

STUDIES ON THE EFFECT OF NATURAL FEEDS IN DIFFERENT  
COMBINATIONS ON GROWTH AND SURVIVAL OF *CLARIAS*  
*GARIEPINUS* LARVAE

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**Key words:** *Clarias gariepinus*, larvae, feeding, primary nursing.

ABSTRACT

The suitability and potential of three live food were evaluated for feeding *Clarias gariepinus* fry. Three-day old African catfish larvae (5-7 mm total length, 1.2-3.0 mg body weight) were stocked at a density of 100 larvae per liter in nine glass aquaria 150 x 50 x 50 cm each, representing three treatments. Each treatment was represented in three replicates). Fish were reared for 35 days on three different feeding regimes using *Artemia salina*, *Moina macrocopa* and *Brachionus plicatilis* as live food. Larvae of all treatments were fed on *Brachionus* at a density of 10 per ml in the first four days. From day 5, the three treatments were fed on *Brachionus* at a density of 20 per ml until day 9, for treatments 1 and 3, and day 15 for treatment 2. In all rearing aquaria, *Chlorella* was added at a density of  $1-3 \times 10^5$  cells per ml to serve as food for the rotifer and maintain good quality of water. Starting at day 10, *Artemia* nauplii were given to larvae of the first and third treatments initially at a density of 2 per ml in addition to *Brachionus*. The amount of *Brachionus* in the two treatments was gradually reduced to 10 per ml until it was completely removed on day 17. From this day to the end of the experimental trial, fish of the first treatment were fed on *Artemia* only, whose density was finally increased gradually to be 10 per ml. In treatment 3, *Moina macrocopa* were fed to the *Clarias gariepinus* larvae in combination with *Artemia* from day 18 to day 20 and later on, *Moina* was fed until day 35. In treatment 2, fish continued to feed on *Brachionus* and feeding of fish on *Artemia* was delayed until day 15. *Artemia* nauplii were fed in combination with *Brachionus* until day 20, after which only *Artemia* was given. Delaying feeding of *Artemia* nauplii until day 15 (in treatment 2) on resulted in slower larvae growth rates compared with fish fed *Artemia* starting on day 10. Partial replacement of *Artemia* nauplii by *Moina macrocopa* starting on day 17 showed a marked growth in larval growth over the delayed

*Artemia* treatment. There was no significant difference in the survival percentage of all treatments.

## INTRODUCTION

In successful fish farm practices, consideration is generally given to the dietary protein component to produce optimal fish growth (Erfanullah, 1998). Equally important is the production of sufficient seed supply. The insufficient supply of the African catfish *Clarias gariepinus* limits its use in fish culture (De Kimp and Micha, 1974). The scarcity of *Clarias* fry or fingerlings in natural waters represents an obstacle in this regard. Controlled rearing of the fry indoor could be a reliable way to produce considerable numbers, however with small final average weights (Hogendoorn, 1980 and Abd El-Nasser, 1997). Consequently, the primary nursing phase indoors is necessary for rearing *Clarias* larvae. However alternatives should be paid into account to improve survival and growth performance of *Clarias gariepinus* larvae indoor. It has been realized that the application of live zooplankton as a source of supplementary food in nursery tanks especially under intensive culture is beneficial (Jana and Pal, 1987). *Artemia salina* nauplii are well suited as a starter feed for many fish species, when rearing of the fry is carried out indoors (Coche and Bianchi, 1997). This feed was also found valuable for rearing *Clarias lazera* fry in indoor tanks (Hogendoorn, 1980). Msiska, (1981) conducted an experiment on rearing the fry of African catfish *Clarias lazera* using live and artificial feed stuff. He found that feeding with live natural organisms during the first period was essential, both *Artemia* and zooplankton giving acceptable results and zooplankton was found to be equally suitable, which may be important in rearing *Clarias* fry when *Artemia* is difficult to obtain. Watanabe *et al.* (1983) stated that *Moina* is richer in nutrients compared to *Artemia*.

Hogendoorn (1983) carried out experimental investigations on feeding and early rearing of *Clarias* larvae to produce fingerlings indoors. Machiels and Henken (1985) examined the effect of the dietary protein levels on growth and food utilization of (*C. gariepinus*) using casein as the protein source. Degani *et al.* (1988) examined the effect of different protein levels and temperatures on food utilization, growth and body composition of *C. gariepinus*.

The objective of this study was to evaluate the zooplankton supply in the primary nursing phase indoor and its effects on the growth performance of cultivated fish species. Also it aimed to determine the influence of delaying feeding of *Artemia* and partial replacement of *Artemia* by *Moina* on the growth and survival of *Clarias gariepinus* larvae.

## MATERIALS AND METHODS

A number of the fully ripe females were brought from the production ponds at the Central Lab for Aquaculture Research, Abbassa, Egypt. They were kept in an earthen pond for 5 months. Feeding was administered 6 days a week, using 25% protein diet at a rate of 3% from the total biomass. In the spawning season when they reached ripe stage, females were injected with carp pituitary suspension (4 mg/kg). They were stripped by gentle pressure on the abdomen. The stripped eggs were collected in clean plastic pan. Eggs were fertilized and incubated according to the method described by Abd El-Nasser and El Ghobashy (2000). Newly hatched larvae (5-7 mm total length, 1.2-3.0 mg body weight) were stocked at a density of 100 larvae per liter in nine glass aquaria 150 x 50 x 50 cm each. Within 3 days of hatching after the yolk sac absorption period, the so-called fry started to search for food. The nine glass aquaria were randomly divided into three groups representing three treatments (three replicates each). Fish were reared for 35 days on three different feeding regimes using *Artemia salina*, *Moina macrocopa* and *Brachionus plicatilis* as live food. Larvae of all treatment were fed on *Brachionus* at a density of 10 per ml in the first four days. From day 5 the three treatments were fed on *Brachionus* at a density of 20 per ml until day 9, for treatments 1 and 3, and .day 15 for treatment 2. In all rearing aquaria, *Chlorella* was added at a density of  $1-3 \times 10^5$  cells per ml to serve as food for the rotifer and to maintain good water quality. Starting at day 10, *Artemia* nauplii were given to larvae of the first and third treatments initially at a density of 2 per ml in addition to *Brachionus*. The amount of *Brachionus* in the two treatments was gradually reduced to 10 per ml until it was completely removed on day 17. From this day to the end of the experimental trial, fish of the first treatment were fed on *Artemia* only, whose density was finally increased gradually to be 10 per ml. In treatment 3, *Moina macrocopa*

were fed to the *Clarias gariepinus* larvae in combination with *Artemia* from day 18 to day 20 and later on *Moina* was fed until day 35. In treatment 2, fish continued to feed on *Brachionus* and feeding of fish on *Artemia* was delayed until day 15. *Artemia* nauplii were fed in combination with *Brachionus* until day 20, after which only *Artemia* was given.

Rearing aquaria were cleaned by siphoning uneaten food and feces every morning prior to the first feeding. Water was changed daily using a rubber drain hose (2.5 cm inside diameter) fitted with a plankton net-covered plastic bottle. About 15-50% of the total water volume was changed with fresh water from day 4 to day 15. From day 16 until the end of rearing period, 50-75% of the water was changed. Throughout the rearing period, the water temperature ranged from 18 to 22 °C. dissolved oxygen varied from 5-6.2 ppm while pH ranged from 7.2 to 8.65.

## RESULTS AND DISCUSSION

The best growth in terms of mean total length ( $19.20 \pm 1.08$  mm) and body weight ( $0.49 \pm 0.12$  g) was attained by *Clarias gariepinus* larvae fed *Brachionus* plus *Artemia* (treatment 1) as demonstrated in fig. 1. Fish in treatment 1 (*Brachionus* plus *Artemia*) and 3 (*Moina*) had similar growth rates. However, the survival rate ranged from 45.6% (treatment 3) to 65.9% (treatment 2) and did not vary significantly among the fish groups. Survival of fish fed *Moina* (treatment 3) was largely affected by cannibalism by "jumpers" (mean total length 39.0 mm). However, growth of fish in this treatment was fast during the last five days of rearing (day 31-35). This confirmed the report of Femin (1991), however on a marine fish species, that 15-day old sea bass fed *Moina* had faster growth rates compared to larvae fed *Artemia*. *Moina* proved to be an excellent alternative live food to *Artemia*. It is considered a better source of highly unsaturated fatty acids (Watanabe *et al.*, 1983).

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Table 1: Schedule of feeding of *Brachionus plicatilis* (B), *Artemia salina* (A) and *Moina macrocopa* (M) to *Clarias gariepinus* larvae.

Treat.	Rearing period (day)																
	1	9	10	14	17	18	20	30									
1	B	B	B	B	B	BA	BA	BA	BA	BA	A	A	A	A	A	A	
2	B	B	B	B	B	B	B	BA	A	A	A						
3	B	B	B	B	B	BA	BA	BA	BA	BA	A	AM	AM	AM	M	M	M

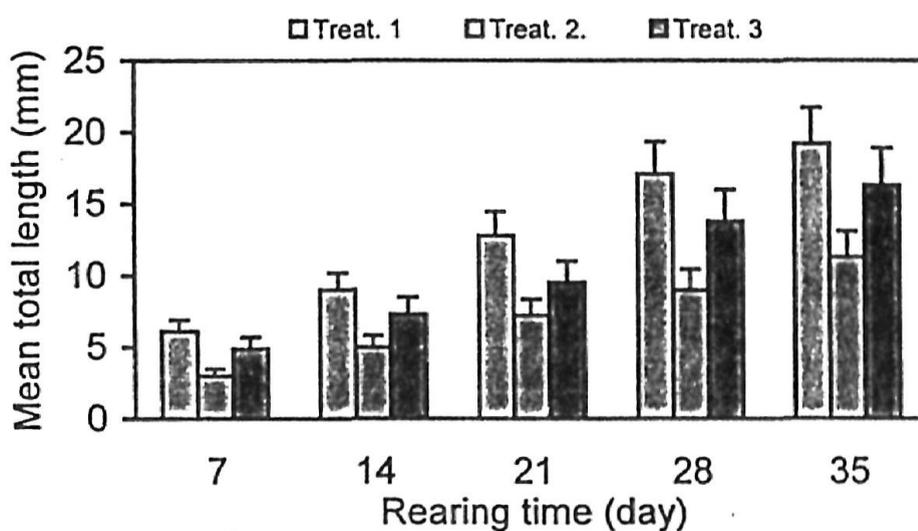


Fig. 1. Mean total length (mm) of African catfish, *Clarias gariepinus*, larvae fed on different regimes using live zooplankton food. Treatment 1 = *Brachionus plicatilis* and *Artemia salina*; treatment 2 = *Brachionus* plus delayed introduction of *Artemia*; treatment 3 = *Brachionus*, *Artemia* and *Moina macrocopa*. Vertical lines above each bar represent standard deviation (SD).

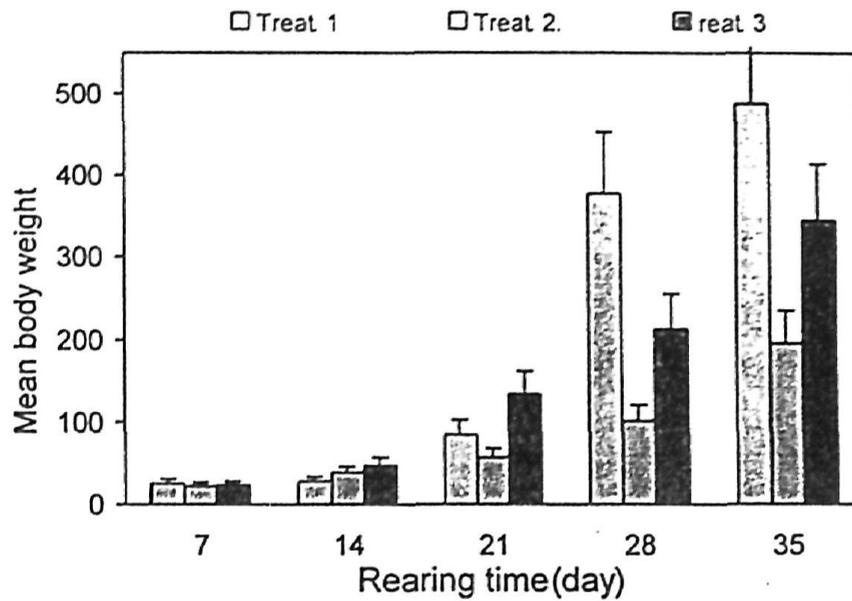


Fig. 2.

Mean body weight (mg) of African catfish, *Clarias gariepinus*, larvae fed on different regimes using live zooplankton food. Treatment 1 = *Brachionus plicatilis* and *Artemia salina*; treatment 2 = *Brachionus* plus delayed introduction of *Artemia*; treatment 3 = *Brachionus*, *Artemia* and *Moina macrocopa*. Vertical lines above each bar represent standard deviation (SD).

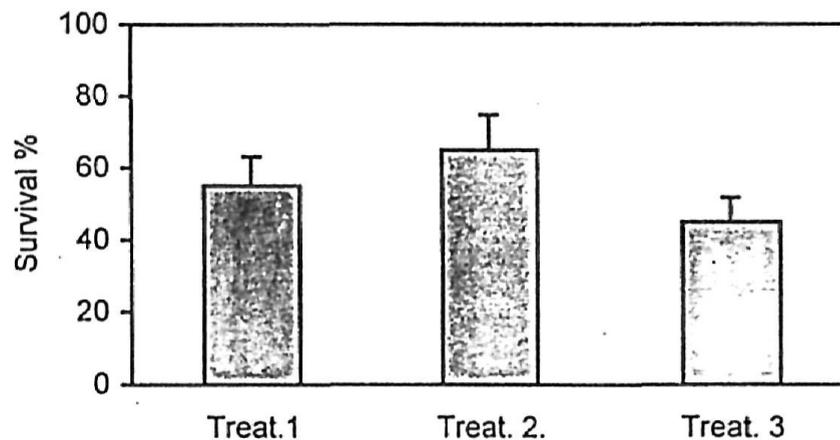


Fig. 3.

Survival percentage of African catfish, *Clarias gariepinus*, larvae fed on different regimes using live zooplankton food. Treatment = *Brachionus plicatilis* and *Artemia salina*; treatment 2 = *Brachionus* plus delayed introduction of *Artemia*; treatment 3 = *Brachionus*, *Artemia* and *Moina macrocopa*. Vertical lines above each bar represent standard deviation (SD).