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INTEGRATED FARMING PRACTICE AMONG FISH FARMERS IN OGUN STATE, NIGERIA

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Abstract: Climate change has indeed affected fish production; however, the practice of integrated farming provides a sustainable pathway to increase food production and climate smart practices. Thus, this study assessed level of integrated fish farming practice in Ogun State, Nigeria. Questionnaire was used to collect data on training needs, constraints to farming, and level of integrated fish farming practice from 124 fish farmers. The data collected were analyzed using frequency, percentage and mean. The mean values revealed that insect and disease control (1.40); type of enterprises to integrate with fish production (1.17) were the major training needs reported by the respondents. Insufficient access to farm land (1.56) was the major constraint to the practice of integrated fish farming. Fish farmers integrated fish and vegetable (0.65) and poultry production (0.62) respectively than other enterprises. However, most (63.7%) of the fish farmers had low practice of integrated fish farming. The study therefore concludes that there was high need for training on integrated farming. Hence, it is recommended that adequate training should be provided, access to land should also be created to enable the farmers innovate and practice integrated farming and consequently improve income and food security.

Keywords: Climate change, Fish production, Integrated farming, Practice, Sustainable.

Introduction

Nigeria has enough land and water resources for farming or fish production to thrive, as such; this provides a viable option in reducing unemployment, poverty and improves food and nutrition security. This is in line with the assertion of Mmanda (2020) and Wetengere (2010) that fish farming is on the ascendancy in sub Saharan Africa as a unique economic pathway for generating employment, increasing household income, contributing to nutrition and food security.

As reported by Respikius *et al*., (2020) that the Conservation International and World Fish Centre (2010) conducted a global study which assessed fish farming in 18 different countries. Findings revealed that although aquaculture is central in feeding the growing urban population, it is prone to climate change that has serious consequences on fish farming communities (Ababouch and Fipi, 2015). Respikius *et al*., (2020) further posited that the risk of climate change is spreading fast to lowland areas with significant impact to resource-poor farmers, causing loss of livelihoods, human displacement and migration. Similarly, the World Bank (2013) warns that the effects of climate change can shift the status quo of people in tropical countries, harm agriculture in general and fish farming which is a source of livelihood for people living under vulnerable conditions.

The practice of integrated fish farming provides a sustainable pathway to increase food production and climate smart practices, therefore, waste from one farming enterprise, will serve as input in another farming enterprise, thereby reducing external input and enhancing efficiency and increase in production. Zajdband (2011) opined that integrated fish farming is an efficient and environmentally sound farming system. The basic principle of integrated fish farming is to grow fish in water bodies that are closely integrated into household farms, and intentionally make use of the resource flows such as animal and plant by-products from the diverse on-farm enterprises. It is practiced to achieve various aims including reducing the need for external inputs while offering diversified technologies and enabling efficient use of conventional inputs such as labour, organic fertilizer and capital to increase farm productivity. Also, integrated fish farming aims to convert agricultural wastes and manure into high-quality fish protein; to use the nutrients generated in the pond as fertilizers for growing crops to reduce the need for off-farm inputs. This promotes efficient utilization of farm space for multiple productions (Abiona *et al.*, 2012).

Ogun State has a great potential in fish and other agricultural production, its proximity to Lagos which is the commercial hub of the country provides an economic advantage as well. Further, the State is one of the six identified maritime States in Nigeria which makes fish production, processing and marketing a significant occupation in the State (Bada and Rahji, 2010). Nonetheless, the food and economic potentials presented by fish farming may likely be eroded by the increasing effect of climate change and subsistence nature of farming in the country. Thus, farmers may become unable to scale up production, and meet requirement. Consequently, integrated fish farming becomes imperative in order to maximize fish farmers profit, scale up production to meet the nutritional requirement with food security and improve livelihood of the famers. In addition, integrated fish farming provide medium for farmers to produce more with ideal resource usage and recycling of waste materials. However, there are several push factors that could likely constrain fish farmers in practicing integrated fish farming. This study therefore assessed the practice of integrated fish farming in Ogun State.

Specific objectives of the study

The study was carried out to:

i. assess the level of practice of integrated fish farming in the study area;

ii. assess the training needs of fish farmers on integrated fish farming; and

iii. identify constraints to practice of integrated fish farming.

Methodology

This study was carried out in Ogun State, South-West Nigeria. The State is divided into four Agricultural Extension Zones namely: Abeokuta, Ilaro, Ijebu-Ode and Ikenne. Each Zone is further divided into blocks and cells for ease of extension services within the State. These Zones are well known for fish production and marketing. The State is well enriched with natural water bodies including springs, perennial flowing rivers, lakes amongst others (Babalola *et al.*, 2015).

A four-stage random sampling technique was used. In the first stage, two (2) Zones (Ikenne and Ijebu Zones) were randomly

selected. There are 4 blocks in Ikenne Zone and 6 blocks in Ijebu Zone; 40% of blocks in each of the Zones were selected in the second stage. Further, 50% of cells in the selected blocks were considered in the third stage. Lastly, a sampling frame containing 247 fish farmers were established, from which 124 fish farmers were selected randomly to give the sample size.

The level of practice of integrated fish farming was measured by presenting nine list of common farming enterprises in the study area that can be integrated with fish production for farmers to indicate if they practice or not. For this list, No was assigned 0, while Yes was assigned 1. Consequently, the average score (3.19) was used to categorize respondents practice of integrated fish farming into high and low. Above the average score indicated high practice, while below the average score indicated low practice of integrated fish farming.

Results and discussion

Practice of Integrated Fish Farming

As shown in Table 1, most (63.7%) of the fish farmers integrated fish and vegetable production than other enterprise. This implies that it can be attributed to the relative advantage the combination of fish and vegetable production provide for farmers. Advantages such as waste water from pond to serve as water source for vegetable production reduce cost of labour amongst others. These would consequently increase farm income and sustain production.

Similarly, integration of fish production and poultry (62.1%) was the next practiced integrated farming system among the fish farmers. This suggests that the fish farmers understand the nutritional benefit of poultry waste as a source feed input for fish production. This report is in agreement with Momoh and Norman (2015) who concluded that "compared to other livestock wastes, poultry wastes have inherent qualities that make them particularly valuable for fish. Poultry wastes are higher in nutrient than other livestock wastes."

Table 1: Distribution of respondents by practice of integrated fish farming (n=124)

Practice of integrated fish farming	Frequency	Percentage	Mean
Fish and vegetable farming	79	63.7	0.64
Fish and piggery farming	33	26.6	0.27
Fish farming and horticulture	14	11.3	0.11
Fish and poultry farming	77	62.1	0.62
Fish and cattle rearing	31	25.0	0.25
Fish farming and tree crop farming	16	12.9	0.13
Fish and maize production	66	53.2	0.53
Fish and rice farming	4	3.2	0.32
Fish and cassava production	75	60.5	0.60

Source*:* Field survey, 2020

Level of Practice of Integrated Fish Farming

Consequently, the result in Table 2 showed that the overall practice of integrated fish farming in the study area was low (63.7%). This indicated that the practice of integrated fish farming is still very low in the study area. This could be as a result of lack of training and constraints being faced such as inadequate access to land and credit facility among the fish farmers. This corroborates the reports that inadequate capital and technical know-how are among the major constraints facing women in homestead fish farming and affecting practice of integrated farming (Kinkela *et al.*, 2019; Ibrahim and Yahaya, 2011).

Table 2: Distribution of respondents by level of practice of integrated fish farming (n=124)

Level of practice	Frequency	Percentage	Mean	Standard deviation
High (mean and above)	45	36.3	3.19	1.47
Low (below mean)	79	63.7		

Source: Field survey, 2020

Training Needs of the Respondents on integrated fish faming

As shown in Table 3, the mean values revealed that training on insect and disease control is the most needed by the respondents (1.40), this is followed by training on the types of agricultural enterprise that can be integrated with fish farming (1.17). Similarly, respondents expressed the need for training on feed management in the integrated farming system (1.11). The findings indicated the need to train fish farmers on the practice of integrated farming system which would in turn enhance sustainable farming and efficient production. In addition, training would improve farmers experience and understanding of the intricacies of integrated fish farming. This is in agreement with Barguma and Ndughu (2014) who reported that training and experience have impact on fish farming productivity and enhance usage innovation.

Table 3: Distribution of respondents by training needs on integrated fish farming (n = 124)

Training needs	No	Not sure	Yes	Mean
Preparation and management of integrated fish farming system	57.3	16.9	25.8	0.69
Selection of seeds species and stocking density	36.3	38.7	25.0	0.89
Water quality management	54.0	12.9	33.1	0.79
Feed management	31.5	25.8	42.7	1.11
Insect and disease control	21.8	16.1	62.1	1.40
Harvesting and input	64.5	16.9	18.6	0.54
Processing	49.2	29.8	21.0	0.72
Marketing of product	39.5	37.1	23.4	0.84
Types of agro enterprise to integrate with fish farming	24.2	34.7	41.1	1.17

Source: Field Survey, 2020

Constraints to Practice of Integrated Fish Farming

The mean scores in Table 4 revealed that insufficient access to farm land (1.56) was the major constraint to the practice of integrated fish farming. Subsequently, respondents reported that poor power supply to generate water (1.14), lack of agricultural insurance on production risk, and irregular supply of input (1.07) respectively are other major constraints faced in the practice of integrated fish farming among respondents. This implies that without access to sufficient land, the practice of integrated fish farming may likely not be realistic and equally result to food insecurity. The insufficient land available may likely encourage fish farmers to source for land in other areas which may not be closed to their place of residence, and consequently expose their farms to theft. This assertion is in line with Mulokozi *et al.*, (2020) who posited that fish farms being distantly located from residential areas made it easy to be accessed by trespassers.

Table 4: Distribution of respondents by constraints to practice of integrated fish farming (n=124)

Constraints	Not a constraint	Mild	Severe	Mean
Lack of technical skill	33.1	35.5	31.5	0.98
Inadequate labour	50.8	23.4	25.8	0.75
Poor power supply to generate water	11.3	21.8	66.9	1.14
High cost of feed and pond maintenance	16.9	58.9 52.4	24.2 16.9	0.94 1.56
Insufficient access to land for farming	30.6			
Irregular supply of input	29.8	49.2	21.0	1.07
Inadequate finance	34.7	37.1	28.2	0.86
Inaccessibility to extension services	26.6	39.5	33.9	0.91
Marketing problem	21.0	42.7	36.3	0.94
Lack of agricultural insurance on production risk	16.1	44.4	39.5	1.07

Source: Field survey, 2020

Conclusion and Recommendations

From the forgoing it can be concluded that the fish farmers had high need for training on integrated farming. Consequently, access to land, insurance, input and credit were major constraints faced in the practice of integrated fish farming. Fish and vegetable production, and poultry were the most integrated agricultural enterprises by the fish farmers. However, integration of fish and rice production was very low. Generally, the practice of integrated fish farming was low. Thus, it is recommended that adequate training should be provided, access to land and input should also be created to enable the farmers innovate and practice integrated farming and consequently improve income and food security.

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