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FOREWORD

Compliment of the season to all our contributors, well-wishers and world of Academia in general. I respectfully appreciate and welcome you all to the volume 3 issue 2 of Federal Polytechnic – Journal of Pure and Applied Sciences (FEPI-JOPAS) which is a peer reviewed multi-disciplinary accredited Journal of International repute. It is imperative to re-affirm that FEPI-JOPAS publishes full length research work, short communications, critical reviews and other review articles. In this issue, readers will find a series of manuscripts of top-rated significance in pure and applied sciences, engineering and built environment. This issue is the last of its kind for 2021 calendar year which features findings from basic and applied researches of high societal impacts from the seasoned authors. These articles have been reviewed and packaged for wider readership through the collective efforts of our managing editor, publishing editors, our valuable reviewers and editorial board members.

In this particular issue, you will find that Ilelaboye and Jesusina evaluated the quality of biscuits and chin-chin made from okara enriched plantain-sorghum flour blends. Ojo and Ebisin utlilized convolutional neural network for gender classification through facial analysis. Omotayo and Fafioye investigated antimalarial potential of ethyl acetate fraction of Phyllanthus niruri while Olubodun and Adetona examined landscaping as a strategy for combating air pollution in Lagos megacity. Buoye and Ojuawo provided imperative dataset on Covid-19 crisis management in Nigeria and Brazil. Obun-Andy and Banjo investigated effective communication as a tool for good governance in Nigeria. Yusuff and co-workers conducted a field survey on fish hatcheries in Yewa South and Yewa North Local Government of Ogun State. Akinlade and co-workers meticulously expatiated on the effect of aqueous blend of three herbs on haemato-biochemical indices of broiler chicken at starter phase. Ajeigbe, Sangosina, Ogunseitan, Lawal, & Yusuff analysed the Effects of Neem Leaves (Azadirachta Indica) and Cassava Peels on the Performance of West African Dware Goat. Abdussalam & Adewole in their paper carefully explained the Formulation of Natural Products Repellents for the Control of Cockroaches (Periplaneta americana). Elesin & Obafunmiso gave as Assessment of Public Toilets Facilities Provision and Management in Tertiary Institutions in Nigeria- An Overview of The Federal Polytechnic, Ilaro, Ogun State.

I would like to deeply appreciate and extend my profound gratitude to my co-editors, editorial board members, reviewers, members of FEPI-JOPAS, especially the Managing Editor, as well as all the contributing authors for making the production and publishing of this volume 3 issue 2 a reality. I will like to appreciate the authors in this issue for allowing their works to be subjected to our thorough and rigorous peer-review processes and for taking all the constructive criticism in good fate. The authors are solely responsible for the information, date and authenticity of data provided in their articles submitted for publication in the Federal Polytechnic Ilaro – Journal of Pure and Applied Sciences (FEPI-JOPAS). I am looking forward to receiving your manuscripts for the subsequent publications.

You can visit our website (https://fepi-jopas.federalpolyilaro.edu.ng) for more information, or contact us via e-mail us at fepi.jopas@federalpolyilaro.edu.ng.

Thank you and best regards.

Prof. Olayinka O. AJANI

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A Survey of Fish Hatcheries in Yewa South and Yewa North Local Government Areas of Ogun State, Nigeria

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Abstract
Fish culture today is hardly possible without the artificial propagation of fish seeds of preferred culturable fish species. This has led to this research work to determine the number of fish hatcheries in the immediate local environment and assess the constraints encountered in this sub-sector of agriculture. A field survey through the use of well structured questionnaire was conducted in two local government areas of Ogun State namely Yewa South and Yewa North LGAs. The study revealed that there are 57 fish hatcheries in the two Local Governments. Majority of the respondents (89.5%) were males in their active youthful age. Out of these, 94.7% are privately owned (sole ownership), 3.5% are on partnership and 1.8% are government owned with majority having annual production above 100,000 fingerlings. The intensity of hatchery in each town under the study area are Ilaro (16), Owode (13), Ilobi (1), Imasai (10), Oke –Odan (2), Oja-Odan (14) and Ibese (1), with Ilaro having the highest number of fish hatcheries. This study has revealed that the quantity and quality of fish hatcheries in Yewa South and Yewa North LGAs of Ogun State need to be increased.

Keywords: Aquaculture, Fish hatchery, Yewa South LGA, Yewa North LGA

INTRODUCTION
Fish is a vital source of quality protein needed by the public. Fish is a source of rich food for the indigent and plays an important role in stabilizing food security and the nutritional status of the people, most especially those in Africa and other developing part of the world (Ayoola 2010). More focus has been shifted in increasing fish production in Nigeria through aquaculture, because of the immense economic and nutritional benefits of fish to the populace.

Nigeria is a country deficient in protein (FAO, 2006). Protein from animal sources is inadequate in Nigeria due to the current surge in the nation's population. This situation has led to a considerable increase in the request for fish to complement the much needed animal protein intake. FAO (2006) explained that to maintain the current per capital fish consumption level of 13 kg per year, 2.0 million metric tons of food fish would be needed. It was noted by some workers that the only way of meeting up with this annual fish demand for the country would be through an action-oriented option of intensive fish farming (Ezeri, Olaoye, and Agbon, 2009).

The steadily growing importance of fish farming has compelled improvement in the technologies necessary for securing the initial and basic requirement for productive aquaculture, namely: the production of fish seed for stocking. Aquaculture today is impossible without the artificial propagation of fish seeds of preferred culturable fish species (Olaoye and Oke, 2012). A rearing environment that assures optimum and rapid growth which allow harvest in the shortest possible period is quintessential with the stocking of fish fingerlings or juveniles for the production of marketable fish. Fish hatchery is the solid foundation through which fish farming can be sustained (Madu, 2004). However, unavailability and scarcity of fingerlings and juvenile has been a major setback to the development of aquaculture especially during the non-breeding season. It is oblivious to know that the demand for aquaculture product is always on the rise both locally and globally. This has led to this research work to discover the number of fish hatcheries in the immediate local environment, obtain the socio-demographic characteristics of fish hatcheries owners, investigate the process of fish hatchery operations and assess the constraints encountered in this sub-sector of agriculture as the challenge to increase protein consumption in Nigeria appears to be more urgent now than ever.

MATERIALS AND METHOD
The Research Study Area

The research was conducted in Ogun State in South-Western Nigeria. The state has a total population of 3,751,140 according to National Population Commission (NPC, 2004). The state is bounded in the west by Benin Republic, in the south by Lagos State and Atlantic Ocean, in the east by Ondo State, and in the north by Oyo State. It covers a land area of 16,409.28 km^2, less than two percent (2%) of the country's landmass (Olaoye, Adekoya, Ezeri, Omoyinmi, and Ayansanwo, 2007). The state has

marine and riverine biotopes and is well endowed with natural water bodies such as springs, perennial flowing rivers, lakes and brackish waters. Ogun State has twenty Local Government Areas with her capital in Abeokuta. The Local Government Areas are Abeokuta North, Abeokuta South, Ado-Odo/Ota, Ewekoro, Ifo, Ijebu North East, Ijebu North, Ijebu Ode, Ijebu East, Ikenne, Imeko Afon, Ipokia, Obafemi Owode, Odeda, Odogbolu, Ogun Waterside, Remo North, Sagamu, Yewa North and Yewa South. Ogun state has four main political zones; Ijebu, Remo, Egba and Yewa. The last zone which is Yewa was the area of study.

Fig. 1 showing map of Ogun State

Sampling Procedure and Sample Size

Purposive sampling technique was used; due to the proximity of the local government areas to the institution. The Federal Polytechnic, Ilaro herself is located within Yewa South LGA. Fish hatchery owners; either private or government owned located in Yewa South and Yewa North LGAs were sampled. Primary data were collected through the distribution of 150 well-structured questionnaire. Questionnaires were administered through physical interview with fish hatchers and visual observation of facilities in each farm. Respondents (Fish hatchery operators from the two Local Government Areas) were located and selected through snow ball technique and from reports obtained from OGADEP and Ministry of Agriculture (OGADEP 2009). Out of the 150 questionnaires budgeted, only 57 were administered due to the low population of the targeted respondents in the study area. This gives 38.7% serving as the sample size.

Data Analysis

Data obtained from the field were subjected to descriptive analysis using Statistical Package for Social Sciences (SPSS) and inferential statistical analysis. Frequency counts, percentages, charts and tables were used to describe the socio-demographic characteristics of respondents.

RESULTS AND DISCUSSION

The study carried out on fish hatcheries in Yewa South and North Local Government Areas in Ogun State indicates that majority of the respondents (89.5%) were males. The number of female into hatchery business are very few with a percentage of 10.5% (Table 1). 50.9% were within the age range of 30-39, 28.1% within age 40-49, 20.5% within age 20-29, while 7.0% and 3.5% occupy the age range of 50-59 and above 60years respectively. This shows that a good population of the respondents are within their active youthful age. Among the respondent 75.4% were married and 24.6% were single. The educational level attained by the fish hatchers surveyed indicated that a lofty percentage of the fish farmers, 66.6% had their tertiary education certificate, 28.1% with secondary school certificate while 5.3% only had primary level of education. Among the respondents, 73.7% were Christians with the remaining population of 26.3% being Muslims. This can be related to the fact that the Yewas are predominantly Christians. 45.6% are full-time fish farmers, those have trading as secondary occupation are 19.3%, those who are artisans are 19.3% while civil servants into hatchery operations are 15.8%.

Table 1: Biodata of respondents

Data	Frequency	Percentage %
Sex		
Male	51	89.5
Female	6	10.5
Age		
20-29	6	10.5
30-39	29	50.9
40-49	16	28.1
50-59	4	7.0
≥60	2	3.5
Marital Status		
Single	14	24.6
Married	43	75.4
Religion		
Christianity	42	73.7
Islam	15	26.3
Educational level		
Primary	3	5.3
Secondary	16	28.1
Tertiary	38	66.7
Secondary occupation		
None	26	45.6
Trading	11	19.3
Artisan	11	19.3
Civil servant	9	15.8

Source: Field work, 2020

The survey uses 57 questionnaires out of 150 budgeted for this study, signifying there are about 57 fish hatcheries in Yewa South and North Local Government Area of Ogun State. Out of these hatcheries, 94.7% are privately owned (sole ownership), 3.5% are on partnership and 1.8% are government owned with majority having annual production above 100,000 fingerlings. The intensity of hatchery in each town under survey area are Ilaro (16), Owode (13), Ilobi (1), Imasai (10), Oke –Odan (2), Oja-Odan (14) and Ibese (1), with Ilaro as town with the highest fish hatcheries in Yewa South and North Local Government Area of Ogun state (Fig. 3). 47 hatcheries (82.5%) breed as well as culture fish to table size while the remaining 17.5% operate fish hatchery alone (Fig.2).

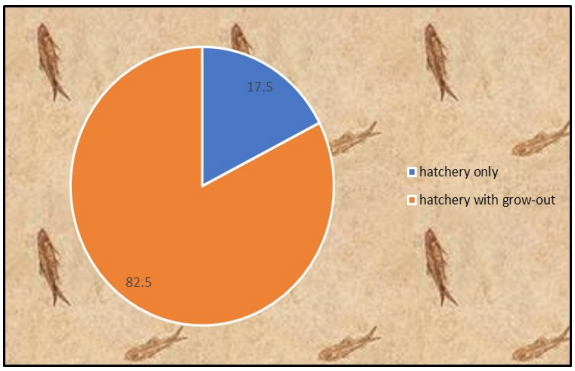

Fig 2: Type of fish farm

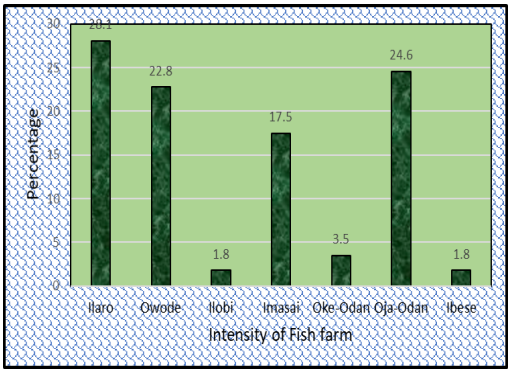

Fig 3: Intensity of fish farm per town

Figure 4 reveals that majority (82.5%) of the fish hatchery operators don't belong to any association while 17.5% belong to one association or the other. They believe that

registering with relevant associations will create some form of financial responsibility on them, as this may later result in financial burden

on the fish farm operators. This had led to a small percentage of the fish hatchery operators registering with the relevant association. Fig. 5 shows the fish tank mostly used in the study area with concrete and plastic users having the highest percentage (24.6%).

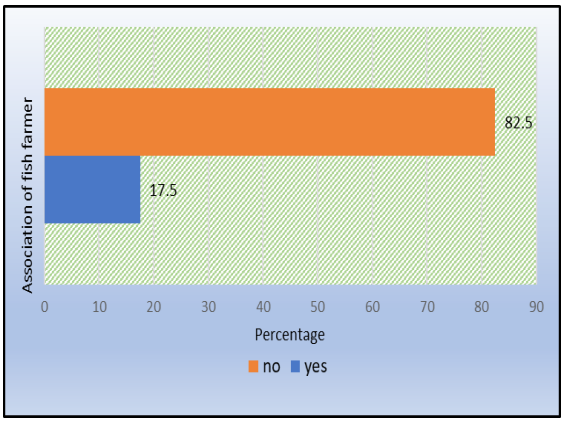

Fig 4: Association of fish farmers

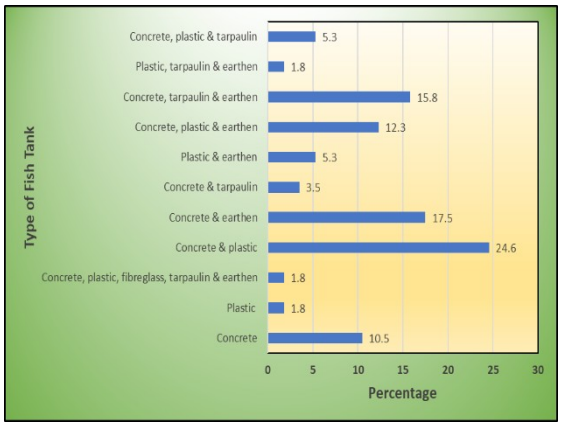

Fig 5: Type of fish tanks used in each farm

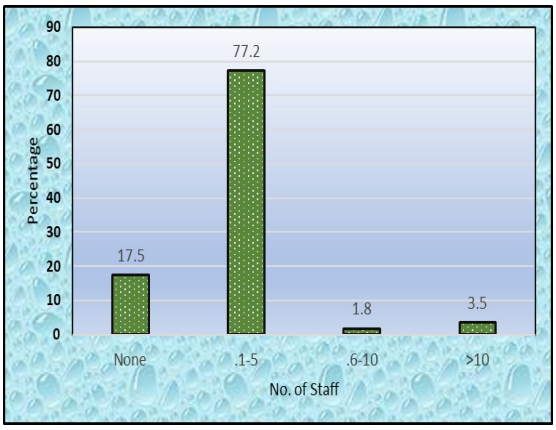

Fig. 6: Number of staff

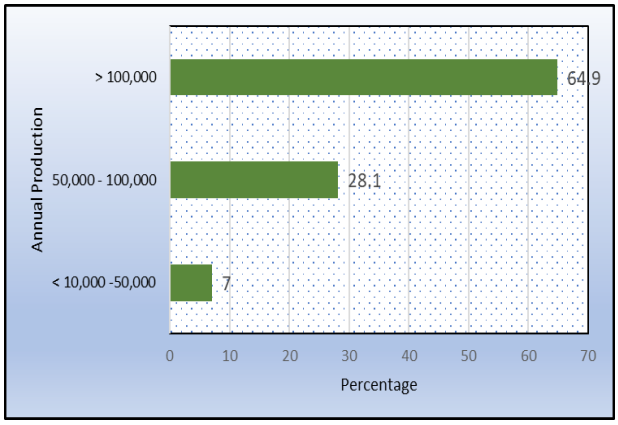

Fig. 7: Annual production of fingerlings

Hatcheries with farm attendants of 1 to 5 were most dominant, followed by those without staff (Figure 6). This is an indication that the hatcheries are just weathering the storm of establishment as a private ownership. Despite having low number of farm attendants, majority of the fish hatcheries are able to produce more than 100,000fingerlings per annum. An indication of this is shown in Figure 7.

As most of the hatchery are still at their formative stage, the study revealed that a good percentage of the hatchery have the arrangement/set-up of their farm as being satisfactory. A few exception have an excellent organization. Table 2 further describe several methods used in the breeding process, type of feeds given to fish fry and fingerlings, type of hormones used for artificial induced breeding, number of breeding cycles done per annum, etc. It is quite surprising that all the fish farms located within the research study area are into the culture of catfish. In spite of several challenges faced by the respondents and the willingness of a few (14%) to quit the job if there's an alternative, a 100% fish farmer agreed that fish hatchery business is highly lucrative and profitable.

According to Olanrewaju, Agbelege, Daddy, and Okoye, (2010), effective aquaculture development has been identified as a critical remedy to improving local fish production in Nigeria in order to reduce the current deficit in fish demand. For maximum production of aquaculture to be attained, the quantity and quality of fish hatcheries need to be increased. Akankali Seiyaboh, and Abowei, (2011) also stated that the vital requirement of fish hatchery, nursery, rearing and production ponds which includes hormone, brood-stocks, water and feed, serving as the basic essentials in fish production need to be adequately addressed. Fish hatchery usually encounter challenges hindering production efficiency. Some of the major challenges faced in production are capital in expanding the business, sudden fluctuating weather condition and disease infection resulting in low survival or high mortality of fish seeds (Olanrewaju *et al.,* 2010), lack of electricity supply in pumping water, posing a huge financial burden on farmers by using generators as substitute and immediate access to market among others.

Table 2: Fish Breeding Methods cum Level of Production

Parameter	Frequency	Percentage %
Hatchery organization		
Excellent	7	12.3
Satisfactory	50	87.7
Breeding method		
Artificial induced breeding	55	96.5
Natural induced breeding	2	3.5
Source of broodstock		
In situ	22	38.6
Other farms	8	14.0
Wild	1	1.8
In situ & open market	1	1.8
In situ & other farms	25	43.9
Fingerlings feed		
Commercial feeds	51	89.5
Natural live feeds	1	1.8
Commercial and others	1	1.8
Commercial & live feeds	2	3.5
All the above	2	3.5
Fry feed		
Artemia	24	42.1
Artemia and others	28	49.1
Plankton and others	5	8.8
Type of hormone		
Pituitary gland	10	17.5
Ovaprim	4	7.0
Pituitary gland & ovulin	7	12.3
Pituitary gland & ovatide	9	15.8
Pituitary gland & ovaprim	15	26.3
Pituatiary gland, ovulin & ovaprim	4	7.0
Ovuline	5	8.8
Pituitary gland, ovatide & ovaprim	3	5.3
Challenges in production		
Financial challenge	17	29.8
Weather	4	7.0
Disease	2	3.5
Electricity	12	21.1
Mortality	3	5.3
Brood stock	3	5.3
Accessibility to market	5	8.8
Weather and others	11	19.3
Production cycle/annum		
1-4	4	7.0
5-10	18	31.6

11-15	6	10.5
≥ 16	29	50.9
Abandoning profession		
Yes	8	14
No	49	86

Source: Field work, 2020

CONCLUSION

The outcome of this research work has revealed that catfish is the major fish cultured in Yewa South and North LGAs. Most of the respondents were interested in fish farming and understood that fish hatchery has a paramount role to play in the rejuvenation of aquaculture by producing required amount of fish seeds for fish culture. As fish hatchery is a solid foundation upon which a sustainable aquaculture can be built and for aquaculture to be a great unique remedy to declining capture fisheries, several landmines as mentioned above faced by fish hatchery operators need to be focused upon. These challenges pose a major constraints to successful hatchery operation in Yewa South and North LGAs, Ogun State. In order to sustain fish hatchery, the following recommendations may be of great benefit.

Recommendations

- Fish farmers within a community should collaborate to form an e-platform providing vital information such as accessible markets, source of broodstock, agriloans from government etc.
- Hatchery operators should embark on further training on induced breeding activities and hatchery management to combat challenges such as disease outbreak and sudden weather changes.
- Hatcheries should always get some of their broodstock from other farms to avoid in-breeding.
- All the arms of the government (local, state and federal) should assist in sourcing for a cheap and constant alternative to electricity supply.

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