values (UV) were calculated for the 166 species belonging to 53 families that were cited during the 133 semi-structured interviews in order to determine the most important plants to the interviewees at the time of the survey. The plant that was cited most was the *Khaya angolensis* (seeTable 3.1). This species has the highest use-value (0.86) due to the highest number of use-reports indicated by the highest number of informants in the category of Food, Medicine but mainly for Building and Household items. *Mesoneron bantamianus* on the other hand had the lowest use-value and this may be due to the lowest number of use-reports indicated by the informants. Only the fruit of this plant is noted as edible by one informant (see Table 3.1).

TABLE 3.1: LIST OF THE MOST COMMONLY USED PLANT SPECIES IN THE AFADJATO COMMUNITY FOREST CONSERVATION AREA.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Acanthaceae	*Justicia flava* D.N Gibson (Ligbetovi)	100	0.15	C	G/Fm	F, M	Hb	Shoot, Ba	Young shoots are eaten as vegetable in soups. Bark decoction is used to treat diarrhoea in children.
	Phaulopsis falcisepala Willd (Ofemanini)	100	0.13	W	Fo	F	Hb	Le	Young shoots are eaten as vegetable in soups.
Amaranthaceae	*Cyatula prostrata* (L.) Blume (Tsofoŋganu)	100	0.15	W	Fm/Fo	B	Hb	Le, E	Thatching farm huts. Entire plant is used as antiseptic.
Anacardiaceae	*Lannea acida* A. Rich (Kuntunkuri)	100	0.30	W	Fm/Fo	H, F	Tr	St, Le, Fr	Timber for stools and carved objects. Leaves used as vegetable in soups. Alcoholic beverages.
	Lannea welwitchii A.Rich (Kumani ni)	100	0.30	W	Fm/Fo	H, F	Tr	St, Le	Wood for making handles of tools e.g. Cutlass. Leaves edible in salads.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Annonaceae	*Annona senegalensis* Pers. (Mampihege)	100	0.11	C	G/Fm	F, M	Tr	Fr	Fruits are consumed directly. Alcoholic beverages. Leaves decoction is used to treat diarrhoea.
	Monodora myristica Blanco (Yiku)	100	0.68	W	Fo/Fm	H, M	Tr	St, Fr, Se	Wood for making handles of tools e.g. Cutlass. Leaves edible in salads.
	Monodora ternuifolia Benth (Yiku)	100	0.68	W	Fo/Fm	H	Tr	St, Se	Seeds are used for making beads. Wood for making handles of domestic tools.
	Uvaria chamae P.Beauv. (Gbanagbana)	66.67	0.06	W	Fo/Fm	F,H,M	Li	Fr, St, Ba, Rt	Fruits are edible, stem for baskets and cane chairs, Leaves decoction for treatment of menstruation problems.
	Uvaria doeringii Diels (Agbana)	83.33	0.06	W	Fo/Fm	F,H,M	Li	Fr, Ba, Rt, St	Fruits are edible, stem for baskets and cane chairs. Bark decoction is used to treat menstruation problems.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Annonaceae	*Uvaria globosa* Hook .f. (Gbegangi)	66.67	0.06	W	Fo/Fm	F,H,M	Li	Ba, Fr,St	Fruits are edible, stem for baskets and cane chairs.
Apocynaceae	*Alstonia boonei* De Wild. (Tomtom)	100	0.75	W	Fo/Fm	H,M	Tr	Ba, St, Rt	Wood for making drums and coffins. Bark decoction is used for the treatment of stomach pains, body pains, and malaria remedy.
	Baissea multiflora A.DC. (Agordati)	100	0.11	W	Fo/Fm	B	Hb	E	Thatching temporary structures e.g farm sheds. Leaves decoction for treating Cardiovascular diseases.
	Funtumia africana Stapf (Okae)	56.94	0.58	W	Fo/Fm	B	Tr	St, Rt	Timber for beams or planks of permanent structures
	Funtumia elastic Stapf (Funtum)	100	0.58	W	Fo/Fm	L,H	Tr	St	Wood harvested for charcoal, fuel wood, tools handles e.g. Axe.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Apocynaceae	*Holarrhena florimbunda* T.Durand & Schinz (Aforkpati)	100	0.63	W	Fo/Fm	L,H,M	Tr	St, Rt	Wood for making tool handles e.g cutlass. Stem and root decoctions are mixed other substances to treat cardiovascular diseases, dysentery, Anaemia, and body pains.
	Rauvolfia vomitoria Wennberg (Dedemakpowoe)	100	0.24	W	Fm	L, H,M	Tr	St, Ba, Rt	Fuel wood, charcoal
	Tabernaemontana pachysiphon Stapf. (Pepea)	100	0.24	W	Fo/Fm	H	Sh	St	Wood for making bowls, plates, utensil etc.
	Landolfia dulcis (Sabine) Pichon (Obowe)	90.9	0.14	W	Fo/Fm	B,F	Hb	E,Fr	Thatching temporary structures, edible fruits.
	Landolfia macranta (K.Schum.) Pichon (Pempem)	90.9	0.14	W	Fo/Fm	B,F	Hb	E,Fr	Thatching temporary structures, edible fruits.
	Landolfia togolana (Hallier f.) Pichon (Pumpune)	90.9	0.14	W	Fo/Fm	B,F	Hb	E,Fr	Thatching temporary structures, edible fruits.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland)

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Asclepiadaceae	*Asclepias speciosa* Torr.	100	0.11	W	Fo/Fm	F	Hb	St	Stems are used as chewing sticks.
Asteraceae	*Chromolaena odorata* (L.) R.M.King &H.Rob. *(*Acheampong)	100	0.24	W	Fm	B,M	Sh	E,Le	Thatching farm huts and sheds, Leaves decoction for treating burns and cuts.
	Emilia coccinea G.Don	100	0.11	C	G/Fm	F	Hb	Le	Eaten as a spinach or fresh in salads.
	Vernonia camporum M.E.Jones (Hosikonu)	100	0.11	W,C	G/Fm	F	Hb	Rt	Fresh root is chewed for cough and heart related disease.
Araceae	*Culcasia angolensis* Welw.ex Schott (Toga)	100	0.09	W	Fm	B	Hb	E	Thatching farm sheds and hats.
	Culcasia parviflora P.Beauv (Toga)	100	0.09	W	Fo/Fm	B	Hb	E	Thatching farm sheds and huts.
Araliaceae	*Cussonia barteri* Seem (Kwabrofe)	100	0.27	W	Fo/Fm	B, H	Tr	St	Wood for wall support (house posts, frames etc), hair combs.
Bignoniaceae	*Newbouldia leavis* (P.Beauv.) Seeman ex Bureau (Kpotiyia)	100	0.37	W	Fo	B	Tr	St,Br	Timber for building permanent structures fuel wood, charcoal Bark decoction is used to treat epilepsy.
	Spathodia campanolata Pal. (Adatsigolo)	100	0.27	W	Fo/Fm	L,M	Tr	St,Ba	Fuel wood, charcoal; bark decoction is used as appetizer.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland)

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Bombacaceae	*Adansonia digitata* L. (Adidoti)	55.26	0.32	W	Fo/Fm	B, L, F	Tr	Fr, Se, Ba, Le	Inner bark for ropes, fuel wood, Leaves used as vegetable, edible seeds. Bark decoction for stomach pains.
	Bombax buonopozense P. Beauv. (Okuo)	94.74	0.32	W	Fo/Fm	B,F	Tr	St, Le	Timber for building permanent structures. Leaves as vegetables.
	Ceiba pentandra (DC.) Bakh. (Ewuti)	81.25	0.81	W	Fo	H,F	Tr	Fr,Ka,St	Kapok used in stuffing local mattresses, fruits edible, Wood-ashes used as salt substitute in soups.
Burseraceae	*Canarium schweinfurthii* Engl.(Bediwonua)	100	0.26	W, C	G/Fm	F	Sh	Se,Fr	Edible seeds and fruits eaten only when cooked.
	Dacleodes klaineana (Pierre) H.J.Lam (Adwea)	100	0.26	W	Fo	H	Sh	St	Wood for making domestic utensils e.g ladles, tapoli.
Cecropiaceae	*Myrianthus arboreus* Beauv.(Nyankuma-bere)	66	0.42	W	Fo/Fm	L, F, M	Tr	Fr, St, Le, Ba	Fuel wood, charcoal, edible fruits vegetable in soups. Bark decoction is used to treat chest pains.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Combretaceae	*Combretum paniculatum* Vent. (Aveto)	60	0.05	W	Fo/Fm	B, F, H, M	Cl	St, Le, Rt	Ropes for building purposes, salt substitutes, baskets, cane chairs and table. L eaves decoction as a dewormer and root decoction as appetizer.
	Terminalia avicennioides Guill. & Perr. (Petni)	56.81	0.76	W, C	G/Fm	B, L, H	Tr	Tr	Timber, fuelwood, making carved objects e.g mortar.
	Terminalia glaucescens Planch.ex Benth. (Ongo)	59.09	0.76	W, C	G/Fm	B, H	Tr	St	Timber, making handles of tools e.g hoes.
	Terminalia macroptera Guill.& Perr (Kwatiri)	61.18	0.76	W, C	G/Fm	B, H	Tr	St	Wood for wall supports e.g frames.
	Terminalia superba Engl. & Diels (Kegblade)	61.18	0.76	W, C	G/Fm	B, H	Tr	St	Wood for wall supports e.g house posts.
Commelinaceae	*Byrsocarpus coccineus* Schumach (Awennade)	100	0.45	W	Fo/Fm	L	Tr	St, E	Wood harvested for charcoal, fuel wood.
	Palisota hirsuta K.Schum.ex C.B.Clarke. (Klugbogbo)	100	0.13	W	Fo/Fm	F	Hb	Le, St	Leaves used as ingredient in palm-nut soups, stems chewed as a remedy for cough. Entire plants used as antiseptic.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Connaraceae	*Agalaea nitida* Sol.ex Planch. (Apose)	100	0.17	W	Fo/Fm	B, M	Sh	St	Timber for making local bridges.
	Cnestis feruginea Vahl ex DC. (Akitase)	100	0.26	W	Fo/Fm	B	Sh	St, Rt	Thatching temporary structures. Root decoction is used to induce abortion.
Costaceae	*Costus afer* Ker-Gawl. (Eyra)	100	0.13	W	Fo	F	Hb	Le	Eaten in palm-nut soups, leaves rubbed on children's feet to make them walk.
Dichapetalaceae	*Dichapetalum madagascariense* Poir (Folie)	100	0.45	W	Fo/Fm	H	Tr	St	Wood for making bowls, plates utensils, cutlery etc.
Ebenaceae	*Diospyros abyssinica* (Hiern) F. White (Kusibiri)	100	0.26	C	Fo/Fm	H, F	Sh	Fr, St, Rt	Wood for making handles of tools e.g Cutlass. Fruits edible. Root decoction is used to induce abortion.
	Diospyros madecassa H.Perrier (Kusibiri)	100	0.26	C	Fo/Fm	F, H	Sh	Fr, Rt, St	Wood for making handles of tools. Fruits edible. Root decoction is used to induce abortion.
	Diospyros monbuttensis Gürke (Kusibiri)	100	0.26	C	Fo/Fm	F, H	Sh	Rt, Fr, St	Wood for making handle of tools. Fruits edible. Root decoction is used to induce abortion.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Euphorbiaceae	*Alcornea cordifolia* (Schumach.) Müll.Arg (Avovlo)	100	0.09	W	Fo/Fm	B, M	Hb	Ba, Le, Rt	Binding material (ropes). Bark decoction for treating rashes, Root decoction is used to induce abortion.
	Bridelia ferruginea Benth. (Asaraba)	100	0.15	W	Fo/Fm	B, L, F, M	Sh	Ba, St, Fr	Timber for house posts, frame, beams, fuel wood fruits edible.
	Margaritaria discoides (Baill.) Webster (Pepea)	100	0.15	W	Fo/Fm	F, M	Sh	Fr, Rt, St	Fruits are eaten; Stem is processed into wood-ashes and used as salt substitute in soups. Root decoction is used to induce abortion, Root decoction is used as analgesic.
	Mallotus oppositifolia (Geisel.) Muell. Arg. (Satadua)	75	0.22	W	Fo/Fm	B, L, M	Sh	St, Rt	Light timber, fuel, charcoal.
	Macaranga barteri Muell. Arg (Yurodu)	68.92	0.61	W	Fo/Fm	B, L	Tr	St	Timber, fuel wood, charcoal.
	Microdesmis puberula Hook.f. (Ofumai)	61.11	0.19	W	Fo/Fm	B, L, F	Sh	St, Ba, Se	Timber, fuel wood, charcoal, edible seeds. Bark decoction is used for expulsion of worm.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Euphorbiaceae	*Phyllanthus arboreus* Sessè & Moc. Ex Baill (Kpavidetume)	80	0.10	W	Fo/Fm	B, F	Hb	Le, E	Thatching farm hats and sheds, fuel, Leaves decoction for treating fever.
	Tragia aquapimensis L. (Dza)	100	0.24	W	Fm	L	Sh	St	Wood harvested for charcoal, fuel wood.
	Tetrorchidium didymostemon (Baill.) Pax & K. Hoffm. (Aboagyedua)	100	0.36	W	Fo/Fm	L	L	St	Wood harvested for charcoal, fuel wood.
	Uapaca togoensis Baill. (Kontannini)	95	0.26	W	Fo/Fm	B, L, F	Sh	St, Fr	Timber, good charcoal, edible fruits.
Fabaceae	*Abrus precatorius* L. (Dedekude)	100	0.12	W	Fo/Fm	H, M	Hb	Se, St, Le	Beads, baskets, cane chairs and tables, Leaves decoction for treating colds. Root decoction is used for expulsion of worms.
	Acacia kamerunensis Gandoger (Damalia)	47.50	0.36	C	Fo	B, L, H	Tr	Ba, St, Le	Timber, fuelwood, handles of tools e.g Axes. Bark decoction for treating stomach pains,
	Afzelia africana Sm. (Wokpa)	100	0.72	W	Fo/Fm	B, H	Tr	St, Se	Timber, beads.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Root, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Fabaceae	*Albizia adianthifolia* (Schumach.) W.F. Wight (Aziwoe)	100	0.69	W	Fo/Fm	H	Tr	St, Se	Wood for making domestic utensils and carved objects.
	Albizia ferruginea (Guill. & Perr.) Benth. (Toziwa)	100	0.69	W	Fo/Fm	H	Tr	St	Wood for making domestic utensils and carved objects.
	Albizia zygia (DC.) J.F.Macbr. (Toziwa)	100	0.69	W	Fo/Fm	H	Tr	St	Wood for making domestic utensils and carved objects.
	Anthotica sassandraensis L. (Totoro)	100	0.15	W	Fo/Fm	L	Sr	St	Wood for charcoal, fuel.
	Baphia pubescens Hook. f. (Ezi)	100	0.70	W	Fo	H	Tr	St	Wood for making handles of tools e.g, hoe
	Berlinia occidentalis Keay (Kwatafombaboa)	100	0.24	W	Fo	B	Sh	St	Timber for construction purposes.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Fabaceae	*Cassia siamea* Lam.(Mal.) (Kulgo)	60	0.33	W	Fo	B,H,F	Tr	St, Le	Timber for building bridges, poles, wood for stools, pestles, mortar, tables. Vegetables.
	Daniela olivera L.(Sopi)	100	0.22	W	Fo	H,F,M	Sr	St, Fr, Ba	Wood for making handles for tools e.g hoe. Leaves are eaten during famine.Bark decoction is used in treating neurological disorder.
	Dialium guineense Willd. (Atortoe)	78.43	0.83	W	Fo/Fm	B , F, M	Tr	St, Fr, Le	Timber, fruits edible.Wood for pestles, mortar, tapoli etc.
	Erythrophloem ivorense A. Chev. (Potrodom)	100	0.64	W	Fo	H	Tr	St	Timber for making beds, chair, tables, stools.
	Griffonia simplicifolia Baillon (Kagya)	100	0.22	W	Fo/Fm	H	Sh	St	Making baskets, cane chairs and tables.
	Hymenostegia afzelii (Oliver) Harms (Takorowa)	100	0.10	W	Fo/Fm	B, M	Hb	E, Ba	Thatching of farm sheds and hut, bark decoction is used as antiseptic for treating wounds.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Fabaceae	*Leucaena glauca* (Lam.) De Wit (Nalenga)	91.67	0.15	W,C	Fo/Fm	L, F, H	Sh	St, Se, Le	Seeds for beads, wood for fuel, charcoal, and leaves are used for vegetable.
	Lonchocarpus sericeus (Poiret) Kunth	100	0.15	W	Fo/Fm	H, L, M	Sh	Ba, St	Wood of drums, chairs, tables fuel, charcoal. Bark decoction is used to treat epilepsy.
	Millettia zechiana Harms (Amatike)	68.92	0.64	W	Fo/Fm	B, H	Tr	St	Timber of building, making tool handles.
	Parkia bicolor A. Chev (Dawadawa)	90.54	0.60	W	Fo/Fm	B, F, M	Tr	St, Le, Ba	Wood for making handles of tools e.g. Hoe leaves used as vegetable in soups. Bark decoction for treating anaemia and body pains.
	*Piptadesniastrum africanum (*Hook. f.)Brenan (Yewoye)	100	0.22	W	Fo/Fm	H	Sh	Le, St, Rt	Wood for making hands of tools eg Hoe, rashes, root decoction is used to induce abortion.
	Pterocarpus malbraedii Harms (Hote)	100	0.22	W	Fo/Fm	F,M	Sr	Fr, Rt, Ba, Le	Edible fruits, decoction is used to induce abortion.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Fabaceae	*Tamarindus indica* L. (Tamarind)	66.67	0.28	W	G/Fm	F,L	Tr	Fr, Le, St	Edible fruits, leaves used as vegetable in salads. Stems used for fuel and charcoal.
Flacourtiaceae	*Homalium letestui* Pellegr. (Nankoroma)	67.86	0.25	W	Fo/Fm	F,L	Tr	Fr,St	Edible fruits, fuelwood.
Lamiaceae	*Hoslandia opposita* Vahl (Asifuaka)	100	0.12	W	Fo/Fm	F	Hb	Fr, Rt	Edible fruits, powdered root are used as antiseptic.
	Mesona bantamianus Vahl (Anoka)	100	0.09	W	Fo/Fm	F,M	Hb	Fr, Le	Edible fruits, Leaves decoction for treating fever.
Lauraceae	*Persea americana* Miller (Paya)	100	0.30	C	G/Fm	F	Tr	Fr,	Fruits are consumed directly.
Lecythidaceae	*Napoleonaea vogelii* Hook.& Planch. (Obua)	100	0.22	W	Fo/Fm	L	Sh	St	Fuel wood, charcoal.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Liliaceae	*Smilax kraussiana* Willd. (Klamatsu)	100	0.15	W	Fo/Fm	F, B, M	Sh	Tu Fr, St, Se, Rt	Tubers are eaten as famine food, stem are used as a rope, used in sweet beverages. Boiled roots are used to treat urinating problems.
Maranthaceae	*Hypselodelphys violacea* (Ridl.) (Babadua)	80	0.09	W	Fo	B, H	Hb	St	For tying poles fixed in building, making lid of rice-bins
	Thaumatococcus daniellii (Benn.) Benth. (aklamakpa)	100	0.15	W	Fo/Fm	F	Hb	Se	Seeds are used as a sweetener in pap, tea or mashed 'kenkey'.
Meliaceae	*Khaya angolensis (*Desr.) A. Juss. (Mahogany)	100	0.86	W	Fo/Fm	B	Tr	St	Timber for building permanent structures.
	Khaya grandifoliola C.DC. (Kruba)	100	0.86	W	Fo/Fm	B, M	Tr	St, Ba, Rt	Timber for building permanent structures, Root decoction is used for treating delivery complications. Bark decoction is used in treating neurological disorders.
	Trichilia heudeloti (Thon.) J.J De Wilde (Tandro)	86	0.51	W	Fo/Fm	B, L	Tr	St, Rt	Timber, fuel wood, charcoal. Root decoction is used to induce abortion.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Part used Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Meliaceae	*Trichilia monadelpha* (Thon.) J.J De Wilde (T*andro*)	86	0.51	W	Fo/Fm	B, L	Tr	St, Rt	Timber, fuel wood, charcoal.
	Trichilia puriana (Thon.) J.J De Wilde (Tandro)	86	0.51	W	Fo/Fm	B, L	Tr	St, Rt	Timber, fuel wood, charcoal. Root decoction is used to cause abortion.
	Trichilia patens (Thon.) J.J De Wilde (Tandro)	82	0.51	W	Fo/Fm	B,L	Tr	St	Timber. Leaves added to palm wine and Akpeteshie and taken to increase potency.
Menispermaceae	*Dioscoreophyllum cumminsii* (Stapf) Diels	85.71	0.13	C	G/Fm	B,F	Hb	St, Le	Binding materials, roots eaten boiled.
	Triclisia lanceolata Oliv.	100	0.12	W	Fm	B,M	Hb	E	Thatching of farm sheds and hats. Leaf decoction is used as analgesic.
Moraceae	*Antiaris toxicaria* Leschenault (Loko)	65.38	0.69	W	Fo/Fm	B, H	Tr	St	Timber for building permanent houses, making handles of tools.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Moraceae	*Ficus asperifolia* Desf. Ex Pers. (Tsatsaflala)	62.65	0.73	W	Fo/Fm	B, L, M	Tr	St, Fig, Rt	Timber, fuel, charcoal, Edible figs.
	Milicia excelsa (Welw.) C.C.Berg (Odum)	57.43	0.82	W	Fo/Fm	B, H, M	Tr	St. Ba, Le	Wood for building local bridges, household Furniture and stools. Young leaves eaten as vegetable. Stems are boiled in porridge and given to babies to aid Baby development, Bark decoction is used for treating dermatological cases.
	Morus mesozygia Stapf (Odzimtsui)	63.54	0.79	C	Fo/Fm	B, L	Tr	St, Se	Timber, fuel wood, charcoal, edible seeds.
	Trilepisium madagascariense DC. (Dzekluzi)	100	0.31	W	Fo/Fm	H, M	Tr	Le, St	Timber for drums, handles of domestic utensils. Stem decoction for treating liver problems.
Myristicaceae	*Pycnanthus angolensis* (Welw.) Warb. (Kpornugbordeti)	51.28	0.67	W	Fo	B, L, F	St, Fr	Fr, Le,	Timber, fuel, fruits used as spices.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Myrtaceae	*Eugenia calophylloides* DC. (Pepre)	100	0.22	W	Fo	F, H	Sh	St	Spices in soups, for brooms.
Ochnaceae	*Lophira alata* Banks ex Gaertn. (Kaku)	100	0.26	W	Fo	B	Sh	St	Hard wood for building local bridges.
	Lophira lanceolata Banks ex Gaertn. (Azobe)	100	0.26	W	Fo	B, M, F	Sh	St, Le, Ba	Hard wood for building local bridges, the leaves are used as flavours in soups. Bark decoction is used to treat backache
	Ouratea flava (A. St-Hil.) Engl. (Opunini)	75	0.24	W	Fo	B, L	Sh	St	Timber, Fuel.
Olacaceae	*Olax subscorpioidea Oliv.* (Ahoohendedua)	100	0.10	W	Fo/Fm	F	Hb	Le, Fr	Spices in soups.
Passifloraceae	*Adenia lobata* (Jacq.) Engl. (Akpeka)	100	0.10	W	Fo/Fm	B	Hb	St	Binding materials in building.
Piperaceae	*Piper guineense* Thonn (Atinkale)	100	0.15	W,C	Fo/Fm	F, M	Hb	Fr, Le	Eaten as vegetable.
Poaceae	*Andropogon gayanus* Kunth. (Fugbe)	90	0.12	W	Fo/Fm	L, B	Hb	St, Le	Thatching farm huts and sheds. Fuel.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Poaceae	*Olyra latifolia* L. (Mumagbe)	90	0.13	W	Fo	B, F	Hb	St, Le	Thatching farm sheds edible leaves.
	Olyra subcoides L. (Mumogbe)	90	0.13	W	Fo	B, F	Hb	St, Le	Thatching farm huts, edible leaves.
	Oplismensus boomenii (L.) Pal. Cv. (Kogbe)	90	0.13	W	Fm	B, F	Hb	St, Le	Thatching, edible leaves.
	Panicum fragmitoides Schultes. (Afla)	100	0.13	W	Fo/Fm	H	Hb	St	Making brooms, baskets.
	Setaria gayanus Stapf & C. Hubb. (Wotowoto)	100	0.10	W	Fo/Fm	B	Hb	E, Le	Thatching farm sheds.
Polygalaceae	*Carpolobia lutea* G.Don (Otwewa)	100	0.19	W	Fo/Fm	F, H	Sh	St, Fr	Edible fruits, wood for making bowls plates, utensils, cutlery etc.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Polygalaceae	*Securidaca longiflorum* Fres. (Kpaliga)	65.79	0.31	W	Fo/Fm	L, H, M	Tr	St, Le, Rt	Fuelwood, charcoal, wood for making handle of tools Powdered root tips are inhaled to treat catarrh.
Rubiaceae	*Argocoffeopsis rupestris* (Hiem.) Robbrect (Aduba)	100	0.19	W	Fo	F	Sh	St	Fruits used for alcoholic and non alcoholic beverages.
	Chassalia kolly (Schumach.) Hepper.	100	0.19	W	Fm	L	Sh	St	Fuelwood.
	Crossopterix febrifuga Fenzl (Pakyisie)	100	0.19	W	Fo/Fm	L, M	Sh	St, Le	Fuelwood, charcoal, leaf decoction used to treat cough.
	Morinda lucida Benth. (Venamakpa)	100	0.19	W	Fo	L	Sh	St	Fuelwood, charcoal.
	*Nauclea latifolia (*de Wild.) (Nyimoke)	66.67	0.40	W	Fo	B, H	Tr	Ba, St, Rt	Good timber for building permanent structures, drums stools etc. Bark decoction is used to treat stomach Pains. Root decoction is used to induce abortion.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Rubiaceae	*Pavetta corymbosa* (SC.) F.N.Williams (Kronko)	100	0.19	W	Fo/Fm	L, F	Sh	St, Le	Fuelwood, charcoal, leaves used as vegetable in soups.
	Psychotria calva Hiem (Aposin)	72.22	0.19	W	Fo	B, L	Sh	St	Timber, fuelwood, charcoal
	Psychotria subobliqua Hiem (Aponsin)	72.22	0.19	W	Fo/Fm	L, B	Sh	St	Timber, fuelwood, charcoal
	Rothmannia longiflora Salisb. *(*samankube)	100	0.24	W	Fo/Fm	L	Sh	St	Fuelwood, charcoal Stem decoction is used as analgesic.
Rutaceae	*Clausena anisata* (Willd.) M Roemer (Eyira)	100	0.17	W	Fo/Fm	F, B, M	Sh	Fr, St, Le	Timber, Edible Fruits.Sten decoction is used to treat body pains.
	Zanthoxylum leprieurii Guill. & Perr. (Exedza)	56.67	0.54	W	Fo/Fm	B, L	Tr	St, Se, Le	Timber, fuelwood, charcoal. Seeds used as spices in soups. Leaf decoction is used as appetizer.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Sapindaceae	*Allophylus africanus* (L.) Räusch. (Kotamenyati)	100	0.19	W	Fo/Fm	H, M	Sh	St, Fr	Wood for making carved objects e.g stools fruit decoction is used as a dewormer.
	Blighia sapida Konig (Akye)	100	0.72	W	Fo/Fm	H	Tr	St	Wood for making handles of tools e.g knife.
	Cardiospermum grandiflorum Swartz (Tooto)	100	0.12	C	G/Fm	F, M	Hb	Le, Rt	Leafy vegetable. Root decoction is used as appetizer.
	Deinbollia pinnata (Poir.) Schum. & Thonn. (Potoke)	100	0.27	W	Fo/Fm	H, M	Tr	St, Se, Rt	Timber for building permanent structure edible seeds. Dried roots are used to cure asthma.
	Lecaniodiscus cupanioides Planch. ex Benth. (Dwindwera)	61.22	0.81	W	Fo/Fm	B, L, F	Tr	Se, St	Timber, fuelwood, charcoal, edible oils are extracted from their seeds.
	Pancovia floribunda Pellegr. (Aflato)	96.43	0.25	W	Fm	B, F	Tr	St, Fr	Timber, Edible fruits
	Paullinia pinnata Linn. (Tsiotsi)	100	0.06	W	Fo/Fm	F, M	Li	St, Le, Rt	Used in alcoholic beverages, stomach pains, cuts, leaf decoction is used to induce abortion.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Sapotaceae	*Chrysophylum giganteum* A. Chev. (Alasaa)	100	0.36	C	G/Fm	H, F	Tr	St, Fr	Timber for making pestle, mortar etc, edible fruits.
	Malacantha alnifolia Pierre. (Efoe)	100	0.19	W	Fm	L, M	Sh	St, Ba	Fuelwood, charcoal. Bark decoction is used in treating cardiovascular diseases..
	Manilkara multinervis Adams (Berekunkum)	100	0.28	W	Fo/Fm	H, F	Tr	St, Fr	Wood for making domestic utensils and carved objects e.g ladles mortars. Edible fruits.
	Mimusops elongi L. (Mal.)	100	0.22	W	Fo	H	Sh	St,	Wood for making domestic utensils and carved objects e.g ladles mortars.
	Pachystela brevipes Pierre ex Radlk. (Aframdua)	100	0.17	W	Fo/Fm	H	Sh	St	Wood for making domestic utensils and carved objects e.g ladles mortars.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Sterculiaceae	*Cola gigantea* A. Chev. (Agawuti)	67.95	0.66	W	Fo/Fm	H, L, M	Tr	St, Le	Wood for fuelwood, charcoal, making tool handles, rashes, body pains.
	Cola mellinii K. Schum. (Esele)	67.95	0.66	W	Fo/Fm	H, L, M	Tr	St, Le	Good timber for house post, frames, beams for permanent structures (mud house) Rashes, body pains.
	Nesogordonia papaverifera A.Chev. (Adanta)	100	0.48	W	Fo	B	Tr	St	Timber for roofing houses and making carved objects.
	Pterigota macrocarpa K.Schum. (Kyereye)	100	0.17	W	Fm	H	Sh	St	Wood for making tool handles eg. Cutlass.
	Sterculia oblonga Mast. (Ohaa)	47.5	0.33	W	Fo/Fm	B, H	Tr	St	Timber for roofing house and making carved objects.
	Sterculia rhinopetala K.Schum. (Wawabima)	47.5	0.33	W	Fo/Fm	B, H	Tr	St	Timber for roofing house and making carved objects.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	Species, Local name in Brackets	Fidelity Level (%)	Use Value	Cultivation Status	Places of Collection	Use category	Habit	Part used	Uses
Sterculiaceae	*Sterculia tragacantha* Lindl. (Sofo)	45	0.33	W	Fo/Fm	B, F, M, H	Tr	St, Le,	Timber for roofing houses, making carved objects Young leaves are used as vegetables in soups. Shoot decoction used as a dewormer.
	Triplochiton scleroxylum K.Schum. (Wawa)	87	0.82	W	Fo/Fm	B, H	Tr	St	Timber for house posts, frames, doors, and beams. Wood for stools and handles of tools.
Tiliaceae	*Christiana africana* DC. (Asesedua)	55.56	0.19	W	Fo/Fm	B, L, F	Sh	St, Le	Timber for building bridges, frames, beams doors. Wood for fuelwood and charcoal. Young leaves eaten as vegetable.
	Grewia pubescens (Vahl.ex DC.) Baill. (Yualega)	83.33	0.15	W	Fo/Fm	B, H, F	Sh	St, Tw, Le	Twigs with chewed ends used as paint-brushes. Timber for building purposes. Vegetable.
Ulmaceae	*Celtis mildbraedii* Engl. (Tadzoe)	54.35	0.78	W	Fo/Fm	B, L, F	Tr	St, Fr	Timber, fuelwood, charcoal edible fruits.
	Celtis zenkeri Engl. (Sia)	55.56	0.78	W	Fo	B, L, F	Tr	St	Timber, fuelwood, charcoal.
Umbelliferae	*Centella asiastica* (L.) (Gatigati)	100	0.19	W	Fo	F	Hb	Le	Vegetable in soups.

Table 3.1 (Cont.) List of the Most Commonly used Plant Species in the Afadjato Community Forest Conservation Area.

(Use-Categories: F-Human food, L-Fuelwood, B-Building, H-Household items. **Parts used**: Le-Leaves, Se-Seed, St-Stem, Fl-Flowers, Rt-Ro.ot, Tu-Tubers, E-Entire plant, Ba-Bark, Fi-Fig, Tw-Twig. **Habit**: Tr-Tree, Sh-Shrub, Hb-Herb, Li-Lianas, Cl-Climber. **Cultivation status**: W-Wild, C-Cultivated. **Collection location**: G-Garden, Fo-Forest reserve, Fm-Farmland).

Family	**Species, Local name in Brackets**	**Fidelity Level (%)**	**Use Value**	**Cultivation Status**	**Places of Collection**	**Use category**	**Habit**	**Part used**	**Uses**
Verbenaceae	*Vitex doniana* Schum. & Thonn. (Eforti)	91.84	0.81	W,C	G/Fm	H, F	Tr	St, Shoot	Timber for making domestic utensils and carved objects; young leaf shoot is eaten as vegetable.

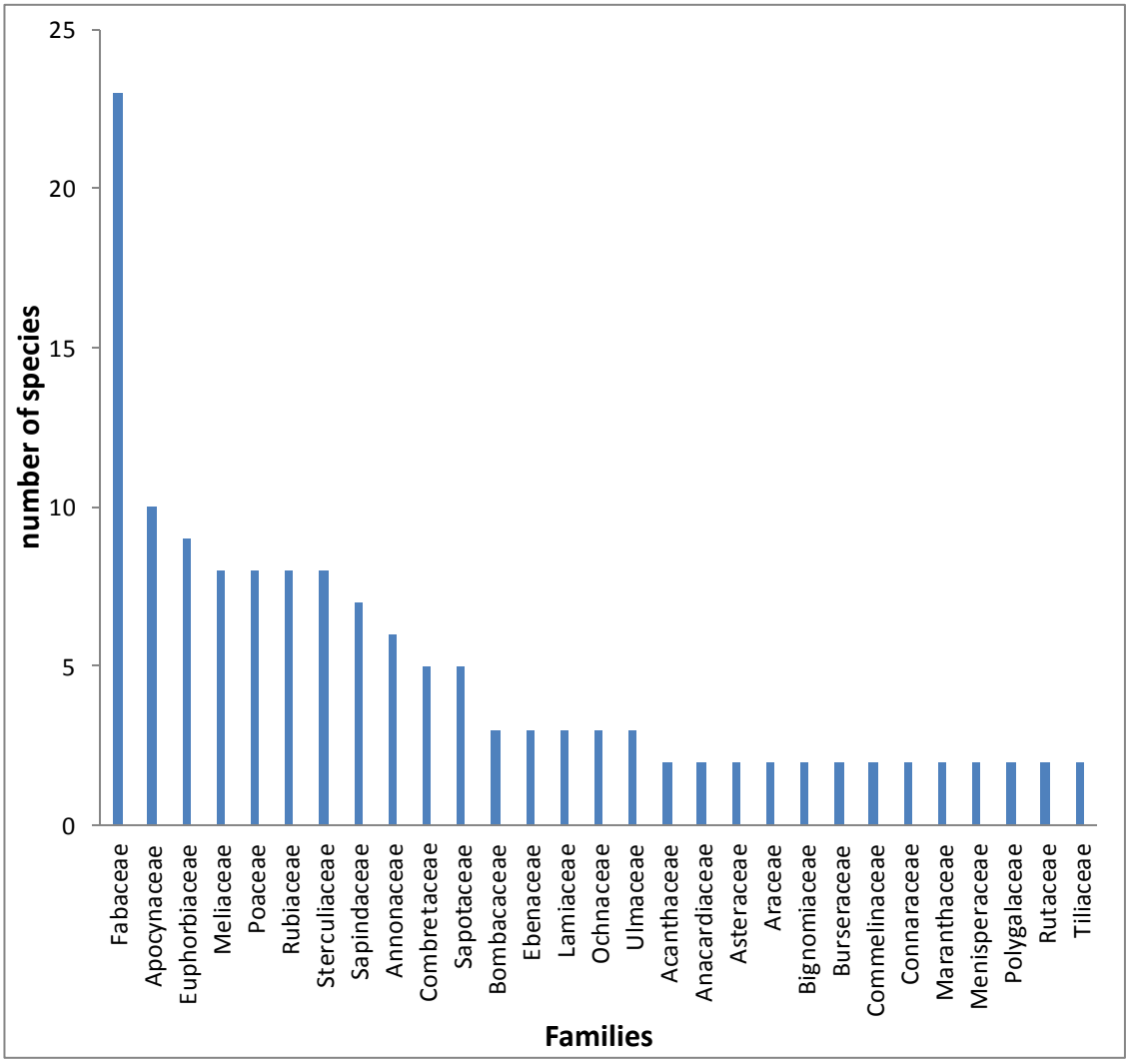

Fig 3.2: Plant families with three or more species in the Afadjato Communities.

Out of the 53 families of plants listed by the respondents from the Afadjato Communities, the most predominant families in terms of number of species used included Fabaceae, Apocynaceae and Euphorbiaceae (Fig 3.2)

Plant families with 1 and 2 species are, however, not represented in the Fig 3.2 above.

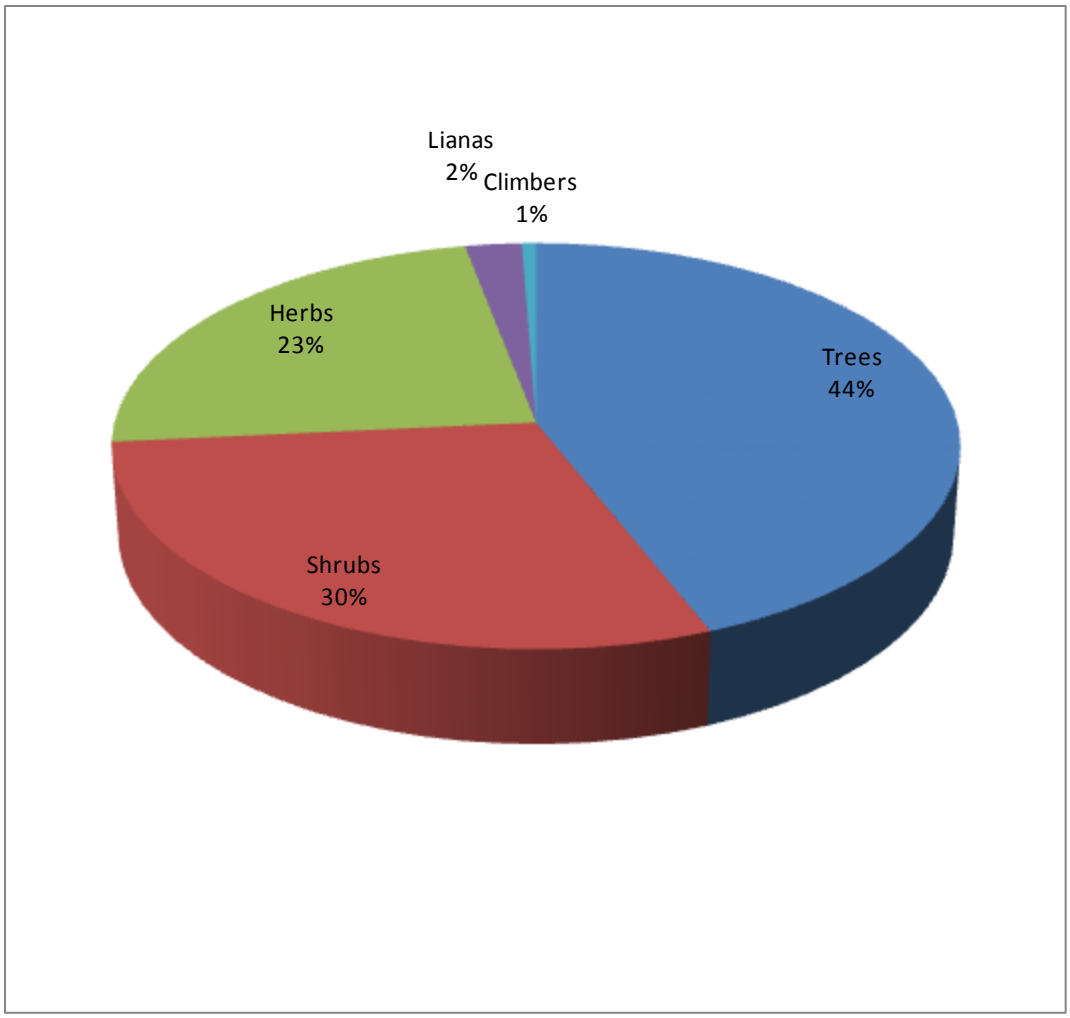

Fig. 3.3: Habit of plants used by Communities living around the Afadjato Conservation area.

In terms of the habit of the plants, trees were the most dominant (44%), followed by shrubs (30%), herbs (23%), lianas (2%) and climbers (1%) (Fig 3.3).

3.1.3 Use Categories and Plant Parts Used

The use category for Building involved the use of many plants (with 25.20%), followed by Human Food (23.3%), Household items (19.9%) and Medicine (15.8%) (Table 3.2). There was high agreement among the respondents in the use of plants for Building, showing a use report of 80 (0.68 F_{ic}), followed by Human food with a N_{ur} of 74 (0.52 F_{ic}), Household items with N_{ur} of 63 (0.66F_{ic}) and Fuelwood and Medicinal uses both having a use report of 50 (0.55 F_{ic}) each (Table 3.2). The generally high F_{ic} values observed in all the use-categories gives an indication that the degree of knowledge shared by the users in the study area regarding plants use is high.

Table 3.2: Informant Consensus Factor for Commonly Used Plants of the Afadjato Community Forest Conservation Area. (A taxon may be reported in more than one use category)

Use Category	Number of use reports (N_{ur})	% all Species	Number of taxa (N_t)	Informant Consensus factor (F_{ic})
Building (B)	80	25.20	26	0.68
Household items(H)	63	19.90	22	0.66
Human Food (F)	74	23.30	36	0.52
Fuelwood (L)	50	15.80	23	0.55
Medicinal use (M)	50	15.80	23	0.55

3.1.4. Place of Collection, Cultivation Status and Plant Parts Used

The collection location of plant species were categorized into three areas, mainly; forest (protected area), home garden and farmlands. From the analysis presented in Table 3.3, it can be seen that 47.3% of trees were collected from the farmland, 45.1% from the forest and 50% from the Gardens. Additionally, 26% of shrubs were collected from the farmland, 29.6% from forest and 6.3% from the Gardens. In the herbaceous category, 23.7% were collected from the farmland, 21.8% from the forest and 43.3% from the gardens. The Lianas were collected from two sources namely; farmland (3.1%) and forest (2.8%) whilst the climbers were collected in only forest (0.70%).

Considering the cultivation status, 44 % of the tree species were collected from the wild whiles 47.7% were cultivated. From the shrubs 29% were wild species whilst 26.3% were cultivated, 23% of the herbs were wild species whilst 26.3% were cultivated. All the Lianas and the Climbers reported in the study were collected from the wild (Table 3.3).

Among the different plant parts used, the stem (53.4%) of trees was the most frequently used by the people in the Community for building, making household items and for fuelwood (Table 3.3).

Table 3.3: Relationships among Growth Forms, Collection Location, Cultivation Status and Plant Parts Used In the Afadjato Community Forest Conservation Area (W-Wild, C-Cultivated, St-Stem, Le-Leaves, Fr-Fruits, Se-Seed, Sh-Shrubs, Rt-Roots, Ba-Bark, Tu-Tubers, E-Eintire plant, Tw-Twig, Fi-Fig). The numbers indicated are in percentages.

Growth Form	Collection location			Cultivation status		Plant parts used										
	Farmland	Forest	Garden	W	C	St	Le	Fr	Se	Sh	Rt	Ba	Tu	E	Tu	Fi
Trees	47.3	45.1	50	44	47.70	53.4	37.7	35.7	46.7	100	38.2	43.5	-	-	-	100
Shrubs	26	29.6	6.3	29	26.30	33.6	20.8	38.1	33.3	-	29.4	30.4	100	14.3	100	-
Herbs	23.7	21.8	43.3	23	26.30	9.2	37.7	19	20	-	20.6	13.1	-	78.6	-	-
Lianas	3.1	2.8	-	2.6	-	3.1	1.9	7.1	-	-	8.8	13.1	-	7.1	-	-
Climbers	-	0.7	-	0.6	-	0.8	1.9	-	-	-	2.9	-	-	-	-	-

3.2.0 Plant Species Present at the Afadjato Community Forest Conservation Area

A total of 73 species of herbs belonging to 34 families, 96 species of shrubs belonging to 34 families and 100 species of trees belonging to 32 families were present in the plots demarcated and studied along three transects in the Afadjato Community Forest Conservation Area (Tables 3.4, 3.5, and 3.6). About 34.7% of the families were common to the three plant habits under study (Tables 3.4, 3. 5 and 3.6).

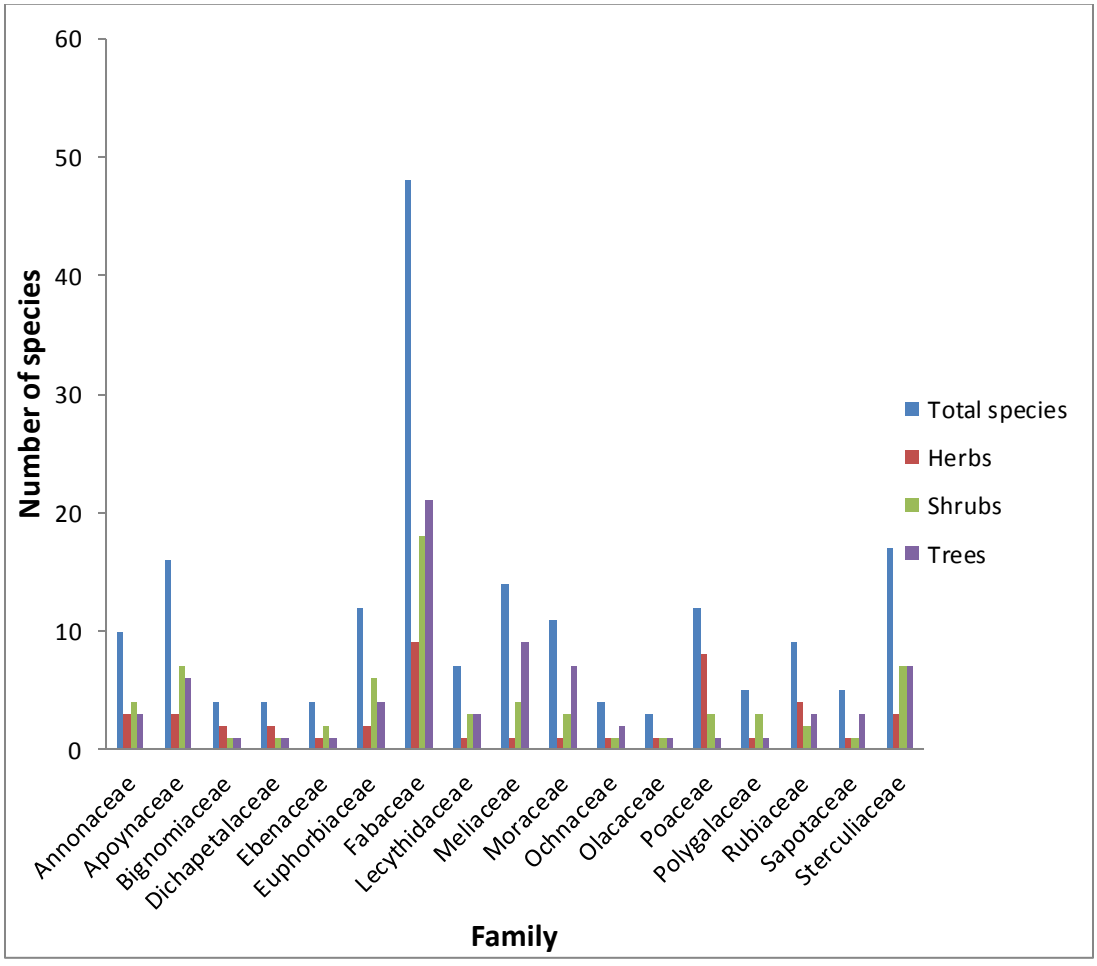

Fig 3.4: Families with the highest representation of species within the herbs, shrubs, and trees

Herbs, Shrubs, and Trees belonging to each family were enumerated to determine the most abundant families on the landscape. Of the plant families listed in the study, Fabaceae, Sterculiaceae, Apocynaceae, Meliaceae, and Poaceae were found to be the dominant families within the herbs groups, while Fabaceae, Poaceae, and Rubiaceae were the most dominant within the shrubs group, and Fabaceae, Meliaceae, Moraceae, and Apocynaceae the most dominant within the trees group. There were some form of relationship between knowledge, use and diversity as these families listed here as the most dominant in the plot inventory were the same families listed as the most dominant in the ethnobotanical study on the communities around the study site. Fabaceae contributed the greatest number of species under the herbs shrubs and the trees (Fig 3.4). Families with one or two species are however not represented in this figure.

The figure 3.5 below shows the distribution of the stems of the trees enumerated in the survey by GBH classes. It was observed that 65 tree species were relatively small (GBH range of between 10-70cm) (Fig 3.5). They included: *Albizia sp, Argocoffeopsis rupestris, Securidaca longiflorum,* and *Sterculia sp* (Table 3.6). Also 18 tree species were found to be of relatively medium size (GBH range of between 71-120cm) (Fig 3.5). These included: *Cassia siamea, Cola mellinii, Ficus sur, Holarrhena floribunda, Crossopterix febrifuga* and *Dichapetalum madagascariense* (Table 3.6). There were 17 relatively large tree species (GBH range of above 120cm) (Fig 3.5). These included *Alstonia boonei, Antiaris toxicaria, Ceiba pentandra, Dacleodes kleineana, Erythrophloem suaveolus,* and *Macaranga barteri* (Table 3. 6).

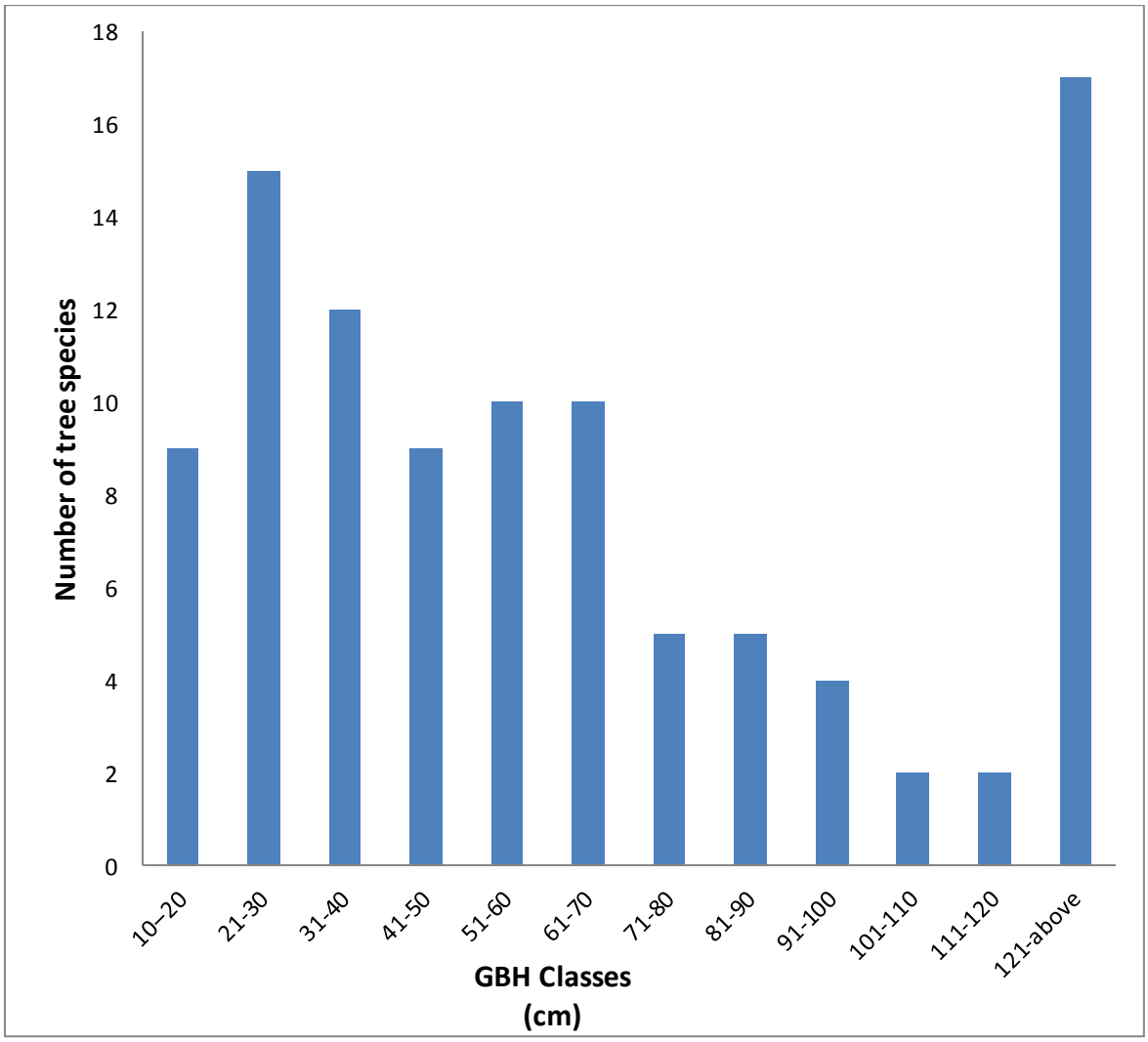

Fig 3.5: Number of tree species in the different GBH Classes

The Table 3.4 below shows the distribution by height and densities of herbs listed in the study. The tallest herb species were *Palisota hirsuta* and *Thaumatococcus danielii* with mean height of 1.0 m each. Others with height of above 0.5 m include: *Dioscoreophullum cumminsii, Justicia flava, Lophira lanceolata, Melinis minutiflora, Piper guineense,* and *Uvaria globosa.*

About 80% of the herbs show trends towards shorter stature (0.2m-0.5m) an indication of shading effect by the trees. The predominant herb species in the landscape are *Andropogon gayanus* (1.96), *Melinis minutiflora* (0.75), *Smilax krauseana* (0.54), *Thaumatococcus danielii* (0.33), *Olyra latifolia* (0.27), *Chromolaena odorata* (0.21) and *Heteropogon contortus* (0.18). The *Psychotria calva* (0.03) is the most scarsely seen herb on the landscape.

Table 3.4: Herbaceous Species Present At the Afadjato Community Forest Conservation Area.

Species	Family	Density	Relative density (%)	Freq	Relative freq (%)	Mean Height(m)
Acasia kamerunensis	Fabaceae	0.09	1.01	0.06	1.33	0.30
Adenia lobata	Passifloraceae	0.09	1.01	0.06	1.33	0.40
Andropogon gayanus	Poaceae	1.96	22.00	0.15	3.33	0.40
Annona senegalensis	Annonaceae	0.03	0.34	0.03	0.67	0.40
Baissea multiflora	Apocynaceae	0.06	0.67	0.06	1.33	0.20
Centella asiastica	Umbelliferae	0.03	0.34	0.03	0.67	0.20
Chassala koli	Polemoniaceae	0.06	0.67	0.06	1.33	0.20
Chromolaena odorata	Lamiaceae	0.21	2.36	0.21	4.67	0.30
Culcasia angolensis	Araceae	0.06	0.67	0.06	1.33	0.20
Culcasia parviflora	Araceae	0.03	0.34	0.03	0.67	0.20
Cyatula prostrate	Amaranthaceae	0.03	0.34	0.03	0.67	0.40
Dioscorea smilacifolia	Dichapetalaceae	0.03	0.34	0.03	0.67	0.30
Dioscoreophyllum cumminisii	Menispermaceae	0.03	0.34	0.03	0.67	0.60
Emelia coccinea	Asteraceae	0.03	0.34	0.03	0.67	0.40
Heteropogon contortus	Poaceae	0.18	2.02	0.06	1.33	0.20
Hoslundia opposita	Lamiaceae	0.03	0.34	0.03	0.67	0.40

Table 3.4(Cont.): Herbaceous Species Present At the Afadjato Community Forest Conservation Area.

Species	Family	Density	Relative density (%)	Freq	Relative freq (%)	Mean Height(m)
Hypselodelphys violacea	Maranthaceae	0.03	0.34	0.03	0.67	0.40
Justicia flava	Acanthaceae	0.06	0.67	0.06	1.33	0.60
Landolfia dulcis	Apocynaceae	0.03	0.34	0.03	0.67	0.40
Landolfia micrantha	Apocynaceae	0.09	1.01	0.09	2.00	0.40
Leptaspis cochleata	Poaceae	0.03	0.34	0.03	0.67	0.40
Lophira lanceolata	Ochnaceae	0.03	0.34	0.03	0.67	0.60
Melinis minutiflora	Poaceae	0.75	8.42	0.06	1.33	0.60
Olax subscorpioides	Olacaceae	0.03	0.34	0.03	0.67	0.60
Olyra latifolia	Paceae	0.27	3.03	0.06	1.33	0.80
Oplismenus boomenii	Poaceae	0.09	1.01	0.06	1.33	0.20
Palisota hirsute	Commelinaceae	0.03	0.34	0.03	0.67	1.00
Panicum fragmitoides	Poaceae	0.3	3.37	0.03	0.67	0.40
Phaylopsis parviflora	Acanthaceae	0.3	3.37	0.18	4.00	0.50
Piper guineense	Piperaceae	0.06	0.67	0.06	1.33	0.60
Psychotria calva	Rubiaceae	0.02	0.22	0.06	1.33	0.40
Psychotria subobliqua	Rubiaceae	0.03	0.34	0.03	0.67	0.40
Scleria speciosa	Cyperaceae	0.03	0.34	0.03	0.67	0.60
Securidaca longiflorum	Polygalaceae	0.27	3.03	0.06	1.33	0.40
Setaria gayanus	Poaceae	0.09	1.01	0.09	2.00	0.20
Smilax krauseana	Liliaceae	0.54	6.06	0.18	4.00	0.40
Thaumatococcus danielii	Maranthaceae	0.33	3.70	0.12	2.67	1.00
Tragia akuapimensis	Euphorbiaceae	0.15	1.68	0.12	2.67	0.20
Triclisia lanceolata	Menispermaceae	0.06	0.67	0.06	1.33	0.50
Uvaria doeringii	Annonaceae	0.03	0.34	0.03	0.67	0.20
Uvaria globosa	Annonaceae	0.03	0.34	0.03	0.67	0.60
Vernonia camporum	Asteraceae	0.06	0.67	0.03	0.67	0.30
Total		8.91	100.00	4.50	100.00	31.00

Table 3.5 below shows the distribution by height, GBH, density, and frequency of occureance of the shrub species on the landscape. The tallest shrub species are *Triplochiton scleroxylum* (6.0m), *Rothmania longiflora* (4.1m) and *Pterigota macrocarpa* (4.1m). About 55% of the shrub species are of height of 3.0m and above, an indication of good regeneration and adaptability. *Crossopterix febrifuga*, however, is the shortest shrub species recorded in the study.

The most abunbant and the most sparcely distributed shrub on the landscape is *Byrsocarpus coccineus*, it has a density of (0.050) and relative frequency of (4.29%). Other species of high occurrence includes *Palisota hursuta*, *Lophira lanceolata* and *Panicum fragmitoides*.The readily seen species on the landscape have density of (1.0) and relative frequency of (0.33%). Among them include *Agalea nitida*, *Alcornia cordifolia*, and *Asclepia speciosa*.

The relatively high density (0.718) of the entire shrub species present on the landscape gives an indication of good vegetation recovery. This assertion is also supported by the high GBH measurements (gbh of between 2.0 - 4.4cm) for the various shrub species (Table 3.5).

Table 3.5: Shrub species present at Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Abrus precatorius	Fabaceae	0.002	0.34	0.06	0.66	3.90	3.70
Acasia kamerunensis	Fabaceae	0.002	0.34	0.06	0.66	3.20	3.10
Afzelia Africana	Fabaceae	0.002	0.34	0.06	0.66	2.90	3.00
Agalea nitida	Connaraceae	0.001	0.17	0.03	0.33	2.60	3.00
Albizia adianthifolia	Fabaceae	0.012	1.69	0.27	2.97	2.90	3.20
Albizia ferruginea	Fabaceae	0.002	0.34	0.06	0.66	3.10	3.00
Albizia zygia	Fabaceae	0.005	0.67	0.09	0.99	3.20	3.90
Alcornia cordifolia	Euphorbiaceae	0.001	0.17	0.03	0.33	2.90	3.20
Alstonia boonei	Apocynaceae	0.001	0.17	0.03	0.33	3.20	4.20
Asclepia speciosa	Asclepiadaceae	0.001	0.17	0.03	0.33	2.80	3.20
Baphia nitida	Fabaceae	0.004	0.51	0.09	0.99	3.50	3.00
Baphia pubescens	Fabaceae	0.016	2.19	0.33	3.63	3.00	3.40
Blighia unjugata	Sapindaceae	0.002	0.34	0.06	0.66	3.10	3.00
Byrsocarpus coccineus	Commelinaceae	0.050	6.91	0.39	4.29	2.90	3.00
Cadiospermum grandifolium	Sapindaceae	0.001	0.17	0.03	0.33	3.60	3.50
Carpolobia lutea	Polygalaceae	0.005	0.67	0.12	1.32	3.10	3.30
Celtis mildbraedii	Ulmaceae	0.001	0.17	0.03	0.33	2.80	3.00
Celtis zenkeri	Ulmaceae	0.001	0.17	0.03	0.33	3.10	3.20
Chassala koli	Polemoniaceae	0.008	1.18	0.18	1.98	2.60	3.50
Chromolaena odorata	Asteraceae	0.007	1.01	0.09	0.99	2.60	3.00
Chrysophylum giganteum	Sapotaceae	0.001	0.17	0.03	0.33	2.90	3.00
Clausena anisata	Rutaceae	0.001	0.17	0.03	0.33	3.80	3.80
Cnestis febrifuga	Connaraceae	0.008	1.18	0.12	1.32	3.40	3.30
Cola gigantean	Sterculiaceae	0.006	0.84	0.15	1.65	3.10	3.20

Table 3.5 (Cont.): Shrub species present at Afadjato Community Forest Conservation Area.

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Cola Mellinii	Sterculiaceae	0.016	2.19	0.33	3.63	3.00	3.00
Costus afer	Costaceae	0.001	0.17	0.03	0.33	3.20	3.80
Crossopterix febrifuga	Rubiaceae	0.011	1.52	0.06	0.66	2.10	3.00
Daniellia olivera	Fabaceae	0.030	4.22	0.24	2.64	2.50	3.00
Deinbollia pinnata	Sapindaceae	0.004	0.51	0.09	0.99	3.40	3.30
Dialium guineense	Fabaceae	0.022	3.04	0.33	3.63	3.10	3.00
Dichapetalum madagascariense	Dichapetalaceae	0.017	2.36	0.33	3.63	2.90	3.00
Dioscoreophyllum cumminsii	Dioscoreaceae	0.001	0.17	0.03	0.33	2.30	3.00
Diospyros mobitensis	Ebenaceae	0.001	0.17	0.03	0.33	2.90	3.00
Diospyros abyssinica	Ebenaceae	0.005	0.67	0.12	1.32	2.90	3.00
Erythrophloem suaveolus	Fabaceae	0.002	0.34	0.03	0.33	2.70	3.00
Eugenia calophylloides	Myrtaceae	0.001	0.17	0.03	0.33	3.10	3.40
Ficus exasperate	Moraceae	0.001	0.17	0.03	0.33	2.30	3.00
Griffonia simplicifolia	Fabaceae	0.012	1.69	0.30	3.30	3.10	3.10
Holarrhena florimbunda	Apocynaceae	0.013	1.85	0.15	1.65	4.40	3.10
Hoslundia oppositifolia	Lamiaceae	0.001	0.17	0.03	0.33	3.20	3.10
Hymenostegia afzelii	Fabaceae	0.001	0.17	0.03	0.33	2.80	3.10

Table 3.5 (Cont.): Shrub species present at Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Khaya ivorensis	Meliaceae	0.005	0.67	0.03	0.33	2.80	3.00
Landolfia macranta	Apocynaceae	0.004	0.51	0.03	0.33	2.80	3.00
Landolfia africana	Apocynaceae	0.004	0.51	0.09	0.99	3.20	3.40
Landolfia togolana	Apocynaceae	0.001	0.17	0.03	0.33	2.60	3.00
Lannea acida	Anacardiaceae	0.002	0.34	0.06	0.66	3.10	3.00
Lecaniodiscus cupanoides	Sapindaceae	0.033	4.55	0.45	4.95	3.10	3.30
Leucaena glauca	Fabaceae	0.001	0.17	0.03	0.33	3.60	3.30
Lonchocarpus sericeus	Fabaceae	0.004	0.51	0.09	0.99	3.30	3.40
Lophira lanceolata	Ochnaceae	0.042	5.90	0.21	2.31	2.60	3.00
Macaranga barteri	Euphorbiaceae	0.001	0.17	0.03	0.33	3.10	4.20
Mallotus oppositiflia	Euphorbiaceae	0.004	0.51	0.09	0.99	3.10	3.30
Microdesmis puberula	Euphorbiaceae	0.006	0.84	0.06	0.66	3.00	3.00
Milicia excels	Moraceae	0.001	0.17	0.03	0.33	2.40	3.50
Millettia zechiana	Fabaceae	0.013	1.85	0.27	2.97	3.10	3.30
Monodora ternuifolia	Annonaceae	0.007	1.01	0.18	1.98	3.10	3.40
Monodora myristica	Annonaceae	0.012	1.69	0.09	0.99	2.90	4.40
Napoleona vogelii	Lecythidaceae	0.001	0.17	0.03	0.33	3.80	3.00
Nesogordonia papaverifera	Sterculiaceae	0.019	2.70	0.21	2.31	3.20	3.20
Newbouldia laevis	Bignoniaceae	0.007	1.01	0.18	1.98	2.70	3.10
Olax subcorpioides	Olacaceae	0.011	1.52	0.12	1.32	2.80	3.30
Olyra latifolia	Poaceae	0.002	0.34	0.06	0.66	2.80	3.40
Olyra subcoides	Poaceae	0.008	1.18	0.06	0.66	2.90	3.00
Paulinia pinnata	Sapindaceae	0.001	0.17	0.03	0.33	3.40	3.40

Table 3.5 (Cont.): Shrub species present at Afadjato Community Forest Conservation Area.

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Pavetta corymbosa	Rubiaceae	0.012	1.69	0.09	0.99	3.20	3.20
Phyllanthus arboreus	Euphorbiaceae	0.001	0.17	0.03	0.33	3.00	3.00
Piptadesniastrum africanum	Fabaceae	0.002	0.34	0.06	0.66	3.70	3.60
Psychotria calva	Rubiaceae	0.001	0.17	0.03	0.33	2.80	3.30
Pterigota macrocarpa	Sterculiaceae	0.001	0.17	0.03	0.33	4.10	3.40
Pterocapus mildbraedii	Fabaceae	0.009	1.35	0.09	0.99	2.40	3.00
Rothmania longiflora	Rubiaceae	0.007	1.01	0.15	1.65	4.10	3.60
Securidaca crossopterix	Polygalaceae	0.001	0.17	0.03	0.33	2.30	3.00
Securidaca longiflora	Polygalaceae	0.012	1.69	0.12	1.32	2.60	3.00
Smilax krauseana	Liliaceae	0.016	2.19	0.09	0.99	2.60	3.00
Sterculia oblonga	Sterculiaceae	0.001	0.17	0.03	0.33	3.60	3.00
Sterculia tragacantha	Sterculiaceae	0.006	0.84	0.09	0.99	3.40	3.40
Tabernaemontana pachysiphon	Apocynaceae	0.001	0.17	0.03	0.33	2.40	3.00
Terminalia superba	Combretaceae	0.001	0.17	0.03	0.33	3.20	3.00
Thaumatococcus danielii	Maranthaceae	0.018	2.53	0.03	0.33	3.20	3 .00
Tragia aquapimensis	Euphorbiaceae	0.002	0.34	0.06	0.66	3.00	3.20
Trichilia monadelpha	Meliaceae	0.004	0.51	0.09	0.99	2.60	2.00

Table 3.5 (Cont.): Shrub species present at Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Trichilia puriana	Meliaceae	0.001	0.17	0.03	0.33	2.80	3.00
Trilepisium madagascariense	Moraceae	0.012	1.69	0.09	0.99	3.10	3.00
Triplochiton scleroxylum	Sterculiaceae	0.001	0.17	0.03	0.33	6.00	4.10
Uapaca togoensis	Euphorbiaceae	0.001	0.17	0.03	0.33	2.90	3.00
Uvaria chamae	Annonaceae	0.001	0.17	0.03	0.33	3.00	3.30
Uvaria doeringii	Annonaceae	0.001	0.17	0.03	0.33	3.00	3.80
Vernonia camporum	Asteraceae	0.008	1.18	0.09	0.99	2.40	3.00
Total		0.718	100.00	9.18	1.00	294.70	305.40

Table 3.6 below shows the distribution by height, GBH, and density of the trees on the landscape. The tallest tree is *Morus mesozygia* (73.8m) and the shortest tree is *Crossopterix febrifuga* (2.7m). However the short height seen in most of the trees confirms the regeneration of the forest. *Khaya angolensis* is the most abundant and the most widely distributed on the landscape. It has a density of (5.3) and relative frequency of occurrence of (0.32%). Other trees of high density and distribution are *Cola mellinii, Bridelia ferruginea*, and *Albizia adianthifolia*.

The sparsely distributed trees are those that have a density of (0.0001) and relative frequency of occurrence of (0.30%) among them include *Acacia kamerunensis, Afzelia* africana *and Anthotica sassandraensis.*

Table 3.6: Tree Species Present At the Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Acacia kamerunensis	Fabaceae	0.0001	0.28	0.03	0.32	10.50	29.50
Afzelia Africana	Fabaceae	0.0001	0.19	0.03	0.32	12.00	35.00
Albizia adianthifolia	Fabaceae	0.0024	4.26	0.63	6.05	18.70	54.60
Albizia ferruginea	Fabaceae	0.0004	0.76	0.20	1.91	22.40	71.30
Albizia zygia	Fabaceae	0.0006	1.14	0.17	1.59	26.20	71.80
Allophylus africanus	Sapindaceae	0.0003	0.57	0.03	0.32	14.00	21.00
Alstonia boonei	Apocynaceae	0.0004	0.76	0.13	1.27	23.00	177.00
Amphimas pterocarpoides	Fabaceae	0.0002	0.38	0.07	0.64	31.00	44.50
Anthotica sassandraensis	Fabaceae	0.0001	0.19	0.03	0.32	9.00	38.00
Annona senegalensis	Annonaceae	0.0002	0.28	0.03	0.32	32.00	23.00
Antiaris toxicaria	Moraceae	0.0003	0.57	0.13	1.27	42.10	185.40
Argocoffeopsis rupestris	Rubiaceae	0.0006	1.04	0.23	2.23	15.00	39.60
Azadiracta indica	Meliaceae	0.0001	0.19	0.03	0.32	12.00	27.00
Baphia nitida	Fabaceae	0.0001	0.19	0.03	0.32	9.00	28.50
Baphia pubescens	Fabaceae	0.0006	1.14	0.23	2.23	14.00	32.30
Berlinia occidentalis	Fabaceae	0.0001	0.19	0.03	0.32	11.00	45.00
Blighia sapida	Sapindaceae	0.0002	0.28	0.07	0.64	32.50	130.00
Bombax buonopozenze	Bombacaceae	0.0001	0.19	0.03	0.32	16.00	48.00
Bridelia ferruginea	Fabaceae	0.0026	4.54	0.13	1.27	21.00	13.00
Canarium schweinfurthii	Burseraceae	0.0001	0.19	0.03	0.32	11.00	23.00
Cassia siamea	Fabaceae	0.0007	1.33	0.03	0.32	23.00	65.00
Cassia sieberianus	Fabaceae	0.0002	0.28	0.03	0.32	49.00	82.00
Ceiba pentandra	Bombacaceae	0.0013	2.27	0.40	3.82	26.20	162.30
Celtis malbraedi	Ulmaceae	0.0003	0.47	0.07	0.64	34.50	112.50
Celtis zenkeri	Ulmaceae	0.0001	0.19	0.03	0.32	22.00	56.00
Christiana Africana	Tiliaceae	0.0002	0.28	0.07	0.64	28.10	53.50
Cola gigantean	Sterculiaceae	0.0004	0.66	0.13	1.27	14.00	46.00
Cola mellinii	Sterculiaceae	0.0042	7.48	0.60	5.73	17.00	177.00

Table 3.6 (Cont.): Tree Species Present At the Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Combretum paniculatum	Combretaceae	0.0013	2.37	0.07	0.64	6.50	50.60
Crossopterix febrifuga	Rubiaceae	0.0042	7.48	0.27	2.55	2.70	22.20
Cussonia barteri	Araliaceae	0.0001	0.19	0.03	0.32	13.00	11.40
Dacleodes kleineana	Burseraceae	0.0004	0.76	0.13	1.27	32.00	110.40
Danielia olivera	Fabaceae	0.0014	2.46	0.20	1.91	11.90	65.00
Dialium guineense	Fabaceae	0.0004	0.76	0.13	1.27	12.30	40.00
Dichapetalum magagascariense	Dichapetalaceae	0.0004	0.66	0.13	1.27	18.50	45.50
Diospyros mobitensis	Ebenaceae	0.0001	0.19	0.03	0.32	8.00	27.00
Erythrophloem suaveolus	Fabaceae	0.0006	1.04	0.17	1.59	37.70	28.00
Eugenia calophylloides	Myrtaceae	0.0002	0.38	0.07	0.64	21.00	36.00
Ficus asperifolia	Moraceae	0.0001	0.19	0.03	0.32	32.00	91.00
Ficus exasperate	Moraceae	0.0004	0.66	0.10	0.96	19.20	51.30
Ficus sur	Moraceae	0.0004	0.76	0.10	0.96	14.80	56.40
Funtumia Africana	Apocynaceae	0.0001	0.19	0.03	0.32	18.00	53.00
Funtumia elastic	Apocynaceae	0.0002	0.28	0.07	0.64	13.50	41.00
Grewia pubescens	Tiliaceae	0.0001	0.19	0.03	0.32	26.00	50.00
Holarrhena floribunda	Apocynaceae	0.0005	0.95	0.13	1.27	13.90	59.70
Homalium letestui	Flacourtiaceae	0.0002	0.38	0.10	0.96	13.50	42.30
Khaya angolensis	Meliaceae	5.3333	0.09	0.03	0.32	8.50	25.00
Khaya anthotica	Meliaceae	0.0003	0.47	0.13	1.27	22.10	75.00
Khaya grandifolia	Meliaceae	0.0003	0.57	0.07	0.64	44.80	20.40
Khaya ivorensis	Meliaceae	0.0001	0.19	0.07	0.64	30.00	125.00
Lannea welwitschi	Anacardiaceae	0.0002	0.38	0.10	0.96	7.20	35.50
Lecaniodiscus cupanoides	Sapindaceae	0.0026	4.54	0.47	4.46	19.20	37.00
Lonchocarpus sericeus	Fabaceae	0.0003	0.47	0.07	0.64	12.00	26.50
Lophira lanceolata	Ochnaceae	0.0043	7.58	0.13	1.27	9.50	45.80
Macaranga barteri	Euphorbiaceae	0.0005	0.85	0.17	1.59	18.30	30.80

Table 3.6 (Cont.): Tree Species Present At the Afadjato Community Forest Conservation Area.

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Macaranga microphyla	Euphorbiaceae	0.0002	0.28	0.03	0.32	21.00	62.00
Magaritaria discoides	Euphorbiaceae	0.0002	0.28	0.07	0.64	11.90	27.50
Malacantha alnifolia	Sapotaceae	0.0001	0.19	0.03	0.32	7.20	26.00
Mesona bantamianus	Lamiaceae	0.0001	0.19	0.03	0.32	12.00	15.00
Milicia excels	Moraceae	0.0002	0.28	0.07	0.64	37.50	131.00
Millettia zechiana	Fabaceae	0.0013	2.27	0.23	2.23	24.70	34.00
Mimusops elongi	Sapotaceae	0.0002	0.28	0.07	0.64	20.00	73.00
Monodora myristica	Annonaceae	0.0002	0.38	0.10	0.96	20.40	46.70
Monodora ternuifolia	Annonaceae	0.0002	0.28	0.07	0.64	14.40	42.50
Morus mesozygia	Moraceae	0.0004	0.66	0.10	0.96	73.80	58.90
Myrianthus arboreus	Cecropiaceae	0.0003	0.57	0.07	0.64	15.50	71.50
Napoleona vogelii	Lecythidaceae	0.0001	0.19	0.03	0.32	7.00	34.00
Nauclea latifolia	Rubiaceae	0.0007	1.23	0.13	1.27	4.00	11.70
Nesogordonia papaverifera	Sterculiaceae	0.0006	1.04	0.20	1.91	23.50	54.80
Newbouldia laevis	Bignomiaceae	0.0007	1.23	0.20	1.91	17.10	35.50
Olax subscorpioides	Olacaceae	0.0002	0.28	0.07	0.64	6.30	19.50
Olyra latifolia	Poaceae	0.0002	0.28	0.03	0.32	6.70	21.00
Ouratea flava	Ochnaceae	0.0004	0.66	0.10	0.96	3.00	20.00
Pachystela brevipes	Sapotaceae	0.0002	0.28	0.07	0.64	17.50	39.00
Parkia bicolour	Fabaceae	0.0001	0.19	0.03	0.32	63.50	285.00
Pavetta corymbosa	Rubiaceae	0.0002	0.28	0.03	0.32	20.00	22.00
Pycnanthus angolensis	Myrtaceae	0.0001	0.19	0.03	0.32	21.00	42.00
Rauwolfia vomitoria	Apocynaceae	0.0002	0.28	0.07	0.64	22.60	44.00
Rothmania longiflora	Rubiaceae	0.0001	0.19	0.03	0.32	33.00	56.00
Securidaca longiflora	Polygalaceae	0.0074	13.16	0.23	2.23	3.70	20.30
Sterculia oblonga	Sterculiaceae	0.0002	0.28	0.07	0.64	17.40	39.50
Sterculia rhinopetalum	Sterculiaceae	0.0001	0.19	0.03	0.32	9.20	33.00
Sterculia tragacantha	Sterculiaceae	0.0014	2.56	0.27	2.55	26.50	47.40

Table 3.6 (Cont.): Tree Species Present At the Afadjato Community Forest Conservation Area

Species	Family	Density	Relative Density (%)	Freq	Relative Freq (%)	Mean Height (m)	Mean GBH (cm)
Tabernaemontana pachysiphon	Apocynaceae	0.0003	0.57	0.07	0.64	11.50	37.00
Tamarindus indica	Fabaceae	0.0002	0.28	0.07	0.64	4.20	45.00
Terminalia avicennioides	Combretaceae	0.0002	0.38	0.07	0.64	5.00	59.00
Terminalia glaucocescens	Combretaceae	0.0001	0.19	0.07	0.64	23.00	77.50
Terminalia microptera	Combretaceae	0.0001	0.19	0.03	0.32	13.00	38.00
Terminalia superb	Combretaceae	0.0002	0.28	0.07	0.64	30.00	111.50
Tetrochidium didymostemon	Euphorbiaceae	0.0001	0.19	0.03	0.32	9.50	67.00
Trema orientalis	Ulmaceae	0.0001	0.19	0.03	0.32	7.50	20.00
Trichilia heudeloti	Meliaceae	0.0001	0.19	0.03	0.32	6.50	35.00
Trichilia monadelpha	Meliaceae	0.0002	0.38	0.07	0.64	15.50	62.00
Trichilia puriana	Meliaceae	0.0002	0.38	0.03	0.32	10.50	47.00
Trichilia roka	Meliaceae	0.0001	0.19	0.03	0.32	9.00	69.00
Trilepisium madagascariense	Moraceae	0.0006	1.04	0.13	1.27	22.10	60.00
Triplochiton scleroxylum	Sterculiaceae	0.0002	0.28	0.07	0.64	47.50	316.00
Vitex doniana	Verbenaceae	0.0005	0.95	0.23	2.23	21.90	65.20
Zanthoxylum leprieuri	Rutaceae	0.0003	0.47	0.13	1.27	21.00	53.50

The table 3.7 below shows the descriptive statistics of the occurrence of the plant species at the study site.

When the density is considered, Simpson's diversity index was lower in the herbs (-0.05) than in the shrubs (3.48), but this figure in the shrubs are also higher than the trees (1.06). This similar trend is also seen in the Shannon diversity index. It was lower in the herbs

(0.81) than the shrubs (0.86) and the shrubs are also higher than the trees (0.81) (see Table 3.7).

The mean Shannon and Simpson diversity for the herbs, shrubs and the trees are 0.83 and 2.48 respectively. The mean stand density of all the species present in the study area is 3.38 ± 0.09 Table 3.4.

In terms of height, the Simpsons Diversity indicated the highest height in the trees (0.01m) followed by shrubs (0.01m) and the lowest in the herbs (-0.02m) (Table 3.7). In a similar way, the Shannon J indicated the highest height in the trees (1.00m) followed by the shrubs (1.00m) and the lowest in the herbs (0.98m) (Table 3.7).The mean tree height for this study is 19.12m Table 3.7. The range of tree species count per 25m x 25m plot is 7 to a maximum of 15 (Appendix 1a). For the GBH measurements, Simpson's Diversity was higher in the trees (0.02cm) than the shrubs (0.01cm). Similarly, Shannon J results indicated that trees have higher GBH (1.00cm) than the shrubs (0.95cm) (see Table 3.7)

Table 3.7: Descriptive Statistics for the occurence of the herbs, shrubs, and tree species at the study site.

Sample	Herbs		Shrubs			Trees		
	Density	Height (m)	Density	Height (m)	GBH (cm)	Density	Height/m	GBH (cm)
Mean	10.12 ±0.25	0.42 ±0.17	0.007 ±0.01	3.04 ±0.53	3.15 ±0.43	0.001 ±0.01	19.12 ±12.32	58.18 ±49.65
Variance	0.06	0.03	0	0.28	0.17	0	151.72	2465.49
Standard error	0.03	0.02	0.01	0.05	0.04	0	1.23	4.97
Minimum	0.02	0.02	0.01	2.10	2	0	2.70	11.40
Maximum	1.96	1	0.05	6	4.40	0.01	73.80	316
Confidence interval	0.01	0.01	0	0.06	0.03	0	29.74	488.24
Shannon J	0.81	0.98	0.86	1.00	0.95	0.81	1.00	1.00
Simpson D	-0.05	-0.02	3.48	0.01	0.01	1.06	0.01	0.02

3.3.0 Comparison of total mean number of individual plants in the transects

The mean number of individual trees in the 25m x 25m plots in the three transects laid was 11.00±5.23 (Appendix 1a). There was a significant difference ($F_{2,\ 27}$ =13.49, P<0.001) (Appendix 1b), in the mean number of individual plants between the transects. There was a significant difference in the number of individuals between transects 1 and 2 (P<0.003) and transects 1 and 3 (P<0.001). However, the difference between transects 2 and 3 was not significant (P>0.05) (Appendix 1c). Transect 1 recorded the highest

number of individuals (15.80±5.57), followed by transect 2 (10.20±2.35) and transect 3 (7.00±2.75).

The mean number of individuals per transect for the entire transects was 9.36±5.08 in the 5m x 5m (Appendix 1a). There was a significant difference ($F_{2, 30} = 3.36$, $P < 0.05$) (Appendix 2a) in the mean number of individual plants between the transects. There was a significant difference in the number of individuals between transects 1 and 2 ($P < 0.016$). Those of transects 1 and 3 ($P > 0.353$) and 2 and 3 ($P > 0.116$) were however not significantly different (Appendix 2b).

The mean number of individuals per transect for the entire transects was 8.06±5.68 in the 1m x 1m (Appendix 1a). There was a significant difference ($F_{2, 30} = 10.38$, $P < 0.001$) (Appendix 3a) in the mean number of individual plants between the transects. There was a significant difference in the number of individuals between transects 1 and 2 ($P < 0.001$) and 1 and 3 ($P<0.013$) however the difference between transects 2 and 3 was not significant ($P > 0.069$) (Appendix 3b).

3.3.1 The mean values of density and height of the herbs along/across the transects

The mean density of the herbs in transects 1, 2, and 3 was (0.24±0.15), (0.19±0.21) and (0.52±1.15) respectively (Appendix 4 and Table 3.8). The mean heights of the herbs in transects 1, 2, and 3 was (0.41±0.13), (0.43±0.18), and (0.42±0.18) respectively. However, there was no significant difference in the density ($F_{2, 91} = 2.43$, $P > 0.09$) and heights ($F_{2, 91} = 0.22$, $P > 0.80$) (Appendix 5a) of the herbs between the three transect.

Herb species that occurred in only transect 1 includes: *Adenia lobata, Culcasia angolensis, Cyathula prostrata, Dioscoreophyllum cumminsii* and *Hypselodelphys violacea* among others Table 3.8. Herb species perculiar to only transect 2 includes: *Annona senegalensis, Baissea multiflora* and *Chassala koli* among others. Herb species perculiar to only transect 3 includes: *Andropogon gayanus, Centella asiastica*, and *Cardiospermum longiflorum*. Also there are some herb species that occurred in all the 3 transects. They include: *Phaulopsis parviflora* and *Smilax longiflora*. Table 3.8.

Table 3.8: Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Abrus precatorius	0.36	0.09	0.20	0.18	0.18	0.50	-	-	-
Acacia kamerunensis	-	-	-	0.27	0.18	0.30	-	-	-
Adenia lobata	0.27	0.18	0.40	-	-	-	-	-	-
Albizia adianthifolia	-	-	-	0.09	0.09	0.30	0.18	0.18	0.30
Albizia zygia	-	-	-	0.18	0.18	0.60	-	-	-
Andropogon gayanus	-	-	-	-	-	-	5.90	0.45	0.40
Annona senegalensis	-	-	-	0.09	0.09	0.40	-	-	-
Antiaris toxicaria	0.27	0.27	0.40	0.36	0.27	0.50	0.09	0.09	0.40
Baissea multiflora	-	-	-	0.18	0.18	0.20	-	-	-
Baphia pubescens	-	-	-	0.09	0.09	0.30	-	-	-

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Blighia sapida	-	-	-	0.18	0.18	0.30	0.09	0.09	0.20
Byrsocarpus coccineus	-	-	-	0.36	0.27	0.40	0.09	0.09	0.20
Cardiospermum longiflorum	-	-	-	-	-	-	0.09	0.09	0.40
Centella asiastica	-	-	-	-	-	-	0.09	0.09	0.20
Chassala koli	-	-	-	0.18	0.18	0.20	-	-	-
Chromolaena odorata	0.36	0.36	0.20	0.27	0.27	0.30	-	-	-
Cola mellinii	-	-	-	0.09	0.09	0.50	-	-	-
Culcasia angolensis	0.18	0.18	0.40	-	-	-	-	-	-
Culcasia parviflora	-	-	-	0.09	0.09	0.20	-	-	-

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Cyatula prostrata	0.09	0.09	0.40	-	-	-	-	-	-
Danielia olivera	-	-	-	-	-	-	0.18	0.09	0.30
Dialium guineense	-	-	-	-	-	-	0.63	0.27	0.40
Dichapetalum barteri	-	-	-	0.09	0.09	0.40	-	-	-
Dioscorea smilacifolia	-	-	-	0.09	0.09	0.30	-	-	-
Dioscoreophyllum cumminsii	0.09	0.09	0.60	-	-	-	-	-	-
Diospyros abyssinica	-	-	-	-	-	-	0.09	0.09	0.40
Emelia coccinea	-	-	-	0.09	0.09	0.40	-	-	-
Eugenia calophylloides	-	-	-	0.09	0.09	0.40	-	-	-

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Griffonnia simplicifolia	0.18	0.18	0.50	0.27	0.27	0.30	0.09	0.09	0.30
Grewia carpinifolia	-	-	-	0.09	0.09	0.30	-	-	-
Heteropogon contortus	-	-	-	-	-	-	0.54	0.18	0.20
Hoslundia opposite	-	-	-	0.09	0.09	0.40	-	-	-
Justicia flava	-	-	-	0.18	0.18	0.60	-	-	-
Landolfia dulcis	-	-	-	0.09	0.09	0.60	-	-	-
Landolfia micrantha	-	-	-	0.27	0.27	0.40	-	-	-
Lecaniodiscus cupanoides	-	-	-	0.09	0.09	0.50	-	-	-

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Leptaspis cochleata	0.09	0.09	0.40	-	-	-	-	-	-
Lophira lanceolata	-	-	-	-	-	-	0.09	0.09	0.60
Melinis minutiflora	-	-	-	1.09	0.09	0.60	1.18	0.09	0.40
Millettia zechiana	0.18	0.18	0.50	-	-	-	0.09	0.09	0.40
Nesogordonia papaverifera	0.09	0.09	0.30	0.27	0.27	0.60	-	-	-
Newbouldia laevis	-	-	-	0.09	0.09	0.40	-	-	-
Olax subscorpioides	-	-	-	-	-	-	0.09	0.09	0.60
Olyra latifolia	-	-	-	-	-	-	0.81	0.18	0.80

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Oplismenus boomenii	0.27	0.18	0.20	-	-	-	-	-	-
Pachystela brevipes	-	-	-	0.09	0.09	0.60	-	-	-
Pancovia florimbunda	-	-	-	0.09	0.09	0.50	-	-	-
Pancovia turbinate	-	-	-	0.18	0.18	0.50	-	-	-
Panicum fragmitoides	-	-	-	0.90	0.09	0.40	0.81	0.18	0.40
Paulinia pinnata	-	-	-	0.09	0.09	0.60	-	-	-
Pavetta corymbosa	-	-	-	-	-	-	0.09	0.09	0.30
Phaulopsis parviflora	0.72	0.27	0.50	0.09	0.09	0.50	0.09	0.09	0.50
Piper guineense	0.18	0.18	0.60	-	-	-	-	-	-

Table 3.8 (Cont): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Psychotria calva	-	-	-	0.18	0.18	0.30	-	-	-
Psychotria subobliqua	-	-	-	0.09	0.09	0.40	-	-	-
Setaria gayanus	0.27	0.27	0.20	-	-	-	-	-	-
Smilax krauseana	0.45	0.27	0.40	0.09	0.09	0.40	1.09	0.18	0.90
Spathodia campanolata	-	-	-	0.09	0.09	0.30	-	-	-
Sterculia tragacantha	-	-	-	0.09	0.09	0.30	-	-	-
Thaumatococcus danielii	0.27	0.27	0.60	0.72	0.09	1.00	-	-	-

Table 3.8 (Cont.): Herbs occurring along the transects

Species	Transect 1			Transect 2			Transect 3		
	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)	Density	Freq	Mean Height (m)
Tragia aquapimensis	0.36	0.27	0.30	0.09	0.09	0.20	-	-	-
Trichilia monadelpha	-	-	-	-	-	-	0.09	0.09	0.30
Uvaria doeringii	-	-	-	0.09	0.09	0.20	-	-	-
Uvaria globosa	-	-	-	-	-	-	0.09	0.09	0.60
Vernonia camporum	-	-	-	-	-	-	0.18	0.09	0.30

3.3.2 The mean values of density, height and GBH of shrubs along/across the transects

The mean density of the shrubs in transects 1, 2, and 3 was (0.23±0.29), (0.31±0.34) and (0.46±0.72) respectively (Appendix 4 and Table 3.20). The mean heights of shrubs within transect 1, 2, and 3 was (3.06±0.62), (2.98±0.34), and (2.91±0.51) respectively. The mean GBH of shrubs for transects 1, 2, and 3 was (3.26±0.41), (3.27±0.46) and (3.00±0.38) respectively (Appendix 4). There was no significant difference in the density ($F_{2, 159} = 2.92$, $P > 0.06$) and heights ($F_{2, 159} = 1.12$, $P > 0.33$) of the shrubs between the three transects. (Appendix 5b). Shrub species that occurred in only transect 1 includes: *Celtis mildbraedii, Chrysophyllum giganteum, Diospyros monbuttensis, Eugenia calophyloides* and *Ficus exasperata* among others Table 3.9. Shrub species perculiar to only transect 2 includes: *Agalaea nitida, Asclepias speciosa, Baphia pubescens, Blighia unjuculata,* and *Celtis zenkeri* among others. Shrub species perculiar to only transect 3 includes: *Adansonia digitata, Albizia ferruginia, Alcornia cordifolia, Cardiospermum grandifolium* and *Crossopterix febrifuga* among others. Also there are some Shrubs species that occurred in all the 3 transects. They include *Byrsocarpus coccineus* and *Carpolobia lutea* among others Table 3.9.

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Table 3.9: Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Abrus precatorius	-	-	-	-	0.09	0.09	3.20	3.10	0.09	0.09	2.90	3.70
Acacia kamerunensis	0.09	0.09	3.00	3.10	0.09	0.09	2.80	3.00	-	-	-	-
Adansonia digitata	-	-	-	-	-	-	-	-	0.18	0.09	2.40	3.60
Afzelia Africana	-	-	-	-	0.09	0.09	2.60	2.80	0.09	0.09	3.30	3.20
Agalea nitida	-	-	-	-	0.09	0.09	2.60	2.60	-	-	-	-
Albizia adianthifolia	0.09	0.09	3.00	3.10	0.36	0.36	3.10	3.50	0.45	0.36	2.70	2.90
Albizia ferruginea	-	-	-	-	-	-	-	-	0.18	0.18	3.10	3.00
Albizia zygia	0.09	0.09	2.80	3.20	-	-	-	-	0.27	0.18	3.20	4.60
Alcornia cordifolia	-	-	-	-	-	-	-	-	0.09	0.09	2.90	3.20
Alstonia boonei	0.09	0.09	4.00	4.20	-	-	-	-	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Antiaris toxicaria	0.36	0.27	3.00	3.10	1.18	0.45	3.00	3.20	0.09	0.09	3.10	2.80
Asclepia speciosa	-	-	-	-	0.09	0.09	2.80	3.20	-	-	-	-
Baphia nitida	-	-	-	-	0.27	0.27	3.50	2.60	-	-	-	-
Baphia pubescens	0.36	0.27	3.00	3.30	0.63	0.54	3.00	3.30	0.18	0.18	3.00	2.90
Blighia unjuculata	-	-	-	-	0.18	0.18	3.10	2.90	-	-	-	-
Byrsocarpus coccineus	0.54	0.36	3.00	3.40	0.36	0.36	3.10	3.40	2.81	0.45	2.90	2.70
Cadiospermum grandifolium	-	-	-	-	-	-	-	-	0.09	0.09	3.60	3.50
Carpolobia lutea	0.09	0.09	3.20	3.40	0.18	0.18	2.90	3.00	0.09	0.09	3.10	2.50
Celtis mildbraedii	0.09	0.09	3.00	3.20	-	-	-	-	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

SPECIES	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Celtis zenkeri	-	-	-	-	0.09	0.09	3.00	3.80	-	-	-	-
Chassala koli	0.36	0.27	2.80	3.20	0.27	0.27	2.60	3.50	-	-	-	-
Chromolaena odorata	0.09	0.09	2.60	3.00	0.18	0.09	2.90	2.80	0.27	0.09	2.40	3.00
Chrysophylum giganteum	0.09	0.09	2.90	3.00	-	-	-	-	-	-	-	-
Clausena anisata	-	-	-	-	0.09	0.09	3.80	4.20	-	-	-	-
Cnestis febrifuga	0.09	0.09	3.60	3.60	0.54	0.27	3.20	2.90	-	-	-	-
Cola gigantean	-	-	-	-	0.36	0.36	3.10	3.10	0.09	0.09	2.8	3.40
Cola Mellinii	0.36	0.18	3.20	3.50	0.54	0.54	2.80	3.00	0.27	0.27	3.00	3.00

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Costus afer	-	-	-	-	0.09	0.09	3.20	3.80	-	-	-	-
Crossopterix febrifuga	-	-	-	-	-	-	-	-	0.81	0.18	2.40	2.60
Deinbollia pinnata	-	-	-	-	0.09	0.09	3.60	4.20	0.18	0.18	3.10	3.10
Dialium guineense	0.72	0.45	2.90	3.30	0.54	0.36	3.10	3.30	0.36	0.18	3.10	2.70
Dichapetalum madagascariense	0.27	0.27	3.00	3.90	0.54	0.54	3.00	3.10	0.45	0.18	2.90	2.70
Dioscorea smilacifolia	-	-	-	-	0.09	0.09	2.30	2.80	-	-	-	-
Diospyros monbuttensis	0.09	0.09	2.90	3.00	-	-	-	-	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Diospyros abyssinica	0.18	0.18	3.20	3.50	0.18	0.18	2.80	2.70	-	-	-	-
Erythrophloem suaveolus	-	-	-	-	-	-	-	-	0.18	0.09	2.70	2.90
Eugenia calophyloides	0.09	0.09	3.10	3.00	-	-	-	-	-	-	-	-
Griffonia simplicifolia	0.18	0.18	2.50	3.00	0.45	0.45	3.70	3.30	0.27	0.27	3.00	3.00
Holarrhena florimbunda	0.27	0.09	2.50	3.00	0.45	0.27	3.10	3.70	0.27	0.09	3.20	2.70
Hoslundia oppositifolia	-	-	-	-	-	-	-	-	0.09	0.09	3.20	3.10
Hymenostegia afzelii	0.09	0.09	2.80	3.00	-	-	-	-	-	-	-	-
Hypselodelphys violaca	-	-	-	-	0.09	0.09	2.40	2.80	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Khaya anthotica	0.27	0.09	3.40	3.40	0.09	0.09	2.80	2.90	0.09	0.09	3.50	2.70
Khaya ivorensis	-	-	-	-	0.36	0.09	2.80	2.90	-	-	-	-
Landolfia macranta	0.09	0.09	2.80	3.00	-	-	-	-	-	-	-	-
Landolfia Africana	-	-	-	-	0.27	0.27	3.20	3.40	-	-	-	-
Landolfia togolana	-	-	-	-	-	-	-	-	0.27	0.09	2.60	3.00
Lannea acida	-	-	-	-	0.09	0.09	3.20	3.60	0.09	0.09	2.90	2.80
Lecaniodiscus cupanoides	1.36	0.54	2.90	3.00	0.45	0.45	3.10	3.30	0.63	0.36	2.10	2.90
Leucaena gluca	-	-	-	-	-	-	-	-	0.09	0.09	3.60	3.30

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Lonchocarpus sericeus	0.09	0.09	3.20	3.30	0.09	0.09	3.60	3.80	0.09	0.09	3.20	3.10
Lophira Ianceolata	0.09	0.09	3.00	4.00	0.09	0.09	3.20	4.20	3.00	0.45	2.60	2.80
Macaranga barteri	-	-	-	-	0.09	0.09	2.20	2.80	-	-	-	-
Mallotus oppositiflia	0.09	0.09	2.80	3.00	0.09	0.09	2.80	3.00	0.09	0.09	3.10	3.30
Microdesmis puberula	0.09	0.09	2.80	3.20	0.36	0.09	3.20	3.10	-	-	-	-
Milicia excelsa	-	-	-	-	0.09	0.09	3.60	4.20	-	-	-	-
Millettia zechiana	0.36	0.27	2.80	3.00	0.36	0.27	2.70	2.70	0.27	0.27	2.80	3.30
Monodora ternuifolia	0.18	0.18	3.30	4.10	0.36	0.36	3.10	3.40	-	-	-	-
Monodora myristica	0.09	0.09	3.10	3.00	0.81	0.18	2.90	4.40	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Napoleona vogelii	-	-	-	-	0.09	0.09	3.20	4.20	-	-	-	-
Nesogordonia papaverifera	0.36	0.27	2.90	3.00	1.09	0.36	3.10	3.60	-	-	-	-
Newbouldia laevis	0.18	0.18	3.40	3.10	0.36	0.36	2.40	3.20	-	-	-	-
Olax subcorpioides	0.18	0.09	3.00	3.40	0.09	0.09	3.00	3.60	0.54	0.18	2.60	3.20
Olyra latifolia	-	-	-	-	0.18	0.18	2.50	3.00	-	-	-	-
Olyra subcoides	-	-	-	-	-	-	-	-	0.63	0.18	2.90	2.60
Pachystela brevipes	-	-	-	-	0.18	0.18	2.90	3.20	-	-	-	-
Palisota hirsuta	1.45	0.09	2.40	3.00	1.81	0.18	2.90	3.20	-	-	-	-

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Pancovia turbinata	-	-	-	-	0.09	0.09	3.10	2.60	-	-	-	-
Panicum fragmitoides	-	-	-	-	-	-	-	-	2.90	0.09	2.40	2.60
Paulinia pinnata	-	-	-	-	-	-	-	-	0.09	0.09	3.40	3.40
Pavetta corymbosa	0.54	0.18	3.20	3.20	0.36	0.09	3.20	3.20	-	-	-	-
Phyllanthus arboreus	0.09	0.09	3.00	3.00	-	-	-	-	-	-	-	-
Piptadesniastrum africanum	0.09	0.09	4.60	4.00	0.09	0.09	2.80	3.20	-	-	-	-
Pterigota macrocarpa	0.09	0.09	4.10	3.40	-	-	-	-	-	-	-	-
Pterocapus malbraedii	0.09	0.09	2.50	2.40	0.09	0.09	3.00	3.00	0.54	0.09	2.10	3.00
Rothmania longiflora	-	-	-	-	0.18	0.18	3.00	3.60	0.36	0.27	4.80	2.90

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Securidaca crossopterix	-	-	-	-	-	-	-	-	0.09	0.09	1.80	3.00
Securidaca longiflora	0.09	0.09	2.80	3.80	0.09	0.09	3.00	4.00	0.72	0.18	2.40	2.60
Smilax krauseana	-	-	-	-	-	-	-	-	1.18	0.27	2.60	2.60
Sterculia oblonga	-	-	-	-	-	-	-	-	0.09	0.09	3.60	2.90
Sterculia tragacantha	0.09	0.09	4.00	4.20	0.27	0.27	3.30	3.70	0.09	0.09	2.80	2.60
Tabernaemontana pachysiphon	-	-	-	-	0.09	0.09	2.40	3.00	-	-	-	-
Terminalia superba	-	-	-	-	-	-	-	-	0.09	0.09	3.20	2.80
Thaumatococcus danielii	-	-	-	-	1.36	0.09	2.30	2.60	-	-	-	-
Tragia aquapimensis	-	-	-	-	0.09	0.09	3.00	3.40	0.09	0.09	3.60	3.50

Table 3.9 (Cont.): Shrubs occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Trilepisium madagascariense	-	-	-	-	0.81	0.18	3.10	3.00	0.09	0.09	2.80	3.00
Trichilia monadelpha	-	-	-	-	0.09	0.09	3.40	2.90	0.18	0.18	1.90	2.70
Trichilia puriana	0.09	0.09	2.80	3.00	-	-	-	-	-	-	-	-
Triplochiton scleroxylum	0.09	0.09	6.00	4.10	-	-	-	-	-	-	-	-
Uapaca togoensis	0.09	0.09	2.90	2.50	-	-	-	-	-	-	-	-
Uvaria chamae	0.09	0.09	3.00	3.30	-	-	-	-	-	-	-	-
Uvaria doeringii	-	-	-	-	0.09	0.09	2.80	3.40	-	-	-	-
Vernonia camporum	0.63	0.27	2.20	2.70	-	-	-	-	-	-	-	-

3.3.3 The mean values of density, height and DBH of trees along/across the transects

The mean density of trees in the transects 1, 2, and 3 was (0.57±1.07), (0.43±0.66) and (1.01E+00 ±2.12E+00) respectively (Appendix 4 and Table 3.10). The mean heights of trees in the transects 1, 2, and 3 was (18.31±12.68), (21.00±10.33) and (1.71E+01±2.03E+01) respectively (Appendix 4 and Table 3.10). The mean GBH of trees in the transects 1, 2, and 3 was (62.62±61.68), (62.27±40.31) and (5.44E+01±5.01E+01) respectively (Appendix 4 and Table 3.10).There was no significant difference in the density ($F_{2, 168} = 2.89$, $P > 0.06$), heights ($F_{2, 168} = 0.96$, $P > 0.39$) and GBH ($F_{2, 168} = 0.33$, $P > 0.72$) of the trees between the three transects (Appendix 6). More trees occurred in transect 1 (82) than transect 2 (52) and transect 3 (39). The unique tree species (that is tree species found in only one transect but not in others) also show similar patterns with transect 1 recording the highest (33), transects 2 and 3 with (9 species each) (Figure 3.7)

A total of 22 species of trees, however, occurred in all the three transects Figure 3.7. They include *Albizia adianthifolia, Baphia pubescens, Bridelia ferruginea, Cola mellinii, Crossopterix febrifuga, Dacleodes kleineana* and *Dilium guineense* among others. (Table 3.10).

Table 3.10: Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Acacia kamerunensis	0.20	0.10	10.50	29.50	-	-	-	-	-	-	-	-
Afzelia africana	-	-	-	-	0.10	0.10	12.00	35.00	-	-	-	-
Albizia adianthifolia	1.80	0.70	12.90	43.80	1.60	0.70	27.80	61.17	1.00	0.50	15.50	58.40
Albizia ferruginea	0.20	0.20	27.00	99.50	0.40	0.30	17.70	43.00	0.10	0.10	16.00	20.00
Albizia zygia	0.20	0.10	35.50	91.00	0.70	0.20	30.00	81.00	0.20	0.20	13.00	43.50
Allophylus africanus	-	-	-	-	-	-	-	-	0.50	0.10	11.00	21.00
Alstonia boonei	0.20	0.20	18.30	143.30	-	-	-	-	0.50	0.20	27.50	210.00
Amphimas pterocarpoides	0.30	0.20	31.00	44.50	-	-	-	-	-	-	-	-
Annona senegalensis	-	-	-	-	-	-	-	-	0.20	0.10	4.20	19.00

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Anthotica sassandraensis	0.10	0.10	9.00	38.00	-	-	-	-	-	-	-	-
Antiaris toxicaria	0.40	0.30	43.20	250.70	-	-	-	-	0.10	0.10	41.00	120.00
Argocoffeopsis rupestris	0.80	0.50	10.40	42.70	0.20	0.20	19.50	36.50	-	-	-	-
Azadiracta indica	-	-	-	-	-	-	-	-	0.10	0.10	12.00	27.00
Baphia nitida	-	-	-	-	-	-	-	-	0.10	0.10	8.00	25.00
Baphia pubescens	0.70	0.50	11.90	31.60	0.10	0.10	18.00	33.30	0.30	0.10	12.00	32.00
Berlinia pubescens	0.10	0.10	20.00	45.00	-	-	-	-	-	-	-	-
Blighia sapida	0.20	0.20	32.50	130.00	-	-	-	-	-	-	-	-
Bombax buonopozenze	-	-	-	-	0.10	0.10	16.00	48.00	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Bridelia ferruginea	1.50	0.10	13.00	12.00	1.50	0.10	8.00	12.00	1.70	0.20	4.00	14.00
Canarium schweinfurthii	0.10	0.10	11.00	23.00	-	-	-	-	-	-	-	-
Cassia siamea	-	-	-	-	1.30	0.10	23.00	65.00	-	-	-	-
Casia sieberianus	0.20	0.10	49.00	82.00	-	-	-	-	-	-	-	-
Ceiba pentandra	0.90	0.60	26.40	162.30	1.00	0.40	35.00	118.00	0.40	0.20	26.00	-
Celtis mildbraedii	0.40	0.20	34.50	112.50	-	-	-	-	-	-	-	-
Celtis zenkeri	0.10	0.10	22.00	56.00	-	-	-	-	-	-	-	-
Christiana africana	0.20	0.20	28.10	53.50	-	-	-	-	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Cola gigantean	0.40	0.20	9.90	33.00	0.10	0.10	11.00	35.00	0.10	0.10	21.00	70.00
Cola mellinii	3.70	0.80	14.80	308.40	2.80	0.70	16.10	43.10	1.30	0.30	19.00	44.70
Combretum paniculatum	1.40	0.10	8.90	50.60	1.00	0.10	8.00	49.00	-	-	-	-
Crossopterix febrifuga	0.70	0.10	8.00	13.00	0.70	0.10	7.00	13.00	6.30	0.60	6.70	40.70
Cussonia barteri	-	-	-	-	-	-	-	-	0.10	0.10	7.00	42.00
Dacleodes kleineana	0.30	0.20	40.00	113.30	0.10	0.10	21.00	82.00	0.30	0.10	35.00	136.00
Danielia olivera	0.10	0.10	14.00	85.00	-	-	-	-	2.40	0.50	9.80	45.00
Dialium guineense	0.30	0.20	7.00	31.80	0.30	0.10	14.00	65.00	0.10	0.10	16.00	23.00

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Dichapetalum madagascariense	0.20	0.20	18.50	42.00	0.40	0.20	17.50	49.00	-	-	-	-
Diospyros monbitensis	0.1	0.1	8	27	-	-	-	-	-	-	-	-
Erythrophloem suaveolus	0.20	0.10	33.50	100.50	0.20	0.20	46.50	167.00	0.60	0.20	33.00	136.50
Eugenia calophilata	-	-	-	-	-	-	-	-	0.30	0.20	4.50	32.00
Ficus asperifolia	0.10	0.10	32.00	91.00	-	-	-	-	-	-	-	-
Ficus exasperata	0.50	0.20	15.40	42.50	0.10	0.10	23.00	60.00	-	-	-	-
Ficus sur	0.40	0.20	10.00	57.30	0.30	0.20	19.50	55.50	-	-	-	-
Funtumia africana	-	-	-	-	0.10	0.10	18.00	53.00	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Funtumia elastica	0.10	0.10	9.00	29.00	-	-	-	-	-	-	-	-
Grewia pubescens	0.10	0.10	26.00	50.00	-	-	-	-	-	-	-	-
Holarrhena florimbunda	0.10	0.10	27.00	70.00	0.10	0.10	19.00	70.00	0.70	0.20	14.60	39.00
Homalium letestui	-	-	-	-	0.30	0.30	13.50	42.30	-	-	-	-
Khaya angolensis	0.10	0.10	8.50	25.00	-	-	-	-	-	-	-	-
Khaya anthotica	0.10	0.10	15.50	30.00	0.30	0.30	28.70	120.00	-	-	-	-
Khaya grandifolia	0.50	0.20	44.80	20.40	-	-	-	-	-	-	-	-
Khaya ivorensis	-	-	-	-	0.20	0.20	30.00	125.00	-	-	-	-
Lannea welwitschi	0.10	0.10	9.10	25.00	0.10	0.10	42.00	166.00	0.10	0.10	5.20	46.00

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Lecaniodiscus cupanoides	3.20	0.60	26.10	36.40	1.00	0.70	13.60	45.70	0.50	0.10	18.00	29.00
Lonchocarpus cereseus	0.10	0.10	17.00	25.00	-	-	-	-	0.30	0.10	7.00	28.00
Lophira lanceolata	-	-	-	-	-	-	-	-	7.90	0.40	9.50	45.80
Macaranga barteri	0.50	0.30	18.30	30.80	0.30	0.20	21.00	84.50	-	-	-	-
Macaranga microphyla	-	-	-	-	0.20	0.10	21.00	62.00	-	-	-	-
Magaritaria discoides	0.10	0.10	8.70	17.00	0.10	0.10	15.00	38.00	-	-	-	-
Malacantha alnifolia	0.10	0.10	7.20	26.00	-	-	-	-	-	-	-	-
Mesoneron bantamianus	-	-	-	-	-	-	-	-	0.10	0.10	6.00	15.00

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Milicia excelsa	0.10	0.10	30.00	45.00	0.10	0.10	45.00	217.00	-	-	-	-
Millettia zechiana	1.50	0.50	36.00	34.20	0.50	0.10	25.00	49.00	0.30	0.10	13.00	19.00
Mimusops elongi	0.10	0.10	17.00	31.00	-	-	-	-	0.10	0.10	23.00	115.00
Monodora myristica	0.10	0.10	38.00	80.00	0.10	0.10	21.00	42.00	0.10	0.10	4.00	18.00
Monodora ternuifolia	0.20	0.20	14.40	42.50	-	-	-	-	-	-	-	-
Morus mesozygia	0.50	0.20	24.60	47.80	-	-	-	-	0.10	0.10	123.00	70.00
Myrianthus arboreus	0.10	0.10	12.00	97.00	0.40	0.10	19.00	46.00	-	-	-	-
Napoleona vogelii	0.10	0.10	7.00	34.00	-	-	-	-	-	-	-	-
Nauclea latifolia	0.30	0.10	2.30	9.00	0.30	0.10	6.00	9.00	0.60	0.20	3.60	15.50

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Nesogordonia papaverifera	0.70	0.30	22.20	65.30	0.30	0.30	24.70	44.30	-	-	-	-
Newbouldia laevis	0.90	0.30	17.10	35.50	0.30	0.30	19.70	42.70	-	-	-	-
Olax subscorpioides	0.20	0.20	6.30	19.50	-	-	-	-	-	-	-	-
Olyra latifolia	0.20	0.10	6.70	21.00	-	-	-	-	-	-	-	-
Ouratea cocleensis	0.20	0.10	4.00	20.00	0.20	0.10	4.00	20.00	0.20	0.10	4.00	20.00
Pachystela brevipes	0.20	0.20	17.50	39.00	-	-	-	-	-	-	-	-
Parkia bicolour	0.10	0.10	62.50	285.00	-	-	-	-	-	-	-	-
Pavetta corymbosa	0.20	0.10	6.50	22.00	-	-	-	-	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Pterocarcus santalenoides	0.20	0.10	11.50	49.00	-	-	-	-	-	-	-	-
Pycnanthus angolensis	-	-	-	-	0.10	0.10	21.00	42.00	-	-	-	-
Rauwolfia vomitoria	0.10	0.10	9.20	28.00	0.10	0.10	36.00	60.00	-	-	-	-
Rothmania longiflora	-	-	-	-	0.10	0.10	33.00	56.00	-	-	-	-
Securidaca longiflora	2.40	0.20	4.50	29.00	2.30	0.10	4.00	10.00	9.10	0.40	4.50	21.80
Sterculia oblonga	0.10	0.10	8.80	31.00	0.10	0.10	26.00	48.00	-	-	-	-
Sterculia rhinopetala	0.10	0.10	9.20	33.00	-	-	-	-	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Sterculia tragacantha	1.70	0.30	11.50	34.30	0.70	0.40	30.50	77.80	0.20	0.10	11.00	30.00
Tabernaemontana pachysiphon	0.10	0.10	8.00	32.00	0.40	0.10	15.00	42.00	-	-	-	-
Tamarindus indica	0.10	0.10	5.00	45.00	0.10	0.10	5.00	45.00	-	-	-	-
Terminalia avicennioides	0.20	0.10	11.00	59.00	0.20	0.10	11.00	59.00	-	-	-	-
Terminalia glaucescens	-	-	-	-	-	-	-	-	0.30	0.20	29.00	77.50
Terminalia microptera	0.10	0.10	13.00	38.00	-	-	-	-	-	-	-	-
Terminalia superba	0.10	0.10	46.00	172.00	0.10	0.10	14.00	51.00	-	-	-	-
Tetrochidium didymostemon	0.10	0.10	9.50	67.00	-	-	-	-	-	-	-	-

Table 3.10 (Cont.): Tree species occurring along the transects

Species	Transect 1				Transect 2				Transect 3			
	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)	Density	Freq	Mean Height (m)	Mean GBH (cm)
Trema orientalis	0.10	0.10	7.50	20.00	-	-	-	-	-	-	-	-
Trichilia heudeloti	0.10	0.10	6.50	35.00	-	-	-	-	-	-	-	-
Trichilia monadelpha	0.10	0.10	9.00	75.00	0.20	0.10	22.00	49.00	-	-	-	-
Trichilia puriana	0.30	0.10	10.50	47.00	-	-	-	-	-	-	-	-
Trichilia roka	0.10	0.10	9.00	69.00	-	-	-	-	-	-	-	-
Trilepisium madagascariense	0.90	0.30	19.00	52.90	0.10	0.10	42.00	123.00	-	-	-	-
Triplochiton scleroxylum	0.20	0.20	47.50	316.00	-	-	-	-	-	-	-	-
Vitex doniana	0.20	0.20	23.50	63.50	0.50	0.30	28.00	80.00	0.20	0.20	14.10	52.00

3.4.0 The occurrence of species and their numbers at different altitudes

The highest mean number of individual species was recorded in altitude 288m (16.00±7.80) with the least recorded in altitude 716m (6.00±0.00) in the 25m x 25m plots (Appendix 7). The ANOVA indicated that there was no significant difference in the means among the various altitudes. ($F_{9, 20}$ = 0.78, P> 0.64) (Appendix 8a). This result seems to suggest a decreasing number of individual species as the altitude increases. The variation in the number of individual species is also wider in lower altitudes than in the higher altitudes. For instance, the largest variations were experienced in altitudes 288m (16.00±7.80), 326m (12.40±3.15), and 379m (12.30±6.51) whilst that of the altitude 716m (6.00±0.00) was the lowest (Appendix 7).

The highest mean number of individual species in the 5m x 5m plots was recorded in altitude 288m (15.00±8.88). The mean for this particular altitude also registered the most widely varied responses as indicated in the standard deviation of 8.88. The least number of individuals was recorded at altitude 755m (4.00±1.00 (Appendix 7). The ANOVA indicated that there was no significant difference in the means among the various altitudes. ($F_{10, 22}$ = 1.68, P> 0.15) (Appendix 8b). The results suggest that as the altitude increases, the number of individual species decreases resulting in a lower variation in means recorded for the higher altitude plots (Appendix 7).

The highest mean number of individual species in the 1m x 1m plots was recorded in altitude 288m (13.00±11.53). The mean for this particular altitude also registered the most widely varied species as indicated in the standard deviation. The least number of individuals was recorded at altitude 755m (3.30±1.53) (Appendix 7). The ANOVA

indicated that there was no significant difference in the means among the various altitudes. ($F_{10, 22}$ = 0.79, P> 0.64) (Appendix 8c).The results suggest that as the altitude increases, the number of individual species decreases (Appendix 7). The most frequently occurring herbs in the lower altitudes included *Acacia kamerunensis, Antiaris toxicaria, Landolfia macranta, Mallotus oppositifolia, Paullinia pinnata,* and *Phaulopsis parviflora*. In the middle belt , *Byrsocarpus coccineus, Phaulopsis parviflora, Smilax krauseana,* and *Tragia aquapimensis* are found, and in the upper altitudes, *Andropogon gayanus, Byrsocarpus coccineus, Chromolaena odorata, Justicia flava, panicum fragmitoides,* and *Securidaca longiflora* are the most dominant herbs (Table 3.11).The most dominant shrub species in the lower altitudes include *Afzelia Africana, Albizia sp, Cola gigantea, Cola mellinii, Deinbolia pinnata, Dialium guineense, Griffonia simplicifolia, Olax subscorpioides, Rothmania longiflora, Carpolobia lutea, Trilepisium madagascariense, Lecaniodiscus cupanoides,* and *Millettia zechiana*. In the middle altitudes, *Albizia sp, Baphia sp, Crossopterix febrifuga, Byrsocarpus coccineus, Landolfia sp, Lophira lanceolata, Rothmania longiflora, Nesogordonia papaverifera,* and *Cola mellinii* are commonly found. In the upper altitudes however, *Byrsocarpus coccineus Crossopterix febrifuga, Daniela olivera, Holarrhena florimbunda, Lophira lanceolata, Securidaca longiflora, Vernonia camparum,* and *Sterculia tragacantha* are the dominant shrubs (Table 3.12). The most common trees found in the lower altitudes include *Albizia sp, Alstonia boonei, Argocoffeopsis rupestris, Ceiba pentandra, Cola mellinii, Cola gigantea, Ficus sur, Khaya sp, Lecaniodiscus cupanoides, Nesogordonia papaverifera,* and *Macaranga barteri.*

In the middle altitudes, the trees found included *Antiaris toxicaria*, *Argocoffeopsis rupestris*, *Baphia pubescens*, *Cola mellinii*, *Crossopterix febrifuga*, *Dacleodes kleineana*, *Daniela olivera*, *Dialium guineense*, *Lophira lanceolata*, *Newbouldia laevis*, *Pachystela brevipes*, and *Millettia zechiana*.The following species are also very common in the upper altitudes: *Albizia adianthifolia*, *Cola mellinii*, *Crossopterix febrifuga*, *Daniela olivera*, *Securidaca longiflora*, *Sterculia tragacantha*, *Vitex doniana*, *Combretum paniculata*, *Lecaniodiscus cupanoides*, and *Lophira lanceolata* (Table 3.13).

Table 3.11: Herbaceous species occurring on the horizontal plots at similar altitudes

Species	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Acacia kamerunensis	0.3	0.3	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Adenia lobata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.3	-	-	-	-	-	-
Baissea multiflora					0.33	0.33			0.33	0.33												-
Andropogon gayanus	-	-	-	-	-	-	-	-	-	-	-	-	4.0	0.3	3.6	0.3	1.3	0.3	2.6	0.3	2.6	0.3
Annona senegalensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	
Centella asiastica	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chassala koli	-	-	-	-	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Chromolaena odorata	-	-	-	-	-	-	-	-	-	-	0.6	0.3	-	-	-	-	-	-	0.3	0.3	0.6	33
Culcasia angolensis	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Culcasia parviflora	-	-	-	-	0.6	0.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cyantula prostrata	-														0.33	0.33						
Dioscorea Smilacifolia	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dioscoreophyllum cumminisii	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

Table 3.11 (Cont.): Herbaceous species occurring on the horizontal plots at similar altitudes.

Species	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	
Emelia coccinea	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Heteropogon contortus	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.3	-	-	-	-	1.3	0.3	-	-
Hoslundia opposita	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-
Hypselodelphys violacea	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Justicia flava	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	0.3	0.3	-	-
Landolfia dulsis	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Landolfia micrantha	0.6	0.6	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Leptaspis cochleata	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-
Lophira lanceolata	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-
Melinis minutiflora	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8.3	
Olax subscorpioides	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Olyra latifolia	-	-	0.3	0.3	-	-	2.6	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.11 (Cont.): Herbaceous species occurring on the horizontal plots at similar altitudes.

Species	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	
Oplismenus boomenii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.3	-	-	-	-	-	-
Palisota hirsuta	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-
Panicum fragmitoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.0	0.3	5.3	0.6
Paulinia pinnata	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Phaylopsis parviflora	0.3	0.3	0.3	0.3	-	-	-	-	-	-	-	-	1.0	0.3	1.0	0.3	-	-	0.3	0.3	-	-
Piper guineense	0.3	0.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Psychotria calva	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-
Psychotria subobliqua	-	-	-	-	-	-	0.3	0.3	-	-	-	-	0.6	0.3	-	-	-	-	-	-	-	-
Scleria speciosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.3	0.3	-	-
Securidaca longiflorum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2.6	0.3	-	-	0.3	0.33
Setaria gayanus	-	-	-	-	-	-	-	-	-	-	1.0	0.3	-	-	-	-	-	-	-	-	-	-

Table 3.11 (Cont.): Herbaceous species occurring on the horizontal plots at similar altitudes.

Species	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Smilax krauseana	0.3	0.3	-	-	-	-	-	-	2.0	0.3	2.0	0.3	-	-	1.0	0.3	0.3	0.3	-	-	-	-
Thaumatococcus danielii	-	-	-	-	-	-	-	-	-	-	-	-	3.6	0.6	-	-	-	-	-	-	-	-
Triclisia lanceolata	-	-	0.3	0.3	-	-	-	-	-	-	1.3	0.3	-	-	-	-	-	-	-	-	-	-
Uvaria doeringii	-	-	0.3	0.3	-	-	-	-	-	-	-	-	0.3	0.3	-	-	-	-	-	-	-	-
Uvaria globosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Vernonia camporum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.6	0.3	-	-	-	-
Abrus precatoria	0.01	0.01	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Acacia kamerunensis	-	-	-	-	-	-	-	-	0.03	0.03	-	-	-	-	-	-	-		-	-	-	-
Adansonia digitata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.12: Shrub species occurring on the horizontal plots at similar altitudes

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Afzelia Africana	0,01	0.01	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Agalea nitida	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Albizia adianthifolia	-	-	0.01	0.01	0.01	0.01	0.01	0.01	0.03	0.01	0.01	0.01	-	-	0.01	0.01	0.01	0.01	0.03	0.01	-	-
Albizia ferruginea	0.01	0.01	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Albizia zygia	0.03	0.06	-	-	-	-	-	-	0.03	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Alcornia cordifolia	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Alstonia boonei	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Antiaris toxicaria	-	-	0.06	0.03	0.03	0.03	0.04	0.03	0.09	0.03	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Asclepia speciosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01
Baphia nitida	-	-	0.03	0.01	-	-	0.01	0.01	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Baphia pubescens	-	-	0.01	0.01	0.04	0.04	0.03	0.02	0.04	0.03	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-
Blighia unjugata	-	-	0.01	0.01	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Byrsocarpus coccineus	-	-	-	-	0.01	0.01	0.05	0.01	0.04	0.01	3.2	0.04	-	-	0.04	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cadiospermum grandifolium	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Carpolobia lutea	-	-	-	-	0.03	0.03	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Celtis mildbraedii	0.01	0.01	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Celtis zenkeri	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Chassala koli	-	-	-	-	0.03	0.03	0.01	0.01	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Chromolaena odorata	-	-	-	-	-	-	-	-	-	-	0.04	0.01	-	-	0.04	0.01	-	-	-	-	0.03	0.01
Chrysophyllum giganteum	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Cnestis febrifuga	0.05	0.03	0.03	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Cola gigantean	0.03	0.03	0.01	0.01	0.01	0.01	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Cola Mellinii	0.01	0.01	0.01	0.01	0.01	0.01	0.05	0.04	0.01	0.01	0.01	0.01	133.33	33.3	0.04	0.01	-	-	-	-	-	-
Costus afer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Crossopterix febrifuga	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	0.08	0.01	0.05	0.03	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Daniellia olivera	-	-	-	-	-	-	-	-	0.03	0.01	-	-	0.08	0.01	0.08	0.01	-	-	0.09	0.03	0.04	0.03
Deinbollia pinnata	0.01	0.01	0.01	0.01	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Dialium guineense	-	-	0.05	0.03	0.03	0.03	0.05	0.03	0.03	0.03	0.03	0.01	-	-	0.04	0.03	-	-	-	-	-	-
Dichapetalum madagascariense	0.01	0.01	0.03	0.03	0.05	0.04	0.05	0.03	0.03	0.03	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Dioscorea smilacifolia	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diospyros monbuttensis	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Diospyros abyssinica	-	-	-	-	-	-	0.01	0.01	0.03	0.03	-	-	0.01	0.01	-	-	-	-	-	-	-	-
Erythrophloem suaveolus	-	-	-	-	-	-	0.03	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Eugenia calophylloides	-	-	-	-	*0.01*	*0.01*	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--
Ficus exasperata	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	--
Griffonia simplicifolia	0.01	0.01	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.01	0.01	-	-	-	-	-	-	-	-	-	--
Holarrhena florimbunda	-	-	-	-	-	-	-	-	0.04	0.01	0.01	0.01	-	-	-	-	-	-	0.03	0.01	0.03	0.01
Hoslundia oppositifolia	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Hymenostegia afzelii	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Hypselodelphys violaca	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-
Khaya anthotica	0.06	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Khaya ivorensis	0.05	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--	-
Landolfia macranta	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	--
Landolfia africana	-	-	-	-	0.01	0.01	-	-	0.03	0.01	-	-	-	-	-	-	-	-	-	-	-	--
Landolfia togolana	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	0.01	0.01	-	-	-	--
Lannea acida	-	-	-	-	-	-	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	--
Lecaniodiscus cupanoides	0.04	0.01	0.05	0.04	0.03	0.03	0.06	0.04	0.04	0.03	0.04	0.03	0.01	0.01	0.08	0.03						-
Leucaena gluca	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Lonchocarpus coccineus	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	--
Lophira Ianceolata	-	-	-	-	-	-	-	-	0.03	0.01	0.05	0.01	-	-	-	-	2.4	0.01	0.12	0.03	0.01	0.01
Macaranga barteri	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	--
Mallotus oppositiflia	0.03	0.03	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Microdesmis puberula	-	-	0.06	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	--
Milicia excelsa	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	--
Millettia zechiana	0.06	0.04	0.03	0.03	0.04	0.04					0.01	0.01										-
Monodora ternuifolia	-	-	-	-	-	-	-	-	-	-	0.03	0.03	-	-	0.01	0.01	-	-	-	-	-	-
Monodora myristica	-	-	-	-	-	-	-	-	0.12	0.03	-	-	0.01	0.01	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Napoleona vogelii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Nesogordonia papaverifera	0.01	0.01	-	-	0.03	0.03	-	-	0.14	0.03	0.01	0.01	0.03	0.01	-	-	-	-	-	-		-
Newbouldia laevis	-	-	-	-	0.01	0.01	-	-	0.01	0.01	-	-	0.04	0.03	0.01	0.01	-	-	-	-	-	-
Olax subcorpioides	0.01	0.01	0.06	0.01	-	-	-	-	-	-	-	-	-	-	0.01	0.01	0.01	0.01	-	-	-	
Olyra latifolia	-	-	0.06	0.01	-	-	0.03	0.01	0.01	0.01	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Olyra subcoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pachystela brevipes	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	0.01	0.01	-	-	-	-	-	-
Palisota hirsuta	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-
Pancovia turbinata	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-
Panicum fragmitoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.08	0.01	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Paulinia pinnata	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pavetta corymbosa	-	-	05	0.01							0.01	0.01			0.06	0.01						-
Phyllanthus arboreus	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	--
Piptadesniastrum africana	0.91	0.01	-	-	-	-	-	-	-	-	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	--
Psychotria calva	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Pterigota macrocarpa	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-
Pterocapus malbraedii	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.09	0.04	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Rothmania longiflora	0.01	0.01	0.03	0.01	0.01	0.01	-	-	-	-	-	-	0.01	0.01	0.01	0.01	-	-	-	-	-	-
Securidaca crosspterix	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Securidaca longiflorum	-	-	-	-	-	-	-	-	-	-	0.04	0.01	-	-	-	-	0.06	0.04	0.01	0.01	0.01	0.01
Smilax krauseana	-	-	-	-	-	-	-	-	0.04	0.01	0.09	0.01	-	-	0.04	0.01	-	-	-	-	-	-
Sterculia oblonga	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sterculia tragacantha	0.01	0.01	-	-	0.01	0.01	-	-	-	-	0.01	0.01	-	-	0.01	0.01	0.01	0.01	-	-	-	-
Tabernaemontana pachysiphon	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Terminalia superba	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Thaumatococcus danielii	-	-	-	-	-	-	-	-	-	-	-	-	2.6	0.01	-	-	-	-	-	-	-	-
Tragia aquapimensis	0.01	0.01	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-
Trichilia monadelpha	0.03	0.03	0.03	0.03	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichilia puriana	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trilepisium madagascariense	0.11	0.01	-	-	0.01	0.01	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Triplochiton scleroxylum	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-

Table 3.12 (Cont.): Shrub species occurring on the horizontal plots at similar altitudes.

Species	Plots 1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a 10b 10c		11a 11b 11c	
	288m		326m		379m		413m		449m		572m		573m		615m		705m		716m		755m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Uapaca togoensis	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uvaria chamae	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Uvaria doeringii	-	-	-	-	-	-	-	-	0.01	0.01	-	-	-	-	-	-	-	-	-	-	-	-
Vernonia camporum	-	-	-	-	-	-	-	-	-	-	-	-	0.01	0.01	-	-	0.05	0.04	0.03	0.01	-	-

Table 3. 13: Tree species occurring on the horizontal plots at similar altitudes

Species	1a 1b 1c 288m		2a 2b 2c 326m		3a 3b 3c 379m		4a 4b 4c 413m		5a 5b 5c 449m		6a 6b 6c 472m		7a 7b 7c 573m		8a 8b 8c 615m		9a 9b 9c 705m		10a10b10c 716m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Acacia kamerunensis	0.042	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Afzelia Africana	-	-	-	-	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	
Albizia adianthifolia	-	-	0.42	0.0016	0.001	0.0016	0.006	0.001	-	-	0.8	0.0016	0	0.0005	0.0016	0.0005	0.0042	0.001	0.0042	0.0005
Albizia ferruginea	-	-	0.0042	0.001	0.0042	0.0005	-	-	0.002	0.0005	-	-	-	-	0.0042	0.0005	-	-	-	
Albizia zygia	0.021	0.0005	0.32	0.001	-	-	-	-	-	-	-	-	-	-	0.0042	0.0005	-	-	-	
Allophylus africanus		-	0.001	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Alstonia boonei	0.001	0.001	0.0021	0.0005	0.0042	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	
Amphimas pterocarpoides	-	-	0.0021	0.0005	-	-	-	-	-	-	-	-	0	0.0005	-	-	-	-	-	
Annona senegalensis		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0042	0.0005
Anthotica sassandraensis	-	-	-	-	-	-	-	-	-	-	0.002	0.0005	-	-	-	-	-	-	-	
Antiaris toxicaria	0.021	0.0005	-	-	0.0021	0.0005	0.002	0.0005	0.004	0.0005	-	-	-	-	-	-	-	-	-	
Argocoffeopsis rupestris	0.064	0.0005	0.0021	0.0005	0.0042	0.0005	0.004	0.001	0.004	0.001	-	-	-	-	-	-	-	-	-	
Azadiracta indica	-	-	5.3	33.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baphia nitida	0.021	0.0005	5.3	33.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Baphia pubescens	0.021	0.0005			0.021	0.0005			10.7	33.3	0.006	0.001							-	
Berlinia pubescens	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0021	0.0005	-	-	-	
Canarium schweinfurthii	-	-	-	-	-	-	-	-	-	-	-	-	0	0.0005	-	-	-	-	-	
Casia siamea	0.069	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Casia sieberianus	0.042	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ceiba pentandra	0.016	0.0016	0.026	0.001	0.032	0.001	0.002	0.0005	0.004	0.0005	-	-	0.02	0.0005	0.0021	0.0005	-	-	-	
Celtis mildbraedii	-	-	0.0021	0.0005	-	-	-	-	0.004	0.0005	-	-	-	-	-	-	-	-	-	
Celtis zenkeri	-	-	-	-	-	-	-	-	-	-	-	-	0	0.0005	-	-	-	-	-	
Christiana Africana	-	-	-	-	0.0021	0.0005	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	

Table 3. 13: Tree species occurring on the horizontal plots at similar altitudes

Species	1a 1b 1c 288m		2a 2b 2c 326m		3a 3b 3c 379m		4a 4b 4c 413m		5a 5b 5c 449m		6a 6b 6c 472m		7a 7b 7c 573m		8a 8b 8c 615m		9a 9b 9c 705m		10a10b10c 716m	
	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Combretum paniculatum	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.021	0.0005	0.02	0.0005	-	
Crossopterix febrifuga	-	-	-	-	-	-	-	-	0.037	0.005	0.064	0.0005	0.06	0.0005	0.048	0.0005	0.096	0.0005	0.037	0.0005
Cussonia barteri	0.042	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Dacleodes kleineana	-	-	-	-	-	-	0.006	0.0005	0.006	0.001	-	-	0	0.0005	-	-	-	-	-	
Danielia olivera	-	-	-	-	-	-	-	-	0.004	0.0005	0.006	0.0005	0.04	0.0005	0.048	0.001	0.0064	0.0005	-	
Dialium guineense	-	-	0.0021	0.0005	-	-	-	-	0.004	0.0005	0.004	0.0005	-	-	0.0021	0.0005	-	-	-	
Ficus sur	0.0021	0.0005	0.0042	0.0005	-	-	-	-	-	-	-	-	-	-	0.0021	0.0005	-	-	-	
Funtumia africana	0.0021	0.0021	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Funtumia elastica	0.0201	0.0021		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Grewia pubescens	-	-	-	-	-	-	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	

Table 3. 13 (Cont.): Tree species occurring on the horizontal plots at similar altitudes

Species	1a 1b 1c 288m Den		2a 2b 2c 326m Freq		3a 3b 3c 379m Den		4a 4b 4c 413m Freq		5a 5b 5c 449m Den		6a 6b 6c 472m Freq		7a 7b 7c 573m Den		8a 8b 8c 615m Freq		9a 9b 9c 705m Den		10a10b 10c 716m Freq		- Den		- Freq		- Den		- Freq		- Den		- Freq		- Den		- Freq		- Den		- Freq	
Holarrhena florimbunda	-		-		-		-		0.021		0.0005		-		-		0.004		0.001		-		-		-		-		0.0064		0.0005		-		-	
Homalium letestui	-		-		0.0021		0.0005		-		-		-		-		0.002		0.0005		-		0		0.0005		-		-		-		-		-	
Khaya anthotica	0.0021		0.0005		0.0021		0.0005		0.0021		0.0005		0.002		0.0005		-		-		-		-		-		-		-		-		-		-	
Khaya grandifolia	0.0021		0.0005		-		-		-		-		-		-		-		-		-		0		0.0005		-		-		-		-		-	
Khaya ivorensis	-		-		0.0021		0.0005		-		-		0.002		0.0005		-		-		-		-		-		-		-		-		-		-	
Macaranga barteri	0.0021		0.001		0.0021		0.0005		-		-		-		-		-		-		-		0		0.0005		-		-		-		-		-	
Macaranga microphyla	-		-		-		-		0.0021		0.0005		-		-		-		-		-		0		0.0005		-		-		-		-		-	
Magaritaria discoides	-		-		-		-		0.0021		0.0005		-		-		-		-		0.002		0.0005		-		-		-		-		-		-	
Malacantha alnifolia	-		-		-		-		-		-		0.002		0.0005		-		-		-		-		-		-		-		-		-		-	

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Table 3. 13 (Cont.): Tree species occurring on the horizontal plots at similar altitudes

Species	288m		326m		379m			413m		449m		472m		573m		615m		705m		716m	
	1a 1b 1c		2a 2b 2c		3a 3b 3c			4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a10b10c	
	Den	Freq	Den	Freq	Den	Freq		Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Mesoneron bantamianus	0.0021	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Milicia excelsa	0.0021	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Millettia zechiana	-	-	0.0064	0.0005	0.0021	0.0005	0.08	0.001	0.004	0.0005	-	-	0	0.0005	-	-	-	-	-		
Mimusops elongi	-	-	0.0021	0.0005	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	
Monodora ternuifolia	-	-	-	-	5.3	33.3	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Morus mesozygia	0.0021	0.0005	-	-	-	-	-	-	-	-	0.004	0.0005	-	-	-	-	-	-	-	-	
Myrianthus arboreus	-	-	-	-	-	-	-	-	-	-	-	-	0.02	0.0005	-	-	-	-	-	-	
Newbouldia laevis	-	-	-	-	-	-	0.002	0.0005	0.006	0.001	0.026	0.001	0.01	0.0005	-	-	-	-	-	-	
Olax subscorpioides	-	-	-	-	-	-	0.002	0.0005		-	0.002	0.0005	-	-	-	-	-	-	-	-	
Olyra latifolia	-	-	0.0042	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Ouratea cocleensis	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0042	0.0005	

Table 3. 13 (Cont.): Tree species occurring on the horizontal plots at similar altitudes

	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m	
	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a10b10c	
Species	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Pachystela brevipes	-	-	-	-	-	-	-	-	0.002	0.0005	0.002	0.0005	0	0.0005	-	-	-	-	-	-
Parkia bicolour	-	-	-	-	-	-	-	-	-	-	-	-	0	0.0005	-	-	-	-	-	-
Pavetta corymbosa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0042	0.0005	-	-	-	-
Pterocarpus santalenoides	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0042	0.0005	-	-	-	-
Pycnanthus angolensis	0.0021	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Rauwolfia vomitoria	-	-	-	-	0.0021	0.0005	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	-
Securidaca longiflora	-	-	-	-	-	-	-	-	-	-	0.069	0.0005	0.05	0.0005	0.0021	0.0005	0.13	0.0005	0.076	0.0005
Sterculia oblonga	-	-	-	-	-	-	0.004	0.001	-	-	-	-	-	-	-	-	-	-	-	-
Sterculia rhinopetalum	-	-	-	-	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	-
Sterculia tragacantha	-	-	0.021	0.0016	-	-	-	-	-	-	0.058	0.0005	0	0.0005	0.037	0.001	-	-	-	-
Tabernaemontana pachysiphon	-	-	0.026	0.001	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Tamarindus indica	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0021	0.0005	-	-
Terminalia avicennioides	-	-	-	-	-	-	-	-	0.004	0.0005	-	-	-	-	-	-	0.0042	0.0005	-	-
Terminalia glaucoscens	-	-	-	-	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	-
Terminalia microptera	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.0021	0.0005	-	-	-	-
Terminalia superba	-	- -	-	-	0.0021	0.0005	0.002	0.0005	-	-	-	-	-	-	-	-	-	-	-	-
Trema orientalis	0.0021	0.0005	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Trichilia monadelpha	-	-	0.0021	0.0005	-	-	0.006	0.001	-	-	-	-	-	-	-	-	-	-	-	-

Table 3. 13 (Cont.): Tree species occurring on the horizontal plots at similar altitudes

	288m		326m		379m		413m		449m		472m		573m		615m		705m		716m	
	1a 1b 1c		2a 2b 2c		3a 3b 3c		4a 4b 4c		5a 5b 5c		6a 6b 6c		7a 7b 7c		8a 8b 8c		9a 9b 9c		10a10b10c	
Species	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq	Den	Freq
Trilepisium madagascariense	32	0.0005	-	-	0.0042	0.0005	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-
Triplochiton scleroxylum	-	-	-	-	0.0021	0.0005	-	-	0.002	0.0005	-	-	-	-	-	-	-	-	-	-
Vitex doniana	-	-	-	-	0.0021	0.0005	0.002	0.0005	0.004	0.0005	-	-	0	0.0005	-	-	0.0021	0.0005	-	-
Zanthoxylum leprieuri	-	-	0.0021	0.0005	-	-	-	-	0.002	0.0005	-	-	0	0.0005	-	-	-	-	-	-

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CHAPTER FOUR

4.0 DISCUSSION

4.1 Useful Plant Families

In this study, the dominant families listed as useful in the category of food, building, making household items, fuelwood and for medicine by the Afadjato Communities include Fabaceae, Apocynaceae, and Euphorbiaceae (Fig 3.2). This trend is similar to a study in the Kade forest of Ghana where Fabaceae, Apocynaceae, and Euphorbiaceae were reported as the most dominant families for the same uses (Lawson *et al.*, 1970). The Fabaceae family in addition to having the most useful species in the use-categories under study has again been linked to other minor uses as ornamental and ritualistic by some few informants. As such this family has great importance for the community in this study, indicating the need for further studies on the use and management of the species of this family (Albuquerque & Lucena; 2005).

In relation to habits of the species reported as useful, trees were the most represented in the five use categories under study, followed by shrubs, herbs, lianas and climbers (Fig 3.3). This trend was also seen in the works of Albuquerque & Lucena, 2005; Stepp & Moerman, 2001. According to Moerman (1994), a tree having a high number of distinct parts (wood, bark, leaves, fruits, seeds, roots etc) is more likely to have more uses than stems and herbs that may not have some of these parts pronounced. Crepalpi & Peixoto (2008) also found trees to be the most represented in the similar use-categories in their study in the Quilombola community, though the position of the shrubs and herbs was

reversed. The high percentage of the uses of trees in the study justifies the undertaking of projects to increase native tree forest cover in the community.

Results from the plant use-value shows that species that had low UVs were mentioned by a few interviewees for a few uses whiles those with high values were cited by large numbers of participants for various uses. A similar situation was seen in a study involving Afro-descendants in Colombia (Galeano, 2000) and another one involving the inhabitants of a community in semi-arid north eastern Brazil (Ferraz *et al.*, 2006). This trend is an indication that ethnobotanical knowledge among interviewees was quite diffused with each informant having his/her owns set of known useful plants and it strengthens the idea that the Gbledi people have added to the formation of knowledge about useful plants in Ghana. However, there may be differences in the UV of the species, when there is only one event, according to Rossato *et al.* (1999), and when several interviews were directed to the same informant, according to Phillips & Gentry (1993). When several events are carried out with the same informant, the UV of the species tends to be more homogenous. The low number of Lianas (2%) and climbers (1%) cited by the interviewees coupled with their use-values and fidelity values calls for an inventory into their socio-economic and ecological aspects so as to counterbalance the general lack of information of these plant lifeforms. The UV indicates which plants are most known and used by the interviewees, and can aid specific studies about the use, management and conservation of the most important plant species.

4.2 Uses of Plants

In this study, the end use-categories with the highest number of citation of plant species are in the order Building, Human food, Household items, fuelwood and Medicine. This trend is evident in the fact that trees were the life form category most cited and within the trees, timber species were cited most. Also the plant part most cited was stems.

Most of the buildings in the communities around the study site were of 'atakpame' type (local building) made of wooden frame structures and covered with, mud and roofed with thatch. As such knowledge about timber species used for building purposes is high. However, the knowledge about traditional medicinal practices is gradually eroding as was evident in the lowest number of species cited in the medicinal use category.

In the works of Hanazaki *et al.* (2000), Lima *et al.* (2000), and França (2001) (the latter being undertaken with the Quilombolas in the Cairuçu Environmental Protection Area in Rio de Janeiro State) the category of Medicinal use and then Food had the greatest numbers of species cited. This is followed by Fuelwood and Building. In work of Fonseca-Kruel & Peixoto (2004), however, these species positions were reversed with Medicinal use and Fuelwood category having the highest citation of species.

Generally, F_{ic} of local knowledge for the use of a plant in a particular use-category depends on the availability of the plant species in the study area (Rajakumar & Shivanna, 2009). In the present study, F_{ic} of species obtained for the various use-categories is in agreement with the previous studies among the Quilombolas in the Cairuçu Environmental Protection Area in Rio de Janeiro State in Brazil. The generally high F_{ic} values for species observed in all the use-categories give an indication that the degree of

knowledge shared by the users in the study area regarding plant use is high (Rokaya *et al*., 2010).

4.3 Places of collection, cultivation status and plant parts used

The Gbledi people tell stories of contact with Akpini (Kpando people) and Gbi (Hohoe people) when they came down from Notsie in the Republic of Togo to their present settlement in Ghana and they affirm that they have learned many things from them. Most of the species reported as useful by the informants are cultivated species. This means that the Gbledi people still hold in high esteem the traditional knowledge regarding plant usage even as they migrated from Notsie to their present settlement around the study site. The generally high percentage of wild species reported as useful by the informants is viewed as indicating that the Gbledi people introduced a lot of native plants and their uses into their culture.

This same high percentage of wild species reported as useful may also be related to the high diversity of the forest biome where the community is established (Almeida, 2003). According to Hanazaki *et al*. (2000), the diversity of knowledge about plants and their uses is influenced by diversity in the local environment, but could gradually be lost when plant resources become depleted (Shanley & Rosa, 2004), with globalization and development, traditional plant uses may be substituted with synthetic products (Case *et al*, 2005).

A similar observation to this study in terms of plant parts used was made by Zschocke *et al*., (2000); Lima *et al*., (2000); Begossi *et al*., (1993); and Hanazaki *et al*., (2000). The high percentage for the use of stems raises concern about the local conservation of plant

species. The harvesting of leaves and other aerial plant structures can affect energy investment and reproductive success of the plant, but does not remove the individual plant or its descendants from the population. Among the strategies Zschocke *et al.* (2000) has proposed for conserving plants is the use of more easily replaced leaves and twigs instead of stems and barks.

4.4 Informant Consensus Factor (F_{ic})

In order to use the informant consensus factor (F_{ic}) plant uses were classified into 5 use categories, The F_{ic} values in this study ranged from 0.52 to 0.68. In the present study, building category had the highest F_{ic} of 0.68 and it is in agreement with the previous studies among a neighboring indigenous communities in Tamil Nadu, India where household items had the highest F_{ic} of 1.00 among the Irulas in Thanjavur district (Ragupathy & Newmaster, 2009), fuelwood had the highest F_{ic} of 0.92 among the Malaser tribals in Coinbatore district (Ragupahty et al, 2008) and 0.923 among the Paliyar tribals in Theni district (Pandikumar et al, 2011). The least agreement between the informants was observed in the human food categories with F_{ic} 0.52 (see Table 3.2). It was found that building category utilized the most plants with 25.20% of all the species mentioned by the informants. This is in agreement with the study of Andrade – Cetto (2009). Human food category had the lowest F_{ic} of 0.52 but this use – category ranks second in the number of use – reports (61) and first in number of taxa (36) attributed to this category. This may be due to lack of communication among informants in the study area regarding the use of

food plants as a result of people of different tribes and cultures who settle there to farm (Rokaya et al, 2010), globalization and amalgamation of cultures (case et al, 2005).

4.5 Fidelity level (Fl)

This involves the analysis of the use - categories with major agreements to highlight the most important plants mentioned by the informants in the study area. Out of the reported plants, 99 species had the highest fidelity level of 100%, most of which were used in a single use – category with multiple informants. The maximum Fl for these 99 species listed in Table 3.1 indicated the 100% choice of the interviewed informants for use in a specific use – category and this could be an indication of abundance of such species on the landscape and high knowledge on its use (Ragupathy et al., 2008; Ali – Shtayeh et al., 2000).

4.6 Use Value

K. angolensis (0.86) *K. anthotheca* (0.86) and *K. grandifoliola* (0.86) were the most common timber species of trees reported by the largest number of informants of the study area. These species were reported as useful in all the use – categories under study but mainly recognised by the informants as timber for building purposes. *Khaya* species were the most abundant on the landscape. In his study of the Useful Plants of Ghana, Abbiw (1990) recognised the *Khaya* species as one of the most important timber species used for building purposes and also for making furniture in Ghana.

In general scarce availability of the plants in the study area leads them to low UV (Hudaib et al, 2008, Rokaya et al. 2010).

4.7 Plant species present at the Afadjato Community Forest conservation Area

A total of 269 species of herbs, shrubs and trees representing a total of 100 families were found in the Afadjato Community Forest Conservation Area. Out of the families recorded, Fabaceae, Sterculiaceae, Apocynaceae, Euphorbiaceae and Rubiaceae were the most dominant families in the three habits studied. In fact, Fabaceae family has the most represented species in the three habits. This similar trend of families was reported in the Kade forest of Ghana where Fabaceae, Sterculiaceae and Apocynaceae have the highest representation of species in the herbs, shrubs and the tree categories (Lawson *et al.*, 1970). Elsewhere, Fabaceae, Euphorbiacece and Rubiaceae are the dominant families in almost all types of forests except the mangrove (Padalia *et al.*, 2004).

Greater number of the trees are of small size, GBH >70cm. This presumably reflects "creaming" of the forest by exploitation and a boost in recruitment (Okali & Ola-Adams, 1987). The Simpson's diversity and Shannon diversity was lower in the herbs than the shrubs but decrease in a gain in the trees suggesting a trend consistent with the observation by Ashton, (1981) and Bormann & Likens (1981) that tree diversity tends to be low at the early stages of succession, and increases subsequently, before decreasing as the final stages of forest succession are approached. The mean Shannon and Simpson's diversity values were high. These values infer that the conservation area has high species diverse systems (Murali *et al.*, 1996). The mean stand density of 3.38 ±0.087 of all the

species present in the conservation area is well within the range of 3.00±0.056 – 4.61 ±0.063 reported in the tropics (Murali *et al*., 1996; Sundarapandian & swamy, 1997 Ghate *et al*., 1998). In the dry semi-deciduous forest elsewhere, the range of tree species count per 25m x 25m plot is 20 to a maximum of 223 (Parthasarathy & Sethi, 1997). In the present analysis the range of tree species count per 25m x 25m plot is 6 to a maximum of 16 for dry semi-deciduous forest at the study site. The mean tree height (19.119m) record in this study gives an indication of good regeneration and adaptability.

4.8 General comparison of number of individual plants in the 3 transects

The generally high number of trees (11.00 ±5.233) for the entire transects suggest their tolerance to biotic pressure and wide ecological amplitude (Pandey & Shukla, 1999). The low number of shrubs (9.36±5.079) and herbs (8.06±5.684) gives an indication of shading effect by the trees in the conservation area. The shade from the trees reduces the light intensity reaching the understory resulting in the simplification and low diversity of the shrubs and the herbs (Bhat *et al*., 2000).

4.9 The mean values of diversity, height & GBH of trees along /across transects.

The density, height and GBH values for the tree species in this study revealed that tree species are more abundant in the Western side of the mountain where the transects 1 and 2 were laid and diminishes eastwards where transect 3 was laid (Linder, 2003).

This trend of species is also seen from the base of the mountain and gradually towards northwards (Linder, 2003). The factors accounting for this may be:

1) Differences in the contemporary environmental conditions of which, rainfall and topography emerged as significant. Clearly, rainfall reliability contributes to explaining west-east geography effect, whiles the emergence of topographic heterogeneity is consistent with the topography effect in the west (Linder, 1991).

2) Excessive extraction of economic/medicinal species is occurring at the eastern side which is closer to Wote Township and not covered by any conservation measures.

3)The Eastern side is very rocky and steep which does not promote growth of more species.

4)The sunlight and wind intensity is higher in the eastern side which is directly facing the sun while the western portions are shaded.

5)Geographical positions and climatic changes can also be a factor for variations in density, height and GBH of trees from base towards the north (summit) of mountains (Linder, 1991).

The more unique tree species occurring in transect 1 than transects 2 and 3 reflects high utilization pressure (Bhat *et al*., 2000). Transect 2 and 3 are closer to Dzigbordi and Wote communities than transect 1 to Gbledi community as such human recurrent interventions for collection of fuelwood and minor forest products may have changed the habitat fitness for many tree species (Pandey & Shukla, 1999). Also tree species that are restricted to a particular transect may reflect the particular ecological requirements of these species (Pandey & Shukla, 1999).

The (22) tree species that occurred in all the three transects suggest their tolerance to biotic pressure and wide ecological amplitude. (Bhat *et al.*, 2000).

4.10 The mean density, height and GBH of shrubs along /across the transects

The shrubs density increased across the transects, from West to East as the trees density decreased. This situation is as a result of the reduction of shady effect by the trees (Bhat *et al.*, 200; Linder, 1991). Other factors accounting for this observation includes:

1) Increasing rocky and steep nature of the mountain from West to East.
2) Increasing disturbance intensity from West to East.

3) Excessive extraction of economic /Medicinal species increases from West to East. The observed decrease in heights of the shrubs across the transects may be attributed to soil properties and increasing rocky and steepness of the mountain from west to east (Pandey & shukla, 1999). The tendency of the shrubs towards shorter heights and medium GBH may be due to edaphic factors (Pandey & Shukla, 1999), and anthropogenic pressures (Bhat *et al.*, 2000)

4.11 The mean values of density and heights of the herbs along/across the transects

Transect 3, dominated by herbs and shrubs with few and small trees are an indication of the eastern portion being savannah. This portion is strongly affected by rocky soils,

steep elevations and human disturbance. In a similar finding, Linder (1991) observed that herb species were found to be the most dominant in environments under human disturbance. The shorter and medium stature of the herbs may be due to anthropogenic pressures (Bhat *et al.*, 2000), soil property, humidity and canopy structure (Cody, 1986).

4.12 The Occurrence of species and their numbers at different attitudes

This study revealed a decrease in the number of herbs, shrubs and trees with high elevation in all the three transects. This observation is in accordance with the results obtained by Aiba & Kitayama, (1999) and Kitayama (1992) in the mountains of Kinabalu in Borneo and Tailor & Regal (1978), Lawlor (1983) Due & Polis, 1986, Polis, 1986 and mountains of the Baja California Peninsula of Mexico. This trend is due to climatic and geographical parameters (Polis, 1986), Altitude and human disturbance (Aiba & Kitayama, 1999), Topography, soil, and environmental factors (Sundarapandia & Swamy, 1997).

The observed variations in the number of individual species (see the standard deviations of the species in the various altitudes in Appendix 7) is also wider in lower altitudes and gets more stabilised resulting in lower variation in means for the higher altitudes. This trend may be due to species tolerance to a particular ecological amplitude (Bhat *et al.*, 2000), Topography, soil and climatic factors as one moves up the mountain (Sundarapandia & Swamy, 1997).

CHAPTER FIVE

5.0 SUMMARY AND RECOMMENDATION

5.1 SUMMARY

- A total of 166 plant species belonging to 53 families were revealed through the ethnobotanical studies as useful by the informants in the Afadjato Community.
- A total of 269 species comprising 100 tree species, 96 shrub species and 73 herb species were present in a total of 96 plots studied.
- The present studies revealed that accurate medicinal knowledge of plants were held by only a few individuals in these communities accounting for the medicinal use-category having the lowest number of citations of species.
- Many of the forest species important to the community (particularly those for building, household items, fuelwood and medicine) are harvested from the reserve site especially the eastern side of the mountain that is not directly under the wildlife.
- The three most abundant families of plants in the Afadjato Community Forest Conservation Area were: Fabaceae, Apocynaceae, and Euphorbiaceae. The species belonging to these families have great importance value for the community. An indication of a direct relation between use and diversity
- The building category had the highest number of species reported as used.
- The results confirm that there is a positive correlation between use-value, use-reports and number of informants citing a species that probably can be stated as a general rule: The higher the number of informants citing a species, the more

widespread the use-report and the higher the use-value of the species to the community under study. That is, those versatile plants with several uses are generally more familiar to people than those with only one use. Regarding the plant parts used; the stem was the part most used.

- Trees formed the source from which most specimens were collected at the study site.
- Greater number of the tree species reported as useful are of smaller stature.
- The socio-economic aspects of the climbers and lianas collection and use have hardly been addressed by the respondents in this study. The species contributing to this category are the least distributed on the landscape.
- The eastern side of the mountain is the most disturbed and has completely turned into savanna and is extending to the reserve area. If action is not taken to turn the whole of the western and eastern side into a biological reserve, the whole area will become savanna and species diversity will decline.
- The trees and shrubs are more abundant in the western side of the mountain and diminishes eastwards. The herb species however shows a reverse trend.
- The species biodiversity was high at the base of the mountain but shows a steady decline towards the top.
- The variability in rainfall and the distinct hilly terrains of the three sites where the three transects were laid has resulted in more unique species occurring in transect 3 than transect 2 and transect 1. However, some species show tolerance to biotic pressure and wide ecological amplitude and so occurred in all the places where trasects were laid.

- The tree species diversity was observed to decrease with increasing girth class. It has become clear that there is the need to protect and promote biodiversity especially trees which happen to be the most prominent with respect to other plant habits such as shrubs, herbs lianas, climbers etc. From the ethnobotanical study, the trees were the most cited, exploited and used in all the use-categories mentioned.

5.2 RECOMMENDATION

- A detailed study of the ethnomedicinal traditions of these communities is required since there is a risk that medicinal species may be lost together with the traditional knowledge on them.
- The Gbledi community members, however, still have a high level of ethnobotanical knowledge concentrated principally on wild species growing in the forest area, and this knowledge can be utilized in the management and conservation programs of the forest.
- A pilot study on the three most dominant families: Fabaceae, Apocynaceae and Euphorbiaceae, is recommended regarding the management of their component species.
- People in the community should be encouraged to use gas instead of fuelwood which depletes the forest.
- In terms of the species used for building, it would be necessary to institute areas of sustainably managed forests near the community. The initiative taken by the

Youth Employment Secretariat to go into afforestation, especially Teak and Bamboo farming in the area is a step in the right direction.

- Further inventory is recommended for climbers and lianas to augment the information on them.
- There is the need to make available to the visitor centre of such sites books that enable visitors to identify plants in general (Mori *et al*., 1997, 2002), trees, vegetation types (Granville & Sastre, 1991) and the publication of useful guides to the plants and books about nature. All these will enhance the visitors experience and thereby help to promote an appreciation for wilderness areas.
- Steps should be taken by the Ghana Wildlife Society to incorporate the eastern side of the mountain (which is currently not covered by conservation measures) into the conservation area.
- Any use should be allowed with great caution, starting on very limited scale. However, harvesting of fruits and other aerial plant parts should be strongly favoured over the stem and the whole plant. Any whole plant removal should be planned and monitored very closely, to the scale of individual trees (as with logging).
- Plant removal or similar extreme disturbance should not be allowed to areas that are heavily disturbed (particularly the Eastern side) which is hilly, rocky and steep slopes with small and short trees. Such already disturbed areas should be given the chance to regenerate and recover.
- Efforts should be made to find new species in the study area and must be named accordingly.

- There is a need for a detailed monitoring of the conservation area while it remains exploited. Checks on the human disturbance should be ongoing and patrols by park guards need to be intensified so as to arrest incursions before they go out of hand.
- According to reserve regulations by the Ghana Wildlife Society, communities around the landscape are allowed to collect and use plants from the reserve site so as to promote traditional plant knowledge and use of forest species and also for the people not to feel that they have lost their benefits. However, these activities should be monitored so as to maintain appropriate levels of sustainable use; in doing this, the exploited areas should be monitored to check the levels of damage and amount of plant materials extracted.
- There is a call for the individual conservation planting for the trees. They are outstanding, first economically, as the source of many products essential to communities under study such as raw materials, timber, fuel, food and medicine. Therefore they are prone to decimation from harvesting. Second, they are prominent environmentally, as forests help to stabilize the environment by fixing carbon dioxide, by preventing soil erosion and by lowering the water table. Third, trees are dominant economically as they determine a wealth of interactions with other life forms in the community. Since forest tree species inevitably sustain reduction in numbers from human exploitation, safeguarding their genetic resources is the key to their conservation. The in situ conservation will be the best method for this purpose (Hanazaki *et al.*, 2000).

- There is the need to raise public awareness about the importance of plant diversity (ALL MUST KNOW) through schools and colleges , policy briefs, exploiting the media to stimulate debate and reach everybody with the message

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APPENDIX 1

Appendix 1a: The mean number of individuals of plants per the transects

25m x 25m Transect	Mean (SE)	5m x 5m Transect	Mean (SE)	1m x 1m Transect	Mean (SE)
1	15.80±5.57	1	7.00±3.38	1	3.45±1.29
2	10.20±2.35	2	12.18±4.36	2	12.18±4.36
3	7.00±2.75	3	8.91±6.09	3	8.55±6.36
Total	11.00±5.23	Total	9.36±5.08	Total	8.06±5.68

Appendix 1b: ANOVA results for difference in mean number of individuals per plot for transects used for the 25m x 25m plot study

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	396.80	2	198.40	13.49	.001
Within Groups	397.20	27	14.71		
Total	794.00	29			

Appendix 1c: Post-Hoc ANOVA results

(I) Transect	(J) Transect	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1	2	5.60*	1.72	.003	2.08	9.12
	3	8.80*	1.72	.001	5.28	12.32
2	1	-5.60*	1.72	.003	-9.12	-2.08
	3	3.20	1.72	.073	-.32	6.72

*. The mean difference is significant at the 0.05 level.

APPENDIX 2

Appendix 2a: ANOVA results for difference in mean number of Individuals per plot for transects used for the 5m x 5m plot study

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	151.09	2	75.55	3.36	.05
Within Groups	674.55	30	22.49		
Total	825.64	32			

Appendix 2b: Post-Hoc ANOVA results for the 5m x 5m plots among the transects

(I) Transect	(J) Transect	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1	2	-5.18*	2.02	.02	-9.31	-1.05
	3	-1.91	2.02	.35	-6.04	2.22
2	1	5.18*	2.02	.02	1.05	9.31
	3	3.27	2.02	.12	-.86	7.40

*. The mean difference is significant at the 0.05 level.

APPENDIX 3

Appendix 3a: ANOVA results for difference in mean number of individuals per plot for transects used for the 1m x 1m plot

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	422.79	2	211.39	10.38	.001
Within Groups	611.09	30	20.37		
Total	1033.88	32			

Appendix 3b: Post-Hoc ANOVA Results of Number of Individuals per Plot For Transects Used For the 1m X 1m Plot

(I) Transect	(J) Transect	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
1	2	-8.73*	1.92	.001	-12.66	-4.80
	3	-5.09*	1.92	.013	-9.02	-1.16
2	1	8.73*	1.92	.001	4.80	12.66
	3	3.64	1.92	.069	-.29	7.57

*. The mean difference is significant at the 0.05 level.

APPENDIX 4

Appendix 4: Descriptive Statistics For the Transects Studied

Transect	Summary statistics	Density	Height/m	GBH/cm
Herbs				
1	N	21	21	
	Mean (SE)	0.24±0.15	0.41±0.13	
	Std. Error of Mean	0.03	0.03	
2	N	47	47	
	Mean (SE)	0.19±0.21	0.43±0.18	
	Std. Error of Mean	0.03	0.03	
3	N	26	26	
	Mean (SE)	0.52±1.15	0.42±0.18	
	Std. Error of Mean	0.23	0.04	
Total	N	94	94	
	Mean (SE)	0.30±0.63	0.42±0.17	
	Std. Error of Mean	0.07	0.02	
Shrubs				
1	N	51	51	51
	Mean (SE)	0.23±0.29	3.06±0.62	3.26±0.41
	Std. Error of Mean	0.04	0.09	0.06
2	N	63	63	63
	Mean (SE)	0.31±0.34	2.98±0.34	3.27±0.46
	Std. Error of Mean	0.04	0.04	0.06
3	N	48	48	48
	Mean (SE)	0.46±0.72	2.91±0.51	3.00±0.38
	Std. Error of Mean	0.10	0.07	0.05
Total	N	162	162	162
	Mean (SE)	0.33±0.48	2.985±0.50	3.19±0.43
	Std. Error of Mean	0.04	0.40	0.03
Trees				
1	N	82	82	82
	Mean (SE)	0.43±0.66	18.31±12.68	62.62±61.68
	Std. Error of Mean	0.07	1.40	6.81
2	N	52	52	52
	Mean (SE)	0.57±1.07	21.00±10.33	62.27±40.31
	Std. Error of Mean	0.15	1.43	5.59

APPENDIX 4 (Cont.)

Appendix 4: Descriptive Statistics For the Transects Studied

Transect	Summary statistics	Density	Height/m	GBH/cm
3	N	37	37	37
	Mean (SE)	1.01E+00± 2.12E+00	1.71E+01± 2.03E+01	5.44E+01± 5.01E+01
	Std. Error of Mean	3.48E-01	3.34E+00	8.24E+00
Total	N	171	171	171
	Mean (SE)	0.60±1.24	18.86±14.09	60.72±53.32
	Std. Error of Mean	0.10	1.08	4.08

APPENDIX 5

Appendix 5a: Anova for herbs occurring on the three transects

		Sum of Squares	Df	Mean Square	F	Sig.
Density * Transect	Between Groups (Combined)	1.89	2	.95	2.43	.09
	Within Groups	35.47	91	.39		
	Total	37.37	93			
Mean Height * Transect	Between Groups (Combined)	.01	2	.01	0.22	.80
	Within Groups	2.58	91	.03		
	Total	2.59	93			

Appendix 5b: Anova for shrubs occurring on the three transects

			Sum of Squares	df	Mean Square	F	Sig.
density * Transect	Between Groups	(Combined)	1.30	2	.65	2.92	.06
	Within Groups		35.44	159	.22		
	Total		36.74	161			
Mean Height * Transect	Between Groups	(Combined)	.55	2	.27	1.12	.33
	Within Groups		39.003	159	.25		
	Total		39.55	161			
Mean GBH * Transect	Between Groups	(Combined)	2.27	2	1.14	6.45	.002
	Within Groups		27.98	159	.18		
	Total		30.25	161			

Appendix 6

Appendix 6: Anova for trees occurring on the three transects

			Sum of Squares	df	Mean Square	F	Sig.
Density * Transect	Between Groups	(Combined)	8.74	2	4.37	2.89	.06
	Within Groups		254.44	168	1.51		
	Total		263.18	170			
Height * Transect	Between Groups	(Combined)	379.94	2	189.97	.96	.39
	Within Groups		33349.25	168	198.51		
	Total		33729.19	170			
GBH * Transect	Between Groups	(Combined)	1914.37	2	957.19	.33	.72
	Within Groups		481476.51	168	2865.93		

Appendix 7

Appendix 7: Altitude Study

25m x 25m		5m x 5m		1m x 1m	
Altitude	Mean(SE)	Altitude	Mean(SE)	Altitude	Mean
M/S+0.00,288m	16.00±7.80	M/S +0.00,288m	15.00±8.88	M/S+0.00,288m	13.00±11.53
M/S +0.00,326m	12.40±3.15	M/S +0.00,326m	13.30±3.79	M/S+0.00,326m	10.30±5.86
M/S +0.00,379m	12.30±6.51	M/S +0.00,379m	12.00±2.00	M/S+0.00,379m	10.00±5.29
M/S +0.00,413m	12.00±5.20	M/S+0.00,413m	10.70±5.51	M/S+0.00,413m	9.70±4.93
M/S +0.00,449m	12.00±9.17	M/S +0.00,449m	10.30±3.79	M/S+0.00,449m	9.30±6.51
M/S +0.0,472m	11.70±5.86	M/S +0.00,472m	10.00±6.25	M/S+0.00,472m	9.00±7.55
M/S +0.00,573m	10.70±0.57	M/S +0.00,573m	9.00±6.08	M/S+0.00,573m	9.00±6.08
M/S +0.00,615m	8.70±3.51	M/S +0.00,615m	7.70±3.22	M/S+0.00,615m	6.00±3.46
M/S +0.00,705m	8.30±4.51	M/S +0.00,705m	5.70±1.53	M/S+0.00,705m	4.70±2.08
M/S +0.00,716m	6.00±0.00	M/S +0.00,716m	5.30±1.53	M/S+0.00,716m	4.30±2.31
Total	11.00±5.23	M/S +0.00,755m	4.00±1.00	M/S+0.00,755m	3.30±1.53
		Total	9.40±5.80	Total	8.10±5.68

APPENDIX 8

Appendix 8a: ANOVA results for differences in mean among altitudes of the 25m x 25m plot

Between Groups	206.00	9	22.89	.78	.64
Within Groups	588.00	20	29.40		
Total	794.00	29			

Appendix 8b: ANOVA for mean differences in plots within altitudes of the 5m x 5m plots

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	357.64	10	35.76	1.68	.15
Within Groups	468.00	22	21.27		
Total	825.64	32			

Appendix 8c: Anova Results for Differences in Mean Number of Individuals in Altitudes of 1m X 1m Plots

		Sum of Squares	df	Mean Square	F	Sig.
Between Groups	(Combined)	273.88	10	27.39	.79	.64
Within Groups		760.00	22	34.55		

Total	1033.88	32

APPENDIX 9

Plant Survey Questionnaire

PLANTS/TREES USED FOR FOOD, FUELWOOD, BUILDING, MEDICINE AND FOR MAKING HOUSEHOLD ITEMS SURVEY

TIME/DATE …….

INTERVIEWER……

COMMUNITY……

RESPONDENT……..

OCCUPATION……..

GENDER M [ ] F [ ]

APPROX. AGE……

BACKGROUND

(1) What plants do you use?

(2) What local names do you have for these plants?

(3) What do you use the plants mentioned above for? Food [ ] Fuelwood [ ] Household items [ ] Building [ ] Medicine [ ].

(4) Which plant parts do you use? Stem [ ] Fruit [ ] Seed [ ] Leaves [ ] Root [ ] Entire plant [ ] Flowers [ ] Tubers [ ] Bark [ ] Fig [ ] Twig [ ] Rhizome [ ] Bulbs [ ] Corms [ ].

(5) What specifically do you use these plant parts for?

(6) Where do you collect these plants from? Farmland [ ] Home Gardens [ ] Reserve site [ ]

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Other important notes