Original Research Article

AN INVENTORY OF AGROFORESTRY PRACTICES IN BUTTA SUB-COUNTY, MANAFWA DISTRICT, UGANDA

ABSTRACT

Agroforestry was been regarded as an effective, low-cost means of minimizing the degradation of cultivated land and of maintaining or even increasing the productive capacity of agricultural ecosystems. A household survey was conducted using descriptive survey method to develop an inventory of agroforestry practices and constraints among small-scale farmers in Butta sub-county, Manafwa district in Uganda. The quantitative data collected from the household heads was analyzed using Statistical Package for Social Science (SPSS) version 20.0 and Microsoft office excel 2013. Descriptive analysis was conducted and frequencies and percentages of the responses was obtained. Friedman test was conducted to identify the most critical constraints associated with agroforestry adoption. A total of five practices were identified and these range from Boundary marking, live fences, hedges, woodlots to Home gardens. The most significant constraint was Pest and diseases with mean rank 1.24 followed by fire outbreak, Lack of labor, Drought, Shortage of land, and lack of seedlings and Theft with mean rank of 1.32, 2.11, 2.41, 2.53 and 3.11 respectively. This study suggest that, there is need for loans to farmers to cater for their financial needs and similar study has to be conducted in other parts of the country in order to assess the extent of Agroforestry practices to guide in planning further interventions to improve adoption and practice of agroforestry practices.

Keywords: Agroforestry, Degradation, Inventory, Descriptive survey, Constraint

1.0 INTRODUCTION

The association of trees, agricultural crops and animals in a farming system is an ancient practice throughout the world, probably dating back as far as 7000 B.C, in the form of shifting cultivation [1]. Agroforestry has been defined as a dynamic, ecologically based, natural resource management system that, through the integration of trees on farms and in the agricultural landscape, diversifies and sustains production for increased social, economic and environmental benefits for land users at all levels [1]. Agroforestry and conservation agriculture have emerged as a sustainable land management practices addressing land degradation and loss of soil fertility [2]. It is regarded as an effective, low-cost means of minimizing the degradation of cultivated land and of maintaining or even increasing the productive capacity of agricultural ecosystems. By World Bank estimates, over 1.2 billion people derive their livelihoods from agroforestry systems. Owing to its capacity to enhance multiple functions in agriculture, agroforestry will become increasingly important in land-use practices around the world [3]. If properly conceived and practiced, agroforestry can contribute to sustained productivity of natural resource base by

enhancing soil fertility, controlling erosion, enhancing microclimate of cropping and grazing lands and general improvement of the environment [4]. The importance of agroforestry in Africa can therefore, not be under-stated.

Since 1988, Agroforestry research in Uganda has focused on identifying tree species that could be incorporated on agricultural land without significantly interfering with food crops. Several Agroforestry practices were been introduced and promoted in the country, mainly by the International Center for Research in Agroforestry (ICRAF) and the Uganda Forestry Resources Research Institute (FORRI) in collaboration with number of non-governmental Organizations (NGOs). Practices for soil fertility improvement, production of fuel wood, timber, fodder, fruits and other products was being tested on both research stations and farmers' fields in several districts in the country. Many of the Agroforestry activities were been targeted in areas with very severe land degradation, including the southern and eastern highlands, the Lake Victoria Crescent, Southwestern rangelands and the eastern lowlands [5]. However, the adoption of agroforestry practices in Uganda is still in modest in scale [6], and this situation is known to exist in all tropical countries.

Agroforestry technologies and innovations can therefore, make significant contributions towards addressing high levels of poverty and associated land degradation in Uganda [4]. For this to happen, however, there is need to promote agroforestry technologies and innovations that farmers can invest in and that in turn generate incomes and/or save them costs they incur.

It is upon this background that this study aimed to develop an inventory of agroforestry practices and constraints among small-scale farmers in Butta sub-county, Manafwa district in Uganda.

2.0 MATERIALS AND METHODS

Butta sub-county is one of the sub-county in Manafwa district eastern Uganda. The sub-county has four parishes (Tooma Butta, Fuluma Butta, Busantsa and Butta). Butta sub-county is loacated in the eastern Region of Uganda, boardering the Sibanga in the east,Bupota in west, Bugobera in south and Buwagogo in north. It lies between the longitudes of 34^0 20 and 34^0 23 east, and latitudes $1^0$0 to 1^O0 North. It also lies on an average altitude of 1,800 meters above sea level.

The area experience bimodal type of rainfall with the highest in the first season of March to June and the second, which is normally light, in September to November. A short dry spell is between June/July while the December to March spell is longer with average rainfall of 1800mm per annum. In general, there are no extreme temperature range; these conditions can be attributed to closeness to Mountain Elgon National Park.

A household survey was conducted in the three parishes of Manafwa district during April and May 2015. National Population and Housing Census Provisional Result 2014 showed that, Butta sub-county has a total population of 4,757 with total households of 1,002 (Census, 2014). Contact with the sub-county head quarter revealed that there are 120 agroforestry adapters and 3 Extension staff.

Butta sub-county was selected for the study because it was one of the two sub-counties (Namabya and Butta) chosen by ACIAR in collaboration with NaFORRI for agroforestry program. Butta sub-county has four parishes, which are Tooma Butta, Fuluma Butta, Busantsa and Butta. Were selected purposefully base on the agro-climatic condition and being at the foothill of Mountain Elgon. Ten villages out of sixteen were selected.

The study was conducted through a descriptive survey research in order to gather qualitative and quantitative data from the target population.

The study was conducted with the heads of household selected using a combination of multistage stratified random sampling and systematic random sampling (see Table 1). The study population of this research involved two categories of respondents that are the household and extension officers from the sub-county. The household heads were further stratified into Adopters and Non-adopters. A sample of 247 (62 Adopters and 185 Non-adopters), small-scale farmers were used in the study. However, during data cleaning only 242 (60 Adopters and 182 Non-adopters), sample were valid for analysis.

Table 1: Types of instruments, Categories of respondents, Sample selected and Sampling Techniques

Type of instruments	Category of respondents	Sample selected	Sampling Techniques
Interview Guide	Extension officers	3	Census
Questionnaire (Survey method)	Adopters	62	Stratified – Systematic sampling
Questionnaire (Survey method)	Non-adopters	185	Stratified – Systematic sampling
Total		250	

Source: Field Survey, (2015)

A sample of 250 respondents were used as shown in table 1 above. The respondents were systematically selected.

2.1 Data analysis

The quantitative data collected from the household heads was analyzed using Statistical Package for Social Science (SPSS) version 20.0 and Microsoft office excel 2013.

Descriptive analysis was conducted to obtained frequencies and percentages of the responses. Friedman test was conducted to identify the most critical constraints associated with agroforestry adoption.

3.0 RESULTS AND DISCUSSION

3.1 An inventory of Agroforestry

The results of the inventory of Agroforestry practices in the three parishes of butta sub-county, Manafwa district revealed a number of agroforestry practices as being used by farmers. A total of five practices were identified and these range from Boundary marking, live fences, hegdes, woodlots to Home gardens. The percentage numbers of farmers practicing each wewre shown in Table 2. Boundary marking and live fences were the most commonly practiced, 48.3% and 25.0% while woodlots have the least percentage of 5.0% farmers.

Table 2: Agroforestry practices and constraints

Parameter	Frequency	Percent
Types of Agroforestry practices		
Boundary marking	29	48.3
Live fences	15	25.0
Woodlots	3	5.0
Hedges	9	15
Home gardens	4	6.7
Values of Trees on Farm		
Mark boundary	61	59.2
Improve land fertility	43	41.7
Prevent gulley formation	34	33.0
Stop soil erosion	81	78.6
Improve soil moisture	56	54.4
Wind break service	56	54.4
Source of Seedling		
Extension officers	3	5.0
Brought from private nurseries	36	60.0
Borrowed from friends	14	23.3
From on farm nurseries	7	11.7
Constraints		
Pests and Diseases	49	47.6
Shortage of labor	35	34.0
Shortage of land	34	33.0
Drought	35	34.0
Fire	45	43.7
Theft	18	17.5
Lack of seedlings	29	28.2

Source: household survey, (2015)

NB: N=60

Note that values of trees on farm constraint to tree planting are multiple responses and therefore could not add up to hundred.

Boundary marking was highly ranked in all the three Parishes indicating its preference. It was characterized by planting trees a long boundary of two different farms. It is an important practice for marking property rights. Likewise, the practice helps the farmers by providing them with poles, timber and fuel wood. The trees also act as windbreakers, which reduce the effect of strong winds that could have damaged the crops. Most farmers also appreciated the fact that the trees save them the costs of buying barbed wires and poles for demarcating their farms. Tree species mostly observed for use in this practice included, *Sema spetabilis (cassia). Eucalyptus sp., Ficus sp., sesbania sesban, and Azadirachta indica.* These results agree with the findings of Wafuke [7], who observed that in small scale farming areas, boundary planting reduces wind speed and that, trees on boundary which was regularly pollarded can meet most of a family's need for firewood while ensuring a properly demarcated boundary.

Jean (2012) indicated that the most frequent species used in Agroforestry in Nyaza, Rwanda were *Grevillea robusta* and those belonging to the genus *Eucalyptus.* He noted that it is multipurpose and a good source of energy and it coppices readily and almost indefinitely.

Live fences were the second highest adopted practice by farmers in the study area. The highest (31.4%) percent was recorded in Butta and the least (12.1%) in fuluma Butta. The trees are planted around homesteads and were mainly composed of indenous trees used as medicine for households and livestock. Live fences control the movement of animals and people. Besides, their main function, trees used in live fences often prove fuel wood, fodder, food and act as windbreakers or enrich the soil depending on the species used. Coomon species used include, *Citrus limon fruit, Psidium Guajva, Dovyalis Caffra, Ficus sp., Jatropha sp.,* and *Erthrina sp*.

A study elsewhere by Maroyi [8] confirm the use of a mixture of *Citrus limon fruit* and *Eucalyptus sp.* Leaves and *Psidium Guajva leaves* as treatment for flu and fever was found to be widespread in Nhema communal area.

Hegde was the third highest adopted practice by farmers in the study area. Like boundary marking, hedges are trees and shrubs planted in thick bushes around farms and mainly play the role of fences and aesthetics. The tree species that were found commonly used in this practice include *Lantana camara, Dovyalis Caffra, Cupressus lusistanica* and *Psidium Guajva.* This practice helps in soil erosion control, protection of cultivated fields against destruction and fuel wood ICRAF [3]. It was noted that, in Murang, a district in of Kenya, farmers planted trees on hedges for timber and as windbreakers, fuel wood and food [7].

Home garden as an Agroforestry practice was adopted across all the three sub-counties. Home gardens involved mostly fruit trees integrated with fodder crops, vegetables, beans and even maize on small

gardens near the homestead. Fruit trees included *Persia Americana, Psidium Guajva, Carica papaya,* and *citrus sp.* Fodder trees included *sesbania sesban, Leucaena leucoecephala, Calliandra calothyrsus, Magnifera indica,* bananas and Napier grass.

The findings are also in line with Maroyi [8] who noted in Zimbabwe the most commonly used plants for home garden include; food plants – *allium cepa, Moringa oleifera, vigna unguiculata,* and *zea mays*; fruit trees – *Citrus sinenseis,, Mangifera indica* and *Psidium Guajva.*

Woodlot though lowest ranked was adopted in the study area (Table 2). Wood lots comprise of sections of the farm set aside purposely for tree planting. Woodlots were most common (9.1%) in fuluma Butta Parish and least common (0.0%) in Tooma Butta. This practice was dominated by *Eucalyptus cassia, Cupressus lustanica* and *Grevillea robusta.* Woodlots were planted in poor land within the farm for rehabilitation of eroded araes. It was also valued for controlling soil erosion on sloping landscapes and as a source of household income.

3.2 Constraints faced by farmers in adoption of Agroforestry practices

The respondents reported the major problems they faced in adoption of agroforestry in the area. The total number of respondents was more than the actual number mentioned in the table 2 because the respondents mentioned more than one problem being faced.

The result revealed that the most significant constraint was Pest and diseases with mean rank 1.24 (Table 3). Majority of the respondents (47.6%) reported that there was occasional outbreak of pest and disease that attack trees in the area (table 2). This support the findings by Irshad [9] who reported that, in Swat, Pakistan harboring of insects, pests and diseases were the major constraints to tree planting in the area. Okorio [10] also reported tree pest and diseases, bush burning and drought as a constraint to tree planting in the lower Kagera, Uganda. He also indicated that forests harbor wild animals that destroy crops.

The problem of fire outbreak came second with 1.32 mean rank. More than forty three percent (43.7%) of the respondents revealed that, fire from hills and bush burning during dry season destroy most of the trees they plant.

About the shortage of labor, 34.0% of the respondents reported being-faced with shortage of labor because most of their children attend boarding schools. Therefore, farm labor is most available only during holiday. However, according to Friedman test as indicated in table 3, this variable has the third lowest rank (1.51) at p=0.000. Irshad [9] reported that, the bigger the family sizes the more forested area. He argues that the size of the forested area can be related to the greater availability of labor for growing woody perennials and more requirements of woody perennials for fuel wood, fodder, timber and fruits for household utilization and to generate extra income to sustain their livelihoods.

Other constraints to Agroforestry adoption found in the study area were Drought, Shortage of land, and lack of seedlings and Theft with mean rank of 2.11, 2.41, 2.53 and 3.11 respectively. The respondents revealed that, though not always, they experience shortage or late rainfall due to change in climate that

caused partial and temporal changes resulting in the dead of many seedlings. This was also confirm by the Extension staff. Zeleke [11] reported that shortage of land could be the major constraint in adopting Agroforestry practices. In his study, he revealed that about 68% of the community had problem of land shortage that resulted in hindering the development of Agroforestry practices in Oromia, Ethiopia.

Wafuke [7], also in his study on Agroforestry adoption in Kenya concluded that small-scale farmers in Kenya were constrained by cost of buying seedlings and farm labor in the adoption of Agroforestry practices. Interview with the Extension staff also revealed that there is increase in tree seedlings theft in the area, which made many farmers reluctant in planting trees on their farms.

In general, the constraints have different negative effect on adoption of agroforestry practices as shown by the analysis where P-value (0.00), $P < 0.01$.

Table 3: Statistical test of constraints faced by Farmers using Friedman test

Constraint	Mean Rank	Test Statistics
Pests and diseases	1.24	N=60
Shortage of labor	1.51	Chi-Square = 41.453
Shortage of land	2.41	Df=6
Drought	2.11	Asymp. Sig. = 0.000
Fire	1.32	
Theft	3.11	
Lack of seedlings	2.53	

Significant difference ($P<0.01$)

4.0 CONCLUSION

There are variety of Agroforestry practices that were been adopted in the study area which range from boundary planting, live fences, hedges, home garden to woodlots.

It was noted that Boundary planting was the commonly adopted agroforestry practice among the farmers in the study area followed by live fences. However, woodlots recorded the lowest percentage of the respondents, this is due to the fact that, most of the respondent possessed small chunk of land and that the practice requires a portion of land to be sacrificed.

This study also revealed that, majority of the respondents suffered from pests and diseases that attack seedlings and even killed them before they matured. Shortage of labor scored the second lowest mean rank. This can be explained by the fact that, farm labor is mostly provided by wives and children which mean that labor is often available when the children are on holiday since most of them attend boarding Schools. It was also observed that there is growing theft of tree seedlings in the study area. Other constraints to tree planting in Butta sub-county include shortage of land, Drought, Fire and lack of seedlings.

CONFLICT OF INTEREST

No conflict of interest declared.

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