Journal of Research in Biology

An International Scientific Research Journal

ISSN No: Print: 2231 – 6280; Online: 2231 - 6299

Original Research

The growth performance of *Clarias gariepinus* fries raised in varying coloured receptacles.

Authors:
Ekokotu Paterson[1] Adogbaji and Nwachi Oster Francis[2].

Institution:
Department of Fisheries, Delta State University, Asaba Campus, Nigeria.

Corresponding author:
Nwachi Oster Francis.

Email Id:
fish2rod@yahoo.com

ABSTRACT:

This study was conducted to access the effect of various background colors of cultured vessel on growth performance and response in the production of *Clarias gariepinus* fry. A total of two female (800 g) and one male (1 kg) of test fish was used. During the eight weeks of the experimental period, the *C. gariepinus* fry were reared in three tanks in duplicates with different background colors (green, blue and white). Body weight and total length of *C. gariepinus* were recorded for the eight weeks and mean variance of the collected data were analyzed for significant difference. Mean weight and Mean length values were separated using Duncan multiple range test (DMRTS). Background color did not significantly affect the growth performance of *C. gariepinus* fry. The length and weight of the sample were measured weekly. Data collected were used to determine the specific growth rate. at week one green tank was 0.19 g with a length of 1.02 cm with a survival rate, mean weight and length of 86%, 0.56 g and 4.26 cm, blue tank was 0.14 g with a length of 1.02 cm with a survival rate, mean weight and length of 84%, 0.64 g and 4.38 cm and white tank 0.16 g with a length of 1.02 with a survival rate, mean weight and length of 82%, 0.53 g and 3.38 cm and general hatchability rate 82% respectively. At the final week (8) of the experiment blue tank had the highest weight and length 0.78 g and 5.9 cm respectively while green tank has 0.74 g and 5.2 cm, white tank has the least 0.69 g and 4.4 cm at a significant difference of 0.05.

Keywords:

Receptacle, growth coloured, cultured, vessel and *Clarias gariepinus.*

Web Address:
http://jresearchbiology.com/documents/RA0392.pdf.

Article Citation:
Ekokotu Paterson Adogbaji and Nwachi Oster Francis.
The growth performance of *Clarias gariepinus* fries raised in varying coloured receptacles.
Journal of Research in Biology (2014) 4(2): 1287-1292

Dates:
Received: 29 Nov 2013 **Accepted:** 17 Dec 2013 **Published:** 20 May 2014

INTRODUCTION

Fresh water fishes have the ability to vary their growth rate in the present of changing environmental conditions (Dahle *et al.,* 2000). This suggests that characteristics pattern of growth exist whose analysis may provide a better understanding of their adaptation to the environment. An analysis of this kind must be accompanied by an appreciation of the fact that growth pattern may change throughout the life history of the fish Light acting through photoperiodicity is becoming accepted as playing a major role in influencing the timing of seasonal reproductive activating, feeding body coloration, survival and specific growth rate rather than other factors such as temperature, pH etc. The African catfish, *Clarias gariepinus* is one of the most important species of the family *Clariidae* which is commonly farmed in Nigeria. *Clarias gariepinus* is a native of tropical and sub-tropical waters outside its natural range (Hecht and Appelbaum, 1988). *Clarias gariepinus* is a well sort fish for the people of tropical and subtropical region it has the ability to live and thrive in fresh water lakes and tropical swamp, it has the ability to take in air from the atmosphere with a remarkable ability to resist endemic disease prevailing in the region, its ability to reproduce in confine water with the aid of insemination increases the ease in which the fingerlings can be made available (Van de Nieuwegiessen *et al.,* 2009). Catfishes also have the unique characteristics of consuming both plant and animal matter. They can feed on insects plankton and even snail found in the water, they can also cannibalize on smaller fishes depending on its ability hence is known to feed on any available palatable feed.

The reproductive activity of *Clarias gariepinus* in its natural environment increases during the period of heavy rains in West Africa (June and July) again in October and November produces deeper and more turbid water which has the effect of reducing illumination breeding activity. Also due to flooding of the lowland coastal areas, the fish spread into waters with dense vegetation which again diminishes light intensity.

Lam and Soh (1995) carried out experiment on the effect of photoperiod on gonadal maturation in the rabbit fish *Siganus canaliculates* and discovered that a long photoperiod of 18 hours light alternation with 6 hours darkness (18L, 6D), retarded gonadal development in contrast with the normal photoperiod of 12 hours light and 12 hours darkness (12L, 12D). Thus a long photoperiod may be used to delay the breeding season of this fish. Histophysiological studies linking external factor with gonadal development have been reported by Hyder (1990) that light intensity are probably the primary cause of the great intensity of reproductive activity. According to Lofts (1970) light can affect the reproductive organs of fishes in terms of ability to reproduce and the size of the organ it can course degeneration of the organ on continuous exposure of gonads. The main purpose of every culturist is to produce fingerlings that would attract farmers; experience has shown that farmers sometimes based the choice of fish seed to be purchased on the colour of the seed which is mainly influenced by the colour of the receptacle used in raising the fish. This work is aimed at examining the effect of different type of colour on the fries cum fingerlings of *Clarias gariepinus.*

MATERIAL AND METHODS

This research work was conducted at the wet laboratory of the Teaching and Research farm of Delta State University Abraka Asaba campus, between the months of October and January, 2013. Data was collected for a period of eight weeks.

Spawning of fish

Spawning refers to the natural procedure the fishes go through in order to give birth to their fry. The broodstock used for the spawning was procured from a well-established farm. After the procurement, the broodstock was disinfected using saline solution (30 g of Nacl per 10 liters of water). The sexes were kept

separately to avoid indiscriminate spawning, and were allowed to acclimatize for 24 hours

Broodstock Selection

The male broodstock selected weigh 1.5-2 kg at the age of 13-15 months, the reproductive organ of the male extend to the anterior papilla and the fish shows element of aggressiveness. The female fish selected weigh 2-2.5 kg at the age of 13-15 months of age, the female fish has swollen soft stomach, reddish to pinkish reproductive organ with the ability to release egg on slight touch.

Administration of Hormone

Reproductive hormone (ovaprim) was injected intramuscularly above the lateral line just below the dorsal fin at the rate of 0.5 ml to 1 kg of body weight of test fish. All the broodstock were returned to solitary confinement for a latency period of 9 hrs at a room temperature (25°)

Stripping

The male fish was sacrificed and dissected to get the milt. After a latency period of nine hours and at a time egg were freely oozing out on slight touch. The eggs were stripped into a clean receptacle and care was taken while stripping to guard the egg and the milt that not to get contact with water.

Fertilization

Milt solution was prepared by macerating milt with mortar and pestle, and mixing the extract with saline solution (0.09% salt). The milt solution was mixed with the eggs and mechanically shaken for a minute. The eggs were then spread on the hatching mat

Hatching

Hatching involve breaking the eggs shell and the releasing of the larvae. Hatchings of the eggs occurred after a fertilization process of about 26 hours after incubation. The hatchling has the yolk sac attached to it for a period of 4 days when they became swim up fry. They were kept for 10 days in the nursery and fed with artemia

Experimental design

The already acclimatized fish were counted (200) and stocked in duplicates in colored receptacles of 100 litres capacity of color blue, white and green (B1, B2, W1, W2, G1 and G2). The fishes were fed with artemia for 7 days.

Table 1: Mean variation of weekly Body Weight of (twenty) *Clarias gariepinus* species per tank reared under different colour.

Week	Green	Blue	White
Week 1	0.19±0.00^{a}	0.14±0.00^{a}	0.16±0.00^{a}
Week 2	0.05±0.01^{a}	0.07±0.01^{a}	0.06±0.01^{a}
Week 3	0.06±0.01^{a}	0.07±0.01^{a}	0.11±0.00^{a}
Week 4	1.90±0.00^{a}	1.98±0.00^{a}	2.01±0.01^{a}
Week 5	0.68±0.01^{b}	0.12±0.01^{a}	0.72±0.00^{a}
Week 6	0.68±0.00^{a}	0.67±0.00^{a}	0.50±0.00^{a}
Week 7	0.65±0.00^{a}	0.89±0.01^{a}	0.66±0.00^{a}
Week 8	0.74±0.00^{a}	0.78±0.01^{a}	0.69±0.01^{a}

Mean: Mean ± SE (standard Error of mean)
X = 0.05 (95% level of significant)

Table 2: Mean variation of weekly Total Length of twenty *Clarias gariepinus* species per tank under different tank colour

Week	Green Tank	Blue Tank	White Tank
Week 1	1.02±0.00^{a}	1.02±0.00^{a}	1.02±0.01^{a}
Week 2	2.00±0.00^{a}	1.82±0.00^{a}	2.44±0.00^{b}
Week 3	1.96±0.00^{a}	1.99±0.01^{a}	1.91±0.01^{a}
Week 4	1.91±0.00^{a}	1.98±0.00^{a}	2.01±0.01^{a}
Week 5	4.50±0.01^{b}	2.40±0.00^{a}	2.57±0.00^{a}
Week 6	5.12±0.00^{b}	4.66±0.00^{ab}	4.30±0.00^{a}
Week 7	5.01±0.00^{ab}	5.14±0.00^{b}	4.55±0.01^{ab}
Week 8	5.280.00^{b}	5.90±0.01^{b}	4.40±0.01^{a}

Mean: Mean ± SE (standard Error of mean)
X = 0.05 (95% level of significant)

Fish sampling

The initial mean weight and total length of the fry were taken using a sensitive analytical balance and meter rule before commencement of feeding. Subsequently, weight and total length of experimental fishes were observed at weekly basis throughout the culture period of two weeks.

Weight determination

Samples to be weighed were randomly removed from each experimental bowls and kept alive in a small plastic bowl and weighed collectively on weighing days, fish were not fed until the whole exercise was completed. After measurements, the fish were put in fresh water and then returned to the rearing bowls while subsequent weighing were done individually and mean weight gain were determined.

$$\text{Weight gain (WG)} = \frac{W_1 — W_f}{d}$$

Where:

W_f = final mean weight gain (mg)

W_1 = initial mean weight gain (mg)

d = nursing period in days.

Specific Growth Rate.

The logarithm of difference in final and initial mean weights test fish was determined by:

$$SGR = \frac{\text{Log}W_2/T_2 - \text{Log } W_1}{T_1.100}$$

Where;

W_2 = Final weight of fry

W_1 = Initial weight of fry

T_2 = Final time

T_1 = Initial time

Survival rate

At the end of each trial (14 days), all the survived fish were harvested totally, counted and divided by the total number stocked.

$$\text{Percentage survival} = \frac{\text{No of fish harvested}}{\text{No of fish stocked. 100}}$$

Determination of water quality parameters.

Water quality data collected during the study include temperature, dissolved oxygen (DO) hydrogen concentration (pH) and other physiochemical requirement were monitored and stabilized. These were observed routinely, Water temperature was maintained at 28 – 30°C, pH at 7.5 – 7.8 and dissolved oxygen (DO) at 7.5 – 8.8 mg\l.

Statistical Analysis

One-way ANOVA was used to compute collected data while Duncan Multiple Range Test (DMRT) was used to separate the mean the at 5% level of significance.

A total of twenty fish was sample from the culture tank on a weekly basis.

The effect of fish environment is important in fish culture fish react positively or negatively to its the natural habitats of fish may negatively affect fish also on fish response under the effect of acute or feeding activity, health, welfare and growth. (Papoutsoglou *et al*., 2000, and Green and Baker *et al*., 1991) The effect of this stressors may affect the performance of the fish. According Strand *et al.,* (2007). Fishes maintained in the blue tanks shows a positive increase in both size and weight this opinion was expressed by Sumner and

Table 3: Mean Weight

Treatment	Initial weight (g)	Final weight (g)	Survival rate (%)	Mean weight (g)
Green (T_1)	0.19	0.74	86	0.56
Blue (T_2)	0.14	0.78	84	0.64
White (T_3)	0.16	0.69	82	0.53

Table 4: Mean Length

Treatment	Initial length (g)	Final length (g)	Hatchability (%)	Mean lenght (g)
Green (T_1)	1.02	5.3	82	4.26
Blue (T_2)	1.02	5.4	82	4.38
White (T_3)	1.02	4.4	82	3.38

Doudoroff (1938). In the present study, no contrast was observed as there was no specific significant disparities in the growth reaction to background colour. Performance was observed for three colors and the mean growth rate of fish in the three treatment was obtained as 0.78 ± 0.01 (g) for blue tank, 0.74 (g) ± 0.0 for Green tank and 0.69 ± 0.01 for white tank. (Table-1).

This finding was similar to the study of Martinez and Purser, (2007). In clear, white, green tanks expressed no Support for the latter metabolic effect of background color differences in growth performance of fry *Clarias gariepinus*, as the length of fish ranges from 4.00 to 7.50 cm for blue tank, 4.00 to 6.50 cm for Green tank and 2.80 to 6.50 cm for White tank. (Table-2).

The hatchability rate was uniform for the three colure tanks due to the fact that the incubator was in one receptacle the hatching rate of 82% (Table-4) was observed for the three tanks but there was significance difference in the survival rate of fish across the three tank as 86% was observed in green tank and 84% rate was observed in Blue tank and 82% rate in white Tank. (Table-3). The high survival rate of *Clarias gariepinus* fry could be due to proper water management during the period of study.

REFERENCES

Dahle R, Taranger GL and Norberg B. 2000. Sexual maturation and Growth of Atlantic cod (Gadus morhua L) reared at different light intensities. In Norberg B; Kjesbu OS; Taranger GL; Anderson E; Stefansson SO. (Eds)(2000) proceeding of the sixth International Symposium on the Reproductive Physiology of Fish. Institute of Marine Research and University of Bergen. Norway, July 4-9 1999. P 336.

Green JA and Baker BI. 1991. The influence of repeated stress on the release of melanin-concentrating hormone in the rainbow trout. J Endocrinol., 128(2): 261-266.

Hecht T and Appelbaum S. 1988. Observations on intra-specific aggression and coeval sibling cannibalism by larval and juvenile *Clarias gariepinus* (Clariidae pisces) under controlled conditions. Journal of zoology. 214(1): 21-44.

Hyder M. 1990. Endocrine regulation of reproduction in Tilapia. Gen comp: Endocine 3(Supplement):729-740.

Lam TJ and Soh CL. 1995. Effect of photoperiod on gonadal maturation in the rabbit fish. *Signanus canaliculatus,* park 1797. aquaculture. 5 (4): 407-4 10.

Lofts B. 1970. Animal photoperiodism; Edward Arnold publishers limited p. 62

Martinez-Cardenas L and Purser GJ. 2007. Effect of tank colour on Artemia ingestion, growth and survival in cultured early juvenile pot-bellied seahorses (*Hippocampus abdominalis*). Aquaculture. 264(1-4): 92-100.

Papoutsoglou SE, Mylonakis G, Miliou H, KaraKatsouli NP and Chadio S. 2000. Effects of background color on growth performances and physiological responses of scaled carp (*Cyprinus carpio L.)* reared in a closed circulated system. Aquacult. Eng.

22(4): 309-318.

Strand A, Alanara A, Staffan F and Magnhagen C. 2007. Effects of tank colour and light intensity on feed intake, growth rate and energy expenditure of juvenile Eurasian perch, *Perca fluviatilis L.* Aquaculture. 272(1-4): 312-318.

Sumner FB and Doudoroff P. 1938. The effects of light and dark backgrounds upon the incidence of a seemingly infectious disease in fishes. Proceedings of National Academy of Science of the United States of America. 24 (10): 463-466.

Van de Nieuwegiessen PG, Olwo J, Khong S, Verreth JAJ and Schrama JW. 2009. Effects of age and stocking density on the welfare of African catfish *Clarias gariepinus.* Burchell aquaculture. 288(1-2):69-75.