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BENEFITS ASSOCIATED WITH INTEGRATED FARMING SYSTEM PRACTICE AMONG FARMERS IN KAINJI LAKE BASIN, NIGER STATE, NIGERIA

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ABSTRACT
The study examined the benefits associated with integrated Farming System (IFS) among farmers in Kanji Lake Basin, Niger State. Specifically, channels of receiving information about IFS were identified; benefits of the IFS practice determined and constraints inhibiting spread of IFS were also identified. A three-stage sampling technique was used to select 150 respondents. Structured interview schedule was used for data collection while frequency counts, mean score, bivariate correlation and chi-square were used for data analysis. Results reveal that 39.3% of the respondents had formal education while 50.0% had fishing as the primary means of livelihood. Friends and relations ranked highest ($\bar{x}$=2.9) as the major source of information on IFS, while National Institute for Freshwater Fisheries Research (NIFFR) ($\bar{x}$=2.8) ranked second highest. The most important constraints of IFS were high cost of inputs with (2.8) unavailability of inputs and complexities of the techniques of IFS ($\bar{x}$=1.9). Main benefits associated with IFS included tremendous improvement in farmers' means of livelihood' with weighted mean score ($\bar{x}$=1.8), increase in income of farmers ($\bar{x}$=1.7), increase in yield of fish ($\bar{x}$=1.7) and increase in rice yield ($\bar{x}$=1.6). Based on findings of the study, it was concluded that IFS have the potentials to increase agricultural production, income and overall standard of living of the farmers. It was recommended that extension organisations should create more awareness and train farmers on the use of IFS techniques.
Keywords: Agricultural enterprises, yield, standard of living, Integrated Farming System

INTRODUCTION

In spite of the present domination of petroleum, a non-renewable resource, as the country's major foreign exchange earner, agriculture remains a relevant bedrock of the nation's economy. The sector currently accounts for about 55.8% of the nation's Gross Domestic Product (GDP) and 88% of the non-oil foreign exchange earnings (CBN 2019). It is also employs about 70% of the active labor force as well as provides raw materials for the Agro-allied industrial sector. Agricultural provides the staple food consumed by the Nigerian population (CBN, 2019).

According to Ayinla (2012), Agricultural sector has not fulfilled the expectations of the farmers as most of them are poorly fed and of low socioeconomic status. Also, the level of food intake by most Africans, Nigeria inclusive is below the recommended level of 2600 kcal calories and 65 grams of protein per day (FAO, 2017). The low level of income, food insecurity and low calories intake are major concerns to all the tiers of government in Nigeria. The Food and Agricultural Organisation FAO (2018) reported that Nigeria produced approximately 4 million metric tons of milled rice and imported roughly 2.9 million metric tons excluding estimated 600,000 metric tons suspected to enter the country illegally on an annual basis. The fisheries sector contributed about 3.4 percent to the country annual Gross Domestic Product in 2018 by National Bureau of Statistics (NBS, 2018).

In spite of the foregoing, domestic fish and rice production still fall far below the total demand. As a result, the country resorted to importation of rice and fish. In addressing this, the Federal Government of Nigeria vigorously pursued policies and programme aimed at improving food production and socioeconomic status of the farmers. The primary aims of any of these programs was the attainment of self-reliance and self-sufficiency in food production and provision of raw- materials for the industries. As a result of food challenges faced by farmers there is need for adequate knowledge on IFS.

Integrated Farming System (IFS) is a system of farming which involves simultaneous activities involving crop and animal production. The main purpose of the IFS is that the farming components support one another; hence, reducing heavy reliance on external inputs (John, 2016). In many parts of the world, integrating crop, livestock and fisheries are common practice. For instance, the crop can serve as animal feed/fodder for the livestock, and the livestock also provides organic manure to maintain soil fertility. Integrated Farming System plays a major role in increasing employment opportunities, nutrition and income for rural populations and it has received considerable attention in recent years. John (2016) reported low awareness on integrated farming system (IFS). However, National Institute for Freshwater Fisheries Research Nigeria presently in Kainji in Niger State has created awareness and encouraged farmers on continuous use of IFS approach to rice and fish production in the study areas. This is expected to facilitate increase in fish and rice production within the Kainji lake region. However, there is dearth of information in literature documenting the perceived benefits of integrated farming system from the farmers' perspective in the study area. This understanding therefore, provides the basis for the study to

examine the benefits of IFS among farmers in Kainji Lake Basin, Niger State, Nigeria. The specific objectives were to;

i. identify the channels through which information about integrated farming system were disseminated to farmers in the study area,
ii. examine the benefits of integrated farming system in the study area
iii. identify constraints militating against the spread of integrated farming system in the study area.

The hypothesis of the study was stated in null form that there is no significant relationship between selected socioeconomic characteristics and and benefits associated with integrated farming system.

METHODOLOGY

Lake Kainji, which is the largest man - made lake in Nigeria, was created in 1968 after the damming of River Niger for electricity generation by the then Electricity Corporation of Nigeria (ECN) now Mainstream Energy Solutions Limited. The Lake lies between Latitudes 9^0 50'and 10^0 55'N, and Longitudes 4^0 25' - 4^0 45' E and between the borders of Sub - Saharan and Northern Guinea Savanna zones.

All the farmers in the Kainji Lake Basin area of Niger State, Nigeria constitute the population of the study. A multi-stage sampling procedure was used to select rural farmers in the study area. Three cells from the available 27 cells were purposively selected based on their high involvement in rice and fish production. Three communities each from the selected three cells were randomly selected. The final stage involved proportionate random selection of 10% of the respondents in each of the nine communities. Thus a total of 150 farmers were selected for the study. Primary data were collected through the use of structured interview schedule and were analysed using appropriate descriptive and inferential statistics.

The dependent variable of the study was perceived **b**enefits associated with practice of integrated farming system. It was measured on a 3 point likert-type scale. Respondents were requested to respond to what extent they agreed to some statements averring benefits associated with use of integrated farming system vis: strongly agreed (3 points), moderately agreed (2 points) and disagreed (1 point). The mean score for each of the statement was estimated and used for the ranking of the benefits associated with IFS. The independent variable, constraints militating against the spread of integrated farming system among farmers, was measured on a 3-point Likert-type scale vis: highly severe (3 points), Fairly severe (2 points) and not severe (1 point). Other independent variables such as age, income, household size were measured at ratio level with absolute values recorded while others such as sex, marital status, religion, etc were measured at nominal level.

RESULTS AND DISCUSSION

Socioeconomic characteristics

Results in Table 1 show that 98.0% of the respondents were male and 2.0% were female. This shows that the male constituted most of the farmers in the study area. The result also showed that 40.7% of the respondents were aged between 31 to 40 years. The mean age was 43 years. This implies that the respondents are still relatively young. Consequently they were supposed to be more physically able to carry out farming operations and adopt innovations (improved practices) since younger people are more mentally alert and have greater flexibility in accepting new ideas in dealing with risks (Smith *et al.*, 2009). Similarly, majority (85.3%) of the respondents were married. Marriage is a norm that offered the opportunity to get children and wives that are used as source of farm labour. In the same vein more than one–third (39.3%) of respondents acquired formal education. Acquisition of formal education had been found to be related to participation in social activities (Ekong, 2003).

Table 1 further reveals that majority (87.3%) of the respondents had an average of 6 members of household. All the respondents had between 1-5 years of experience in integrated farming system, with mean years of experience been 3 years. This result indicates farmers in the Kainji lake area have, for sometimes, been used to the IFS. Furthermore, result shows that half (50.0%) of the respondents had fishing as their primary means of livelihood. It was a small proportion (16.0%) of the respondents that practiced integrated fish with rice production, while a smaller proportion (1.3%) of the respondents practiced fish, poultry and rice integration. The low level of integration of fish, poultry and rice calls for additional effort to popularise the innovation in the study area.

Table 2: The Socioeconomic Characteristic of the Respondent

Socioeconomic Characteristic	Frequency	Percentage	Mean
Sex			
Male	147	98.0	
Female	3	2.0	
Age (years)			
16-20	3	2.0	
21-30	29	19.3	
41-50	61	40.7	43.36
51-60	44	29.3	
61-70	11	7.3	
Above 70	1	0.7	
Religion			
Islam	128	85.3	
Christianity	22	14.7	
Marital status			
Married	128	85.3	
Single	22	14.7	
Level of education			
No formal education	1	0.7	
Primary school	12	8.0	
Secondary education	37	24.6	
Tertiary education	4	2.7	
Quranic education	95	24.3	
Household size			
Below 5	131	87.3	
6-10	18	12.0	6
11-15	1	0.7	
Years of experience			
0-5	150	100.0	
Occupation			
Civil service	6	4.0	
Crop farming	42	28.0	
Fishing only	75	50.0	
Fish with Poultry	1	0.7	
Fish with Rice	24	16.0	
Fish, Poultry and Rice	2	1.3	

Source: Field Survey, 2018

Channels through which integrated farming system was introduced to farmers

The results in Table 2 reveal that the most prominent channels through which integrated farming system was introduced to farmers included friends and relative ($\bar{x}$ =2.9), National Institute for Freshwater Fisheries Research ($\bar{x}$=2.7), Extension Agents ($\bar{x}$=2.1). Print media sources, such as poster, newspaper pamphlet were rarely used as channel of accessing information on integrated farming system. This was understandable as slightly above one-third ($\bar{x}$=39.3%) of the respondents had formal education. Therefore, many of the respondents would probably not be able to read and interpret information in these media. Thus friends and relations constituted the main source of information by farmers on integrated farming system. This was in agreement with the findings of Tologbonse *et al*. (2006) that rural households depend on friends and neighbors for agricultural information.

Benefits of integrated farming system in Kaniji lake basin

Table 3 summarises the benefits derived in using integrated farming system in the study area. The benefits along with weighted mean score include: improved standard of living ($\bar{x}$=1.8), Increased incomes of farmers ($\bar{x}$=1.7), increased yield of rice ($\bar{x}$=1.6), increased yield of fish ($\bar{x}$=1.3), acquisition of knowledge ($\bar{x}$=1.3), acquisition of skills ($\bar{x}$=1.1), increased number of farmers that are involved in the use of integrated farming system for agricultural production ($\bar{x}$=1.0). The results indicate that integrated farming system increase yield of rice and fish. Therefore, it could be inferred that integrated farming system has the potential to reduce reliance on importation of rice and fish to meet the citizen's requirements of these feeding stuffs.

Table 2: Distribution of respondents by channels through which they received information on integrated farming system

Information Sources	Often	Rarely	Not used	Mean	Ranking
NIFFR	74.7	24.0	1.3	2.7	2nd
Radio	4.7	92.0	3.3	2.0	4th
Television	0.0	23.3	76.7	1.2	5th
Internet	0.7	4.0	95.3	1.1	6th
Extension agents	10.0	88.0	2.0	2.1	3rd
Friends and relations	95.3	2.0	2.0	2.9	1st
Newspapers/magazines	0.0	0.7	99.3	1.0	7th
Pamphlets	0.0	0.7	99.3	1.0	7th
Posters	0.0	0.7	99.3	1.0	7th
Non-governmental Organisations	0.0	0.7	99.3	1.0	7th

Source: Field survey, 2018

Table 3: Benefits of integrated farming system in Kainji Lake Basin

Benefits	Strongly Agreed	Moderately Agreed	Disagreed	Mean	Ranking
Increase yield of fish	20	13.3	66.7	1.7	2nd
Increase yield of rice	4.0	50.7	45.3	1.6	3rd
Increase yield of poultry	0.7	1.3	98.0	1.0	6th
Increase income of farmers	4.7	60.7	34.7	1.7	2nd
Acquisition of knowledge	0.7	25.3	74.0	1.3	4th
Acquisition of skills	0.7	14.0	85.3	1.1	5th
Improve standard of living	28.7	67.3	4.0	1.8	1st

Source: Field survey, 2018

Constraints militating against the use of integrated farming system

Table 4 shows the constraints militating against the use of integrated farming system along with the mean score. These include: high cost of inputs ($\bar{x}$=2.8), inputs for integrated farming system were not available ($\bar{x}$=2.6), inadequate knowledge about integrated farming system ($\bar{x}$= 2.6). It was overt that the most severe constraints include high cost of inputs, unavailability of the inputs, and inadequate knowledge about integrated farming system.

These results concurred with the findings of Wetengere (2009) who reported that when analysing determinants of adoption of improved maize variety in coastal lowlands of Kenya found high cost and unavailability of seed as one of the factors responsible for low rate of adoption. These findings have implications on sustaining the practice of IFS amongst farmers, if they remain unaddressed. Farmers, should therefore, constitute themselves into cooperatives through which they can share knowledge and skills about integrated farming system. This will also facilitate joint purchase and use of inputs. This will minimise the cost of implementation of IFS. Also, both NIFFR and extension organisation should increase the tempo of training for the farmers on integrated farming system in order to increase skills and knowledge acquisition about integrated farming system by the farmers.

This will probably lead to increase in number of farmers that will be continuously using integrated farming system, which in turn will lead to increased yield and overall standard of living of the farmers, since as earlier reported, integrated farming system was considered to increase yields of rice and fish and farmers' income.

Hypothesis testing

As shown in Table 5, only educational level was found to be significantly related with benefits associated with IFS (X^2=43.35) at 0.01 level of significance. Other socioeconomic characteristics considered were non-significant. These results indicate that increasing respondents' level of education could probably enhance benefits attained from practice of IFS by the farmers. This is not unexpected as education received by adults is goal-oriented and would be targeted towards meeting their specific knowledge needs in relation to IFS. This submission again buttressed earlier assertion on the need for NIFFR and extension organisation to undertake the task of educating the farmers in the Kainji Lake region about IFS.

Table 4: Constraints militating against the use of integrated farming system

Constraints	Highly severe	Moderately severe	Less severe	Mean	Ranking
The change agents are grossly incompetent to demonstrate integrated farming system technology	6.0	38.7	55.3	1.50	6th
NIFFR extension staff/farmers ratio is low	8.0	14.0	78.0	1.3	7th
Lack of adequate knowledge about integrated Farming system	60.7	35.3	4.0	2.56	3rd
Inputs for integrated farming system are not Available	66.7	30.7	2.7	2.64	2nd
High cost of inputs	84.7	14.7	0.7	2.84	1st
The integrated farming system is culturally unacceptable	0.0	0.7	99.3	1.00	8th
There are competing demand for land and water for other economic use	10.0	62.7	27.3	1.82	5th
Integrated farming system is labor Intensive	11.3	75.3	13.3	1.98	4th

Source; Field survey, 2018

Table 5: Showing relationship between selected socioeconomic characteristics and benefits associated with practice of integrated farming system

Variables	X^2	r	p-value
Level of education	43.335		0.001*
Sex	0.710		0.871
Household Size		0.907	0.989
Age		-0.120	0.145

S=significant at 1%; NS= not significant, X^2=Chi-square
Source: Field survey, 2018

CONCLUSION AND RECOMMENDATION

Based on the major findings of the study, it could be concluded that friends and families were most prominent source of information, while print media sources, such as poster, newspaper pamphlet were rarely used as channel of accessing information on integrated farming system. Secondly, main benefits associated with IFS included improvement in farmers' means of livelihood, increase in income and increase in yield of fish and rice. Thirdly, major constraints inhibiting practice of IFS were high cost of inputs, unavailability of the inputs, and inadequate knowledge about integrated farming system. From the foregoing, it is recommended that farmers should constitute themselves into cooperatives through which they can share knowledge and skills about integrated farming system and also facilitate joint purchase and use of inputs. Also, both NIFFR and extension organisation should increase the tempo of training for the farmers on integrated farming system.

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