

**IMPACT OF AGRO FORESTRY ON HOUSEHOLD FOOD SECURITY IN OWO LOCAL GOVERNMENT AREA OF ONDO STATE**

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**Abstract**

This paper investigated the impact of agroforestry on household food security. Data were collected by using structured interview schedule administered on 80 farmers that were randomly selected from 10 villages in the study area. Descriptive and inferential statistics such as frequency counts, percentages, tables and mean were used for the analysis and chi-square ( $X^2$ ) was used to test the stated hypothesis.

Results showed that 85.0% of farmers were between the age of 31-60 years, 85.0% were male, 71.3% were literate while 68.0% cultivated between 1.0- 5.0 hectares of farm size. Analysis of the data collected revealed that about 83.0% of farmers intercropped food crops and tree crops. However, majority (91.3%) of farmers had been in farming for more than five (5) years. Agroforestry practices was adopted at varying degrees as citrus / arable intercropped (96.25%), Alley cropping, (73.75%) Taungya, (42.50%) and windbreak / shelterbelts (18.75%). Also majority (96.3%) indicated increased in their income after the adoption of agroforestry practices and impact of agroforestry was high on farmers household food security, while the factors

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limiting the adoption of agroforestry are labour intensiveness (97.5%) unavailability of money to hire labour and purchase agro-chemicals (71.25%) lack of genuine agro-chemicals, (56.25%). Lack of money for expansion of the farm (70.0%) seasonal infestation of pest and diseases which decreases production (92.50%) unavailability of land since trees plants deny other members from access to the use of land (96.25%) and stolen of crops (86.25%). The analysis performed on the relationship between agroforestry practices and impact on household food security revealed that there was significant relationship between provision of fuel wood ( $X^2=17.35$ ) provision of charcoal ( $X^2= 19.40$ ) provision of money / cash ( $X^2= 21.24$ ), improved soil fertility ( $X^2= 24.63$ ), drugs use in the household ( $X^2=13.72$ ) improved crops yield ( $X^2=23.76$ ) and agro forestry practices.

**Keywords: Impact, agro forestry, household, food security, Ondo State.**

### Introduction

Agro forestry has the potential of contributing to the improvement of rural livelihood of smallholders to enhance farm production, income generation while protecting the agricultural environment (Hosny, 2004, Oke, 2001). In the past soil fertility maintenance under the subsistence smallholder farmers level in West Africa was long-term bush fallow, which allow re growth of vegetation that resulted in accumulation of organic matter and plant nutrients (Okelola et al, 2010). However, the explosive growth of human population has forced farmers to reduce the length of fallow periods resulting in severe soil erosion, reducing yields and rapid destruction of the natural assets of their communities (Steiner, 1982).

Considering high population growth rates, increasing poverty levels, and scarcity of land, require the need for technologies that would boost food production including crops, animals and forest wood and non- wood products; as well as sustaining the use of land cannot be over emphasized (Young 1987). International concern is to find alternative farming systems that are ecologically and economically, sustainable as well as culturally acceptable to farmers.

Agroforestry is a collective name for all land use systems and practices where woody perennial plants are deliberately grown on the same land and management unit as agricultural

crops and / or animals either in spatial mixture or in temporal sequence (Lungren, 1987). Agro forestry practices have been suggested by several development experts as a new solution to rural development needs (Adedire, 2004). The combination of several types of products in agroforestry, which are both subsistence and income generating help farmers to meet their basic needs and minimize the risk of the production systems and total failure (ICRAF 1993). Agroforestry can help to mitigate deforestation because it addresses in general, the issues of tree planting, which can combat land depletion because of its potential for soil conservation and as a result contribute to the alleviation of rural poverty and ensure food security (ICRAF, 1993).

Given the immense agricultural and environmental potential of agroforestry it is no wonder that it is being promoted for adoption among farmers in most developing countries especially in Sahara and sub- Sahara Africa in which Owo in Ondo State Nigeria is not an exception where agricultural productivity is decreasing / low and more marginal lands are increasingly being brought under cultivation / practices.

In Nigeria, there is a national concern to combat environmental degradation and those emanating from poor agricultural practices (deforestation, soil erosion), have received a lot of attention. Agro forestry has been suggested as one of the solutions (Nabilla, 1984, Owsu, 1990). Agroforestry technologies were introduced in several parts of the country in 1989 by ADPs and other individuals. Examples of the introduced technologies are alley cropping, wood lot, shelterbelt, and windbreaks, fruit trees on crop land. However, technology transfer and adoption has not been very easy in the country as a result of several existing barriers, which have not yet been fully overcome. Some of the barriers that militate against agro forestry adoption include poor knowledge of agroforestry, inadequate capital, lack of competence by practitioners of agroforestry system and lack of improved seeds and fast growing alley species.

Lungren, (1987) stated that there must be significant ecological and economic interactions between the woody and non-woody components for adequate food security.

Therefore, the study sought to determine the impact of agroforestry on household food security in Owo Local Government Area of Ondo State. Specifically the study was to; describe socio – economic characteristics of the respondents. Investigate change in income before and after the adoption of agroforestry, impact of agroforestry on household food security and identify factors that limiting the adoption of agroforestry. It was hypothesized that there was no significant

relationship between agroforestry practices and impact of agroforestry on household food security.

### Methodology

The study was carried out in Owo Local Government Area of Ondo State. The study area lies within latitude  $8^{\circ} 21^{\circ}N$  and  $10^{\circ} 45^{\circ}N$  and longitude  $10^{\circ} 65^{\circ}W$  and  $20^{\circ} 23^{\circ}W$ . The area share boundaries with Ekiti state in the West, Edo state in the North and Akure West Local Government in the south. The total land area is 112, 32 square kilometers and has 1 extension block that made up of Eight (8) extension cells. Five (5) extension cells was randomly selected for the study from each extension cell two (2) villages was randomly selected making a total of ten villages for the study. Eight (8) farmers were randomly selected from each of the chosen village to give a sample size of Eighty (80) respondents for the study. The selected farmers were interviewed with a set of well structured interview schedule in their various villages. Data thus collected were analyzed by using frequency counts, percentages and tables, while stated hypothesis was tested with chi-square ( $X^2$ ). The impact of agroforestry on household food security were measured by using 3 rating score ranges from 0-3, with average mean rating of 1.5, mean rating score of 2.5 and above were considered high, rating of less than 2.5 to 1.5 were regarded as moderate while less than 1.5 rating scores were considered low.

### Results and Discussion

#### Socio-economic characteristics of the respondents

Table 1 shows that age of the farmers ranged from 20 years to 70 years and majority of the farmers( 85.0%) were between 31 and 60 years. This implies that bulk of the agroforestry adopters were at the active age, which indicating the potential of this group as the most important clientele who could be involved in the dissemination of agroforestry practices. Also they are likely to easily adopt a new technology. This finding conforms with Tripp (1993) Boateng (2008) who reported that younger farmers are more likely to adopt a new technology since they have had more education than the older generation or perhaps they have been exposed to new ideas as migrants' labourers. Also in the table about 85.0% of the farmers were male while 15.0% were female. This indicates poor involvement of women in agroforestry practices that may be due to strenuous activities involved, which are done manually in agroforestry practices. However, it can

be said that women are mostly interested in planting and cultivating food crops to meet household consumption needs rather than tree crops. This agrees with Eckman (1992) Boateng (2008) who deduced that individuals within a household may have different rights depending on gender. These found that in some African countries women plant and tend fire-wood or fruit trees but do not have right to harvest fruit or wood. Also Nair, (1983) Shiva (1988). They reported that women are commonly collectors of water; fuel wood, food stuffs and medicinal herbs and that they are directly affected by environmental degradation. Furthermore, the level of education among agroforestry users was generally high; 71.3% of the respondents had formal education. This indicates that the high level of literacy rate would result in the increase of technical efficiency and decrease conservatism / conservatism among the respondents. This would also contribute to the acceptance of agroforestry innovations Sarfo Mensah, (1994) Tripp (1993) Boateng (2008) reported that education is an important socio economic variable that may make a farmer more receptive to advice from an extension agency or more able to deal with technical recommendations that require certain level of literacy.

About 68.0% of the respondents cultivated between 1.0-5.0 hectares of farm size, 15.0% cultivated 6.0-10.0 hectares, while 10.0% and 7.0% cultivated 11.0-15.0 and above 16.0 hectares respectively. This implies that majority of the respondents (67.5%) were small scale farmers. The small farm sizes constitute an obstacle to farm improvement, because it will be difficult for smallholders farmers to expand their farms. This findings supports Hosny (2004) Boateng (2008) who argued that miniature farm sizes and the manner in which they are fragmented and scattered constitute an obstacle to farm improvement since it do not enable farmers to take advantage of economies of scale production. In table 1, about 83.0% of the respondents intercropped food crops and tree crops, 10.0% cultivated tree crops while only 7.5% cultivated food crops alone. This implies that food crops were grown to provide food for household consumption and farmers wanted to increase income by incorporating tree crops. However, agencies involved in agroforestry technology transfer and other innovations should first study and know the priorities of rural farmers in order to design a locally adapted one which can easily fit into the existing land use system.

Furthermore, 91.3% of the respondents have been farming for more than five years. It can be deduced that since the factors that affect the adoption of agroforestry technologies may not be different from those of general adoption of agricultural technologies. The rich experience of

farmers can be used to improve agroforestry, using indigenous technical knowledge to bring about the desired results. Rist (1991) found that revitalizing local knowledge in projects makes communities act and effectively implement their own development programmes, which consists of ensuring their livelihood in harmony with their own nationality. Saravia (1992) also concludes that the cause of many of the ecological, social, cultural and economic problems of farmers is the abandoned and erosion of the farmers' know-how and technologies in favour of modern solutions. The high adoption of citrus / arable intercrop (96.25 %) and alley cropping (77.75 %) could be due to the fact that the [practices have been effective and economical] presently at farmers level (Steiner, 1982).

### **Level of Awareness and Adoption**

Table 2 shows the extent of awareness and the adoption of the agro forestry practices by farmers. The table reveals that farmers were aware of all the agro forestry practices but with varying degrees of adoption. Citrus/arable intercrop (96.25 %) Alley cropping (73.75%) Taungya (42.50%) and Windbreak shelterbelts (18.75%). The low extent of adoption of agro forestry practices namely Taungya (42.50%) and windbreak/shelterbelts (18.75%) could be due to the fact that the technology did not fit into the farmers' existing practices and may not be attractive to farmers to adopt (Saravia, 1992). The high adoption of citrus/arable intercrop (96.25%) and Alley cropping (77.75%) could be due to the fact that the practices have been effective and economical presently at farmers level. (Steiner 1982).

### **Income before and after adoption of agroforestry**

Table 3 shows that 96.25% of the farmers indicated an increase of income after the adoption of agroforestry practices while 90.0% indicated a decrease of income before the adoption of agroforestry practices. This implies that agroforestry practices assisted farmers in generating income. This result conforms with findings of ICRAF, (1993) reported that the combination of several types of products in agroforestry, which are both subsistence and income generating helps farmers to meet their basic needs and minimize the risk of the production systems and total failure.

### **Impact of agroforestry on household food security**

Table 4 revealed that respondents indicated the impact of agroforestry on the household food security as it improves soil fertility ( $x=2.68$ ) improves crop yield (2.64), encourages soil organisms

activities ( $x = 2.59$ ), provide fuel wood ( $x = 2.57$ ), medical treatment ( $x = 2.44$ ), provide clothing ( $x = 2.43$ ), provide charcoal ( $x = 2.42$ ) affordability of school fees and learning materials ( $x = 2.41$ ) provide money / cash ( $x = 2.40$ ), own house ( $x = 2.14$ ) affordability of drugs use in the household ( $x = 2.10$ ), and ability to hire apartment by the family ( $x = 2.05$ ).

This implies that most farmers used money accrued from the sales of tree / crops production in purchasing food items to supplement food in the household. It can be concluded that agroforestry adoption had a significant impact on the food security of most farmers and their households. This agrees with Orarm, (1993) who reported that agroforestry provide a wider range of products, more secure subsistence or more cash income from wood products to enable the farmers to buy food.

#### Table 5 Limiting factors to agro forestry adoption

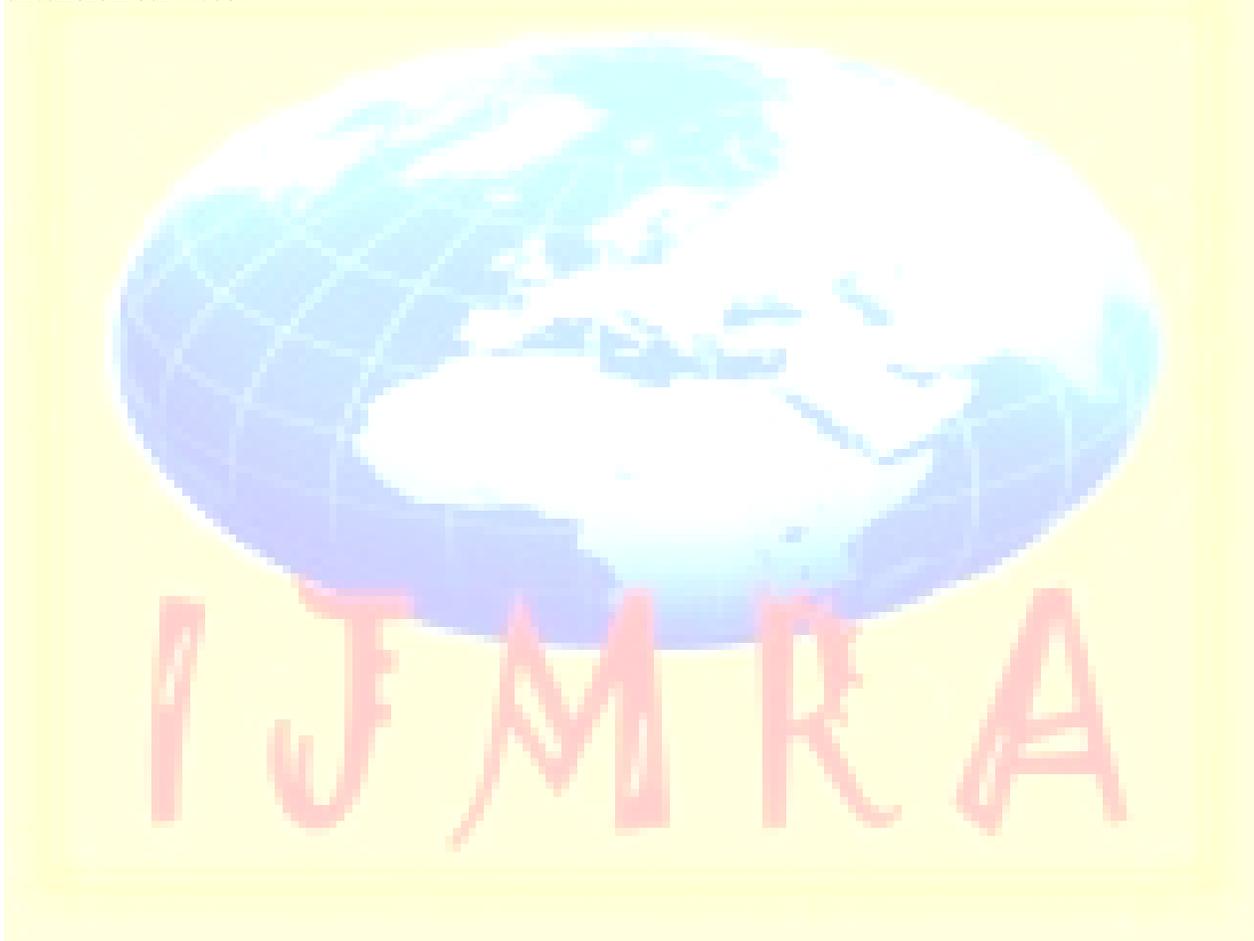
Table 5 reveals that respondents indicated that there were factors that limiting them from adoption of agroforestry such include unavailability of land since trees planting permanently denying other members access to use the land (96.3%) seasonal infestation of pest and diseases that decrease crop production (92.5%) stolen of crops (86.3%), agroforestry practice is labour intensive (77.5%), unavailability of money to hire labour and to purchase agro-chemicals for spraying (71.3%) lack of money for expansion of the farm (70.0%) and some agrochemical were fake (56.3%). This implies that farmers may discontinue the use of agroforestry practices based on the limiting factors indicated.

#### Test of hypothesis

The relationship between agroforestry practices and the impact on household food security in Table 6 showed that there was significant relationship between agroforestry practices and impacts on household food security, provide fuel wood ( $X^2 = 17.35$ ) charcoal ( $X^2 = 19.40$ ), money/cash ( $X^2 = 21.24$ ), improve soil fertility ( $X^2 = 24.63$ ), encourage drugs use in the household ( $X^2 = 13.72$ ) and improve crops yield ( $X^2 = 23.76$ ). This finding corroborative with past findings of Oram (1993), Boateng (2008) which reported that agroforestry provide a wider range of products more secure subsistence or more cash income from wood products to enable the farmer to buy materials they cannot provide on their own.

### Conclusion and Recommendation

The study has shown that despite the challenges militating against adoption of agroforestry, people are solidly interested in the protection of the environment by adopting agroforestry practices in their area. It has proved to be a sustainable land use method to protect fragile soil and improved soil fertility as well as improve crop yield. Agroforestry practices is a farming system that is environmentally and socio –economically required to encourage, improved and enhanced socio-economic upliftment of resources of poor farmers in Nigeria through adequate extension services.



**Table 1: Socio –economic characteristics of the respondents**

<b>Variables</b>	<b>Frequency</b>	<b>Percentages</b>
<b>Age (years)</b>		
20-30	09	11.25
31-40	11	13.75
41-50	41	51.25
51-60	16	20.00
61-70	03	3.75
Total	80	100.00
<b>Sex</b>		
Male	68	85.00
Female	12	15.00
Total	80	100.00
<b>Educational level</b>		
No formal education	23	28.75
Primary education	38	47.50
Junior secondary education	04	16.25
Senior secondary education	04	5.00
Tertiary education	02	2.50
Total	80	100.00
<b>Farm size (hectares)</b>		
1.0-5.0	54	67.50
6.0-10.0	12	15.00
11.0-15.0	08	10.00
16.0 and above	06	7.50
Total	80	100.00
<b>Crops cultivated</b>		
Food crops	06	7.50
Tree crops	08	10.00
Food crops and tree crops	66	82.50
<b>Farming experience (years )</b>		
1-5	07	8.75
6-10	12	15.00
11-15	35	43.75
16-20	10	12.50
21 and above	16	20.00
Total	80	100.00

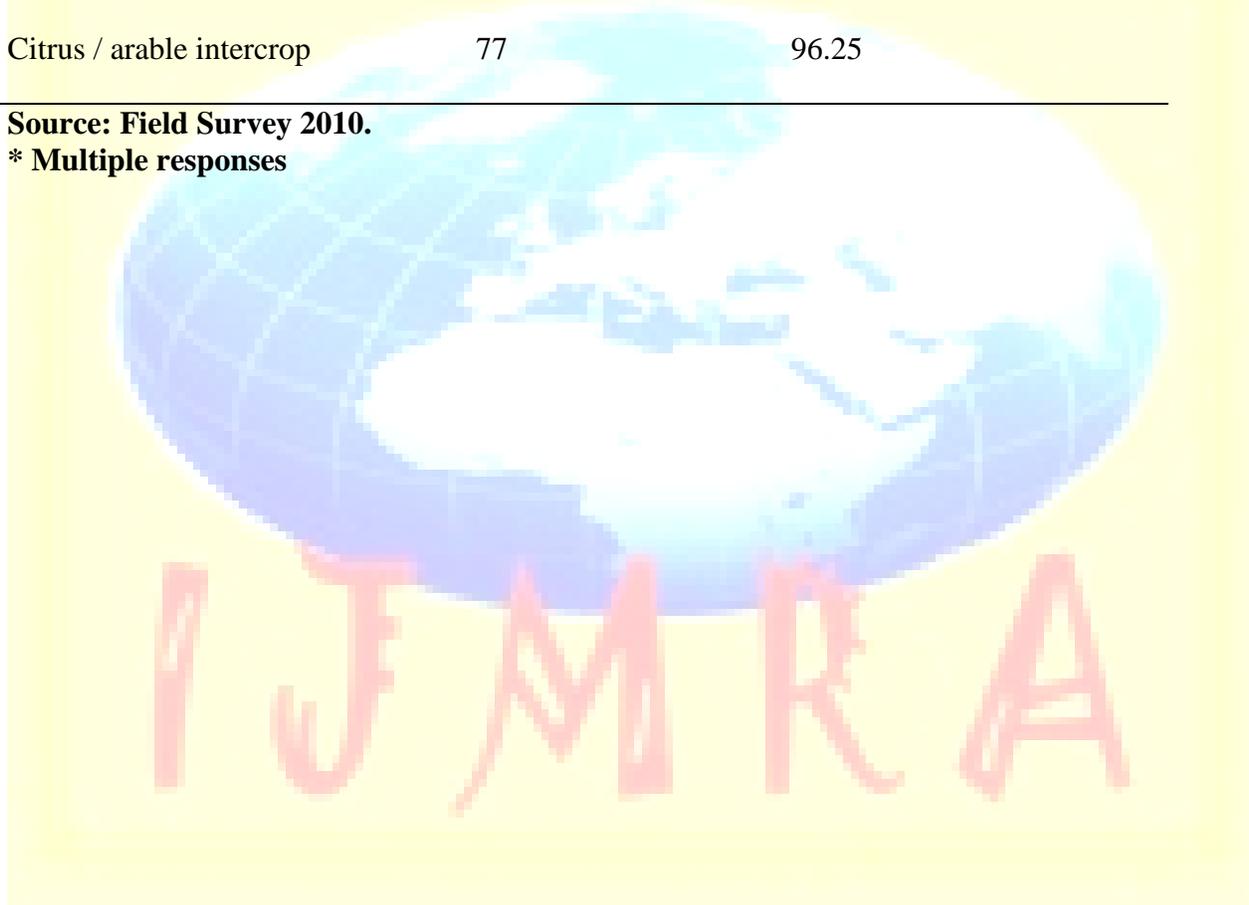
Source Field Survey 2010.

**Table 2: Agroforestry practices adopted**

Agroforestry practices *	Frequency	Percentages
Alley cropping	59	73.75
Taungya	34	42.50
Wind break / shelter belts	15	18.75
Citrus / arable intercrop	77	96.25

**Source: Field Survey 2010.**

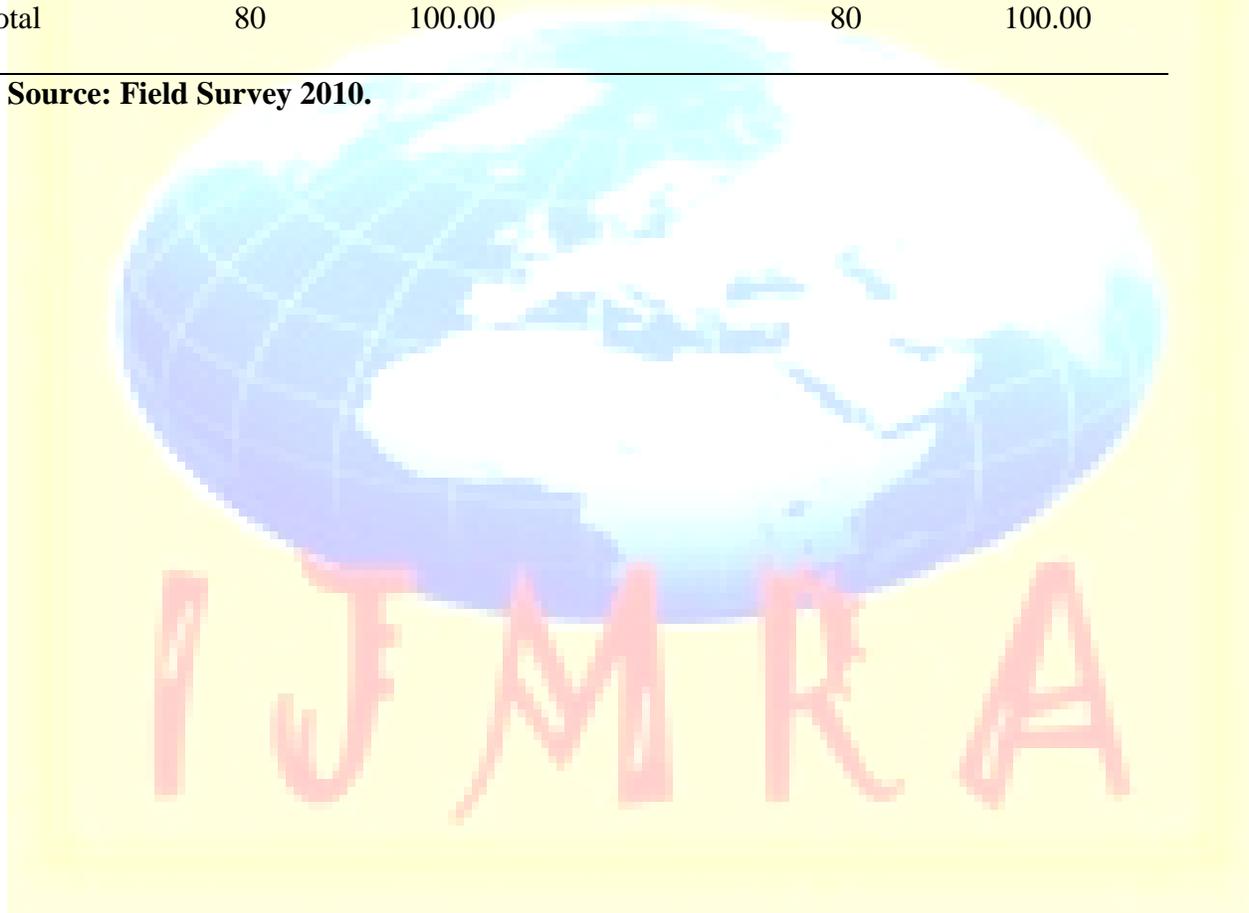
**\* Multiple responses**



**Table 3: Farmers perception in income before and after adoption of Agroforestry**

Income	Income before		Income	Income after	
	Frequency	Percentage		Frequency	Percentage
Increased	03	3.75	Increased	77	96.25
Decreased	72	90.00	Decreased	02	2.50
About the same	05	6.25	About the same	01	1.25
Total	80	100.00		80	100.00

**Source: Field Survey 2010.**



**Table 4: Impacts of Agroforestry on household food security**

Impacts	Mean
Provide fuel wood	2.57
Charcoal	2.42
Money / cash	2.40
Affordability of school fees and learning materials	2.41
Clothes	2.43
Medical treatment	2.44
Drugs use in the household	2.10
Own personal house	2.14
Hired apartment	2.05
Build huts / cottage	1.48
Improve soil fertility	2.68
Encourage soil organisms activities	2.59
Improve crop yield	2.64

**Source: Data analysis result 2010.**

**Table 5: Factors limiting adoption of Agroforestry practices**

Limiting factors *	Frequency	Percentages
Agroforestry practices is labour intensive	62	77.50
Unavailability of money to hired labour and to purchase agro-chemicals for spraying	57	71.25
Some agro chemical were fake	45	56.25
Lack of money for expansion of the farm	56	70.00
Seasonal infestation of pest. and disease which decrease production	74	92.50
Unavailability of land since tree plants permanently denying other members access to use the land	77	96.25
Stolen of crops	69	86.25

**Source: Field Survey 2010.**

**\* Multiple responses.**

**Table 6: Chi-square ( $X^2$ ) analysis of relationship between Agroforestry Practices and impact on household food security**

Impact on household food security	df	$X^2$ cal	$X^2$ tab	Remark
Provide fuel wood	3	17.35	7.82	Significant
Provide charcoal	4	19.40	9.49	Significant
Provide money / cash	5	21.24	11.07	Significant
Improve soil / fertility	5	24.63	12.21	Significant
Drugs use in the household	2	13.72	6.04	Significant
Improve crops yield	4	23.76	10.32	Significant

**Source: Data analysis result 2010.  
Significant at 0.05 levels**

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