

# Assessment of the Qualitative Parameters of African Catfish (*Clarias gariepinus*) Milt Extended with Coconut Water

Adelodun O. B<sup>1\*</sup>, Rafiu R. A<sup>1</sup>

<sup>1</sup> Fisheries Technology Department,  
Oyo State College of Agriculture. P.M.B 10,  
Igboora, Oyo State, Nigeria.

Balogun A. S.<sup>2</sup>

<sup>2</sup> Animal Production Technology Department,  
Oyo State College of Agriculture. P.M.B 10,  
Igboora, Oyo State, Nigeria.

**Abstract:-** This study was carried out to assess the qualitative parameters of African catfish (*Clarias gariepinus*) milt extended with coconut water at different dilution rate. A total of six (6) male *Clarias gariepinus* broodstock of an average weight of 1.1kg were used for this study. The male fish were dissected and the milt collected to form a milt pool. The milt was diluted with coconut water at dilution ratio 1:10, 1:20 and 1:30 respectively. The coconut water had a pH of 6.6 which is close to the seminal fluid of African catfish milt (7.0). Each treatment was replicated three times and saline water was used as control for the experiment. The result revealed that sperm cells in the coconut solutions of 1:20 dilution ratio recorded the highest percentage motility of 76.67% while the lowest percentage motility (56.57%) was observed in coconut solution at 1:30 dilution ratio. The lowest percentage live sperm was observed in the control treatment (96.0%) while all the coconut solutions recorded the same percentage live sperm value of 99.33%. The statistical analysis revealed that there was no significant difference ( $P>0.05$ ) in the sperm concentration across the treatments. From the results of this study, it was observed that African catfish milt diluted with coconut water at 1:20 dilution ratio showed the best result out of all the treatments observed. However, it can be concluded that coconut water at 1:20 dilution rate is a suitable natural extender for African catfish milt.

**Keywords:** Extenders; Dilution rate; Hatchability; Fertility

## INTRODUCTION

Aquaculture can be seen as an aspect of agricultural practices, mainly to increase the production of food above the level that would be produced naturally. The African catfish *Clarias gariepinus* (Burchell, 1822) is the most cultured fish in Nigeria and the specie is native to Africa where it is cultivated mostly on a subsistence level for food. The fish is hardy and adaptable to diverse environments even with poor water quality with its air breathing ability (Ayuba et al., 2012). The procurement of reliable broodstock (of good genetic quality) and production of fish seeds for stocking ponds and fish farms has been a major setback in the development of catfish culture in Nigeria. This is because these cultivable species are not easily obtained from the wild. The efficient propagation of the *Clarias* species is therefore necessary to increase the availability. Male Catfish (*Clarias gariepinus*) do not release milt under abdominal massage and need to

be sacrificed in order to obtain milt for induced breeding. Although, milt collection after killing a male fish is effective for artificial breeding, but in most cases fish produces high viscosity of sperm which are small in volume (Muchlisin, 2005).. Extenders which are medium used to dilute sperm and to get a larger amount of diluted sperm for artificial induced purposes are therefore needed for the dilution of the catfish milt and also increase fertilization during artificial propagation of fish seeds (Ohta et al, 2001)

In artificial propagation of African catfish, one of the most important factors that influence the production of viable larvae is the quality of the milt (Hajirezaee et al., 2010). The use of high quality gametes from fish brood stock is of great importance for ensuring the production of viable larvae for aquaculture (Secer et al., 2004). Milt quality is a measure of the ability of sperm to successfully fertilize an egg, which such ability mostly depends on qualitative parameters of the milt i.e. composition of seminal fluid, milt volume, sperm density and sperm motility (Rurangwa et al., 2004). Presently, saline water and other chemical solutions are commonly used as extenders in artificial breeding and cryopreservation programmes of fish milt. However, the use of the conventional extenders have been reported to require careful preparation while some are costly and could be toxic to the fish milt during the storage of the genetic material (Muchlisin, 2009). Coconut water has been investigated by Muchlisin (2010) to have the requirements of an extender. This study is therefore carried out to assess the qualitative parameters of African catfish (*Clarias gariepinus*) milt extended with coconut water at different dilution ratio, in comparison with the normal saline water.

## METHODOLOGY

Six (6) male African Catfish broodstock of an average weight of 1kg were used for this study. The fish were acclimatized for 24hours prior to the time of usage. Water from Coconut (*Cocos nucifera*) was carefully poured into a round bottom flask and kept aside. The testes were removed by sacrificing the male fish to form a milt pool for the experiment. The milt was collected into clean test tubes and diluted with coconut water at dilution ratio 1:10, 1:20

and 1:30 respectively. Each treatment was replicated three times. Saline water which is commonly used and has been proved to be effective at dilution ratio 1:20 was used as the control experiment. The coconut water had a pH of 6.6 which is close to the seminal fluid of African catfish milt (7.0). The quality of the extended milt was assessed by the following parameters at room temperature.

- a. Sperm cells motility
- b. Sperm cell Concentration
- c. Life to Dead cells ratio

The result was tested by one-way ANOVA and Duncan multiple range test to determine if there are significant differences among treatments.

## RESULT AND DISCUSSION

Assessment of milt qualitative parameters is an important indicator of the breeding potential of male broodstock. The study aims at assessing the qualitative parameters of African catfish milt extended with coconut water.

From the result represented in table 1, coconut solution at 1:10 dilution ratio was observed to have the highest sperm concentration of  $34.21 \times 10^6$ , followed by the control treatment with  $30.70 \times 10^6$ . Coconut solution at 1:20 and 1:30 dilution ratio recorded sperm concentration values of  $26.93 \times 10^6$  and  $19.30 \times 10^6$  respectively. The variation in the sperm concentration as shown in the result could be as a result of the dilution ratio. The value obtained in each treatment decreases with increase in the dilution ratio. This

is in agreement with what was observed by Muchlisin et al; (2010) that the density of sperm is related to the dilution ratio. Lower dilution ratio tends to contain higher density of sperm and hence increasing the fertilization probability. Hajirezaee *et al*; (2010) also reported that when a dense milt sample is used for fertilization, it is obvious that the chance of collision of a sperm with egg is higher than milt containing a lower density of spermatozoa. Although there are variations in the values obtained in each treatment, the statistical analysis revealed that there is no significant difference across the values obtained in the treatments.

Sperm motility is a key prerequisite in determining the quality and fertilizing ability of fish spermatozoa (Alavi and Cosson; 2004). All the treatments showed a considerably high rate of motility, with the exception of coconut solution at 1:30 dilution ratio (56.7%) which was significantly different ( $P < 0.05$ ) from the coconut solution at 1:20 dilution ratio. Hajirezaee *et al*; (2010) reported that high percentage motility increases the probability of sperm reaching and penetrating the female gamete in organism with internal and external fertilization. The high percentage motility observed in sperm cells extended with coconut water at 1:20 dilution ratio is in agreement with Muschlisin (2005) who reported that extenders at the right concentration induced initial motility and increase fertilization.

All coconut solution at different dilution ratio had an almost perfect live sperm cells of 99.3% which is significantly different ( $P < 0.05$ ) from the percentage live sperm cells observed in the control treatment (96.0%).

Table 1: Qualitative characteristics of African Catfish Milt extended with coconut water at different dilution ratio under room temperature.

Parameters	C	1:10	1:20	1:30	SEM
Sperm concentration ( $\times 10^6$ mls)	30.70 <sup>a</sup>	34.21 <sup>a</sup>	26.93 <sup>a</sup>	19.30 <sup>ab</sup>	2.21
Motility (%)	70.00 <sup>ab</sup>	73.33 <sup>ab</sup>	76.67 <sup>a</sup>	56.57 <sup>b</sup>	3.13
Live sperm (%)	96.0 <sup>b</sup>	99.33 <sup>a</sup>	99.33 <sup>a</sup>	99.33 <sup>a</sup>	0.54

Means on the same row with different superscripts (a,b) are significantly different ( $P < 0.05$ )

## CONCLUSION AND RECOMMENDATION

Extender is a medium to dilute milt and to get a larger amount for artificially induced breeding purposes. Studies on extenders are important to determine the readily available and most suitable extenders at concentrations optimal for a particular species. From this study, it was observed that African catfish milt diluted with coconut water at 1:20 dilution ratio showed the best results of all the treatments observed. Based on the findings, coconut water at 1:20 dilution rate can be recommended as a suitable alternative to saline water and chemical extenders for African catfish milt.

## REFERENCES

- [1] Alavi, S.M and Cosson, J. (2004). Sperm motility in fishes. I. Effects of temperature and pH: a review. International Federation for Cell Biology. 29 (2005) 101-110
- [2] Ayuba, V.O, Ofojekwu, P.C and Musa, S.O (2012). Haematological Response and Weight Changes of the African Catfish *Clarias gariepinus* Exposed to Sub Lethal Concentration of *Datura innoxia* Root Extract. Production Agriculture and Technology. www.patnsukjournal.net/currentissue. 8(2): 134-143 ISSN: 0794-5213
- [3] Hajirezaee S, Mojazi Amiri, Mirvaghefi A.R., Sheikh Ahmadi A (2010d). Evaluation of semen quality of endangered Caspian brown trout (*Salmo trutta caspius*) in different times of spermiation during a spawning season. Czech J. Anim. Sci. 55(10): 445-455.
- [4] Muchlisin Z. A., 2005 Review: Current status of extenders and cryoprotectants on fish spermatozoa cryopreservation. Biodiversitas 6(1):66-69.

- [5] Muchlisin Z. A., Siti-Azizah M. N., 2009. Influence of cryoprotectants on abnormality and motility of baung (*Mystus nemurus*) spermatozoa after long-term cryopreservation. *Cryobiology* 58(2):166-169.
- [6] Muchlisin, Z.A., Nadiya, N., Nadiyah, W.N., Musman, M. and Siti-Aziza, M.N. (2010). Preliminary study on the natural extenders for artificial breeding of African catfish *Clarias gariepinus* (Burchell, 1822). *AAAL Bioflux*, 2010, Volume 3, Issue 2. 119-124.
- [7] Ohta H., Kawamura K., Unuma T., Takegoshi Y., 2001. Cryopreservation of the sperm of the Japanese bitterling. *Journal of Fish Biology* 58:670-681.
- [8] Secer, S., N. Tekin, Y. Bozkurt, N.Bukan and Akcay, 2004. Correlation between biochemical and spermatological parameters in rainbow trout (*Oncorhynchus mykiss*) semen. *Israeli J. Aquaculture-Bamidgeh*,56:274-280.