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Environmentally Sustainable Farm Management Strategies Adopted by Compound Farmers in Mbaitoli Local Government Area, Imo State Nigeria

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Abstract
This study identified environmentally sustainable farm management strategies adopted by compound farmers in Mbaitoli Local Government Area Imo State. Specifically, it described the socio-economic characteristics of the compound farmers in the study area, identified the environmentally sustainable strategy adopted by compound farmers, identified compound farming ventures that are mostly adopted, assessed the contributions of compound farming to household food security in the study area and examined factors affecting compound farming in the study area. Of the nine communities in the study area, five were randomly selected for the study. Snowball sampling technique was used in selecting 100 households for the study. Data collection was done using questionnaire and interview schedule and analysed using descriptive statistics. Results shows that organic pesticides (70%), mixed farming (71%), cover-cropping (84%), crop rotation (79%) and mulching (74%) are the major environmentally sustainable farm management practices adopted by compound farmers in the study area. The major compound farming ventures adopted by households were crop production (88%) and poultry (50%). Income generation (Mean = 3.43), reduction of family expenditure on food (Mean = 3.45) and assured availability of food varieties in the family (Mean = 3.35) were the major contributions of compound farming to household food security. The major factors affecting compound farming in the study area were diseases and pests' infestation on compound farm (Mean = 3.40), labour intensive nature of compound farming (mean = 3.40) and lack of irrigation facilities (mean = 3.38). It was recommended that extension agents should play leading role in conveying innovations and inventions that could enhance compound farming activities of farmers as regards pesticides and insecticides as well as irrigation facilities

Keywords: Environmentally, sustainable, farm management

Introduction

Farming system represent an appropriate combination of farm enterprises, cropping systems, livestock, fisheries, forestry, poultry and the resources available to the farmer to raise them for food and/ or profitability (Anikwe, Onyia, Ngwu, &Mba, 2005). Farm management is concerned with how an individual farmer can so

organise the factors of production (land, labour and capital) on his farm, to improve the quality and quantity of his farm produce so as to improve his livelihood (FAO).

Nigeria is generously endowed with abundant natural resources and has the potential to build a prosperous economy and provide for the basic needs of the population. Agriculture provides 41.8% of the Nigerians total GDP, provides employment for 70% of the population and it is a major source of economic activities (FAO, 2007), but the economic performance of Nigerian agricultural sector is usually uncertain due to its biological nature, low infrastructural capacity in addition to relying mainly on natural conditions for agricultural and livestock production. This type of production is inherently risky because of variability of rainfall, animal mortality due to diseases and fluctuations of output prices. The environment in smallest scale compound farming is characterized by crop diseases, flooding, illness of household members and crime (Capitanio, 2008). In general, variations in climatic factor affect change in plant growth and productivity by promoting spread of pests and diseases, increase exposure to heat stress, changes in rainfall patterns, greater leaching of nutrients from soil during intense rain, greater erosion due to stronger winds and more wild fires in dry regions (Yusuf & Gurang, 2008). Variations such as climate conditions, intensity and amount of rainfall, the incidence of diseases and pests, crop failure, fire outbreaks, price fluctuations, unstable government policies, farmers' ill health etc. cause farm income to fluctuate unpredictably. These variations are source of risk, uncertainty to farm produce and lack of interest in small-scale compound farming. Smallholder farmers constitute a significant portion of the world's population, with an estimated 450-500 million compound farmers worldwide, representing 85% of the world's farms (Nagayet, 2005). Compound farmers are also estimated to represent half of the hungry worldwide and probably three-quarters of the hungry in Africa (Sanchez & Swaminathan, 2005). Consequently, the fate of compound farmers will largely determine whether or not the world succeeds in reducing poverty and hunger worldwide and meeting the millennium development goals. Across the tropics, compound farmers already face numerous risks to their agricultural production, including pest and disease outbreaks, extreme weather events and market shocks, among others, which often undermine their household food and income security (Morton, 2007). Because compound farmers typically depend directly on agriculture for their livelihoods and have limited resources and capacity to cope with shocks, any reductions to agricultural productivity can have significant impacts on their food security, nutrition, income and well-being (McDowell & Hess, 2012). Also malnutrition has been persistently evident especially among the rural population of Nigeria. Since the majority of the rural population of Nigeria live and work within the compound farming system.

Improving compound farming could be a way of reducing malnutrition among rural population. Compound farming plays an important role in helping to reduce greenhouse gas (GHG) emissions that contribute to climate change. Agriculture can reduce greenhouse gases through energy reductions modified agricultural practices, and carbon sequestration associated with crop and grassland management. Compound farmers have a suit of practices that may assist them in adapting to these changes and supporting the sustainability of their farming enterprises.

The agricultural development programme such as National Programme for Food Security (NPFS), Community-Based Agriculture and Rural Development Programme (CBARDP), Fadama-III were targeted at rural households aiming to enhance management strategies adopted by compound farmers to couching the effects of environmental threats to their economic activities.

Most Nigerian farmers merely engage in compound farming to provide food for their family while very little is made available in the market. Compound farm as a system consists of the material environment and human environments. The material environment consists of physical elements (such as precipitation, temperature, topography, solar radiation and soil) and biological elements (such as natural vegetation, plant and animal pests and diseases). The human environment consists of economic, institutional and social elements. These elements are linked, and directly connected with the human environment (Amalu, 1998). Compound farms (*ani-ulo* in Igbo) could be described as those farms in the immediate vicinity of the house, which are distinguishable from ordinary fields, or distant farms (*ani-agu* in Igbo) (Francis, 1985). The state of compound farming in Mbaitoli Local Government Area, Imo State Nigeria in present-day condition is threatened due to the fragmentation of limited land among all the indigenes.

Most of the land in Mbaitoli Local Government Area is farmed by small holders who cultivate their field using traditional practices. The farms in this region are very small, and most of the households receive off-farm income. Part-time farming is typical in the area. Compound farm usually operates a small, diversified agricultural enterprise. It is important for policy makers to understand the environmentally sustainable management strategies adopted by compound farmers in Mbaitoli Local Government Area Imo State, Nigeria. The knowledge of how these farmers make economic decisions under environmental threats is important in formulating policies for agricultural development in Nigeria.

The broad objective of the study was to identify the environmentally sustainable strategies adopted by compound farmers in Mbaitoli Local Government Area Imo State, Nigeria. The specific objectives were to:

1 describe the socio-economic characteristics of the compound farmers in the study area;
2 identify the environmentally sustainable strategy adopted by compound farmers in the study area;
3 identify compound farming ventures that are mostly adopted in the area of study;
4 assess the contributions of compound farming to household food security in the study area and
5 examine factors affecting compound farming.

Methodology

The study was conducted in Mbaitoli Local Government Area of Imo State, Nigeria. The rainy season begins in April and lasts until October- with annual rainfall varying from 1,500mm to 2,200mm (Ubuoh, Ikwa & Ogbuji, 2016). An average annual

temperature above 20^{o}C creates an annual relative humidity of 75%, with humidity reaching 90% in the rainy season. The dry season experiences two months of Harmattan from late December to late February. The hottest months are between January and March. The Local Government Area covers a land area of 204km^{2} and had a population of 237,555 according to 2006 census.

The population of the study consist of households that are involved in compound farming practices in the area. The Local Government Area comprises of nine communities namely Afara, EziamaObiato, Ifakala, Orodo, Mbieri, Ogwa, Ogbaku, Ubonmiri and Umunoha. These nine communities make up the population of the study.

Two- stage sampling technique was used for the study. In the first stage, out of the nine communities in Mbaitoli Local Government Area Imo State, Nigeria, five was randomly selected. The second stage employed a snowball sampling technique. The technique was used in identifying a compound farmer and requesting him/her to link up another compound farmer. This technique was used to select 20 households from each of the five (5) communities, making up a total of 100 household heads, for the study.

Date was collected using structured questionnaire, interview and direct observations. The questionnaire provided background information on general socio-economic characteristics of the farmers and other relevant data for the study. The questionnaire was administered by the researcher to the household heads and other relevant information was obtained through observation from the study environment.
Data that was derived from the study was analysed using descriptive statistics namely; frequency, percentage and mean. Objective one, two, three, four and five was analysed using mean, frequency and percentages.

Results and Discussion

The socio-economic characteristic of farmers

Table 1 shows the majority (45%) of the farmers to be between the ages of 41-50 years. It was also shown that more females (70%) engaged in compound farming than their male counterpart. The majority (70%) of the compound farmers are married with mainly (54%) household size of 5 to 10 persons. This reveals that more married persons are engaged in compound farming.

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Table 1: Socioeconomic characteristics of respondents.

Socio-economic characteristics	Percentage (%)(n=100)
Age (years)	
Below 30	9
31-40	12
41-50	45
51-60	26
Above 60	8
Sex	
Male	30
Female	70
Marital status	
Single	30
Married	70
Household size	
Below 5	37
5-10	54
Above 10	9
Educational level	
No formal education	7
Primary education	17
Secondary education	37
Tertiary education	39
Years of farming experience	
1-4	21
5-8	29
9-12	24
Above 12	26
Other occupations	
None	43
Trader	30
Civil servant	15
Labourers	8
Students	3
Pastoring	1
Farm size	
Below 100	23
100-200	49
200-300	20
Above 300	8

Source: Field Survey Data 2016

Only 7% of the farmers did not have any formal education, the rest either had primary (17%), Secondary (37%) or tertiary (39%) education with relatively moderate number having farming experience of between 5 to 8 years and farm size of majorly (49%) 200 to 300m^2. This reveals that even the educated ones engage in compound farming, this could be to complement food availability in their family. Some of them are retired civil servants who have resorted to compound farming as their secondary means of livelihood.
The majority (43%) of the respondents have no other means of livelihood outside farming, while 30% were traders, 8% were labourers, 15% were civil servants, 3% were students and 1% is pastoring. This further reveals the importance of farming to household food security as many of households still depend solely on farming for their daily food needs.

Environmentally Sustainable Farm Management Strategies Adopted

Table 2 shows the environmentally sustainable farm management strategies adopted in the study area. The Table shows that the majority (84%) of the respondents practice cover cropping as an environmentally sustainable management practice. The majority (79%, 74% and 71%) of the farmers practice crop rotation, mulching and mix farming respectively. Engagement in mix farming could be a way to diversify their produce as well as survival strategy in case of complete failure of any particular crop. Odoemelam and Ajuka (2015) similarly identified the major environmentally sustainable farm management practices in Southeast Nigeria to be use of organic manure, mix farming, crop rotation and shifting cultivation.

Table 2: Percentage distribution of environmentally sustainable farm management strategies adopted

Management strategies	Percentage (%) (n=100)
Irrigation is a common practice in compound farming	58
I practice mulching in my farm	74
After harvesting, I allow my farmland to fallow before planting another crop	42
Application of organic fertilizer is better than inorganic fertilizer	70
Crop rotation	79
Mix farming	71
Cover-cropping	84
Inter-cropping	64

Source: Field Survey Data 2016

The Table shows that 42% of respondents allow their farmland to fallow before planting The relatively low percentage of farmers using fallowing method could be as a result of inadequate farmland. The Table also revealed that 64% of the respondents practice inter-cropping. This could also be a means of minimizing risk and also to diversify their produce.

Compound Farming Ventures Adopted by Farmers

Table 3 shows that crop production (88%), poultry (50%) and livestock rearing (31%) were the major compound farming ventures adopted by farmers in the study area. None of the farmers produces mushroom and bee. This could be as a result of respondent perception of mushroom as a forest product.

Table 3: Compound farming ventures that are most adopted in Mbaitoli Local Government Area.

Variable	Percentage (%) (N=100)
Poultry	50
Livestock	31
Crop	88
Fisheries	20
Bee farm	0
Mushroom	0
Snail	8

Source: Field Survey Data 2016

Contribution of Compound Farming to Household Food Security

Table 4 shows that the majority of the respondents agreed that compound farming reduces family expenditure on food (Mean = 3.45), generate income (Mean = 3.43), ensures availability of food variety for the family (Mean = 3.35) and ensures that family livelihood standard is improved (Mean = 3.24). This reveals that compound farming could be a way of reducing family exposure to food scarcity and subsequent hunger and malnutrition. The Table also shows that respondents agreed that compound farm serves as their family demonstration farm (Mean = 3.05). This could be described a significant contribution as it will contribute to exposing the farm family particularly children and youth to farm and farming practices and help them develop positive disposition towards farming. It could also impact positively on them, as they understand that farming could supply the family food needs. Mgbada, Adesope and Enyindah (2014) similarly, identified income generation, meeting of household food security needs, meeting of daily family food needs, attaining millennium development goals (MDGs) of food security, nutrition, health and environmental sustainability as contribution of compound farming to household food security.

Table 4: Contribution of compound farming to household food security adopted in Mbaitoli Local Government Area.

Contributions to household food security	SA	A	D	SD	Mean (ẋ)
Compound farming produces food for my family daily food consumption	28	61	10	1	3.16
I generate income from the sales of produce from my farm	47	50	2	1	3.43
Compound farming reduces family expenditure on food	46	53	1	0	3.45
Compound farming ensures food availability at all season	38	38	21	3	3.11
Compound farming helps to reduce malnutrition problem	26	64	9	1	3.15
Compound farm serves as my family demonstration farm	29	52	14	5	3.05
Compound farming contribute to improve health of my family members	23	63	12	2	3.07
Compound farm ensures availability of food variety in my family	40	55	5	0	3.35
My family livelihood standard is improved through compound farming	38	49	12	1	3.24

Source: Field Survey Data 2016. ***Note: Mean score ≥ 2.50 is significant***

Factors affecting compound farming in the study area

Table 5 shows that 78% of the respondents agreed that limited land space affects their compound farming activities thus hindering the practice of crop rotation. The Table also shows that 30% of the respondents agreed that compound farming increases erosion in their farm. Non-chalant attitude of family members (80%), resistant diseases and pest infestation, lack of irrigation facilities during dry season, labour intensive nature of compound farming, were identified as the factors affecting compound farming.

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Table 5: Factors affecting compound farming adopted

Factors affecting compound farming	SA	A	D	SD	MEAN ẋ
Limited land space in my compound affects my compound farming activity	41	37	19	3	3.16
Resistant diseases and pests infestation on my crops and livestocks affects my compound farming activities	45	51	3	1	3.40
Lack of irrigation facilities during dry season	47	46	5	2	3.38
Compound farming is labour intensive	56	33	6	5	3.40
Lack of finance	47	41	9	3	3.32
Increased erosion in my compound	10	20	55	15	2.25
Increased land pressure	18	38	36	7	3.09
Extension agent nonchalant attitude towards compound farming issues	27	45	25	3	2.96
Excessive village meetings and events (time factor)	22	37	30	10	3.01
Lack of technical skill in some areas i would want to cultivate	24	56	15	5	2.99
Nonchalant attitude of family members	28	51	18	3	3.04

Source: Field Survey Data 2016. ***NOTE: Mean score ≥ 2.50 was adopted***

Conclusion and Recommendations

This study concluded that environmentally sustainable farm management strategies adopted by compound farmers had contributed to the improvement of farmer's income, standard of living, availability of food and food variety as well as household welfare. It has also been shown that compound farming faces serious challenges such as limited land space, excessive village meeting, irrigation, resistance diseases and pest infestation of crops and animals, nonchalant attitude of family members, among others.

Innovative farming methods that minimizes use of land for instance as found in poultry management system should be encouraged to help farmers cope with the challenge of limited land space.
Compound farmers should be encouraged to form cooperatives to enable them pool resources together to combat some challenges particularly access to fund.
Credit facilities should be made accessible for compound farmers with minimal collateral and repayment plan that farmers can cope with.
Government should make available infrastructure such as feeder roads, pipe borne water at strategic points to ensure continues production of farm products throughout the year.

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