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Impact of Different Feeds on Growth of Catfish *Clarias Batrachus* (Gunther)

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Abstract: ***In the present experiment highest survival rate was noted when fishes were fed with Tubifex followed by Artemia, mixed zooplanton and freeze dried tubifex. The survival rates obtained in the present study are comparable with those reported earlier for the same species (Fermin and Bolivar, 1991). Mortalities could be associated with the onset of air breathing (observed at day 9 in the present study) in catfish larvae (Haylor, 1992) and, to a lesser extent, the cannibalistic nature of the fish as influenced by size differences (Hecht and Appelbaum, 1987).***

Keywords: Clarias batrachus, larval feed, rearing, artemia, zooplankton

1. Introduction

Clarias batrachus popularly known is highly popular in India as an extensive table fish. It is widely distributed in India, Bangladesh, Thailand, Phillipins, Combodia, Burma, Hongkong and China. In India the states of Assam, Meghalaya, Tripura, Andra Pradesh, Uttar Pradesh, Karnataka, Maharastra, Tamilnadu, Bihar, Orissa and West Bengal support the significant natural fishery of this catfish (Mahapatra, 2004). Asian catfish Clarias batrachus is considered as a potential aquaculture species in Indian subcontinent. The production potentiality of this species in aquaculture has been reported (Thakur and Das, 1986; Areerat, 1987). High production of this species through mono and polyculture operation can be obtained provided there is adequate supply of stocking material. Moreover, this fish can generally stock at densities 5-10 times than the carp (CIFA manual, 1994).

Studies on the nutritional aspects from culture viewpoint related to conservation and propagation, though important, are very limited particularly for *Clarias batrachus*. The objective of the study was to find out the appropriate feed for the larval stage of *Clarias batrachus* to overcome the problem of seed for culture of that fish.

2. Material and Method

The brooders of *C. batrachus* with an average 120 g body weight were collected from the local water bodies. Breeding of Clarias batrachus was performed as per Sahoo *et al*., 2008. The larvae were released in a cement tanks at 2000/m2 in the indoor hatchery. After yolk–sac absorption, the larvae were fed continuously with mixed zooplankton. The larvae thus reared were collected at the age of five, ten and fifteen days, and were utilised for experimental purpose.

Larval rearing experiment was followed by Evangelista *et. al.*, 2005. The larvae were released in a series of aquarium (3 feet x 2 feet x 2 feet) in the indoor hatchery. The larvae thus reared were collected at the age of five days, and were utilized for experimental purpose. Four feed were used for this experiment namely Artemia (Feed 1), *Tubifex* (Feed 2), mixed zooplankton (Feed 3) and freeze dried *Tubifex* (Feed 4). One of the dement cement cisterns was provided with 5 - 8 cm soil and provided with 2 kg filtered cow dung, 20 g urea and 30 g single super phosphate before seven days of stocking to grow plankton. Zooplanktons collected from Upper lake of Bhopal was inoculated in one of the cisterns. For the present study, *Tubifex* were collected from streams and canals where natural populations are abundant and cultured following the method developed by CIFE, 1998. *Artemia* cysts were incubated and hatched under optimal conditions as described by Sorgeloos *et. al.*, (1986). After 24 h incubation in artificial seawater, newly-hatched *Artemia* nauplii were separated from the hatching debris by interrupting the air supply in the hatching vessel. *Artemia* nauplii were washed and fed to the catfish larvae.

Catfish larvae in the preliminary experiment had mean total length of 7.32 mm. They were randomly stocked at 50 larvae per aquarium. There were four feeding treatments with three replicates each in a completely randomized design. *Artemia*, *Tubifex*, mixed zooplankton and freeze dried *Tubifex* were provided as larval feed. Feeds were introduced 1 day before the start of the experiment in order to ensure food availability as soon as the larvae started to eat. Catfish larvae were fed live organisms daily at a range of 10–20 ml/1 throughout the experiment. First feeding catfish larvae were given at 09.00, 13.30 and 16.00 h. The first feeding trial ran for 12 weeks. The artificial diet was given daily at 25% of the fish biomass in the same time as live feed.

3. Sampling and Analysis

10 catfish larvae per aquarium were sampled weekly for length and weight measurements. Total length was measured to the nearest 0.1 mm using a varnier caliper. Individual wet weight was taken using a Mettler balance (0.1 mg sensitivity). The number of dead fish was recorded daily. The survival rate was determined weekly by counting the remaining larvae in each aquarium during sampling.

4. Result and Discussion

Change in length gain of *Clarias batrachus* larva for 60 days was depicted in Fig – 14. In the 1st fortnight highest enhancement in length (3.4 mm) was found when fishes fed with *Tubifex* and minimum with freeze dried *Tubifex* (0.6 mm). There was an enhancement of 3.28 mm and 2.4 mm

noticed when fishes were fed with *Artemia* and mixed zooplankton. There was a weight gain of 0.59 g as maximum when fishes were fed with *Tubifex* followed by 0.45 g and 0.36 g respectively when fed with *Artemia* and mixed zooplankton in the 1st week of experiment. Minimum weight gain was noticed (0.057 g) when fishes were fed with freeze dried *Tubifex*.

In the 2nd fortnight highest length enhancement (3.1 mm) was found with mixed zooplankton followed by *Tubifex* and *Artemia* which showed an enhancement of 2.9 mm and 2.6 mm respectively. Fishes fed with freeze dried *Tubifex* have an enhancement of only 0.5 mm. In the 2nd week of experiment highest weight gain (0.147 g) was recorded when fishes were fed with *Artemia* and lowest with freeze dried *Tubifex* (0.034 g). Fishes fed with mixed zooplankton showed higher weight gain (0.135 g) than fed with *Tubifex* (0.123 g).

In the 3rd week *Artemia* exhibited the maximum length (2.9 mm) while minimum was found with freeze dried *Tubifex* (0.6 mm). Fishes fed with *Tubifex* and mixed zooplankton showed an enhancement of 2.7 mm and 2.4 mm in length. After 3 weeks of experiment fishes exhibited maximum gain in weight of 0.7 g when fed with *Artemia*. *Tubifex* and mixed zooplankton showed almost same weight enhancement (0.6 g). There was an enhancement of only 0.08 g in weight when fishes were fed with freeze dried *Tubifex*.

The Specific Growth Rate (SGR) was almost same incase of fishes fed with *Artemia* (14.94) and live *Tubifex* (14.25) for the study period followed by mixed zooplankton which was 13.97. Fishes fed with freeze dried *Tubifex* had an SGR of only 7.32. The survival rate of 69% was obtained when fishes were fed with feed followed by 65 % with live *Artemia* 50 % with mixed zooplankton. There was only 28% survival of *Clarias batrachus* larvae recorded when fishes were fed with freeze dried *Tubifex*.

Table 1: Growth and survival of catfish *Clarias batrachus* larva fed with different feeds for 60 days during monsoon months July to August, 2006)

Parameters	*Feed 1*	*Feed 2*	*Feed 3*	*Feed 4*
Initial length (mm)	7.32 ± 0.177	7.30 ± 0.144	7.40 ± 0.104	7.30 ± 0.121
Final length (mm)	20.00 ± 0.517	19.70 ± 1.509	18.00 ± 0.912	9.80 ± 0.567
Length gain (mm)	12.68 ± 0.523	12.40 ± 0.516	10.60 ± 0.621	2.50 ± 0.633
Initial weight (g)	0.008 ± 0.001	0.008 ± 0.001	0.008 ± 0.001	0.008 ± 0.001
Final weight (g)	1.4 ± 0.096	1.1 ± 0.094	1 ± 0.149	0.1 ± 0.03
Weight gain (g)	1.392 ± 0.092	1.092 ± 0.094	0.992 ± 0.32	0.092 ± 0.35
SGR % per day	14.95 + 0.71	14.25 ± 0.67	13.97 ± 0.61	7.32 ± 0.46
Survival %	79 ± 4.2	65 ± 2.3	50 ± 3.1	28 ± 2.8

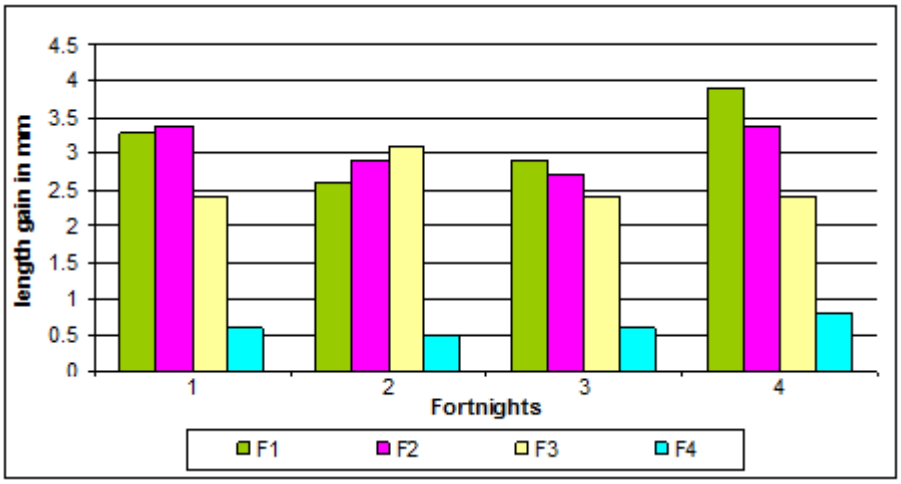

Figure 1: Fortnightly gain in length (mm) recorded during rearing of *Clarias batrachus* for 60 days under different live organisms during monsoon months (1st July, to 31th Aug., 2006).

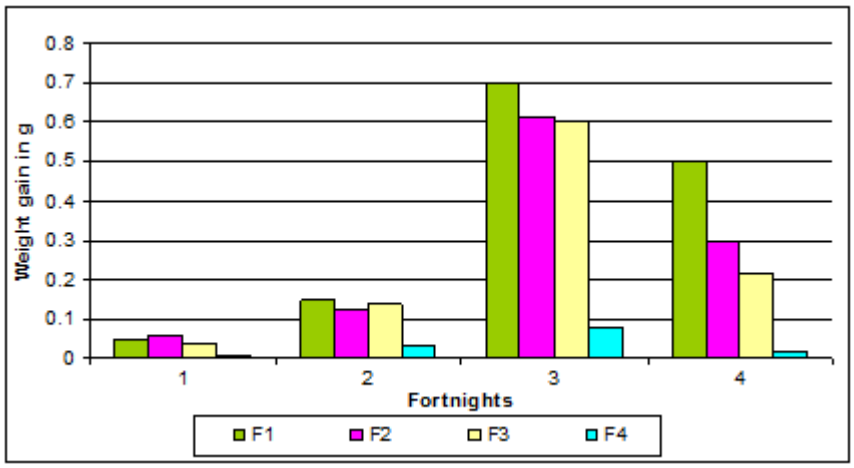

Figure 2: Fortnightly gain in weight (g) recorded during rearing of *Clarias batrachus* for 60 days under different live organisms during monsoon months (1st July, to 31th Aug., 2006).

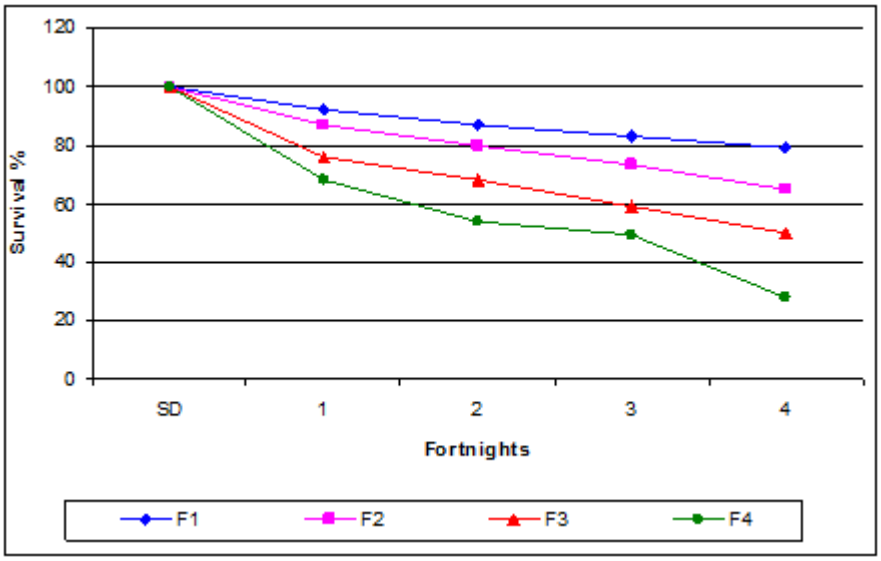

Figure 3: Fortnightly survival recorded during rearing of *Clarias batrachus* for 60 days under different live organisms during monsoon months (1st July, to 31th Aug., 2006).

5. Discussion

Larval nutrition and live feed culture is one of the most important and obligatory matter for successful fish culture. Feeding with live prey for fish larvae are most essential because during first few days of their life they have no complete develop digestive tract, especially their digestive enzymes (Faruque *et. al.*, 2010).

The mean total length and body weight of catfish larvae given different larval feeds over an 8-week period showed significant differences in total length from week 1 and in weight from week 2 onward. Growth was lowest in larvae fed pelleted *Tubifex*. Larvae fed *Tubifex* had significantly higher total length (for first fortnight) and weight (for first fortnight) than those fed the other live feeds. This finding is similar with Evalgelista *et. al.*, (2005) for *Clarias macrocephalus*. Alam and Mollah (1988) concluded that *Clarias batrachus* larvae fed with live *Tubifex* sp. grew significantly better than those fed on the formulated diets. Mollah and Nurullah (1988) reported that *C. batrachus* larvae were successfully reared with live feed (*Tubifex sp.*). *Tubifex* as an excellent food for some larval fishes (Hung *et. al.*, 2002). Regardless of time, *Tubifex*-fed larvae had consistently high growth which could be attributed, in part, to the high lipid (Hashim *et. al.*, 1992) and fatty acid (Tamaru *et. al.*, 1997) contents of *Tubifex*. Similarly, the total length increment and weight gain in 2nd fortnight was highest in catfish larvae given mixed zooplankton. Polling *et. al.*, (1988) obtained same results for *C. gariepinus*. Young fry raised on zooplankton yielded higher growth rates than when fed Artemia naupii, although fry under both treatments had> 90% survival and grew better than when fed dry feed. Zooplanktons have been considered the preferred food source for 3-4week- old fry (Sidthimunka, 1972). From 3rd week onwards larvae showed better weight gain with Artemia than the other. Throughout the larval rearing period freeze dried tubifex showed a lower growth rate.

During the experiment highest survival was noted when fishes were fed with *Tubifex* followed by Artemia, mixed zooplanton and freeze dried tubifex. The survival rates obtained in the present study are comparable with those reported earlier for the same species (Fermin and Bolivar, 1991). Mortalities could be associated with the onset of air breathing (observed at day 9 in the present study) in catfish larvae (Haylor, 1992) and, to a lesser extent, the cannibalistic nature of the fish as influenced by size

differences (Hecht and Appelbaum, 1987). According to Haylor (1992), catfish larvae tend to show negative phototaxis during the onset of air breathing and they struggle against the increase in buoyancy associated with initial air gulping. Cannibalism could be observed as early as day 4 in *H. longifilis* (Baras, 1999). In *C. macrocephalus*, higher mortality due to cannibalism (range ¼ 4–18%) was observed when larvae were fed exclusively dry artificial diet than when larvae were initially given Artemia for 7 days followed by artificial diet (1.5%) (Fermin and Bolivar, 1991).

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