EVALUATION OF THE BIOMASS AND PROFITABILITY OF *HETEROBRANCHUS L0NG1FILLS* UNDER DIFFERENT ENVIRONMENTAL STOCKING DENSITIES

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Abstract

Fingerlings of *Hetereobranchus longifills* weighing between 20 to 22g were collected from African Regional Aquaculture Centre (ARAC) Port Harcourt hatchery in April 2001 using plastic buckets. Fingerlings were stored in the ENADEP Fisheries Adaptive Research Centre Enugu for three weeks before being stocked in twelve concrete ponds averaging $15m^2$ under three environmental stocking rates of 5, 7 and $9m'^2$ with each treatment replicated four times. Tilapias were added to all the ponds in the ratio of 20:80 (Tilapias: *Heterobranchus).* Other environmental parameters of all the treatment and replicate ponds were maintained similarly and also were received equal feed ration for six months. While growth rates were found to be performed in all the treatments, *H Longifils* stocked at 7m-2 performed better when analyzed economically. Based on the result, recommendations were proffered for the optional environmental stocking density for the species.

Introduction

Generally adequate environmental spacing is known to affect the sustainable integrity of living biota. Members of the piscine family no less exhibit this factor. In natural conditions, fishes undergo migration especially during spawning in order to explore adequate environment for enhancing the survival of their offspring.

In culture system, migration is not possible such that stocking densities must be such that the carrying capacity of the environment of culture is not exceeded. The farmer's practice for stocking the catfishes (*Heterobranchus* and *Clarias*) in intensive culture situations has been varied. In most cases, ENADEP (2000) recorded that overstocking of ponds have resulted in low yield and reduced individual sizes at harvest. Indications from farmer's practice in Enugu show that up to 10 to 15 fingerlings are stocked per square metre. Recommendations from research in Enugu vary which show that up to 10 - 15 fingerlings are stocked per square metre. Research commendations also vary depending on management system employed. Hongendoom (1980) indicated that *C.gariepinus* is a very suitable species for high-density culture performing a high growth INTRODUCTION rate accompanied by a very efficient feed utilization. Huisman (1985) reported biomass yields of 15mt/ha of *C.gariepinus* at initial environmental stocking rates of 2000-3000 fingerlings per hectare in earthen ponds. Anibeze and Inyang (2000) showed that the giant African cat fish *Heterobranchus* grows faster and larger than *Clarias* and hence recommended lower environmental stocking rates in intensive culture systems. Stocking rates of between 5 to 10 *Heterobranchus* fingerlings per square metre were recommended for culture and when in polyculture with the tilapias lower stocking densities were advised (Anibeze and Eze, 2000).

While adequate environmental stocking densities depend on a lot of factors including age, size of fish, management system and fish species type it is clear that catfishes can tolerate very high densities in culture ponds. The present trial seeks to evaluate on-the-farm, the exact environmental stocking rates, biomass yield and profitability of *Heterobranchus* species under intensive polyculture environment with the tilapias.

Materials and Method

The experiment was conducted between May and November 2001 in 12 concrete ponds averaging $15m^2$ each belonging to ENADEP contact farmers. Fingerlings of *H.longifilis* weighing between 20-22g were collected from the African Regional Aquaculture Centre Port Harcourt in April 2001 using plastic buckets. The fingerlings were then stored in two ponds at the ENADEP Fisheries Adaptive Research Centre, Enugu for three weeks before being stocked in the 12 concrete ponds under three stocking rates (treatments) of 5, 7 and $9m'^2$ with each treatment replicated four times. Choices of stocking rate were delineated based on Anibeze and Eze (2001). Feed were mixed to 35%

crude protein (Table 1). Feeding rates were the same for all the replicates at 5% body weight adjustments with two regimes per day (morning and evening). Pond water parameters were maintained according to the method employed in Anibeze (2000)(Fig.l).

Fortnightly weight measurements were taken in each of the ponds by using dragnets to haul fish from the pond. Twenty fishes were collected and weighed at each fortnightly sampling and average weight per sample recorded.

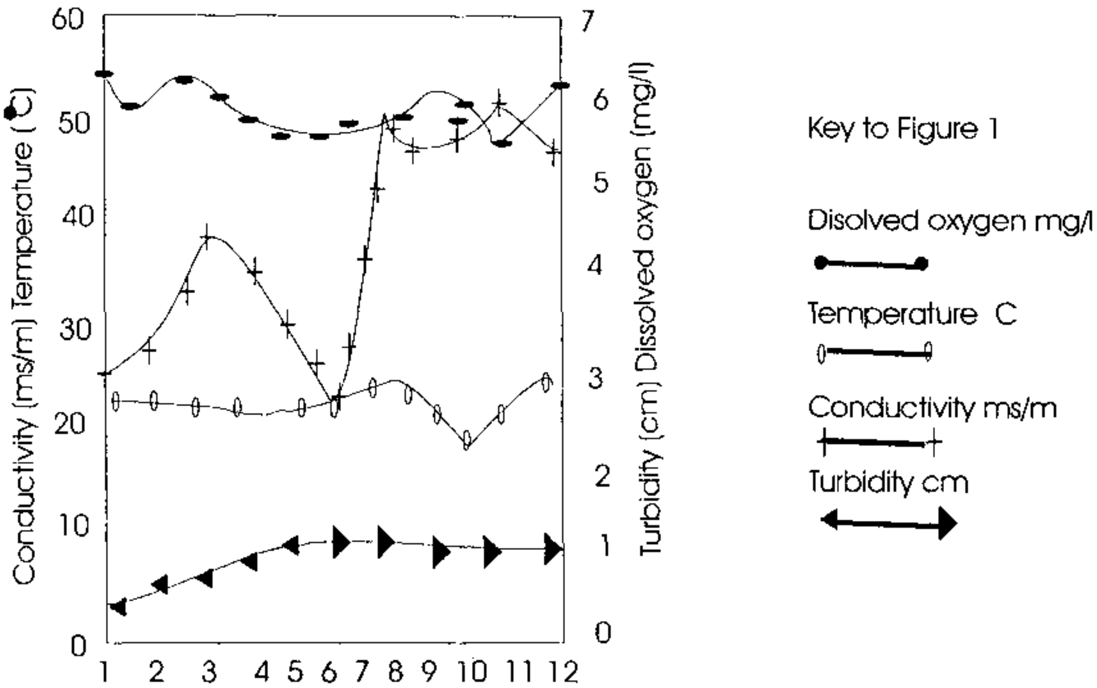

Fig. 1 Fourthnightly values ofphysico-chemical parameters of ponds stocked with H. Longifilis during the experimental period.

Results and Discussion

Results showed that treatment A ($5m'^2$) had a total average weight of 118.7 + 7.6, treatment B ($7m^{2}$) had 199.5 + 10.7 while treatment C ($9m'^2$) had 190.0 + 10.1 (Table 2). A test of significance using the Analysis of Variance (ANOVA) showed that growth rates of treatment B and C were significantly higher than A (P<0.05) while no differences were observed between the growth rates **of** B. and C (P<0.05) (Table 3).

Table: 1 Feed Ingredients and Their Percentage Composition

<u>Feedstuff</u>	**Percentage Composition**
Rice bran/Husk	***9A4***
Bread flour	9.44
Cassava Meal	9.44
Palm Kernel Cake	33.84
Blood Meal	33.84
Vitamin premix	1.0
Palm Oil Bone	1.0
Meal Ascorbic	0.5
acid Common Salt	0.0
	5
	1.5

Table 2: Analysis of Variance of the Yield of Three Stocking Densities of *H. Longifilis*

	1	2	3	4	5	6	7	8	9	10	11	12	Total	Mean
1 5M	22 00	36.200	49.100	72.300	87.500	98.300	135.200	141.600	163.300	178,900	233.700	206.000	1424.100	11.8600
2 7m	21.600	42.500	69.130	88.630	121 280	165.380	204.300	257.700	283.800	329.500	377.500	422.300	2383.620	98.635
3 9m	21.300	35.000	70.900	102.170	126.100	176.650	186.500	227.500	294.900	330600	340.600	361.500	2273.720	89.477
Total	64.900	113 700	189 130	263.100	334.880	440.330	526.000	626.800	742.000	839.000	924.1000	1017.5000		
Mean	21.633	37.900	63.043	87.700	111.627	146777	175.333	208.933	347.333	279.667	209.033	339.167		

Treatments	**1**	**2**	**3**
Size	**12**	**12**	**12**
Standard Deviation	**122.402**	**215.666**	**179.583**

Analysis of Variance

Source of Variation	**DF**	**SS**	**NS**	**F-ratio**
Replication	**11**	**2386493.469**	**35135,770**	**25,911**
Treatment	**2**	**45961.457**	**22980.729**	**16.949**
Error	**22**	**29831.824**	**1355.992**	

The table F-Value at 5% for Treatment is 0 against computed value of 16.94754. Thus the treatments are significantly different.
T-Value at 0.05 probabilities at 22 Degree of Freedom is 0

S.Ed = 15.03325
L.S.D at 5% = 0
C.V =21.7994%
Mean of Treatment 1 2 3 L.S.D at 5%
118.675 199.635 189.477 0.000

Table 3: Fortnightly Changes in the Growth Rates of *H. Longifilis* Under the Three Different Stocking Rates

	A(5m'²)	**B(7m'²)**	**C(9m'²)**
May E	22.0	21.6	**21.3**
May L	**36.2**	**42.5**	**35.4**
June E	**49.1**	**69.13**	**70.9**
June L	**72.3**	**88.63**	**102.17**
JulyE	**87.5**	**121.28**	**126.1**
July L	**98.3**	**165.38**	**176.65**
Aug. E	**135.2**	**204.3**	**186.5**
Aug. L	**141.6**	**257.7**	**227.5**
Sept. L	**178.9**	**329.5**	**330.6**
Oct. E	**206.0**	**377.5**	**346.6**
Oct. L	**233.7**	**422.3**	**361.5**
Mean	**118.7+ 7.6**	**199.0+ 10.7**	**190.0 +10.1**

E = Early L = Late.

Table 4: Economic Analysis of the Stocking Rates of *H. Longifilis*

Items	Treatment A	Treatment B	Treatment C
Initial body weight (g) (average)	22.0	21.6	21.3
Final body weight (g) (average)	233.7	422.3	361.5
Weight gain (g)	211.7	400.7	340.2
Value of gain at N350.00 Per kg	74.10	140.25	119.05
Incremental cost (N)	42.50	72.50	98.00
Total incremental income (N) (benefit)	74.10	140.25	119.05
Benefit cost Ratio	1.74	1.98	1.21

A simple economic analysis of the treatments and data (Table 3) indicates that the pond with 7m'^{2} stocking rate gave the best monetary returns. Hence, although there was no significant difference between stocking rates of 7m'^{2} and 9m'^{2} (Table 3) but for economic considerations, stocking rate of 7m'^{2} is recommended for the culture of *Heterobranchus* species in concrete ponds under intensive management.

The observations in the present experiment is indicative of the fact that stocking rates that will maintain environmental integrity and profitability in concrete ponds are higher than the recommendations of Huisman (1995) and Hogendoom (1980) for earthen ponds. However, it is pertinent to add that the evaluated profitability is assured based on the pond sizes indicated in the experiment. Larger concrete ponds may not yield similar result.

References

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