

Benefits of Agroforestry Farming Practices among Rural Households in Kenya: Experiences among Residents of Busia County

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Abstract: *Despite the low rates of adoption of agroforestry practices among farmers in Kenya, agroforestry remains an important component of sustainable land use and development in agricultural production and reduction of food insecurity. This paper argues that rural poverty continues to increase despite the fact that agroforestry practices are capable of reducing poverty levels. This notwithstanding, agroforestry practices have also been slowly adopted by rural population. Thus, the growing food insecurity and the fading livelihood opportunities are partly attributed to lack of appropriate policies and inadequate awareness on the benefits of agroforestry in reducing rural poverty. If integrated at the household level, agroforestry has the potential to provide economic, social and environmental benefits that are capable of addressing household income, livelihoods and food insecurity and environment related challenges. This paper concludes that there is need for concerted efforts at local, national and international levels to take advantage of the benefits of agroforestry; promote best land use practices as well as develop and implement appropriate policies for the benefit of rural households. This paper recommends that to ensure promotion of sustainability of agroforestry activities, the rural households' participation is fundamental in trainings on how to improve their productivity and maximize the benefits of agroforestry. Additionally, agroforestry information on management of agroforestry systems needs to be communicated in a simpler manner for easy understanding and interpretation by all farmers at the rural households.*

Keywords: Agroforestry, Rural households, Farming practices, Kenya

1. Introduction

During the past two decades, researchers have worked with farmers throughout the tropics to identify and develop improved agroforestry practices that build on local indigenous knowledge and offer substantial benefits to households and the environment (Cooper et al. 1996; Franzel 1999; Sanchez 1995). The Kenyan government has not been left behind, throughout its history, it has attempted to come up with ambitious agricultural policies and strategies seeking to enhance agricultural production and performance as a tool to improve the livelihood of majority of its citizens that are also rural based. Some of the practices that came with these efforts include new methods of soil conservation, (intensive cash crop farming), livestock production, and changes in land tenure system, agroforestry, among others. However, these practices have been received and implemented with various degrees of success and failure depending on the region of the country (Scherr, 1995).

In many developing countries, agricultural development activities are increasingly focused on helping small farmers who have not benefited from the Green Revolution. About 80 percent of deforested areas are used for agriculture, often on degraded soils. Experience indicates that most of these farmers do not have adequate land and the financial resources to invest in irrigated and high-input monocultures typically associated with the green revolution technologies. In most cases, these small farmers cultivate land under rain-fed conditions in arid, semi-arid, and hilly regions where soils are marginally arable, degraded, or generally unsuitable for sustained

intensive monoculture. In these areas, many communities are engaged in diversified farming practices, usually producing a mixture of annual, perennial, and tree crops, as well as rearing livestock (Ibid).

Not only practiced in Kenya, agroforestry is a long-established farming practice in many parts of the world. According to this paper, agroforestry is a dynamic, ecologically-based, natural resource management system that through the integration of trees on farms and in the agricultural landscape, seeks to diversify and sustain production for increased social, economic and environmental benefits for land users at all levels (ICRAF, 2006).

2. Literature Review

Many attempts to promote agroforestry worldwide have been met with poor rates of adoption (Zinkhan and Wear, 1992). According to the studies done by Dunn et al. (1990), Wannawong (1991), there is higher net present values (NPVs) for agroforestry systems when compared to monoculture systems, yet farmers in developing countries show low rates of adoption. However, with low rate of adoption, agroforestry is partly practiced in many parts of the Kenyan rural areas.

For many years, farmers in Africa have been testing improved tree fallows in several countries including Kenya, Zambia, Cameroon, Tanzania, and Malawi, in collaboration with researchers of the International Centre for Research in Agroforestry (ICRAF) and national

agricultural research systems (NARS). Crop improvement in on-station and researcher-managed on-farm trials at sites in Kenya, Zambia, Cameroon, Tanzania and Malawi have been encouraging (Kwesiga and Coe, 1994; ICRAF, 1996, 1997). The challenge now is to assess whether more farmers can achieve similar crop improvement and whether they are able and willing to incorporate improved tree fallows into their farming systems.

In some countries, local leaders have played influential role in promoting agroforestry. For instance, in Zambia, local leaders played important roles in promoting improved fallows sensitizing and mobilizing their constituents to plant improved fallows, and in some cases, promoted the enforcement of by-laws to remove two of the main constraints to agroforestry adoption: the setting of uncontrolled fires and free grazing of livestock (Ajayi et al. 2002). In Kenya, perceived economic importance of agroforestry practice by individual farmers is considered key to adoption of any agroforestry practice (Sorre, 2005). Additionally, farmers will invest in improving their land for annual crop production only if that land is a critical part of their livelihood strategy and only if the investments compete favorably with alternative opportunities (Sorre, 2005).

In Kenya, particularly in Busia County, the findings of woodfuel development programme revealed that agroforestry is a traditional practice that has existed in these areas for many years. Further, most of the inhabitants of these areas practice three major agroforestry systems namely, agrosilvicultural, silvipastoral and agrosilviculture. Within these systems, five major agroforestry practices are widely undertaken. The most common practices are mixed farming, dispersed trees in crop lands, home gardens, trees along hedges, farm boundaries, woodlots and home compounds (Bradley, 1993). The important question here is whether agroforestry can prevent the negative impacts that result from domesticating crops in a monoculture system, which can cause environmental degradation through deforestation, soil erosion, nutrient mining and loss of biodiversity.

From a practical perspective, Busia County is food deficit and largely relies on the Uganda border for much of its food supply annually (Sorre, 2005). Agroforestry, if integrated at the household level, has the potential to provide economic, social and environmental benefits that are capable of addressing household income, fuel, food supply and environment related challenges. Since independence, there have been several agroforestry-related activities initiated in Busia District through the various agricultural departments and recently, the non-governmental organizations. However, little seem to have been achieved in these efforts, especially when it comes to adoption of agroforestry (Scherr, 1995).

Brown (2003) observed that a farmer's adoption of agroforestry technology depends on the following criteria: food (supplying immediate household needs), income (providing cash to service other needs), future (providing savings for longer-term needs, such as, education for children), building (providing wood materials for construction of new house for instance), and erosion

control (activities that minimize soil loss). Therefore, agroforestry offers many entry points to improve the household status, income and health of women and children.

Cultural beliefs influence agroforestry adoption. For instance, ritual and taboo prohibitions against planting or using certain tree products are powerful determinants of people's actions, and often hold more local influence than rules and formal legislation set by national government (Kiptot & Franzel, 2011). According to Chavangi (1994), tree planting activities in western Kenya are dominated by men and it has been effectively sustained through cultural practices. Just as ownership of land is by custom denied to women, ownership of trees is also denied to women. To ensure that this vital customary requirement is sustained, certain reasons are advanced as to why women are not allowed to plant trees. Most of the reasons may scare women from active participation in tree planting activities thus preserving male dominance.

The reasons advanced in western Kenya to inhibit women from planting trees according to Chavangi (1994) include fatalistic beliefs such as if a woman plants a tree, she could become barren; if a woman plants a tree, her husband could die; if a woman plants a tree, the action is viewed as direct challenge to the husband's supremacy in the household. It is seen as seeking to claim equality in the home and such an action could result in divorce; and during the construction of a house, wood from a tree planted by a woman could not be used. However, despite the beliefs, women contribute to planting of trees by promoting seedling to men in their households, while in women headed households, women take the initiative and plant preferred trees depending on their uses.

It is worthy noting that the rural poor have different motivational factors that influence their participation in agroforestry ranging from economic, environmental, medicinal, livelihood and socio-cultural factors. For instance, women have a stronger interest in trees for domestic use for example firewood and medicines while men prefer trees for earning cash for example through timber Harvesting (Kiptot & Franzel, 2011).

It is against this backdrop that this paper discusses the role of agroforestry to the rural households in Kenya with a strong emphasis on economic, socio-cultural, environmental, medicinal and livelihood benefits and how these benefits act as a trigger and sustain the practice of agroforestry.

3. Methodology

This paper draw was conducted in Nambale District, Busia County. Nambale District, one of the Districts in Western Province, is the indigenous home of the Bakhayo people. Other Districts in the Province include Bungoma, Kakamega, Butere-Mumias, Vihiga, and Teso. Busia County is the border between Kenya and Uganda. It borders Uganda to the East, Bungoma County to the Northwest, Kakamega to the Southwest and Siaya to the South. Busia County falls within the Lake Victoria basin. The district has 924,200 hectares (924 sq. km) of agricultural land but only 40,000 hectares is under crop

production. The high potential parts are found in Nambale, Matayos and Butula.

The study was conducted through a descriptive survey research. A survey research according to Mugenda and Mugenda (1999) is a self-report study, which requires the collection of quantifiable information from the sample. Survey design was suitable for data collection in order to gather qualitative and quantitative data from the target population. The study required both primary and secondary data which was collected through a combination of methods. Simple random sampling technique was used to select a sample of 200 respondents' from Nambale District and a semi-structured questionnaire was administered to the sample. Key informant interviews, informal group discussions and participant observation were also employed. The data was analyzed both qualitatively and quantitatively.

This paper is an outcome of objective five of the study that sought to evaluate the benefits of agroforestry farming practices to rural farmers in Busia County. The paper explores the extent to which the practical and perceived benefits influence the adoption of agroforestry practices among rural households in the study area.

4. Findings and Discussions

Adopted Agroforestry Practices

Agroforestry practices in the study area are the basis of this study. The researcher therefore, wanted to find out the adopted agroforestry practices among the respondents. 96.5% have adopted boundary planting, 90% have planted multipurpose trees, 86% live fencing, 15% wind breaks, 76% have practiced mixed cropping, 2.5% fodder trees and trees for soil conservation each.

Table 1: Responses on Agroforestry Practices adopted by respondents

Agroforestry practices	Frequency	Percent	Frequency	Percent
	Yes (n=200)	100%	No (n=200)	100%
Boundary planting	193	96.5	7	3.5
Use of multipurpose trees	180	90	20	10
Live fences	172	86	28	14
Windbreaks	30	15	170	75
Trees in crop land	152	76	48	24
Fodder trees	5	2.5	195	97.5
Trees for soil conservation	5	2.5	195	97.5
Alley cropping	4	2	196	98

NB: This is a multiple response and each variable is out of 200(100%)

From Table 1 above, boundary planting is the most commonly adopted agroforestry practice (96.5%). This could be explained by the fact land is scarce (93%), fuel wood is scarce (96%) there is soil erosion (90%) and believe that trees compete and reduce space for food crops. Therefore, trees are planted at the unexploited areas of the land. Planting of Multipurpose trees was adopted by (90%) of the respondents. The study found out that trees with many uses were preferred because they will solve more than one environmental problem. Trees like *grevillea*, *makhamia lutea* and *cassia spectabilis* are the most commonly planted trees in the area of study because of their multipurpose use. This is because they have many branches which could be used as fuel wood, have good poles and timber, act as windbreak and do not destroy soil and therefore can be grown with crops.

Live fence is planted by 86% of the respondents because they are long lasting and can perform several functions on the farm. This was mainly to control soil erosion, control animal movement, keep off outside animal, for firewood, and beautification. *Lantana camara*, *kie apple*, *finger euphorbia* are the most commonly used trees and shrubs. Only 15% of the respondents reported to have planted windbreaks in their farms. This is to prevent crops, houses and animal sheds from being destroyed by wind. Mixed cropping is practiced by 76% of the respondents. This is where trees (*makhamia lutea*, *croton*,) are mixed with food crops such as (cassava, maize, millet, groundnuts, and sweet potatoes) due to their properties (their leaves act as mulch for crops and they take long to grow big).

Leucaena tree was planted by 2.5% of the respondents for fodder and mulch. The study wanted to find out why *Leucaena* is not planted by many farmers as a fodder tree and soil improvement despite its potential. It was reported that *Leucaena* produces seeds which sprout forming dense thickets which are hard to remove and this reduces land for other crops. In fact, all the farmers have abandoned it for the above reasons. These results are in line with ICRAF (1995) that *Leucaena* has been reported as a weed in over 20 countries. According to the Global Invasive Species Programme, the problem is that *Leucaena* sets seed and spreads by itself, forming dense thickets. This makes land inaccessible, and sometimes threatens areas of natural indigenous vegetation, full of rare plants that grow nowhere else. Because the tree resprouts from cuttings, the thickets are very hard to remove. In an attempt to bring this weedy tree under control, the South African government has introduced an American beetle, which feeds on *Leucaena* seed. Because *Leucaena* is a good fodder plant, farmers often have mixed opinions about efforts to limit its spread. Most of the farmers said that they do not plant fodder trees but mainly plant Napier grass which is viewed by many as the best fodder for animals and can also act as a catch crop.

5. Broader view of the Benefits of Agroforestry among Rural Households

Livelihood Benefits of Agroforestry

Majority of the world's poorest population, particularly in sub-Saharan Africa, live in subsistence farming households and depend on productive use of land for their livelihoods and food security. Agricultural productivity

makes a major contribution to their livelihoods. Agroforestry has been praised world over as a major source of livelihood among rural households. During the study, the researchers found that farmers accrued several livelihood benefits from agroforestry practices. In this section, the benefits towards the farmer's livelihood have been categorized as produce from agroforestry.

Table 2: Livelihood Benefits of Agroforestry

Produce from agroforestry	Who produce (n=200)	Use all produce at home	Use more at home than sell	Sell more than use at home
Milk	70	12(17%)	6(9%)	52(74%)
Animals	157	8(5%)	2(1%)	147(94%)
Bricks	80	3(4%)	4(5%)	73(91%)
Firewood	200	120(60%)	72(36%)	8(4%)
Poles/timber	160	12(8%)	23(14%)	125(78%)
Fodder	136	123(90%)	11(8%)	2(2%)
Home implements	200	193(96.5%)	5(2.5%)	2(1%)
Fruits	192	120(62%)	40(21%)	32(16%)
Raw materials for construction	200	192(96%)	6(3%)	2(1%)
Poultry	200	10(5%)	48(24%)	188(71%)

NB: This is a multiple response and each variable is out of 200(100%)

Table 2 above lists the main farmers produce from agroforestry and the proportion they use or sell. In Nambale District, most of the produce is sold at home for local consumption or to the middlemen that travel around the district. According to the data, most of the farmers produce mainly for home consumption. However, even selling a little proportion of their produce is a significant cash source. From table 2 above, milk sale (74%), animal sale (94%), bricks sale (91%), poles/timber sales (78%) and poultry (71%) were considered to be very important addition to household income.

Cross cattle were the major producers of milk for sale, while local breed produced milk for home consumption. Goats, pig and cattle and sheep were the animals reared for sale by the farmers. Napier grass is the most commonly used fodder grass and is mainly consumed at home through stall feeding but it is also sold to needy farmers. Brick making was a major source of income since these bricks are commonly used for building permanent houses in Nambale district and therefore, there is always a ready market for the bricks. The most common tree species for timber, poles, raw material for construction of traditional houses and firewood sales were *Grevillea robusta*, *makhamia lutea*, *cassia spectabilis* and *eucalyptus*. *Mangifera indica*, *persea Americana* and *carica papaya* were the most important to yield fruits for sale and home consumption.

Fruits were used as food and also for nutritional security among households and more so, by children. Home implements include traditional chairs and baskets made

from *makhamia lutea* and *lantana camara* respectively. However, the greatest proportion of firewood, fruits and raw materials (fito) for construction of traditional house and granaries are used at home.

Poultry plays a very important cultural role among the Luhya Community in the Busia County. All the households (n=200) keep poultry, and in many households, children and women owned the hens. In most cases, chicken are sold and in some cases eggs supplement household income especially when there is emergence for cash.

In a nutshell, majority of the agroforestry units are also major sources of livelihood to the households as evident in milk, bricks, poles, timber, animals and poultry. The produce supplements household income and especially during emergency need for cash or when there is food shortage after the previous harvest is exhausted.

6. Economic Benefits of Trees in Agroforestry

During the study, it was observed that trees in particular were the main unit of agroforestry. This was found to be attributed to the many uses and benefits realized from different tree species by the farmers. The study observed that all the respondents (200) had trees. However, all the respondents had a variety of mixed tree species. Apart from these, there were also shrub (*lantana camara*) and grass (*napier grass*). Table 3 below sums some of the benefits arising from the trees, shrub and grass.

Table 3: Economic Benefits of Agroforestry

Trees, Grass/ Shrub Resources.	Frequency and % of availability (n=200)	Use	Frequency and % of use (n=200)
Grevillea	200 (100)	Poles, timber, firewood	120 (60%)
Eucalyptus	80 (40)	Poles, timber,	10 (5%)
Makhamia lutea	160 (80%)	Poles, timber, firewood and home implements making home implements	160 (80%)
Lantana camara	24 (12%)		6 (3%)

NB: This is a multiple response and each variable is out of 200(100%)

From table 3 above, all the respondents who planted *makhamia lutea* have realized the economic benefits of the tree. *Makhamia lutea* is an indigenous tree among the Luhya community locally known as *olusiola*, which grows naturally and therefore, it is tendered through pruning wherever it grows or is transplanted to a better place. Being a traditional and indigenous tree, it has many uses like building traditional houses and chairs because it bends easily, it provides hard-wood and therefore, preferred by many people for timber and building poles. It is also commonly used for firewood and charcoal. In fact, *Makhamia lutea* coppice are the only ones used for building traditional houses and chairs because it bends easily and therefore its demand is high.

Grevillea is the most common planted tree (100%) among the respondents due to its multi-purpose use. However, during the study period, about 60% have realized the benefits of *grevillea* species, while 40% have not because their trees have not matured to be sold or used as timber or poles or have not reached pruning time to get firewood. Those who have realized the economic benefits planted their trees more than five years ago and have already used timber, poles or firewood for their household use or have sold as timber, poles, coppices or firewood. *Grevillea* branches are sold for tomato grafting to farmers. One of the respondent said that he sold *grevillea* poles worth KSh. 20,000 as timber and used to pay schools fees for his son. It was noted that *grevillea* is preferred by people for its early returns since it grows and matures faster depending on the use. It also does not drain nutrients from the land and thus, can be intercropped with food crops, grass and shrubs.

Those who planted *eucalyptus*, (40%) have realized benefits from the tree products. Eucalyptus is believed to be the most lucrative tree species because its hard-wood provide poles and timber that have a ready market. However, it is not commonly planted by people because believe that eucalyptus destroys soil and therefore should not be planted near crops. It is also known to take long time to mature than *grevillea* and also have fewer branches hence limited products and in most cases, timber and poles are the main products from eucalyptus. One of

the respondents said that he sold poles worth KSh. 400,000 to Kenya power and lighting company which has motivated people to plant eucalyptus. However, this took time about 15 years to realize.

Lantana camara was planted by 24(12%) of the respondents as a live hedge and 6(3%) used lantana stems to make home implements like traditional luhya basket, which is common in every homestead. *Lantana camara* grows naturally as a wild shrub and therefore, it is not planted by many for economic use, but people get the stems along the road to make the baskets for sale. However it is planted by many as a live hedge around the homestead and for ornamental purposes.

When asked how they use the money they get from the sale of the tree products, those who sell timber and poles said that they pay school fees since the trees are sold when there is no other source of income, while money from firewood, charcoal, baskets and fodder is used to buy food and other uses which do not require a lot of money at once. Trees are believed to be an investment for cash when sold or for better market price of land when one decides to sell. A land planted with trees is more expensive since it is known to be developed compared to land with no trees.

7. Socio-cultural Benefits of Agroforestry

Socio-cultural beliefs play a significant role in influencing agroforestry adoption among the rural households in Kenya. The belief systems existing among the rural people may inhibit or promote the practice of agroforestry. These beliefs are powerful determinants of people's actions, attitudes and often hold more local influence than rules and formal legislation set by national government. From table 4, respondents 200 (100%) who planted *grevillea* said that it provided shade, 120(80%) said that *makhamia lutea* provided shade and was used to demarcate the homestead, while 24(12%) used lantana camara as a live hedge and for ornamental purposes and 120(80%) have used finger euphorbia as a boundary marker to demarcate the size of the land.

Table 4: Social and Cultural benefits of Agroforestry

Types of Agroforestry	Frequency and percentage of who planted (n=200)	Benefits	Frequency and % of who benefitted (n=200)
Grevillea	200(100%)	Shade for people, animals, house	200(100%)
Lantana camara	24(12%)	Contain livestock, ornamental	24(12%)
Finger euphobia	182(88%)	Boundary marking	120(80%)
Makhamia lutea	120(80%)	Shade for people and animals and to demarcate the homestead	120(80)

NB: This is a multiple response and each variable is out of 200(100%)

Analysis in Table 4 above indicates that *grevillea* was the favorite tree among the respondents. This was explained by its properties-having many branches, matures faster, do not break easily, it is tall and does not harbor pests. It was found out that during the dry period when it is hot, houses roofed with iron sheets are normally hot and therefore visitors are welcomed under a tree. People also take day meals under a tree or relax after work, while doing other household chores. *Grevillea* grows tall and therefore, makes the houses cool during the day and that is why they are planted near houses.

Lantana camara is planted by 24(12%) of the respondents as a live hedge to contain or keep out livestock. When planted closely *lantana camara* forms a thick hedge, has small thorns and easily controls animals. *Lantana camara* when planted in the compound is beautiful especially when it flowers.

Makhamia lutea, which is an indigenous tree among the Abaluhya people and traditionally, is the tree strategically located in homesteads. The tree commonly found near houses and near animals grazing or feeding area for shade. Culturally, it also symbolizes care, success and good health and therefore a favorite in almost all the homes.

From the focused group discussions, Abaluhya people offered their prayers under a tree they considered very sacred called *Olusiola (Makhamia lutea)* and prayers were led by the father of the home. They would ask God for blessings, food and protection from any sufferings. It is also under the *Olusiola (makhamia lutea)* tree where special prayers were offered for instance if they faced drought, famine or any outbreak of diseases.

Makhamia lutea (Olusiola) was planted in an open area directly to the door of the main house. It was surrounded by three stones, one for the father another one for the mother and the remaining for the children. This place was also used to curse people who had gone against norms and ethics of the community and it was done after serious consultations.

In situations like prolonged drought seasons, the whole clan would gather under *Olusiola (makhamia lutea)* in the morning and a sheep slaughtered. *Finger Euphobia* is used as a cultural symbol for boundary. It is mainly found along land boundaries between homes and/or households. Its sap is also used as a glue to trap birds as a source of food especially doves.

It was also evident from the study that culturally, some trees are planted by women while other species are planted by men with concrete reasons why there is a disparity. This has disadvantaged women and scared them from active participation in tree planting activities while giving men the most advantage thus preserving their dominance. Similar to other parts of Africa, Nwonwu (1996) found that among the Ibo of Southeastern Nigeria, women own economic trees such as the palm oil as a reward from their husbands for their ability to bear children. For every child born, a palm tree is set aside in the communal farmland to mark the arrival of the child.

8. Environmental Benefits

All the respondents 200(100%) who planted *grevillea* tree said that the trees reduce soil erosion, those who planted *lantana*, 24(12%), 18(9%) realized controlled soil erosion, while those who planted *Napier grass*, 150(75%), 142(71%) realized reduced soil erosion.

Table 5: Environmental Benefits of Agroforestry

Responses	Frequency and % of who planted (n=200)	Use	Frequency and % of who benefitted (n=200)
Grevillea	200(100%)	Control soil erosion and provide mulch	200(200%)
Lantana	24(12%)	Control soil erosion	18(9%)
camara	150(75%)	Control soil erosion, reduce water logging and enrich soil and as catch crop	142(71%)
Napier grass			

NB: This is a multiple response and each variable is out of 200(100%)

Those who planted *grevillea* said that it holds soil together and Nambale district being an area of sandy soil, people experience a lot of runoff during rainy season. *Grevillea* was planted in homesteads, near boundaries and was also used to subdivide land into portions since it is known not

to interfere with soil nutrients and soil properties. Therefore, the respondents said that planting *grevillea* reduced soil erosion and those with small seedlings, planted them for multipurpose benefits, where soil erosion control was among the intended benefits. Respondents

who planted *grevillea* in crop land said that the *grevillea* leaves are collected together and used to provide much and more so in banana stems and seedbeds.

Lantana Camara was planted by 24(12%) of the respondents and 18(9%) said that they have realized reduced soil erosion in their homesteads since lantana was commonly planted as a live hedge around homesteads. Lantana is a live shrub and when planted closely it holds soil together while reducing the speed of runoff water during rainy season.

Napier grass was planted by 150(75%) of the respondents and 142(71%) to control soil erosion. Napier grass was also planted along the boundary in water logged areas to reduce water and allow crop production. When intercropped with maize, Napier grass is used as a catch crop for stalk borer disease that attacks maize.

9. Medicinal Benefits

The researcher was also interested in knowing whether trees are also valued because of their medicinal value. However, it was realized that the trees with medicinal value were not commonly planted necessarily, but only a few of the respondents had planted the trees. Therefore, the researcher sought to know which trees are used for medicinal purposes and by who. All the respondents 200 (100%) said that they have ever taken *neem* (mwarubaine) tree as medicine. *Neem* tree is known to cure forty diseases and the most commonly treated disease is malaria. The leaves are boiled and one adult person takes a glass of the bitter concoction three times a day.

Some of the respondents take the *neem* concoction for other ailment including stomach upsets, skin disorders and when they experience a headache. *Neem* tree is sometimes taken when a person feels dizzy and it is said to cure the cause of dizziness which may be any disease. The most common *neem* product is the *neem* soap for bathing. It is locally processed and sold in the form of soap bars at a cost of between KSh. 40-80 depending on the size. However, one of the respondents said that he has never gone to hospital and whenever he feels sick, he takes the *neem* concoction and he recovers. He said that he believes *neem* tree is a powerful tree. When asked why he has not planted the tree, the respondent said that *neem* tree does not need to be planted by an individual as long as one can access it from any other person and it is a taboo to bar someone from picking the tree product for medicinal purposes as long as the tree is not being destroyed.

Croton tree locally known as “Musutsu” is also found to have medicinal purposes. All the respondents said that they know that croton tree is useful for medicinal purposes, that is why majority 180(88%) said they have ever used it for medicinal purposes. Sap from a leaf-twig of the croton is known to stop a fresh wound from bleeding and forms a coat on the wound making the healing process faster. The findings of the study concur with a study done in Burundi, which found that women selected *Markhamia lutea* for planting because they use the leaves to prepare medicine for treating their childrens’ diarrhea (Franzel et al, 1999). It was also revealed that *Nandi flame* tree is used to heal mumps or swollen necks, and is highly valued in the study area. The tree is also

used to make rubber stamps and medicine for poultry. However, it is rarely planted since it is believed to cause death among family members when it sheds its flowers.

10. Conclusions and Recommendations

It is our conclusion that the benefits of agroforestry (source of livelihood, environmental, medicinal, economic and socio-cultural benefits) sustain households. However, the practice has the potential to provide even greater economic, social, health, environmental and other opportunities, which would enhance household income, livelihood opportunities, food security, aesthetics and soil conservation. This paper recommends that rural households’ participation in trainings on agroforestry is fundamental in order to access information on the best practices and its management for optimal benefits.

References

- [1] Ajayi, O, et al, (2002). Effectiveness of local policies in enhancing adoption of agroforestry technologies: The case of by-laws on grazing and fire in eastern Zambia, Pp. 93–99
- [2] Bradley, C. (1993). Bibliography of Western Province, Kenya. African Studies, University of Wisconsin.
- [3] Brown, D. (2003). Considering the role of landscap, farming system and the Farmer in the adoption of trees in Claveria, Misamis Oriental Province, Philippines, Unpublished MS Thesis, University of London.
- [4] Chavangi, N. (1994). Cultural aspects of fuelwood procurement in Kakamega District. KWDP Working Paper No. 4. KWDP/The Beijer Institute, Nairobi, Kenya.
- [5] Cooper, P et al., (1996). Agroforestry and the mitigation of land degradation in the humid and sub-humid tropics of Africa. *Experimental Agriculture*, 32, 235-290.
- [6] Dunn, W. et al., (1990). Benefit-Cost Analysis of Fuelwood Management Using Native Alder in Ecuador. *Agroforestry Systems* 11: 125-139.
- [7] Franzel, S. (1999). Socioeconomic factors affecting the adoption potential of improved tree fallows in Africa. *Agroforestry Systems*, 47, 305-321.
- [8] ICRAF. (1996). ICRAF annual report 1995. Nairobi, Kenya: International Centre for Research in
- [9] Kiptot, E. & Franzel S. (2011). Gender and agroforestry in Africa: are women participating? ICRAF Occasional Paper No. 13. Nairobi: World Agroforestry Centre
- [10] Kwesiga, F., & Coe, R. (1994). The Effect of Short-Rotation Sesbania-Sesban Planted Fallows on Maize Yield. *Forest Ecology and Management*, 64(2-3), 199- 208.
- [11] Mugenda, O & Mugenda A.,(1999). Research methods: Quantitative and Qualitative approaches. Nairobi African Centre for African Studies
- [12] Nwonwu, F., (1996). The gender role and the future of agroforestry in Africa. In: *People and Institutional Participation in Agroforestry for Sustainable Development*. (ed).
- [13] Ministry of Information, Culture, Youth and Sports. Government Press. Nigeria.

- [15] Sanchez, P.A. 1995. Science in agroforestry. Agroforestry Systems 30: 5-55.
- [16] Sorre, B. (2005). Effect of Sugarcane production on food security and nutritional status on Nambale Division, Busia District: Kenya.
- [17] Scherr, S. (1995), Economic Factors in Farmer Adoption of Agroforestry: Patterns Observed in Western Kenya, World Development, Vol. 23, No. 5, 787-804.
- [18] Wannawong, S., et al., (1991). Benefit-Cost Analysis of Selected Agroforestry Systems in Northeastern Thailand, Agroforestry Systems 16: 83-94.
- [19] Zinkhan, C. & Wear, D. (1992), Development of a Multi attribute Utility Approach for Evaluating Potential Agroforestry Systems in the South, Study Plan for USFS and Campbell University Cooperative Agreement