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## PERCEPTION OF FISH FARMERS ON APPLICATION OF AQUACULTURE PRACTICES AND CONSTRAINTS IN NIGER STATE, NIGERIA

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### ABSTRACT

Sufficient studies have not been conducted to understand the peculiarities of aquaculture practices in terms of social, economic, cultural religious environmental and institutional characteristics of the farmers in relation to their responses to the aquaculture practices. The study examined the perception of the fish farmers on application of aquaculture practices in Niger State, Nigeria. A sample size of 231 fish farmers were selected in the state using multi-stage sampling method. Structured questionnaire complimented with interview scheduled used for data collection. Data collected were analysed using descriptive statistics such as (frequency, percentages and mean). The findings reveal that 78.8% and 78.4% of the respondents highly applied medication to treat stress, control pest and disease and sorting density to separate jumpers respectively. Also, 80.1% of fish farmers agreed that use of aquaculture practices can greatly improve farmers', 74.4% agreed that improved practices provide higher yield/income than the old ones, and 66.2% strongly agreed that training is required to correctly apply the improved practices. Furthermore, 40.7% of the respondents agreed that environmental pollution is a serious constraint to aquaculture practices while 42.2% of the respondents strongly agreed that unfavourable weather conditions for fish was very serious constraints to improve aquaculture practices in the study area. It is recommended that fishermen should put in place every measure to avoid using hazardous chemicals and extension officers and research institutes should ensure that fish farmers adequately access improved fingerlings that will enhance their productivity.

**Keywords:** Fish-farmers, application, aquaculture practices, constraints

### INTRODUCTION

Nigeria has large population of fish consumers with a total consumption of more than 3.2 million metric tons while fish imports make up about 2.1 million (Aquaculture in Nigeria, 2019). This ever-increasing demand for fish is due to a number of factors such as high population, growth rate, increasing national income and increasing costs of other sources of animal protein such as livestock. Fishery occupies a very significant position in the primary sector, providing employment for over a million people and contributing about 40% of the annual protein intake in Nigeria particularly the riverine communities (Adekunmi, Ayinde and Ajala, 2017).

Fish as a veritable source of high-quality protein and essential vitamins and minerals is also crucial to human in the context of institutional development (Ipinmoroti and Adesina, 2011). Fish is also adjudged as cheaper source of animal protein with an indispensable role in world protein supplies, particularly in the developing countries, where fish equally provides energy, fatty acids, vitamins and minerals and this is quite true in the tropical countries like Nigeria where animal protein is seriously inadequate (Ajayi *et al.*, 2014). However, despite, the amazing benefits embedded in the fishing sector, most of the fisher-forks were constrained because of lack of understanding of the benefits embedded in the application of improved aquaculture practices (Arowolo, 2019). It has been observed that the application of aquaculture practices in Niger State has assumed a popular dimension in recent years starting from immediate

communities around the (National Institute for Freshwater Fisheries Research (NIFER), New Bussa and spreading by trickle-down effect to communities far and wide along the shorelines and hinterlands of Niger State. Application of appropriate aquaculture has a lot of prospectuses in alleviating under nutrition and poverty as well as promoting foreign exchange for Nigeria. However, despite this fact, most farmers are not applying the existing practices in aquaculture properly coupled with the fact that farmers lack the required currency of knowledge and that the existing practices needs to be constantly reviewed and farmers needs to be consistently updated (Sanni, 2017). Therefore, the need to probe into the factors which determines the application behavior of the fish farmers in aquaculture production to establish the need for sustainable and environmentally friendly production practices. A good number of aquaculture practices have been transferred to the end users through various channels and sufficient studies have not been conducted to understand the peculiarities of the users of such practices in terms of social, economic, cultural religious environmental and institutional characteristics of the farmers in relation to their responses to the aquaculture practices. Specifically, this study tends to examine the application level of improved aquaculture practices, determine the perception of the fish farmers on application of aquaculture practices and identify the constraints to improved aquaculture practices application

## METHODOLOGY

The research was conducted in Niger State. The State is in the Guinea Savannah ecological zone of Nigeria. In terms of land mass, it is the largest State in Nigeria (Mohammed *et al.*, 2018). It covers a total land area of 74,224km<sup>2</sup> thus accounting for about eight percent of Nigeria's land area. About 85% of its land area is good for arable crop production (Niger State Geographical information system, 2015). It is located within longitude 3° 30' and 7° 20' East and latitude 8° 20' and 11° 30' North, with a population of about 3,950,249 (Pelemo *et al.*, 2018) and with a growth rate of 3.2%, the State has estimated population of 5,586,000 in 2017 (Niger State Geographical Information System, 2015). The population of the study consists of culture fish farmers in Niger State area. Multistage sampling was adopted for this study. In the first stage, purposive selection of all the Agricultural zones in the State. The second state involved random selection of Katcha, from zone 1, Bosso from zone II and Borgu from zone III. In the third stage, three (3) communities were randomly selected from each of the L.G.A selected to get nine (9) communities. The fourth stage involved proportionate selection of 10% of fish farmers from each of the communities to get sample size of 231 respondents

Data were collected from the fish farmers with the use of questionnaire administered by the researcher with the assistance of trained enumerators. Application level of improved aquaculture practices (objective i) was subjected to 3-point scale of Highly applied (3), Fairly applied (2), Not applied (1). The cut-off mean was calculated as  $(1+2+3)/3 = 2$ . However, any mean scores  $\geq 2$  was termed applied while  $< 2$  is not applied. Perception of fish farmers on the application of aquaculture practices (objective ii) was subjected to 5- point Likert scale of strongly agree (5), agree (4), undecided (3), disagree (2) strongly disagree (1). The cut-off mean was calculated as  $(1+2+3+4+5)/5 = 3$ . However, any mean scores  $\geq 3$  was termed agreed while  $< 3$  is disagreed Also, objective iii was subjected 4-point Likert type rating scale used to measure the

perceived constraints to adoption of aquaculture practices across a continuum of 'very serious' (4) 'serious', (3) undecided' (2), not a constraint (1) A weighted mean score was computed and compared to the cut-off mean i.e  $(1+2+3+4)/4 = 2.5$ . The decision rule is any mean score  $\geq 2.5$  is serious,  $< 2.5$  is not serious Data were analysed using descriptive and inferential statistics. Objectives i, ii, and iii were achieved using descriptive statistics (such as frequency, percentage and mean).

## RESULTS AND DISCUSSIONS

### Level of Improved Aquaculture Practices

Table 1 shows the distribution of respondents based on improved aquaculture practices in the study area. The result reveals that majority (78.8%) and (78.4%) of the respondents highly applied medication to treat stress, control pest and disease and sorting density to separate jumpers respectively. This implies that medication to treat stress control of pest and disease and sorting density were the most improved practiced applied by respondents in the study area. These may be applied in order to enhance the productivity of the fish farmers. This finding supported Susan and Peter (2014), who reported that sorting practices is needed in aquaculture practices for profit maximization. Also, 74.0% and 70.1% of the respondents highly applied use of ash to control acidity in pond and use of organic or inorganic fertilizer. This implies that control of acidity and uses of organic and inorganic fertilizer were part of the highly practiced improved aquaculture method in the study area. This finding agreed with Olaoye *et al.* (2013), who reported that control of acidity is a common practice among fish farmers in Nigeria. Other findings showed that 69.3% and 64.9% of the respondents highly applied knowledge on rainfall emergence and distribution and use of threads to control predator birds respectively. However, 49.3% and 43.3% of the respondents not applied pond water heater and use of tarpaulins. This might be due to the series of problems such as inadequate knowledge and inadequate capital (Olaoye *et al.* 2016).

**Table 1: Distribution of respondents according to application level of improved aquaculture practices**

Variables	Highly Applied	Fairly Applied	Not Applied
Medication to treat stress, control pest and disease	78.8	21.2	-
Sorting density to separate jumpers	78.4	20.3	1.3
Use of ash to control acidity in pond	74.0	24.2	1.7
Use of organic or inorganic fertilizer	70.1	28.1	1.7
Use of threads to control predator birds	64.9	34.6	0.4
Knowledge on rainfall emergence and distribution	69.3	13.9	16.9
Water pumping machine	50.2	49.4	0.4
Use of plastic vats	22.9	37.2	39.8
Pond water heater	23.8	26.8	49.4
Use of tarpaulins	15.2	41.6	43.3

Sources: Field survey, 2019

#### Categorisation of level of improved aquaculture practices

Table 2 reveals that majority (93.1%) of the respondents' high applied aquaculture practices while 6.9% had low application of aquaculture practice. This implies that majority of the

respondents applied aquaculture practices, and this is expected to improve the output and income of fish farmers in the study area. This agrees with Susan and Peter (2014), who reported that proper adoption of improved aquaculture practices enhance profit maximization.

**Table 2: Categorisation of level of improved aquaculture practices**

Variables	Frequency	Percentage	Maximum	Minimum	Mean	SD
Highly applied	215	93.1	30	18	23.8	4.2
Low applied	16	6.9				

Sources: Field survey, 2019

#### Perception of the fish farmers on application of aquaculture practices

Table 3 indicates the perception of fish farmers on improved aquaculture practices in the study area. The finding indicates that respondents 80.1% of the respondents strongly agreed that the use of aquaculture practices can greatly improve farmers', this shows that proper utilisation of aquaculture practices tend to improve farmers skills in fish farming. Also, 74.4% strongly agreed that improved practices provide higher yield/income than the old ones, this denotes that adoption of improved aquaculture practices will not only enhance the yield but also have positive effect on the income of fisher forks. These finding agree with Sanni (2017), who reported that adoption of aquaculture practices exposes farmers to increase income, yield, and new skills. Moreover, 66.2% of the respondents strongly agreed that training is required to correctly apply the improved practices,

this implies that training must be applied correctly to improve aquaculture practices while 64.9% strongly agreed that improved practices make use of more inputs to give higher output than the old practice, this denotes posit that improved aquaculture practices has ability of increasing output of fish farmers.

Moreover, 65.5% respondents strongly agreed improved practices meet my satisfaction, implying that adoption of improved varieties has the ability to meet satisfaction of farmers in the study area. Also, 45.5% respondents agreed that the practices are cost effective, this shows that adoption of improved practices in aquaculture do not require much capital. However, respondents disagreed with the following perception statements, 39.4% disagreed that improved practices are similar to the existing ones, 51.5% disagreed that the improved practices are easily practicable by beginners

**Table 3: Fish farmers' distribution on perception of improved aquaculture practices**

Items	SA	A	UN	D	SD
The use of aquaculture practices can greatly improve farmers' skills	80.1	18.2	1.3	0.4	0
The improved practices provide higher yield/income than the old ones	74.4	20.8	3.0	1.7	0
Training is required to correctly apply the improved practices	66.2	28.6	5.2	0	0
The improved practices make use of more inputs to give higher output than the old practice	64.9	24.7	9.1	1.3	0
Improved practices meet my satisfaction	65.5	25.1	3.9	5.6	0
The practices are cost effective	41.1	45.5	10.8	2.6	0
Most of the practices are environmentally friendly	35.5	51.9	5.6	6.9	0
Most of the practices requires patience to achieve desired result	53.7	26.0	1.7	8.7	10.0
The recommended practices take too long a time to pay back investment money	53.7	11.3	16.9	18.2	0
Practices can complement existing practices	13.0	72.3	3.0	11.3	0.4
The recommended practices add little to farmer's knowledge	16.9	38.5	2.6	9.5	32.5
Improved practices are like the existing ones	27.7	13.9	2.6	39.4	16.5
The improved practices are easily practicable by beginners	13.0	25.5	7.4	51.5	2.6
The skills required to use improved practices cannot be easily acquired	0.4	44.6	13.9	28.6	12.6

Sources: Field survey, 2019

Note: SA= Strongly agreed, A=Agreed, UN=Undecided, D=Disagreed, SD=Strongly agreed

**Categorisation of perception of improved aquaculture practices**

Table 4 shows that 76.6% of the respondents had high perception while 23.4% had low perception. This implies that majority of the respondents had strong perception on the use of

aquaculture practices, and this is expected to have positive influence on the output of fish farmers. This finding agrees with that of Sanni (2017) who reported a high utilisation of improved aquaculture practice in Niger State, Nigeria.

**Table 4: Categorisation of perception of improved aquaculture practices**

Variables	Frequency	Percentage	Maximum	Minimum	Mean	SD
High perception	177	76.6	60	40	52.3	4.2
Low perception	54	23.4				

Sources: Field survey, 2019

**Constraints to Improved Aquaculture Practices Application**

Table 5 shows the results of perceived constraint to improved aquaculture practices application. It revealed that 40.7% agreed that environmental pollution is a serious constraint. This implies that environmental pollution such as use of toxic chemical is a serious constraint to improve aquaculture practices in the study area. Also, 42.2% of the respondents agreed that unfavourable weather conditions for fish growth was very serious constraints in the study area. This mostly arises when unfavourable weather condition interferes with fishing activities and exposes fish forks to dangers. These agreed with Arowolo *et al.* (2019),

who stated that environmental pollution and unfavourable weather condition were the major constraints affecting fisher forks in Kainji Lake Basin. More so, 36.4% of the respondents agreed that flooding of ponds during rains was a serious constraint, implying that flood which arise as a result of heavy downpour is one of the major and serious factors to improved aquaculture practices in the study area, flood mostly arise from excessive downpour that wash away fish forks pond together with their fish. This furthered agrees with Arowolo *et al.* (2019), that excessive flooding is serious constraints faced by fishermen in Kainji Lake Basin of Nigeria.

**Table 5: Distribution of perceived constraints to use of improved aquaculture practices**

Variables	Very serious	Serious	Slightly Serious	Not constraint	a
Environmental pollution	35.5	40.7	12.1	11.7	
Unfavourable weather conditions for fish growth	42.2	26.8	14.3	16.5	
Flooding of ponds during rains	31.6	36.4	22.1	1.0	
Lack of technical know-how to produce zoo planktons	22.9	44.6	28.1	4.3	
No effective policy	35.1	25.1	29.4	10.4	
Scarcity of improved fingerlings	31.2	31.2	28.1	9.5	
Inadequate power supply	32.9	29.0	26.0	12.1	
Poor quality of water	29.4	22.9	43.3	4.3	
Inadequate training services	19.0	26.0	39.4	15.6	
Inadequate technical know-how	20.3	30.3	22.9	26.4	
Sales of wild fish seeds	19.0	26.4	24.2	30.3	
Distance from NIFFR research institute too far	18.6	17.3	42.0	22.1	

Sources: Field survey, 2019

#### Categorisation of perceived constraints to use of improved aquaculture practices

Table 6 reveals that 55.4% of the respondents experience high constraints in the use of improved aquaculture practices while 44.6% had low constraints. This implies that more than half of

the respondents experience high constraints in aquaculture practices. Constraints such as environmental pollution, unfavourable weather conditions and flooding could negatively affect the output of fish farmers in the study area.

**Table 6: Categorisation of perceived constraints to use of improved aquaculture practices**

Variables	Frequency	Percentage	Maximum	Minimum	Mean	SD
High	128	55.4	38	15	25.1	6.5
Low	103	44.6				

Sources: Field survey, 2019

#### CONCLUSION AND RECOMMENDATIONS

Majority of the respondents highly applied medication to treat stress and control pest and diseases. Also, fishermen agreed that aquaculture practices can greatly improve farmers' skills and improved practices provide higher yield/income than the old ones. It can be concluded that fisher farmers agreed that environmental pollution, unfavourable weather conditions for fish growth and flooding of ponds during rains were the major constraints to aquaculture practices. It is recommended that fishermen should put in place every measure to avert environmental pollution such as use of gamalin and other hazardous chemicals that are toxic to fishes, extension officers and research institutes should ensure that fish farmers adequately access improved fingerlings that will enhance their productivity and young and middle-aged farmers should be enlightened on the benefits embedded in improved aquaculture practices in order to enhance their output.

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