Journal of
Fisheries and Aquatic Science

ISSN 1816-4927

Academic
Journals Inc.

www.academicjournals.com

Journal of Fisheries and Aquatic Science 9 (5): 413-418, 2014
ISSN 1816-4927 / DOI: 10.3923/jfas.2014.413.418

Identification, Distribution and Prevalence of Ecto-parasites Associated with Cultured Fish in Ogun State, Nigeria

[1]O.A. Adeogun, [2]G.A. Oladosu, [1]M.M.A. Akinwale, [1]O.A. Okunade, [1]I.A. Akintayo, [3]N. Idika, [3]A.A. Adeiga, [3]S.M.C. Ezeugwu, [3]E.E. Afocha, [1]O.S. Peters and [1]A.F. Odusanya
[1]Nigerian Institute for Oceanography and Marine Research, Victoria Island, Lagos, Nigeria
[2]Department of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria
[3]Nigerian Institute of Medical Research, Yaba, Lagos, Nigeria

Corresponding Author: O.A. Adeogun, Nigerian Institute for Oceanography and Marine Research, Victoria Island, Lagos, Nigeria

ABSTRACT

Public health issues can be considered as those of direct importance to both producers and consumers of fish and include broader issues of food production, processing and delivery systems. As aquaculture assumes an expanding role in meeting consumer demands for fish and fishery products, it is natural that they meet safety and quality standards. Aquaculture is a growing industry in Nigeria and it has assumed commercial importance activity. This study was part of the project on epizootiological survey of pathogenic diseases of cultured fish species and is aimed at identifying ecto-parasite associated with cultured fish in Ogun State, Nigeria. The study which was carried out in 2012 covered fifty fish farms, spread across the three senatorial zones. Five spieces of fish were randomly picked from each farm surveyed. Participants' observation and structured questionnaires were administered to fish farmers in order to gather information on source of fries, fish feeding and feed type; use of manure and its type; pond type, stocking density, pond hygiene, water source, frequency of changing water and history of diseases and mortalities of fish. Before the fish samples were collected; pond size and physicochemical water quality were assessed. Water test kits were used to measure parameters like iron, nitrate, alkalinity and ammonia. All the procedures for physicochemical water quality parameters analysis were done according to the manufacturer's instructions. Water pH was measured using a probe while dissolved oxygen and both water as well as air temperature were measured by using Hanna kit. All types of farms are included in the survey such as hatcheries, brood stock farms as well as grow out farms. The study revealed the spread of parasites across the senatorial zones. The most common encountered parasites were *Trichodina* sp., *Gyrodactylus* sp., *Dactylogyrus* sp. and trematodes. The intensity of the parasites differed markedly.

Key words: Distribution, prevalence, culture fish, epizootiological survey, ecto-parasites

INTRODUCTION

Fish parasites are the major component of aquatic biodiversity and their monitoring is considered an essential element of the management of the health for animals. The environmental conditions in culture systems, in particular increased density of fish, repeated introduction of hosts, homogeneous host populations, fast growth and a potential decrease in genetic diversity have

an important effect on commercial production and could prevent the expansion of the industry (FAO, 2010; Fernandez-Jover *et al*., 2010; Nowak, 2007). Numerous studies on the parasites of marine fish were carried out, specifically on species with a great economical interest such as the European sea bass (*Dicentrarchus labrax*) or the Gilthead sea bream (*Sparus aurata*) (Antonelli *et al*., 2010; Euzet and Combes, 1998; Focardi *et al*., 2005; Reversat *et al*., 1992). They have long been recognized to have the potential to affect the survival of their hosts (Johnson *et al*., 2004). Investigations revealed that infections through the attachment of parasites and active feeding on mucus and epithelial cells of host fish by large populations can cause severe damages such as necroses, haemorrhages, inflammation and mucus hyperproduction (Manera and Dezfuli, 2003; Noga, 2000; Paperna and Laurencin, 1979). There are many publications on the parasitofauna of cultured sea bass in various Mediterranean areas, where fish farming represents a significant economic activity (Cecchini *et al*., 1998; Johnson *et al*., 2004; Sitja-Bobadilla *et al*., 2006). Despite, the historical and commercial activities related to *D. labrax* in Corsica, few studies have been reported on their parasites. Investigations have revealed that many parasites species are globally frequent on this fish species but large scales of mortality have not yet been registered (Antonelli *et al*., 2009; Antonelli, 2010).

The variation in the patterns of parasite communities was examined by taking into account environmental factors such as temperature and physiological parameters related to host. Several studies have shown an increase of parasite richness with host age and that age and/or size related recruitment influenced parasite aggregation (Cable and Van Oosterhout, 2007; Poulin and Rohde, 1997; Silan, 1984). All animals are not equally infested according to their age. The present study will allow us to identify the most sensitive animals. Prevalence and abundances of the infections in different culture systems, fish stocks and sampling seasons are reported. High stocking densities of susceptible individuals favour the outbreak and spread of fish diseases which therefore represent a special threat to aquaculture.

In Nigeria, the parasitic fauna in aquaculture has been studied primarily in the wild and few fish farms but the information are scattered in the literature. In addition, there is no comprehensive information about the parasitic fauna in aquaculture in Ogun State, Nigeria, so some important issues remain open. Thus, the objectives of this study were to determine the prevalence rate and mean intensity of ecto-parasites as well as the condition factor in cultured fish in the State. Knowledge of fish diseases, fish health management and diagnostic skills are of particular importance for successful fish farming. High stocking densities of susceptible individuals favour the outbreak and spread of fish diseases which therefore represent a special threat to aquaculture.

MATERIALS AND METHODS

Study areas and sample collection: The study was conducted in Ogun State, Nigeria. The State was stratified into three senatorial zones. Fifty fish farms were randomly selected from the three senatorial zones while five fish irrespective of the age, sizes and culture systems were randomly collected from each pond. Before the fish samples were collected; pond size and physicochemical water quality were assessed. Water test kits (Tetra Gmbh, Germany) were used to measure parameters like iron, nitrite, nitrate and ammonia. All the procedures for physicochemical water quality parameters analysis was done according to the manufacturer's instructions. Water pH was measured using a probe (Eco pond supply, USA) while water temperature was measured by using thermometer.

Laboratory sample processing and parasite identification: The fish were sacrificed by decapitation and pithing. The life fish samples were put in a plastic container and subsequently transported to the laboratory for analysis. Parasitological analysis was carried out immediately on arrival while each was clinically examined for any abnormality. In the laboratory, the weight, total length and standard length of each fish was measured and recorded. Each fish was examined for ecto-parasites by scrapping through the skin and cutting of small portion of gills for parasitic observation by raising the operculum slit. The specimen was observed under stereo microscope (20×magnification) with a side lamp.

Analysis of parasitic infestation: The analysis of parasitic infestation for finding the incidence, intensity, density and index were carried out by following equation (Poulin and Rohde, 1997):

$$\text{Incidence of infection} = \frac{\text{Infected host}}{\text{Total hosts examined}} \times 100$$

$$\text{Incidence of infection} = \frac{\text{No. of parasites collected in a sample}}{\text{No. of infected hosts}}$$

$$\text{Density of infection} = \frac{\text{No. of parasities collected in a sample}}{\text{Total hosts examined}}$$

$$\text{Index of infection} = \frac{\text{No. of hosts infected} \times \text{No. of parasites collected}}{\text{Total hosts examined}}$$

RESULTS AND DISCUSSION

Identification of parasites: Out of 250 fish collected from 50 farms in the State, 37 were found to be dead before getting to laboratory for examination. The fish were dead due to long transportation from farms to laboratory. From the remaining 213 fish, 62 fish representing 29.1% were infested by one form of parasites or another. A total of 3 ecto-parasites representing three species were collected from the host fish (Table 1). The species identified in the host fish include *Dactylogyrus* sp., *Gyrodactylus* sp. and *Trichodina* sp. All of these parasites were identified from the skin, intestine and gill. Both Monogenean *Gyrodactylus* sp. and digean gill fluke *Dactyrlogyrus* sp., were found from the body surface of the infected fishes, intestine and the gills of the examined fishes. *Trichodina* sp., was also found in all the fish examined and it accounted for the highest parasite found in the host fish (51.61%).

Parasitic infestation: The analysis for finding the incidence, intensity, density and index were carried out (Table 2). *Trichodina* sp. had the highest incidence rate (15.02%) while, *Dactylogyrus* sp. and *Gyrodactlus* sp. had incidence rate of 9.86 and 4.23%, respectively. The highest intensity rate was recorded for *Gyrodactlus* sp. (7.56%) followed by *Dactylogyrus* sp. (3.24%) while, *Trichodina* sp., had the lowest rate of 0.91%. In this study, densities for the identified parasites were 0.15, 0.1 and 0.04% for *Trichodina* sp., *Dactylogyrus* sp. and *Gyrodactlus* sp., respectively. Furthermore, the index of parasite groups in the study area were also calculated and highest index was of *Dactylogyrus* sp. (6.70%) while, *Gyrodactlus* sp. had the lowest value of 2.87%.

Table 1: Frequency distribution of ecto-parasites found in cultured fish

Parasites	Frequency	Percentage
Dactylogyrus sp.	21	33.87
Gyrodactylus sp.	9	14.51
Trichodina sp.	32	51.61
Total	62	100.00

Table 2: Prevalence, incidence, intensity of infected fish examined in Ogun State

Parasites	No. of parasites	Percentage	No. of fish examined	Incidence	No. of infected host/fish	Intensity	Density	Index
Dactylogyrus sp.	21	33.87	213	9.86	68	3.24	0.10	6.70
Gyrodactylus sp.	9	14.52	213	4.23	68	7.56	0.04	2.87
Trichodina sp.	32	51.61	213	15.02	29	0.91	0.15	4.36

Table 3: Physico-chemical parameters of sampled fish ponds/tanks

Water parameters	Min	Max	Mean
pH	6.0	8.5	6.7±0.52
Pond dissolved oxygen (mg L^{-1})	1.7	13.3	3.9±3.02
Atmospheric temperature (°C)	23.5	39.0	32.0±2.69
Water temperature (°C)	28.5	34.2	30.2±1.09
Ammonia (mg L^{-1})	1.6	2.5	2.5±0.13
Nitrite (mg L^{-1})	0.0	3.3	0.7±0.46
Nitrate (mg L^{-1})	1.3	44.3	43.4±1.33
Iron (mg L^{-1})	0.0	4.9	1.7±1.36

Physico-chemical properties: Data on both atmospheric and water temperatures, Dissolved Oxygen (DO), pH and other physical parameters are tabulated (Table 3). The results of both water and atmospheric temperatures of the farms sampled varied widely depending on the time of the day the fish samples were collected. This also applied to the dissolved oxygen which ranged between 1.73 and 13.29 mg L^{-1} with a mean of 3.89 mg L^{-1}. Ammonia and nitrate contents were found to be very high.

Findings from this study showed that the fish parasites identified were found in three major organs, skin, intestine and gills. Protozoans are common parasites observed in the State. This shows that parasites are abundant in managed pond in-spite of normal water quality. The prevalence of different parasites in the fish farms might be due to higher stocking density. Most of the *Trichodina* sp. identified was located in the skin and intestine of the fish while *Dactylogyrus* sp. and *Gyrodactylus* sp. were concentrated in the intestine and gills. Low number of *Capillaria* sp. and un-identified protozoan were found in the intestine of the fish. The trunk kidney and liver of the fish sampled were free from parasitic organisms but they however showed some lesions such as haemorrhage, friability, pale, fatty, swollen and necrosis. Other clinical signs observed include mucous secretion, laceration and globules.

Most parasites recorded in the present study have been reported previously. The diversity and intensity of the parasitic communities may be influenced by diet and vagility of the host. A number of parasitic fish diseases from different water bodies and culture medium in Nigeria have been investigated and, common protozoan parasites such as *Trichodina* sp.,etc. and metazoan parasites such as *Dactylogyrus* sp., *Gyrodactylus* sp., etc., are infected in most freshwater fishes of Nigeria and other countries such as Bangladesh (Oniye *et al*., 2004; Miah *et al*., 2013).

CONCLUSION

In conclusion, this study highlights that the diversity of parasites reported for cultured fish in Ogun State, Nigeria. The rate of incidence and intensity were found to be quite low. The parasitic fauna in the cultured fish is composed by protozoans and metazoan parasites. However, Trichodinidae are the most frequent protozoan in fish in the State. This report broadens the distribution and confirms the presence of the protozoan and metazoan in Ogun State. Further invstigations should be carried out to clarify the epidemiology of different fish parasites and possibly extended to encompass the study of genetic variations of those parasites population in different species of definitive hosts.

ACKNOWLEDGMENT

We are grateful to Agricultural Research Council of Nigeria (ARCN) for the financial support (Grants No. CARGS RFA 2:29).

REFERENCES

Antonelli, L., S. Ternengo, S. Agostini and B. Marchand, 2009. [December parasitic firm aquacoles of Corse (campaigns 2007-2008)]. Collective Action, Union Contract Farmers in Corsica. University of Corsica. University of Corsica, pp: 47, (In French).

Antonelli, L., 2010. [Impact of parasitology on fish farming in Corsica. Monitoring of parasitoses and study of transfers from the wild fauna to fish raised in the open sea]. Ph.D. Thesis, Universite de Corse, Campus Grimaldi, Corsica, France, (In French).

Antonelli, L., Y. Quilichini and B. Marchand, 2010. *Sparicotyle chrysophrii* (Van Beneden and Hesse 1863) (Monogenea: Polyopisthocotylea) parasite of cultured Gilthead sea bream Sparus aurata (Linnaeus 1758) (Pisces: Teleostei) from Corsica: Ecological and morphological study. Parasitol. Res., 107: 389-398.

Cable, J. and C. van Oosterhout, 2007. The impact of parasites on the life history evolution of guppies (*Poecilia reticulata*): The effects of host size on parasite virulence. Int. J. Parasitol., 37: 1449-1458.

Cecchini, S., M. Saroglia, P. Berni and A.M. Cognetti-Varriale, 1998. Influence of temperature on the life cycle of *Diplectanum aequans* (Monogenea, Diplectanidae), parasitic on sea bass, *Dicentrarchus labrax* (L.). J. Fish Dis., 21: 73-75.

Euzet, L. and C. Combes, 1998. The selection of habitats among the monogenea. Int. J. Parasitol., 28: 1645-1652.

FAO, 2010. The State of World Fisheries and Aquaculture 2010. Food and Agriculture Organization, Rome, Italy, ISBN-13: 9789251066751, Pages: 214.

Fernandez-Jover, D., E. Faliex, P. Sanchez-Jerez, P. Sasal and J.T. Bayle-Sempere, 2010. Coastal fish farming does not affect the total parasite communities of wild fish in SW Mediterranean. Aquaculture, 300: 10-16.

Focardi, S., I. Corsi and E. Franchi, 2005. Safety issues and sustainable development of European aquaculture: New tools for environmentally sound aquaculture. Aquacult. Int., 13: 3-17.

Johnson, S.C., J.W. Treasurer, S. Bravo, K. Nagasawa and Z. Kabata, 2004. A review of the impact of parasitic copepods on marine aquaculture. Zool. Stud., 43: 229-243.

Manera, M. and B.S. Dezfuli, 2003. *Lernanthropus kroyeri* infections in farmed sea bass *Dicentrarchus labrax*: Pathological features. Dis. Aquat. Organ., 57: 177-180.

Miah, M.D.F., D. Mitu, H. Ali, M.M.A. Quddus and K. Ahmed, 2013. Comparative surveillance of parasitic infestation in *Channa punctatus* (Osteichthys: Channidae) collected from open and closed water in sylhet. Bangladesh Adv. Zool. Bot., 1: 17-23.

Noga, E.J., 2000. Fish Disease: Diagnosis and Treatment. Wiley-Blackwell, USA., Pages: 367.

Nowak, B.F., 2007. Parasitic diseases in marine cage culture-An example of experimental evolution of parasites? Int. J. Parasitol., 37: 581-588.

Oniye, S.J., D.A. Adebote and O.I. Ayanda, 2004. Helminth parasites of *Clarias gariepinus* (Teugels) in Zaria, Nigeria. J. Aquat. Sci., 19: 71-76.

Paperna, I. and F.B. Laurencin, 1979. Parasitic infections of sea bass, *Dicentrarchus labrax* and gilt head sea bream, *Sparus aurata*, in mariculture facilities in France. Aquaculture, 16: 173-175.

Poulin, R. and K. Rohde, 1997. Comparing the richness of metazoan ectoparasite communities of marine fishes: Controlling for host phylogeny. Oecologia, 110: 278-283.

Reversat, J., P. Silan and C. Maillard, 1992. Structure of monogenean populations, ectoparasites of the gilthead sea bream *Sparus aurata*. Mar. Biol., 112: 43-47.

Silan, P., 1984. [Comparative biology of the populations of *Diplectanum aequans* and *Diplectanum laubieri*, monogeneans of the gills of *Dicentrarchus labrax*]. Ph.D. Thesis, Academy of Montpellier. University of Science and Techniques of Languedoc, (In French).

Sitja-Bobadilla, A., M.C. de Felipe and P. Alvarez-Pellitero, 2006. *In vivo* and *in vitro* treatments against *Sparicotyle chrysophrii* (Monogenea: Microcotylidae) parasitizing the gills of gilthead sea bream (*Sparus aurata* L.). Aquaculture, 261: 856-864.