

## **Farmers' Attitudes Towards On-Farm Cultivation of Indigenous Fruit Trees in Adwari Sub-County, Lira District, Uganda**

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### **Abstract**

This study was conducted in Adwari sub-county, Lira district to (i) determine the conservation status and threats to indigenous fruit trees (IFTs), (ii) assess farmers' attitudes towards IFT cultivation, (iii) documents local knowledge on propagation and management of IFTs, and (iv) identify opportunities and constraints to promotion of IFTs cultivation. Semi-structured questionnaires were administered to a total of 120 randomly selected respondents. MINITAB statistical package was used to analyze the data. Logistic regression analysis was performed to show the influence of socio-economic characteristics on farmers' attitudes towards their attitudes to plant IFTs. The population of IFTs was found to be generally declining. The major reasons for decline were charcoal burning and firewood collection. Although, majority of farmers had positive attitudes towards cultivation of IFTs, their attitudes were influenced by gender, education level, farm size and occupation status. Lack of clear markets for indigenous fruits, unclear information about their food values, lack of seedlings in local nurseries, and dearth of information propagation techniques were the major hindrance to cultivation of IFTs. There is a need especially by local governments and local councils to formulate clear strategies on conservation of IFTs for example by establishing a community nursery and propagation center for IFTs. There is a need to address the issue of marketing and pricing of indigenous tree fruit products. Lastly, there is a need of further study to analyze the market environment for indigenous tree fruits compared with alternative possibilities such as exotic fruits or agricultural crops.

**Key words:** Domestication, wild fruits, farming systems, food security, Uganda.

### **Introduction**

Indigenous fruit trees (IFTs) can contribute to cash economy of small-scale farmers (Okafor, 1988). Some of the fruits can be processed to make juice, wine, jam, chutneys and animal-feed concentrates. With increased climatic instability causing frequent agricultural crop failure, the role of indigenous fruit in providing nutritional supplement to mankind is gaining recognition (Maghembe, 1995). During drought periods indigenous food plants provide food and income rural households (Eriksen and Mutimba 1998). Fruits such as *Adasonia digitata* provide dietary supplement and are often sold in local markets (Arum, 1989). According to Campbell (1987), IFTs are not normally included in agricultural policies and have been neglected by research and extension programmes by

many developing countries. They have faced a great danger in the recent past due to high population growth, which exerted high pressure on woodland resources (Ondachi, 1999). For a long time, mankind has relied on these resources without managing them or putting in any effort to propagate them. This, coupled with lack of ex situ conservation strategies, has led to their loss in the natural woodlands and forests (Ondachi, 1999). It is no longer possible to leave such strategies to nature to provide the genetic resources. Planting of IFTs on-farm therefore not only has the potential of improving food security but also conservation of biodiversity on-farm (Brownrigg, 1985).

In Uganda, however, little research has been undertaken on IFTs. Moreover, there is a dearth of information on IFTs that can be incorporated in the farming practices. Under the proposed programmes for improved delivery of agricultural and forest services, each district will be expected to work within the framework of the National Forest Plan (NFP), Plan for Modernization of Agriculture (PMA) and National Agricultural Advisory Services (NAADS). In the NFP, districts will be expected to develop and advise on agroforestry technologies (FSCS, 2002). The promotion of on-farm tree planting and indigenous fruit tree domestication will be prominent features in the delivery of service to farmers. However, this will be hampered by lack of information on the fruit trees that can be selected for domestication. The specific objectives were to (1) determine the conservation status and threats to IFTs, (2) assess farmers' attitudes towards IFTs cultivation, (3) document indigenous knowledge on propagation and management of IFTs, and (4) identify the opportunities and constraints to promotion of IFTs cultivation in Adwari, Lira district.

## **Materials and Methods**

The study was conducted in Adwari sub-county found in Otuke county, Lira district in the northern part of Uganda. Adwari is located between 2° 25' - 2° 47' N and 33° 02' - 38° 38' E (LDSOER, 1997). The largest part of the sub-county has acidic and deeply weathered soils with low cation exchange capacity (LDSOER, 1997). The average minimum and maximum temperatures are 22.5 °C and 25.5 °C respectively. The average annual rainfall is 1200 mm. The sub-county is covered with wooded savanna. Large areas of original tree-savanna occupied areas have been taken over by farming and grazing. About 82% of the total population and 79% of the households derive their livelihood from farming.

Semi-structured questionnaires were administered to a total of 120 randomly selected respondents. The purpose was to capture data on the socio-economic profile of the farmers, their attitudes and willingness towards indigenous fruit tree cultivation, indigenous knowledge on propagation and management of IFTs, opportunities and constraints to promoting cultivation of IFTs. The area was stratified into seven administration units (parishes) and respondents from each unit were selected systematically for the interview. The number of respondents selected from each unit ranged from 15 to 17, relative to the size of its population. MINITAB statistical package was used to analyze the data. Logistic regression analysis (Green, 1995) was performed to show the influence of socio-economic characteristics on local farmers' attitudes and willingness to plant IFTs.

## **Results and Discussion**

### **Demographic and socio-economic characteristics of respondents**

The majority (66%, Table 1) were aged between 20-40 years. Seventy four percent of the respondents were male and 75% were subsistence farmers. Eighty five percent were married; the majority had attained either primary or secondary education and the average family size was seven people per household. About 68% of the respondents had an average annual income ranging from Shs. 101,000 - 200,000. About 72% had more than 6 ha of land and 60% of the land, had less than 25% tree cover.

## **Conservation status and threats to IFTs**

The population of the 10 most preferred indigenous fruit tree species is declining in Adwari sub-county (Figure 1). This decline is a challenge to the National Forest Plan (NFP) and Plan of Modernization of Agriculture (PMA) when considering cultivation of IFTs as the wild populations would be the major source of planting materials. The main threats to IFTs are tree cutting for charcoal and firewood, reported by 68% and 55% of the respondents respectively. Wild fires in the dry season and clearing agricultural land are other important threats (Figure 3). Exploitation of wood for making mortars, timber and house construction, beehives and inability of some trees to sprout are the other threats to conservation of IFTs.

## **Farmers' thoughts about IFTs cultivation**

Generally, there were positive feelings towards IFTs cultivation. Majority (89%) of the respondents were willing to plant the fruit trees as long as planting materials are available. Most of them value IFTs for food, cash, building materials, local medicine and firewood (Table 2). The logistic regression (Table 3) indicates that gender, education, farm size and occupation influences farmers' attitudes towards planting IFTs. Gender significantly influenced local their willingness to plant IFTs ( $R = 0.18$ ,  $P = 0.01$ ). The marginal change on the willingness to plant the fruit trees as a result of gender was 0.16 indicating that the probability of planting of IFTs by female increases by 16%. There is an incentive to encourage women to invest their labour in IFTs planting.

Education level had positive influence on farmers' perception to plant IFTs. The marginal effect of 0.14 of the willingness to plant IFTs as a result of education implies that there is a 14% chance of planting these trees if the respondent had formal education. This finding is consistent with other reports that education increases people's environmental awareness and appreciation of the value of trees (Agea *et al.*, 2009; Agea *et al.*, 2005; Obua *et al.*, 1998). The marginal change on the willingness to plant these fruit trees as a result of occupational status was 0.17 implying that the probability of planting IFTs increases by 17%. Farmers usually attach values to trees and withstand high risks associated with planting and managing trees on their farms. Farmers' willingness to plant the IFTs was also influenced by farm size ( $R = 0.16$ ,  $P = 0.04$ ). The larger the farms the more willing people are to plant IFTs. Age, family size, income, land ownership and marital status did not have significant influence on people's attitudes and willingness to plant IFTs.

## **Local knowledge of propagation and management of IFTs**

Table 4 revealed that farmers generally do not manage IFTs. Only a small number (21%) of the respondents indicated they were carrying out some form of management such as pruning, weeding, pollarding, fire, and termite control. Knowledge on propagation was very low among the respondents. Only 25% said they were practicing some form of artificial propagation (Table 4). It is clear that farmers still regard IFTs as wild and God given. There has been little effort to plant IFTs. Lack of awareness and unavailability of seedlings were said to be major constraints to planting IFTs.

## **Constraints and opportunities to planting and managing IFTs**

Lack of clear market for indigenous fruits, limited knowledge by farmers to plant and manage IFTs, inadequate information about food values of wild fruits; lack of planting materials, slow growth and lack of money to buy planting materials hindered on-farm plantings (Table 5). Lack of a developed market for indigenous fruits could be explained in part by the fact that many people have free access to wild fruits and do not perceive them as commodities that can be sold. The other reason for lack of a developed market for indigenous fruits could be related to consumers taste and preference for exotic fruits like apples and avocado.

Many urban consumers perceive indigenous fruits as food for the poor and famine stricken households. This

perception affects the market demand and consumption of the fruits. Development of markets for indigenous fruits is a challenge that needs to be addressed under PMA. Farmers also fear competition of trees with agricultural crops. Many said fruit trees attract birds, which destroy their crops. The finding compares closely with those of Maghembe *et al.* (1998) who reported similar constraints as hindrances to planting of IFTs by farmers in southern Africa.

In spite of the numerous constraints, there are opportunities to planting IFTs e.g. land availability, interest in and willingness to plant IFTs, time availability, increasing support by the National Agricultural Advisory Services (NAADS) and the district agricultural extension agents and willingness of the local people to be trained on indigenous fruit tree propagation techniques. As noted by Chweya (1997), such opportunities could be used as an incentive to lure people to plant indigenous food plants on their farmlands

In conclusion, the population of IFTs is generally declining. This is a major concern at a time when the currently government is trying to show case its achievements in all most sectors. The major driving forces behind the decline are charcoal burning, firewood collection, clearance of land for agriculture and wild bush fires. Attitudes towards cultivation of IFTs were influenced mainly by gender, education level, farm size and occupation status. Lack of clear markets for indigenous fruits, lack of awareness on the need to plant and manage IFTs, unclear information about their food values, lack of seedlings in local nurseries, and dearth of information propagation techniques were the major hindrances to cultivation of IFTs. There is a need especially by local governments and local councils to formulate clear strategies on conservation of IFTs for example by establishing a community nursery and propagation center for IFTs. There is a need to address the issue of marketing and pricing of indigenous tree fruit products. Lastly, there is a need of further study to analyze the market environment for indigenous tree fruits compared with alternative possibilities such as exotic fruits or agricultural crops.

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**Table 1. Demographic and socio-economic characteristics of the respondents (N = 120).**

Variable	%		Variable	%
Sex			Family size	
Male	74		< 5	25
Female	26		6 to 10	56
Age (years)			> 10	19
< 20	8		Annual income (Shs.)	
20 – 40	66		< 100, 000	21
> 40	26		101,000 - 200,000	68
Marital status			201,000 - 300,000	8
Single	9		> 300,000	4

Married	85		Land ownership	
Divorced	6		Yes	92
Level of education			No	8
None	8		Size of land owned (ha)	
Primary	34		< 1 ha	0
Secondary	49		1 to 3	4
College	9		4 to 6	15
Occupation			> 6	72
Farmer	75		Proportion of land under tree cover (%)	
Trader	8		< 25	60
Service worker	25		26 to 50	28
Others (Student)	8		> 50	2

**Table 2. Farmers' attitudes and their reasoning towards IFTs cultivation in Adwari Sub-county (N=120).**

<b>Question and responses</b>	<b>% of respondents</b>
Would you grow IFTs if planting materials were available	
Yes	89
No	11

If yes, why would you grow them	
Domestic consumption and sale	77
Provide shade on compound	62
Building materials	42
Medicinal value	17
Firewood	11
Amenity/ornamental purpose	08

**Table 3. Logistic regression of socio-economic characteristics that influences the local people's attitudes and willingness to plant IFTs in Adwari Sub-county.**

<b>Variable</b>	<b>Coefficient</b>	<b>S.E ±</b>	<b>Probability (5%)</b>	<b>R</b>	<b>Odd ratio</b>
Age	-0.73	0.19	0.64	-0.05	-0.13
Education	1.21	0.37	0.03	0.11	0.14
Family size	-0.97	0.16	0.40	-0.08	-0.01
Farm size	1.17	0.44	0.04	0.16	0.19
Gender (sex)	0.83	0.25	0.01	0.18	0.16
Income	0.54	0.18	0.09	0.07	0.09
Land ownership	-0.88	0.40	0.82	-0.02	0.01

Marital status	-0.67	0.15	0.55	-0.04	-0.11
Occupation	1.11	0.39	0.01	0.13	0.17

**Table 4. Local knowledge of propagation and management of IFTs in Adwari Sub-county (N = 120).**

<b>Question and responses</b>	<b>% of respondents</b>
Do you carryout any form of management of IFTs?	
Yes	21
No	79
If yes, what kinds of management carryout?	
Pruning	58
Weeding	55
Fire control	15
Termite control	4
Pollarding	2
Do you know any local method of propagating IFTs?	
Yes	25
No	75
If yes, which methods?	
Transplanting	55

Direct seeding/sowing on the farm	21
Sowing on the nursery	25
Cuttings	8

**Table 5. Constraints to planting and managing IFTs in Adwari Sub-county (N = 120).**

<b>Constraints to planting and managing IFTs</b>	<b>% of respondents</b>
No clear market for wild fruits	69
Lack of awareness on the need to plant and manage IFTs	68
Unclear information of food values of the wild fruits	63
Some wild fruit trees take so long to fruit	50
Fruit trees attract birds which destroy crops	50
Limited knowledge of nursery and tree propagation	36
Competition with crops	34
Lack of planting materials	29
Planting seasons of wild fruits are unknown to farmers	24
No money to buy planting materials	19

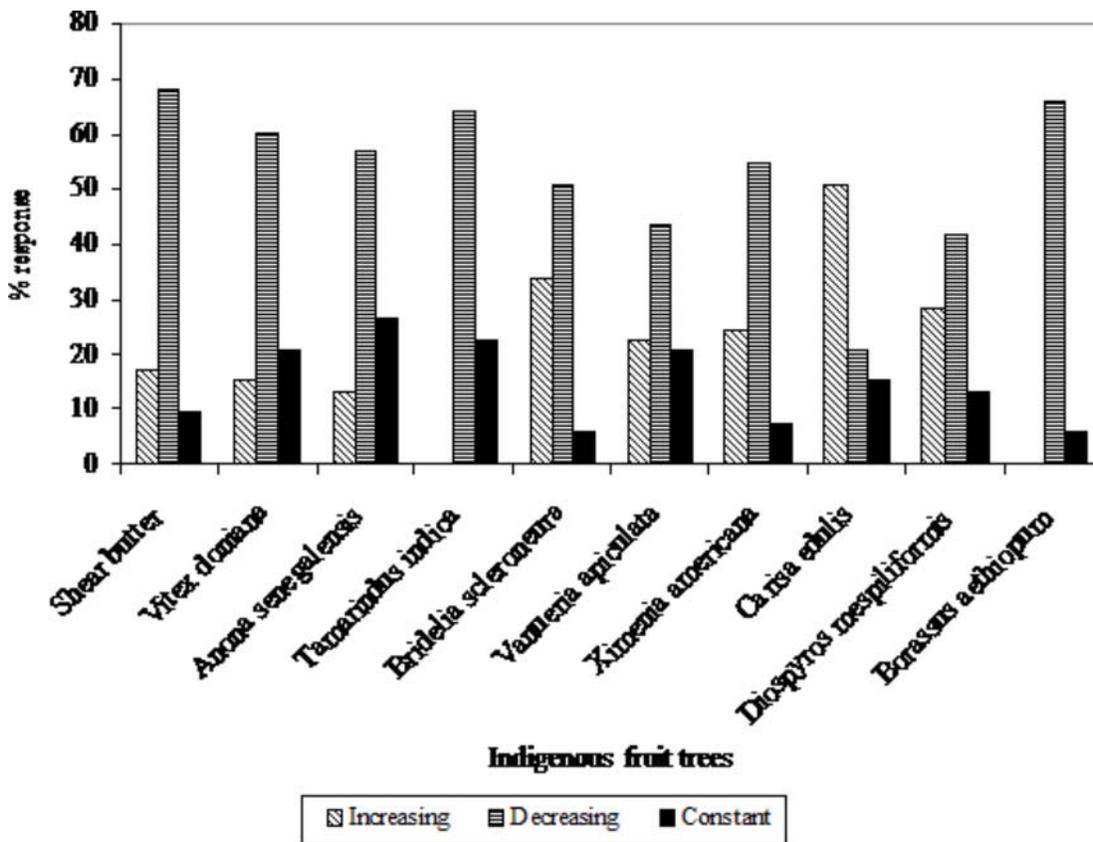


Figure 1. Conservation status of IFTs in Adwari Sub-county.

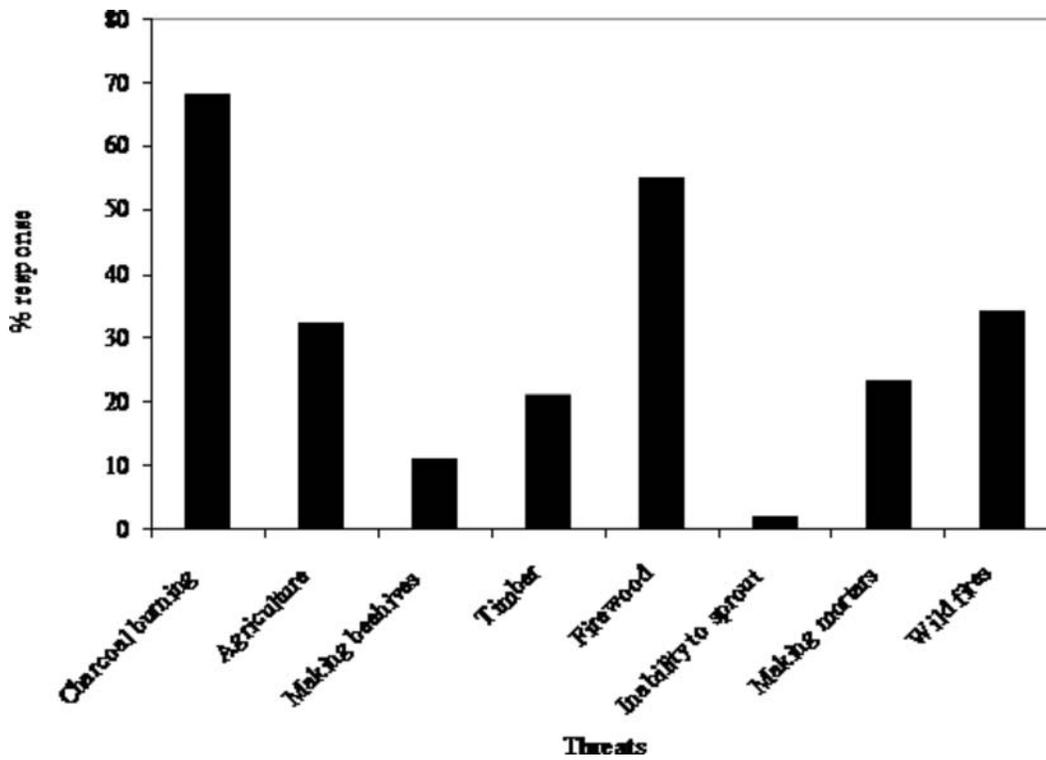


Figure 2. Conservation threats to IFTs in Adwari Sub-county.

