EFFECTS OF AGROFORESTRY ON HOUSEHOLD FOOD SECURITY AS PERCEIVED BY RURAL WOMEN FARMERS IN IMO STATE, NIGERIA.

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ABSTRACT
The study analyzed the effects of agroforestry on household food security status as perceived by rural women farmers in Imo state Nigeria. Multistage sampling technique was used to select a sample size of 270 rural women farmers. Data were collected from the respondents using interview schedule. Data were analyzed using percentages, mean and standard deviations. The result showed that the effect of agroforestry on household food security status of rural women farmers was high with a grand mean of 2.95, and the rural women farmers in the state were food secure with a grand mean of 2.52 obtained from the mean score of the table which was above the discriminating index 2.5, The result also showed that the effect of agroforestry on household food security status of rural women farmers was high with a grand mean of 2.95, We recommend that agroforestry practices be promoted and recommended to all framers who wish to maintain stable food security status in meeting family demands.
Keywords: Agroforestry; Food Security; Rural Women Farmers; Imo State.

INTRODUCTION:

Sustainable agriculture involves the successful management of resources to satisfy changing human needs while maintaining or enhancing the quality of the environment and conserving natural resources (Kimbi *et al.,* 2005). Agriculture encompasses all human activities geared towards the production of crops (food, cash and forest trees) and animals for food and fiber production for the benefit of man.

The acceptance of agroforestry as a system of land management is attributed to increasing spread of tropical deforestation and ecological degradation, shortages of fertilizers and re-awakening of scientific interest in the farming systems since it increase species diversity within farming systems, providing for human needs while supporting wildlife, soil microorganisms, rural communities, economic interests, watersheds, clear air, biodiversity and more (Elevitch and Wilkinson, 2003).

Agroforestry practices offer practical ways of applying various specialized knowledge and skills to the development of a sustainable production system and it is recognized as a land-use option in which trees provide both products and environmental services. In agroforestry systems, the tree on different farmlands in the same locality when aggregated can bring about improved wooded situation thereby enhancing environmental protection (Otogbeye, 2002). Given the reality of awareness among the farmers of multiple land use management, the need to improve on the existing practices becomes necessary in the face of increasing population and limited nature of land. Rural people have been discovered to have a wealth of indigenous knowledge and have incorporated trees in the production system in areas where they lived for a very long period (Evans and Alexander, 2004).

The focus on women and the adoption of agroforestry practices is important for various reasons. At the center of this type of farming system are women farmers who are frequently responsible for managing trees and other agricultural enterprises, they provide labor especially during the initial stages of forestry establishment i.e. planting, weeding and watering (Kiptot and Franzel 2011). Women provide most of the labor (cutting grass, manure application, feeding animals, milking, fetching water and even selling milk). Secondly, with minimal inputs and a low-cost system which requires diversity of products and services such as timber, fruits, fodder, food and soil fertility improvement, women who cannot afford to adopt high cost of technologies due to their severe cash and credit constraints, are offered opportunities (Wambugu *et al*., 2001).
In a study on the achievement and impact of a fodder project in the north central Nigeria, Wambugu *et al*. (2001) found that out of 2600 group members involved in establishing fodder shrub nurseries, 60% are women. In western Nigeria, Place *et al*. (2004), found that women used improved fallows and biomass to transfer technologies more than men who more often used fertilizer. Kippot (2011) suggested that the use of improved fallows for replenishing soil fertility is gender-neutral; women farmers are as actively involved as well as their male counterparts.

However, despite women's greater role in agriculture, most researchers have not given special emphasis on women's involvement in agroforestry towards food

security. Similarly, studies done by Epaphra (2001) and Njuki (2001) concentrated on the roles of women in agroforestry with little attention on the contribution to poverty reduction, particularly in forest adjacent communities. According to (Lulandala, 2004), Agroforestry remains the only resource management option with real and tangible opportunities of breaking the bondages of energy, food insecurity, poverty and poor and imbalanced nutrition of the developing world rural communities.

While several studies according to Edeth *et al.*, (2013), have documented the practice of agroforestry in Nigeria, more needs to be done to ascertain farmers 'perceptions of it, especially now emphasis is on green agriculture. This is more pertinent in Imo State, Nigeria, where more needs to be done on farmers 'perceptions towards agroforestry.

OBJECTIVES OF THE STUDY

The broad objective of the study was to analyze the effects of agroforestry on household food security as perceived by rural women farmers in Imo State, Nigeria. The specific objectives were:

1. identify reasons why rural women farmers practice agroforesttry
2. determine the food security status of rural women farmers in the study area..
3. ascertain rural women farmers perceived effects of agroforestry on household food security status in the area.

METHODOLOGY

The Study area

The study was conducted in Imo State, Nigeria. Imo state was created on February 3, 1976. It is located in the South East zone of Nigeria and lies between latitude 4° 45'N and 7° 15'N and longitude 6° 50'E and 7° 25'E with land area of 5,530Km^2, and an estimated population of about 4.8 million people and an annual growth rate of 3.35 percent (NPC, 2016).

It is bordered by Abia state on the East, by River Niger and Delta state on the East, River Niger and Delta State to the West, Anambra State on the North and Rivers State to the South (Wikipedia, 2016 updated).
Imo state has a total number of 27 local government areas, with a high population density which exceeds that of the annual average of 166 persons per kilometer square (www.imostate.gov.ng). The population density of the State varies from 230 persons per kilometer square in Egbema area to about 1400 persons per kilometer square in Mbaise, Mbano, Orlu and Mbaitoli area (Federal republic of Nigeria Gazette, 2017). Moreover, a greater percentage of the population lives in the rural area and they are farmers. Imo state lies within the rainforest zone Nigeria and has a large forest vegetation containing woods and tree crops (both for timber and the like) such as mahogany, iroko, obeche, palm trees, oil bean trees, Gmelina trees, bamboo, rubber tree, fruit trees such as mango, orange, avocado pear etc. and other tree crops that complement farmers income source. Imo state belong to Benin formation of the coastal plain sand which is of tertiary age, deep, porous, fertile and highly leached. Drained by Imo River, Otamiri river, Nworie river, Njaba and Urashi rivers, the annual rainfall of Imo state varies from 1,500mm-2,200mm (60-80 inches) with about $20^0{}_c$ (68.0^0C) annual temperature and 75 percent annual relative humidity (the humidity reaching 90% in rainy season) (www.imostate.gov.ng).
The indigenes are predominantly Igbos and Christianity is the major religion, and their major economic activity includes the following: farming, trading, agro processing and other non-agricultural practices. The major crops grown by the people are banana, yam, cocoyam, maize, rice, leafy vegetables, melon, palm oil, etc. The state is also endowed with mineral resources like crude oil, natural gas, lead, zinc, aluminum (www.imostate.gov.ng).
Imo state is divided into three agricultural zones of Owerri, Orlu, and Okigwe. Women constitute the majority of the farmers in the state; this could be as a result of the increasing male out-migration common in many rural areas (Orisakwe and Agomuo, 2011). They are also largely involved in the production of such animals as local chicken, goats and sheep. (Ani, 2004)

RESULTS AND DISCUSSIONS

Table 1 showed that majority of rural women farmers practiced agroforestry because agroforestry serves as a source of income ($\bar{X}$=3.4), source of raw material ($\bar{X}$=3.4), shelter for man and livestock ($\bar{X}$=3.2), wind break ($\bar{X}$=3.2), improves soil quality ($\bar{X}$=3.1), sustenance of economic growth ($\bar{X}$=3.0), significant to human health ($\bar{X}$=3.0) and reduction in rural to urban migration ($\bar{X}$=2.7) respectively. The finding confirms the assertion of Ojo *et al.* (2009) that agroforestry forest ensures that hundreds of millions of people in the developing world not go to bed hungry. In fact, he maintained that food security is very much dependent on environmentally responsible and sustainable use of the world's forest. Agroforestry practices in the study area have the potentials to provide food, income, shelter, improve soil fertility, home nutrition, wind breaker, fertilizer for

agricultural operations, and sustained economic growth for rural women farmers.

Table 1: Distribution of rural women farmers based on reasons why rural women engage in agroforestry practices

Reasons	Mean	SD
Provision of food	2.8*	0.3
Act as source of income	3.4*	0.4
Source of raw materials	3.3*	0.4
Provision of shelter/shade for man and Livestock	3.2*	0.5
Helps improve soil quality	3.1*	0.5
Source of home nutrition	2.9*	0.5
Acts as wind breaker	3.2*	0.3
Source of fertilizer for agricultural Operation	3.1*	0.3
It enhances sustained economic growth	3.0*	0.4
It is significant to human health	3.0*	0.4
Rural to urban migration is reduced	2.7*	0.4
Everybody has enough to eat	2.0	0.5
Enough food is locally produced	2.2	0.3
There is control over what people eat and people are no more at mercy of Others	2.0	0.3

Source: Field survey data, 2019

Table 2 revealed that in 19 food security status index understudied, the rural women farmers were found to indicate positive status and secured in 13 indicators. They indicated that they do not cut meal ($\bar{X}$ =3.0), they have enough to eat when they are hungry ($\bar{X}$ =2.8), readily afford to eat balanced food ($\bar{X}$ =2.7), they do not worry that their household food will run out ($\bar{X}$ =2.7), the food they buy always last ($\bar{X}$ =2.6), their children never go hungry ($\bar{X}$ =2.6), their children always eat for whole day ($\bar{X}$ =2.6), they do not skip meal ($\bar{X}$ =2.5), they serve as source of home nutrition ($\bar{X}$ =2.5), different kinds of high cost food were available for children ($\bar{X}$ =2.5), children ate enough food ($\bar{X}$ =2.5) and children never skipped meal up to three or more times in one month ($\bar{X}$ =2.5). Collaborating the findings based on established grand mean of 2.52 was obtained from the mean score of the table which was above the discriminating index on 2.5. this implies that based on this work, the rural women farmers in the state were foods secured. This confirms the assertion of Ojo *et al*. (2009) who posited that household food security is guaranteed with agroforestry. According to him, during

seasonal or emergency periods of food shortage, forest provides food that bridges the gap between sufficiency and famine.

Table 2: Distribution of rural women farmers by food security status of rural households

Indicators	Mean	SD
Not worried that household food will run out	2.7*	0.8
Food bought always last	2.6*	0.9
Readily afford to eat a balanced food	2.7*	0.8
Adult do not cut meal	3.0*	0.7
Adult never skipped meal	2.6*	1.5
Source of home nutrition	2.5*	1.1
You ate enough always	2.3	1.1
You were hungry, but had enough to eat	2.8*	0.4
You gained weight because family food was enough	2.4	1.2
Adult never starved for a whole day	2.3	1.3
Adult starved for a whole day for or more times in a month	2.3	1.2
Different kinds of high-cost food were available for children	2.5*	1.2
Fed children balanced meal always	2.5*	1.4
Children ate enough food	2.5*	1.3
Never cut size of children's meal	2.6*	1.4
Children never skipped meal up to three times or more in one month	2.5*	0.3
Children were never hungry	2.1	0.4
Children never skipped meal	2.4	0.5
Children always ate for whole day	2.6*	1.3

Grand Mean 2.52

Table 3 reveals that agroforestry affected the rural women in all the ten-food security effect indicator used in this study. Precisely, agroforestry provided vegetable rich in calcium ($\bar{X}$ =3.2), fuel wood for cooking ($\bar{X}$ =3.1), adequate edible fruit and vegetable ($\bar{X}$ =3.0) medicinal plants for family use ($\bar{X}$ =3.0), medicinal plants for treating animal diseases ($\bar{X}$ =2.9) reduction in environmental damages by heavy wind ($\bar{X}$ =2.9) cash for purchase of food ($\bar{X}$ =2.9), fodder for domestic animals ($\bar{X}$ =2.9) and improved micro-climate conditions during climate extremes ($\bar{X}$ =2.8). A grand mean of 2.95 was obtained from the mean score which revealed that agroforestry heard strong effect on household food security status of rural women farmers.

This is in agreement with the finding of Kareem *et al* (2009) who proposed that agroforestry fulfils the benefits of food security vis-à-vis the provision of food self-sufficiency employment generation, reduction of poverty, boosting research and extension services effective utilization of land and water, development of agricultural system. Gowland-Mwangi and Maina

(2013) while underscoring the potential of agroforestry resources in attaining food security noted that through agroforestry it is possible to reverse loss of environmental resources such as forest, shrubs, trees and vegetation that provide alternative source of food and income for farmers. He added that African government through comprehensive Africa agriculture development programme (AADP) are leveraging on the potential of agroforestry to tackle under nutrition, rising food prices, inefficient food supply chain, depletion of natural resources, rural-urban migration economic instability and other food security challenges.

Table 3: Distribution of rural women farmers by effects of agroforestry on household food security status of rural women households

Perceived effects	Strongly agree	Agree	Disagree	Strongly disagree	Mean	SD
Supply of adequate fruits and vegetable	98	99	36	37	3.0*	0.5
Provision of supplementary food items	52	143	43	32	2.8*	0.3
Source of cash for purchase of food	85	94	59	34	2.9*	0.4
Provision of vegetable rich in calcium	139	83	23	25	3.2*	0.5
Provision of fuel for cooking	113	107	31	19	3.1*	0.6
Supply of fodder for domestic animals	76	118	49	27	2.9*	0.7
Provision of medicinal plants for family use	85	127	33	25	3.0*	0.3
Medicinal plants for treating animal Disease	89	90	62	29	2.9*	0.5
Reduced environmental damages by heavy wind	85	110	50	25	2.9*	0.7
Improved micro-climate conditions during climate extremes.	76	125	29	26	2.8*	0.8

$\bar{X} \leq$ 2.5 (no effect) $\bar{X} \geq$ 2.5 (had effect).

Conclusion and Recommendations

The study concludes that rural people have been discovered to have a wealth of indigenous knowledge and have incorporated trees in the production system in areas where they lived. The rural women farmers in the state were foods secured. Agroforestry practices in the study area have the capacity and potentials to provide food, income, shelter, improve soil fertility, home nutrition, wind breaker, fertilizer for agricultural operations, and sustained economic growth for rural women farmers. Hence it is recommended that agroforestry practices should be promoted and recommended to all framers who wish to maintain stable food security status in meeting family demands.

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