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Utilization and On-Farm Conservation Of Woody Tree Species In Mazimasa Sub-County, Butaleja District, Eastern Uganda

[1*]Abdulaziz Shehu; [1]Mustapha Shehu Wurno; [1***]Samaila Umar; [1****]Abdulkarim Aminu & [2]Nafiu Abdulkadir**

[1]Forestry Technology Department
College of Agriculture & Animal Science, Wurno, Sokoto State, Nigeria

***Corresponding author: shehuabdulazeez79@gmail.com / +2348032963090/+2349060043444**
****shehumustapha3@gmail.com /+2347035919333**
*****samailaumar726@gmail.com / +2348069679315**
******abdulkarimbo22@gmail.com/+2347033179380**

[2]Microbiology Department
Sokoto State University, Sokoto, Nigeria
nafiuabdulkadir523@gmail.com / +2348032212586

ABSTRACT
The losses of woody species result from rapid human population growth rates and poverty. Losses of woody species do not only affect the rural community that depend on it, but also contribute to the current climate change. The study is to generate information that would contribute to the need for sustainable use of woody plant species in Ugandan`s rural landscape especially in Mazimasa sub-county, Butaleja District. Ethnobotanical survey employed semi-structured interview, guided open and closed questionnaire were used to collect data on trees grown on farm, their utilization and conservation strategies. A quadrat measuring 25m×25m was taken using tape measure for each village. The tree species encountered in each quadrat and households, was identified *in-situ* with the help of forest officer and research assistants from the study area. The species that could not be identified were collected, placed in plant press and taken to the herbarium at Makerere University for identification. The DBH (cm) was determined using the tape measure by using circumference of the tree at a breast height of 1.3m. Twenty nine different tree species belonging to 16 families were identified. *Mangifera indica* L., *Milicia excelsa* (Welw.) C.C.Berg., *Persea americana*Mill,*Markhamia lutea* (Benth).K.Schum, *Artocarpus heterophyllus* Lam., and *Azadirachta indica* A. Juss., were the most abundant and valued tree species in Mazimasa sub-county. Farmers in Mazimasa sub-county valued the identified tree species which play a major role in their livelihood improvement such as source of income, fruits, firewood, shade, timber, poles, medicine, charcoal, wind breakers, soil fertility, fodder as well as fence. The conservation strategies used by the farmers include constant planting of more trees, pruning (methods of harvesting trees) and regulating of its use. Most of the tree species identified is indigenous. Due to their broad leaves they decompose easily. There is need for orienting, training and community sensitization on better methods of tree planting and conservation.
Keywords: Conservation, woody plant, Sensitization

INTRODUCTION

Woody species comprise of trees and shrubs and are threatened in many different parts of the world (Augusseau, 2006). Around the world, the losses of woody species result from rapid human population growth rates and poverty. Conversion of natural land systems for agricultural production, especially under intensive agricultural practices, is believed to lead to loss of tree species biodiversity (Simon, 2004). The loss of woody plants that supply products that are important for local subsistence or income generation can, therefore, cause untold suffering among people who have traditionally relied on them to satisfy their needs. Losses of tree species not only affect the rural community that directly depend on it, but also contribute to the current climate change (FAO, 2009). Among the major challenges facing the world today is deforestation, land degradation, unsustainable farming practices, loss of biodiversity, increased risks of climate change and rising hunger, poverty and malnutrition (FAO, 2009).

For most people living in Africa, woody plants are indispensable to daily existence that is associated with frequent use of wild woody plant species for food, medicine or firewood (Tabuti, 2007). Africa holds 16% of the global forest area but the annual forest loss stands at 4 million hectares (FAO, 2009). Across Africa, women care for their families and are responsible for gathering firewood for cooking. Firewood scarcities are likely to increase their burden at a time when men are increasingly migrating to towns and transferring their activities. For instance, in Uganda, many of the homesteads use wood fuels (NEMA, 2002). A greater population in tropical Africa derive their livelihoods from wild plant products and most people in rural settings especially the poor are dependent on wild woody plant species for their well-being through harvesting of products such as firewood, construction material, food and fodder (Lykke and Wezel, 2006; Tabuti *et al.*, 2010).

In Mazimasa sub-county, Butaleja District, trees on household farms and forests are cut down for timber, firewood, and poles for as well as construction purposes (BLG, 2007). Most of the wetlands drained and poor forestry management with a significant number of trees in the sub-county harvested, wetlands vegetation under rice cultivation (BLG, 2007).

Tree species composition and structure studies are important in the context of understanding the extent of plant diversity in an ecosystem (Addo-Fordjour *et al.*, 2009). They are important for the assessment of sustainability of ecotypes since various ecotypes play a vital role in the conservation of plant species, and ecosystem management (Ssegawa and Nkuutu, 2006). Tree species composition refers to the tree density and diversity which include species evenness and richness. Tree species diversity is dynamic, and has tremendous economic, cultural and environmental importance to local communities (Namanya, 2002; Tabuti 2003: Nkwiine *et al.*, 2003). According to Isabirye (2009) who investigated the ecological status of tree species among small holder farms in the Lake Victoria catchment area found out that, Shannon-weaner diversity index of homesteads was 2.7 with mean evenness of 0.18 and that of gardens was 2.5. He also reported that, most of the species are indigenous to Uganda such as *Moraceae* and *Markhamia lutea* which dominated other families and species respectively. He also reported that fruits and multipurpose trees are dominated.

Also Nazip (2012) recorded a total of 198 species of trees belonging to 44 families in his work. The Shannon weaner index in the study area was 3.42, 3.91, 3.97, 3.84 and 3.91 for the five transect respectively. 1.92-3.10 species diversity was also reported by Wang (2006) in a study conducted in a sub-tropical forest. Species richness that ranges from 10.81 to 53.11 was also reported while tree species evenness that ranges from 16.04 to 44.6 was recorded.

Conservation with the involvement of local communities is therefore very important. Too often, management efforts have not considered the general biology and ecology of these woody plants and as a result, many species continue to disappear (Fuhlendorf, 1999). Some tree species are managed on cultivated lands, along boundaries or home compounds and hedges. Other management methods used may include; controlled grazing (Yrjola, 2002) shifting cultivation and agriculture, community sensitization and empowerment to own the resources planting of these plants on farmlands, sustainable harvesting by restricting harvesters and propagation (Tabuti *et al.*, 2009).

Contrariwise, some management strategies (grazing, shifting cultivation, bush burning to enable regeneration, inappropriate pruning) can cause irreversible damage to woody plant species by

permanently altering ecosystem processes, reducing diversity, and contributing to soil erosion (Fuhlendorf, 1999).

Constraints to the management of woody species include land shortage and insecure tree tenure, poverty, lack of seedlings, land shortage, pests and disease incidences, shortage of planting materials, weak law enforcement in the area, slow growth, Inadequate skills/advisory services for management, Frequent displacement due to insecurity, Bush fire occurrences, High poverty levels, Long juvenile period before fruiting, High demand for charcoal, destruction by grazing animals (Okiror *et al.*, 2012).

Woody species are threatened in Uganda (Tabuti, 2012) and according to NFA 2008; unsustainable use of plant resources has potential to damage the environment and impact negatively on the livelihoods of many communities that depend on natural resources for survival. Natural forests in Butaleja have been cleared to create fields for crops and raw materials for construction and furniture, fuel for cooking and for burning bricks. For the last 30 years a high rate of deforestation has been driven by the increasing population pressure now at 307 persons/sq.km, and excessive tree harvesting sanctioned by the Tororo district authorities (NEMA/UNEP, 2008). Over-harvesting of the native hardwood *Milicia exelsa* trees is rampant. Moreover, no remedial solutions, conservation or sustainable use strategies are in place. There is an urgent need to develop a conservation program by policy makers, environmentalists and National Forest Authority that is socially, culturally and economically acceptable to avert the pending extinction. Developing such a programme would require to some extent information on the current status of trees on household farms which is lacking.

MATERIALS AND METHODS

Study area

The area is dominated by an extensive mixed agriculture consisting of cultivation of rice and expansion of cropland systems. The main cash crops are coffee and cotton. Fruit and vegetable growing is also common, with tomatoes, onions and cabbage dominating (BLG, 2007).

Location

The study was conducted in six villages the sub-county has 7 parishes out of which 3 parishes and 2 villages from each of the 3 parishes were chosen of Mazimasa sub-county in Butaleja District, Eastern Uganda. These were chosen based on the information from the forest officer and physical site visitation. They were found to have a representing number of trees. It is located 8 km East of the Butaleja Town council. It is bordered by Kachonga sub-county in the North, Himutu sub-county in the South, Butaleja town council in the West and Mbale District in the East. Mazimasa sub-county lies between latitudes 33^0 56'42" E, to 33.925000 and longitudes 00055'30"N to 0.925000N and it is 3,600 feet above sea level (Figure 1). Mazimasa Sub-county comprises of 7 Parishes: Kapisa, Muyogu, Lubembe, Bufujja, Kachonga, Mazimasa and Doho Parishes with a total area of $144km^2$

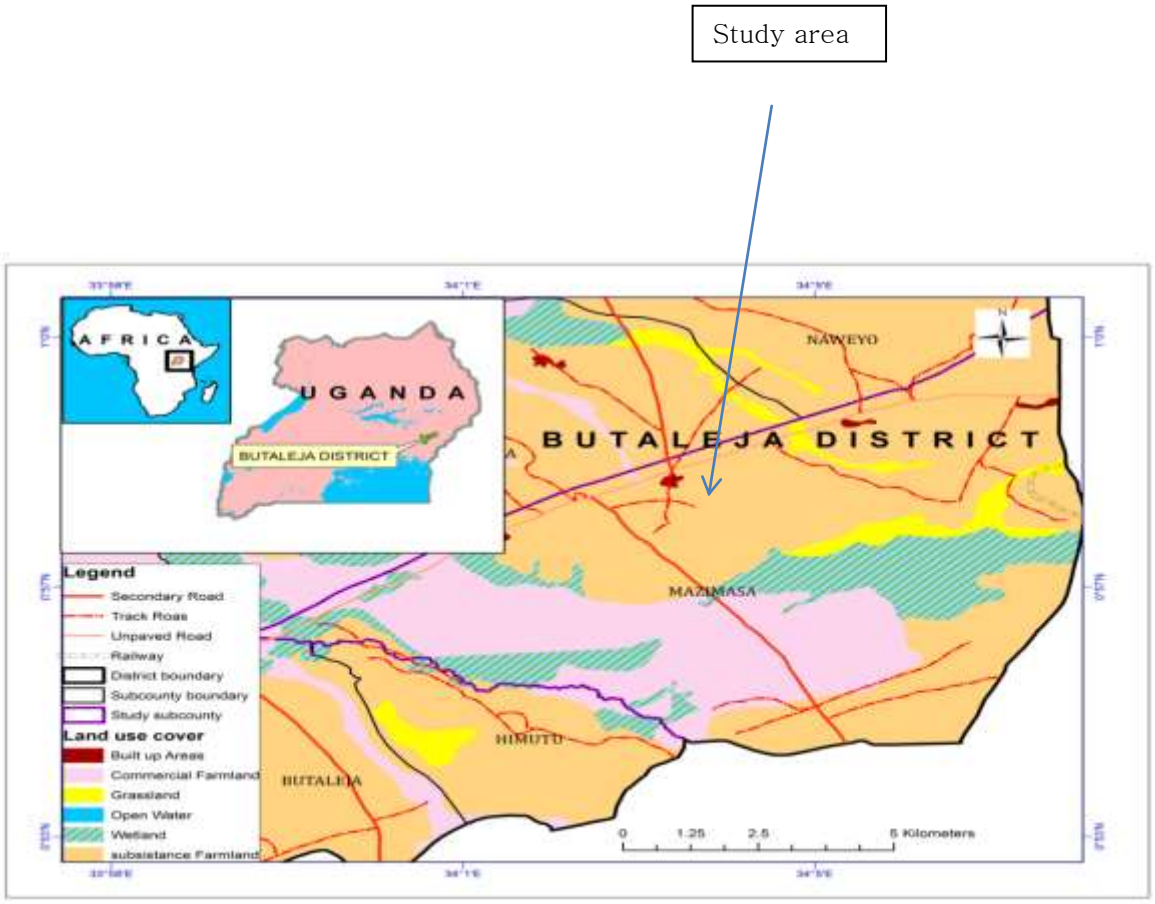

Fig. 3.1- Map of the study area showing Mazimasa sub-county in Butaleja District.

Climate

The district has a sub-humid climate with a bimodal rainfall with first rains starting in early April-July while the second season starting in September- November. The total annual rainfall ranges between 1,130 mm and 1,720 mm, temperature ranges between 16.2 and 28.7 degrees Celsius and the relative humidity ranges between 52 per cent and 89 per cent (BLG, 2007). Butaleja district has in the past suffered from irregular and unpredictable rainfall patterns that disorganize farmers' cropping seasons.

Vegetation and soils

The vegetation is predominantly wooded savannah, with continuous grassland and open canopy and also areas under swamp vegetation (wetland). This is mainly grass land savannah which is characterized by short shrubs and grass particularly in the swampy areas. The soils in the study area have Loamy, Clay and alluvial soils especially along river Manafa basin. There are also some sandy soils in Kapisa parish.

Research Design

Ethnobotanical approach was used in this research to collect data on the different tree species, population structure, uses and conservation strategies.

Study population and Sample size determination

Study Population

Mazimasa sub-county has a total of 32,758 out of which 15,823 are Males and 16,935 are females, with 6,200 numbers of households (UBOS, 2014). The Ethnic groups of the sub-county are Banyole, Bagisu, Bagwere and Basoga and the Languages are Lunyole, Lusoga, Lugwere and Lugusu.

Sample size determination

Sample size selection is the subset of the population that is used to represent the entire population as a whole. According to (UBOS, 2014) Mazimasa sub-county has a total number of 6200 households with an average of 5.3 of people. The sample size of 361 were selected using the Morgan and Krejcie, (1970) method using the formula

$$S = X^2 NP(1-P) / d^2(N-1) + X^2 P(1-P)$$

Where s = required sample size. X^2 = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841), N = the population size, P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size) and d = the degree of accuracy expressed as a proportion (0.05). Because it is an efficient method for determining the sample size and needed to be representative of a given population.

Households in Mazimasa sub-county was randomly selected from different parishes of Mazimasa namely: Kapisa, Mazimasa and Muyogu parishes. 6 villages: Nasemenye & Muhumbania, Mazimasa `A` & Bugalo and Kanghanyi & Wegga respectively were used in the study. Respondents from each of the selected parishes were interviewed to gather information on the different tree species, uses and conservation strategies.

Sampling Technique

The sampling technique employed for this research was systematic random sampling. Five households were selected at the start, skipping two households and then selecting the next five households in that order until the required number was reached, this is because the arrangements patterns of the households in the communities were clustered, therefore this minimized spatial effects.

Data collection Methods

Field activities

Field work for this study was carried out between April and June, 2015. Before any contact with the local community, the study was introduced to the Resident District Commissioner (RDC) through an introductory letter from the Department of Environmental science, Faculty of Science, Islamic University in Uganda. The study was then introduced to the Mazimasa sub-county and Village leaders. The research assistants from the District and study area were hired to ease the work.

A pilot study lasted one week was conducted at the very beginning of the study and key informants were also identified with the help of the local assistants and community.

Ethnobotanical survey of household's farms

A survey employing semi structured interview and guided open and closed ended questionnaires were used to collect data on trees grown on farms, their utilization and conservation strategies. The semi structured interviews were conducted using a checklist of questions and were held with the head of the households. This was done with the help of an interpreter. Parts of the entire tree species mentioned by the respondents and observed on farm were picked and taken to Makerere university herbarium for identification. Confirmation of the names was done using the plant list data base accessed at www.plantlist.org.

Determination of tree species community structure on farm

Tree species diversity was determined using Shannon-Weiner's diversity index below;

…… (1)

Where, H' = Diversity Index; S = is the number of species; Pi = is the proportion of each species in the sample; $lnPi$ = natural logarithm of this proportion.

The species richness (S) was determined using the formula below;

S= ……. (2) Where n is the number of species in a community (Omoro *et al.*, 2010).

Tree species evenness can be determined using formula below;

…… (3)

Where J`= Tree species evenness, $ln\ S$ = is the natural logarithm of the number of species; Pi = is the proportion of each species in the sample; $lnPi$ = natural logarithm of the proportion (Abdul Hayat and Kamziah, 2010).

Data collection on tree community structure

A field work was conducted in Mazimasa sub-county regarding conservation of tree species on farms. A quadrat measuring 25×25m was taken using tape measure for each village; the boundaries of each quadrat was marked using pegs. The placement of the quadrats was based on the proximity of the households, the tree species encountered in each quadrat and households was identified *in-situ* with the help of forestry officer and research assistants from the area. The species that could not be identified were collected, pressed and taken to Makerere University herbarium for identification. The number of individuals of each species were counted and recorded. The diameter at breast height (DBH) of some selected tree species was determined using a tape measure by using the circumference of the tree at a height of 1.3m.

Data Analysis

Determination of Ecological Status and Population Structure of Tree Species

All the data collected from the field on tree species population and structure were entered in Microsoft Office Excel spread sheets, checked for errors, and edited. Trees species diversity, richness and evenness were computed using Microsoft Office Excel version 2010. Descriptive statistics through percentages and frequencies were generated and presented in tables and figures. The variability of tree species diversity, Evenness and richness across the parishes was analyzed by Kruska- Wallis test and the variability considered significant at $p \leq 0.05$.

RESULTS AND DISCUSSIONS

Different tree species on farms of residents in Mazimasa sub-county

A total of 29 different tree species belonging to 16 families were identified in this study of which 19 were indigenous and 10 were exotic (table 4.2).

Table 4.2: Identification of different tree species on households farms in the study area

Scientific names	Family	Frequency	Origin
Mangifera indica L.	*Anarcadiaceae*	243	Exotics
Milicia excelsa (Welw.) c.c.Berg	*Moraceaea*	187	Indigenous
Persea americana Mill.	*Lauraceae*	154	Exotics
Markhamia lutea (Benth)K.Schum	*Bignoniceae*	235	Indigenous
Citrus senensis (L.)Osbeck.	*Rutaceae*	131	Exotics
Artocarpus heterophyllus Lam.	*Moraceaea*	227	Exotics
Azadirachta indica. A. Juss.	*Meliaceae*	136	Exotics
Ficus sur Forssk.	*Moraceaea*	47	Indigenous
Ficus natalensis Hochst	*Moraceaea*	32	Indigenous
Acacia sieberiana Dc.	*Moraceaea*	35	Indigenous
Ficus platyphylla Delile	*Moraceaea*	26	Indigenous
Psidium guajava L.	*Myrtaceae*	55	Exotics
Maesopsis eminii Engl.	*Rhamnaceae*	42	Indigenous
Moringa oleifera Lam.	*Moringaceae*	22	Exotics
Eucalyptus camaldulensis Dehnh.	*Myrtaceae*	67	Exotics
Eucalyptus globulus Labill.	*Myrtaceae*	43	Exotics
Ficus glomusa	*Moraceaea*	23	Indigenous
Ficus mucuso	*Moraceaea*	34	Indigenous
Citrus lemon	*Rutaceae*	56	Indigenous
Chrysophyllum albidum G.Don.	*Sapotaceae*	22	Indigenous
Acacia mellifera (M.Vahl)Benth.	*Mimosaceae*	14	Indigenous
Tamarindus indica L.	*Caesalpiniaceae*	27	Indigenous
Albizia coriaria Wewl.ex Oliv.	*Mirnosaceae*	21	Indigenous
Albizia gummifera (J.F.Gmel)C.A.Sm	*Mimosaceae*	24	Indigenous
Khaya anthotheca (Wewl.)C.DC.	*Meliaceae*	13	Indigenous
Lannea welwitschii (Hiern)Engl.	*Anarcadiaceae*	8	Indigenous
Sterculia dawei Sprague	*Starculiaceae*	11	Indigenous
Vernonia amygdalina Delile	*Asteraceae*	31	Indigenous
Grevillea robusta A.Cunn.ex R.Br.	*Proteaceae*	43	Exotics

Most of the respondents were involved in the growing of indigenous tree species (66%) compared to those growing exotics species (34%) (Figure 4.1). This might be attributed to various reasons one of them being that many locals may not afford the cost of buying seedlings of exotic species also, indigenous trees provide better shades than the exotics.

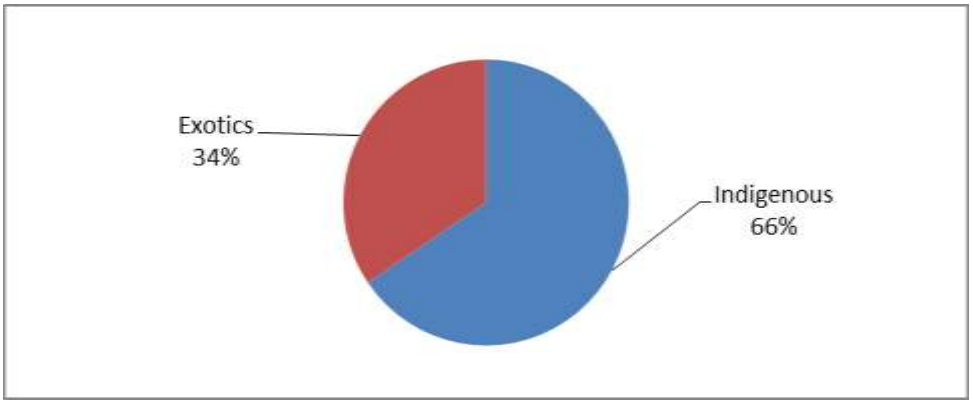

Fig. 4.1: Percentages of indigenous and exotic tree species

Population structure of on farm tree species

This research has shown that Muyagu parish has the highest diversity index (1.65±0.1) of on farm tree species followed by Kapisa parish (1.6±0.1) and lowest in Mazimasa parish (1.43±0.1) (Figure 4.2). However, there was no significant difference in the distribution of tree species across the parishes ($p > 0.05$, Kruska-Wallis test).

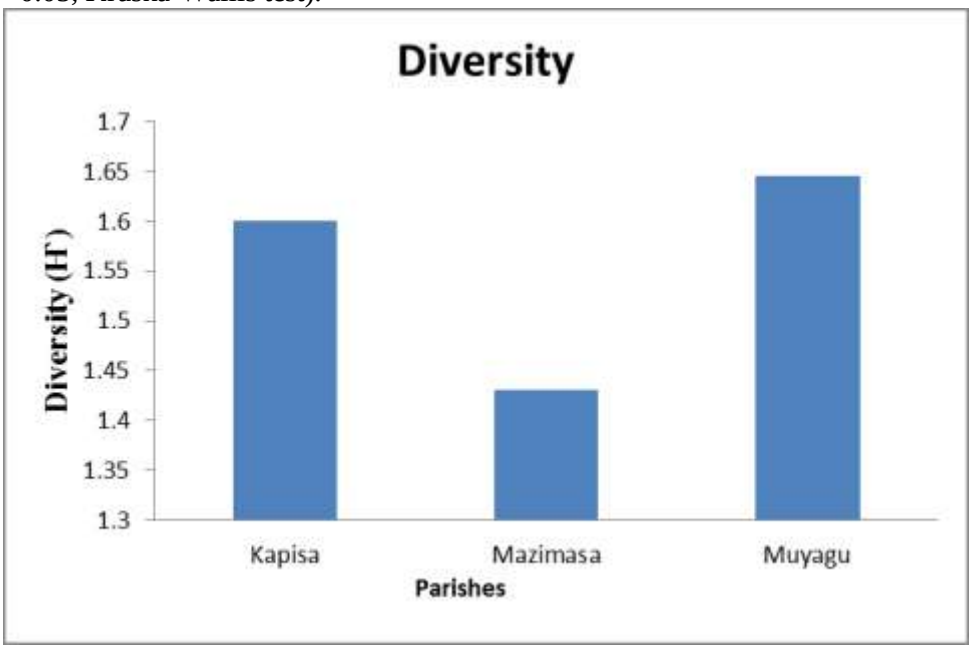

Fig: 4.2 Shannon- wiener diversity index

This finding is however lower than that of Isabirye (2009) who found out that, the Shannon-Wiener diversity index (H') for the tree species in homesteads of Baitambogwe sub-county in Mayuge District was 2.572± 0.1. The lower value of tree species diversity in Mazimasa sub-county can be attributed to destructive harvesting methods such as cutting down trees for firewood, timber, charcoal and poles for building materials among others.

The Shannon Wiener Species richness Index shows that Muyagu and Kapisa parishes have a higher and equal tree species richness index of 5.5±0.58, followed by Mazimasa parish (4.5±0.58) (Figure 4.3). According to Kruska-Wallis test statistically, it is revealed that there is no significant differences in the distribution of tree species richness across the Parishes with value of 0.102 (at $p \leq 0.05$). This shows that the Muyagu and Kapisa parishes have a higher number of trees species than the Mazimasa parish and this could be as a result of conservation strategies used by the farmers in Muyagu and Kapisa compared to those of Mazimasa.

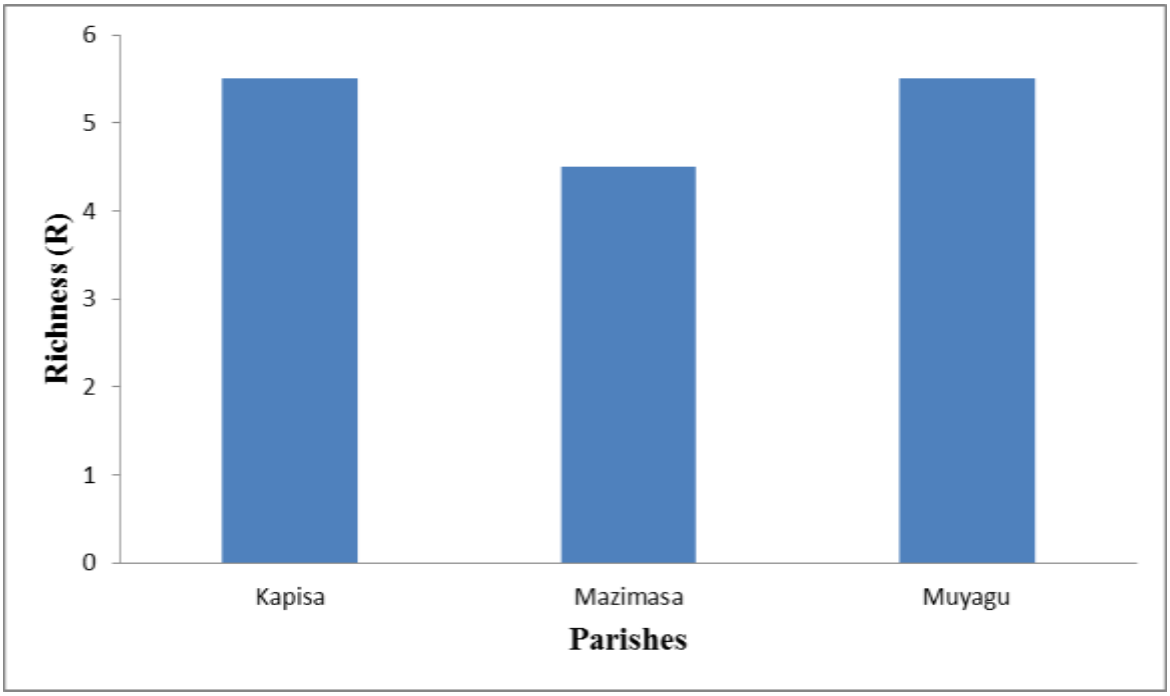

Fig: 4.3 Tree species richness of the three parishes

Muyagu parish had the highest tree species evenness index (0.97±0.02) followed by Mazimasa parish (0.96±0.02) and Kapisa parish (0.94±0.02) (Figure 4.4). According to Kruska-Wallis test statistically, it is revealed that there was no significant differences in the tree species evenness across the Parishes with value of 0.95 (p> 0.05).

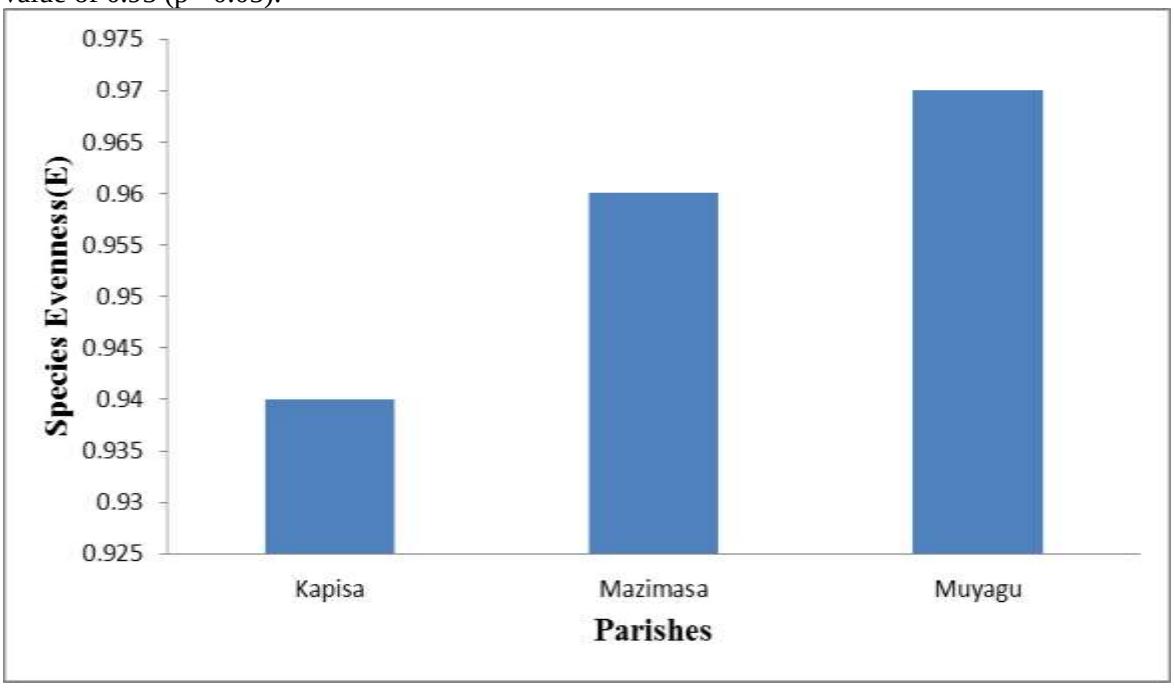

Fig: 4.4 Tree species evenness of the three parishes

Diameter at Breast Height of some selected tree species on farm of households

Among the most abundant tree species *Mangifera indica* had the highest average DBH followed by *Markhamia lutea* and *Milicia excelsa* (Fig 4.5). The highest DBH of *Mangifera indica* could be attributed to local communities' attitude to conserve it in order to provide the mango fruits over a long period of

time. According to Agaba (2015), conservation is greatly influenced by both the perceived and actual attitudes people have towards planting trees on their farmland due to the benefits that they get from trees.

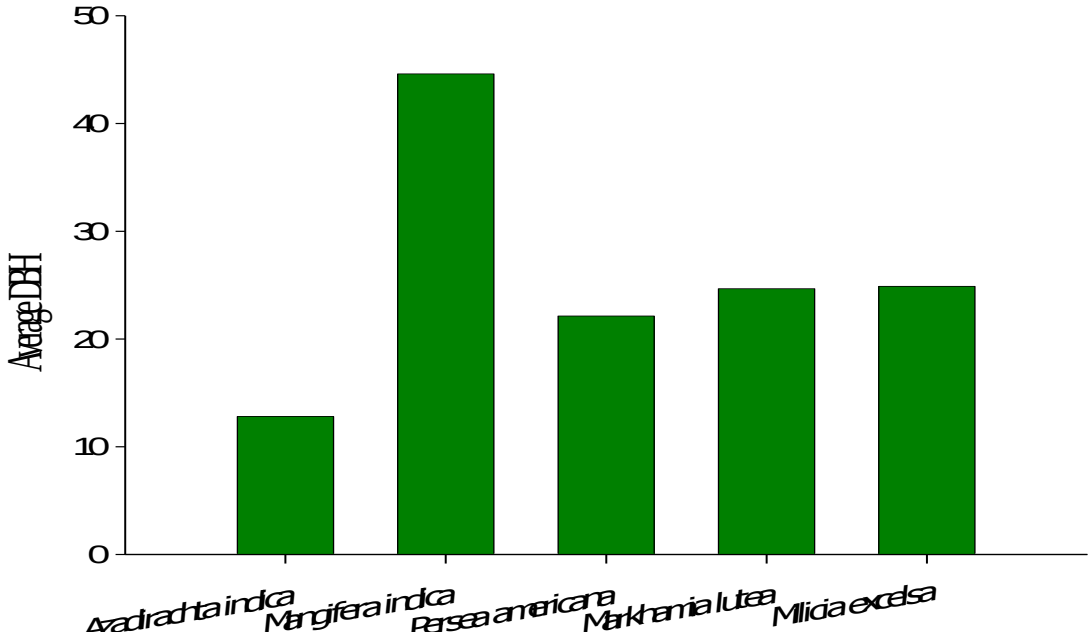

Fig: 4.5 Average DBH (cm) of some selected trees

Conservation strategies used by the farmers

In Mazimasa, the trees are majorly harvested by adults (women and men) in a household who are also responsible for marketing and selling of the products. Children are mainly involved in the harvesting of fruits from the trees. In some households harvesting is done by any member of the household.

Table 4.4: Harvesters of the on farm trees and their products (n=302)

Harvesters	Frequency	Percent
Women	113	37.4
Men	126	41.7
Children	28	9.3
Any member	35	12.6

Source: Field survey (2015)

Various conservation strategies were reported by the respondents to be used to conserve the trees in Mazimasa (Table 4.5). The commonly used method was adoption of harvest method that does not exterminate the tree such as pruning, regular planting and regulated use of tree products. The trees on farm are mainly obtained through planting of both seedlings and cuttings that are obtained from neighbors, purchased from nurseries and at times supplied by government. The trees are managed by many members of the local communities without any help from organization. In few circumstances the government through the local community leaders and National Forest Authority has helped the communities in the management of trees on farm by providing seedlings and cuttings, pesticides and chemicals.

With regard to the cultural practices that have helped them in the conservation and growing of trees, the majority of the respondents (76.8%) indicates that, there were no cultural practices that have helped them in the conservation and growing of these trees and some of the respondents (23.2%) indicates that, there was some cultural practices that have helped them in the conservation and growing of these trees. The cultural practices used includes planting and conserving of tree for family meetings, planting of trees in

remembrance of ceremonies held such as circumcision and marriage. This shows that cultural practices have helped in the conservation and growing trees on farms.

With regard to the laws governing the harvest of trees on farm, the study revealed that many respondents were not aware of any laws governing the harvest of the trees on farms. On the other hand, 43.4% were aware of the law governing the harvest of the trees on their farms. The laws cited were mainly prohibiting careless harvesting of trees and promotion of planting more trees upon cutting one. However the laws are not enforced by any organization or the local communities. This explains why quite a large proportion of the respondents were ignorant of the rules.

Table 4.5 Conservation of trees

	Parameters	Frequency	Percent
Strategies used to conserve them (n=231)	By planting	59	25.5
	Methods of harvesting	97	42
	Regulating its use	68	29.4
	Others (specify)	7	3.03
Mode of acquisition of the trees on the farm	By planting seedling	183	60.6
	By planting cutting	61	20.2
	By germinating them on farm	58	19.2
Source of seedlings (if planted) (n=224)	From neighbor	146	65.2
	Bought from nursery	51	22.8
	From Government	26	11.6
	NGOs (specify)	1	0.4
Role of an organization in tree management on farm	Yes	55	18.2
	No	247	81.8
Type of organization that assisted in tree management (n=57)	NGOs	4	7
	Government	53	93
Cultural practices that helped in the conservation and growing of trees	Yes	70	23.2
	No	229	76.8
Existence of Laws governing the harvest of trees on farm	Yes	131	43.4
	No	171	56.6

Source: Field survey (2015)

Table 4.6 shows the perception of respondents regarding the status of trees in Mazimasa. Majority of the respondents (64.9%) were of the view that, there is a decline in the tree species availability while (35.1%) agreed that, there was an increase in the availability of woody species. Based on the findings of this study, it was revealed that factors that have contributed to the decreasing woody species availability, it shows the over exploitation (68.9%) has the highest percentage from the respondents, Agricultural activities (14.3%) 6.1% pests and diseases, (5.6%) lack of seedlings, others (5.1%). (Table 4.6) This is in line with Monica (2012), that Species that are disappearing appear not to be planted or protected by farmers in the area.

According to the Kyarikunda (2012), woody species face many threats, which include; destructive exploitation to get products like timber or charcoal. Another key factor is clearing land for agriculture. Other factors were pests and diseases, poor methods of propagation, lack of information on the value of trees, high poverty levels, lack of planting materials and poor propagation, prolonged drought and cutting trees without planting others, many trees are being cut down for firewood.

Table 4.6 Changes in availability of farm woody species

Parameters		Frequency	Percent
Availability of trees (n=302)	Increase	106	35.1
	Decrease	196	64.9
Cause of decrease (n=196)	Pest and diseases	12	6.1
	Agricultural activities	28	14.3
	Over exploitation	135	68.9
	Lack of seedlings	11	5.6
	Others	10	5.1
Factors for increase (n=106)	Constant Planting	48	45.3
	Prohibition of charcoal burning	17	16
	Promotion of on farm management by the government	8	7.6
	Government restricts over exploitation	24	22.6
	Others	9	8.5

Source: Field survey (2015)

Majority of the respondents (45.3%) have indicated that increase of woody tree species is as a result of constant planting. In addition (22.6%) have shown that government restricts over exploitation, (16%) as a result of prohibition of charcoal burning and (7.6%) indicated promotion of on farm management by the government and others have 9% (Table 4.6).

This finding is in line with that of the John (2012) that the species known to be increasing in abundance are successful because they are planted, are drought resistant, regenerate naturally, are easy to manage, mature fast, and their seedlings are available among other factors. According to Kyarikunda (2012) *Markhamia lutea*, *Mangifera indica* and *Artocarpus heterophyllus* are abundant. Abundant species are attributed to planting or protection by farmers when found growing naturally. In addition to this, the abundance of woody tree species has been attributed to the following factors; planted most because of the purposes they serve, protected against damage, availability of seedlings and seeds for planting, easy propagation and drought resistant. Other factors are; some tree species mature very fast, grow naturally, are resistant to pests and diseases and are dispersed by Birds. Generally woody species are mainly protected because of the values they serve ranging from edible fruits to non-food values like timber, firewood as well as construction of houses.

From the findings of this study shows that the respondents (75.8%) had trees that they conserve whereas the (24.2%) indicate that they don't conserve trees. According to Agaba (2015), conservation is greatly influenced by both the perceived and actual attitudes people have towards planting trees on their farmland due to the benefits that they get from trees.

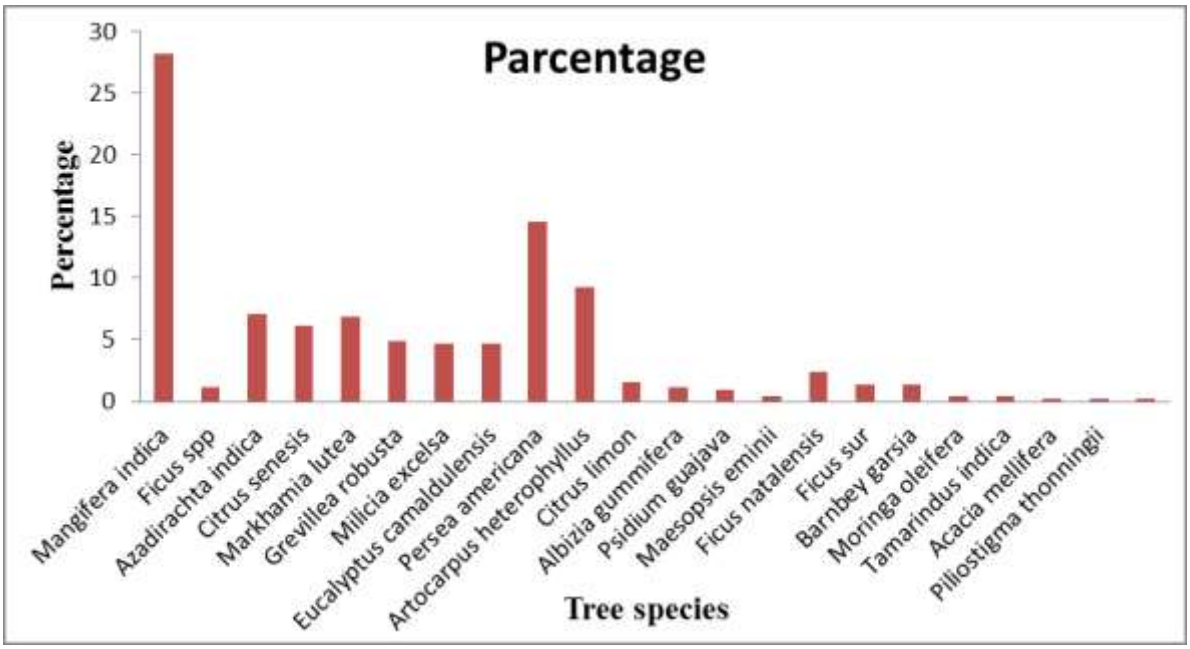

Fig.4.7 Percentages of trees conserved by the farmers

The conservation status of woody species was determined in the study area by asking respondents to list species they conserved. From the study, species such as *Mangifera indica* (28.2%), *Persea americana* (14.6%), *Artocarpus heterophyllus* (9.3%), *Azadirachta indica* (7.1%) and *Markhamia lutea* (6.9%) were found to be the most abundant species in the study area. This was attributed to planting or protection by farmers. Whereas *Citrus lemon* (1.6%), *Psidium guajava* (0.98%), *Maesopsis eminii* (0.40%), *Moringa oleifera* (0.40%) and *Acacia mellifera* (0.20%) were scarce and this may be as a result of species that were not planted or protected by farmers in the area. This finding is in accordance to Kyarikunda (2012) who reported that *Markhamia lutea*, *Mangifera indica* and *Artocarpus heterophyllus* were abundant.

CONCLUSIONS

The findings of the study indicated that, there were many tree species in the sub-county which include the most valuable woody species identified in the study area namely *Mangifera indica, Persea americana, Markhamia lutea, Artocarpus heterophyllus and Azadirachta indica*. The findings of the study indicated that, indigenous species were the most predominant tree species than exotic ones. The results of this study revealed that, tree species diversity in Mazimasa sub-county was relatively low; this could be due to unsustainable utilization of tree species like over exploitation, pests and diseases, agricultural activities, lack of seedlings among others in the area. The tree species status in Mazimasa sub-county was found to be decreasing in its availability. This could be attributed to the un-sustainable utilization of trees by the communities. Planting of more trees, Regulating of its use and Pruning (methods of harvesting trees) were the most common conservation strategies found in the study.There is need for a proper conservation and utilization of the tree species so as to achieve high diversity status in the study area.

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