

## Note

# Growth performance of fry of the black-spot barb *Puntius filamentosus* (Valenciennes, 1844) fed live feeds and artificial feed

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## ABSTRACT

Efficacy of feeding with different live feeds as well as artificial feed on growth performance of black-spot barb *Puntius filamentosus* fry was evaluated by conducting a feeding experiment for a period of 45 days. The fishes (average weight - 121.93 mg; average length - 28.8 mm) were fed under four treatments viz., artificial feed, *Tubifex* worm, *Artemia* nauplii and mixed zooplankton. Results showed that the fry fed *Tubifex* and zooplankton were similar in growth parameters and had significantly ( $p < 0.05$ ) higher final length, weight, specific growth rate (SGR), percent weight gain and percent length gain than those fed with artificial feed and live *Artemia*. No difference in growth parameters was found between the fry fed on artificial feed and *Artemia*. No significant difference was observed in survival rate among the treatments with different live feeds and artificial feed. The present results suggest that live feeds such as *Tubifex* and zooplankton are suitable for feeding fry of black-spot barb and could be considered as affordable options compared to costlier *Artemia* nauplii or artificial feed for small scale hatcheries.

Keywords: *Artemia*, Artificial feed, Growth, *Puntius filamentosus* fry, *Tubifex*, Zooplankton

*Puntius filamentosus*, commonly known as black-spot barb is one of the important cyprinid ornamental fish in India. Its distribution is mainly restricted to southern parts of India (Tekriwal and Rao, 1999; Pethiyagoda and Kottelat, 2005). Mass production of black-spot barb is greatly hampered by the lack of information on suitable live feeds for different stages of its growth. The success of fry rearing depends heavily on the availability of suitable feed which is readily available, easily digestible and provides nutrients required to support growth and good health of the fish. The cost of artificial feeds is very high especially those used in hatcheries and nurseries and therefore, the use of natural feeds can be considered as an affordable option in the case of ornamental fishes. Several studies have compared the effect of artificial feeds over live feed on various fish species (Szlaminska and Przybl, 1986; Fermin and Bolivar, 1991; Hashim *et al.*, 1993; Wolnicki *et al.*, 2003; Garcia-Ulloa and Gomez-Romero, 2005; Darwis *et al.*, 2008; Ingale and Charjan, 2010; Akbary *et al.*, 2010; Sharma *et al.*, 2011). Very few information is available on effect of live feed and artificial feed on hatchery rearing and seed production of *P. filamentosus*. Zooplankton was successfully used as an ideal feed for larvae and fry of

*P. filamentosus* and many other similar species (Anna Mercy and Jacob, 2007; Anna Mercy *et al.*, 2009).

In the present study, three live feeds such as *Tubifex*, *Artemia* nauplii and mixed zooplankton and an artificial feed (28% protein) were evaluated for their suitability as feeds for the black-spot barb fry. *Tubifex* as a live feed has been popularly reported to enhance the growth and reproduction of aquarium fishes (Shim, 1986; Hashim *et al.*, 1993; Vishwanath, 2009; Shubha and Reddy, 2011). *Artemia* is the most preferred and reliable food organism for several species of fish and crustacean larvae (Leger *et al.*, 1986; Lim *et al.*, 2003; Akbary *et al.*, 2010). Similarly, plankton has been successfully used in the rearing of many fish species (Kruger *et al.*, 2001; Kaiser *et al.*, 2003; Nayak *et al.*, 2003; Jha *et al.*, 2006). Live feed has been shown to alleviate cannibalism in fish larvae (Hecht and Pienaar, 1993). Therefore, the present study was envisaged to investigate the effect of different live feeds and artificial feed on growth performance of black-spot barb fry under captivity.

*P. filamentosus* fry (15 days old) were procured from the ornamental fish culture and breeding unit of Central Institute of Freshwater Aquaculture, Kausalyaganga,

Bhubaneswar, India. The stock was acclimated for a period of two weeks, feeding daily on a standard pellet diet at 10% of body weight.

For the experimental feeding, fishes were fed under four treatments *viz.*, artificial feed, *Tubifex* worm, *Artemia* nauplii and mixed zooplankton. *Artemia* cysts were hatched in a glass jar in the ornamental fish unit and nauplii were used for feeding the fry. The live zooplankton were collected from earthen nursery ponds and sieved (mesh size 60 or 150  $\mu$ ) just before feeding the fry. The most predominant groups of zooplankton were copepods, rotifers, cladocerans and ostracods. *Tubifex* worms were obtained from the culture systems in the CIFA farm and were kept under mild flow of running water for 24 h for removal of faeces/mud from the body before feeding fish (FAO, 1996; Thakur *et al.*, 1998). Artificial floating feed (Abis Fish Feeds, Indian Solvent Industry, Chattishgarh, India) having 28% crude protein, 3% crude fat, 5% crude fibre, 10% moisture and 2500 kcal kg<sup>-1</sup> energy was used for the study.

One hundred twenty fry of *P. filamentosus* (average weight 121.93 mg; average length 28.8 mm) after acclimatisation were stocked randomly in twelve 45 l glass aquarium tanks (10 fry tank<sup>-1</sup>) containing 35 l of aged freshwater following a completely randomised design. The quantity of live and artificial feed supplied daily to the aquarium was equivalent to 10% (expressed as dry mass) of the total fish fry biomass. Both live and artificial feeds were given two times per day during the experimental period. All the tanks were provided with continuous aeration during the entire experimental period. The uneaten feed and faecal matter were siphoned out and approximately one third portion of the water was exchanged daily with freshwater before the first feed ration was given.

The important physico-chemical parameters of the rearing water *viz.*, temperature, dissolved oxygen, pH, nitrites and ammonia were measured weekly following standard methods (APHA, 1998).

At the end of 45 days of experiment, the length, weight and survival of fry were recorded and the specific growth rate, percentage weight gain and percentage survival were calculated using the following formulae:

$$\text{Specific growth rate (\%)} = \frac{\ln \text{ final weight} - \ln \text{ initial weight}}{\text{Experimental duration (days)}} \times 100$$

$$\% \text{ Weight gain} = \frac{\text{Final weight} - \text{Initial weight}}{\text{Initial weight}} \times 100$$

$$\% \text{ Length gain} = \frac{\text{Final length} - \text{Initial length}}{\text{Initial length}} \times 100$$

$$\% \text{ Survival} = \frac{\text{Total number of fry harvested}}{\text{Total number of fry stocked}} \times 100$$

The difference among the treatments were assessed using one-way analysis of variance (Snedecor and Cochran, 1967) followed by Duncan's multiple range test (Duncan 1955) to determine significant difference at 5% ( $p < 0.05$ ) level.

The range of water quality parameters recorded during the experiment were: dissolved oxygen 5.6 to 6.5 mg l<sup>-1</sup>; pH 7.5 to 7.6; nitrites 0.020 to 0.030 mg l<sup>-1</sup>; ammonia 0.05 to 0.08 mg l<sup>-1</sup> and temperature 27 to 29°C.

*P. filamentosus* fry fed *Tubifex* worms and zooplankton registered significantly ( $p < 0.05$ ) higher final weight, SGR, percent weight gain, final length and percent length gain as compared to those fed artificial feed and *Artemia* nauplii (Fig. 1a-f). This increased performance might be due to better acceptability and utilisation of *Tubifex* worms and zooplankton by black-spot barb fry. Further, *Tubifex* worms can be easily captured by the fish, probably due to their natural pigmentation and movements (Hyatt, 1979). Moreover, nutritional values of *Tubifex* and zooplankton are higher than *Artemia* and artificial feed (Ponnuchamy *et al.*, 1981; Tamaru *et al.*, 1997. Evangelista *et al.*, 2005).

The comparatively poor performance of *P. filamentosus* fry fed with *Artemia* nauplii might be due to low survival of nauplii in freshwater while poor performance of pelleted diet could be attributed to the fact that pelleted feed may not be supplying all the essential nutrients which live feeds can supply. There was no significant difference in the survival of fish fry among different treatments.

The results of the present study indicate that *Tubifex* worms and live zooplankton could be used as suitable live feeds for feeding fry of black-spot barb. The easy availability of *Tubifex* worms and zooplankton provides cost effective feed substitute for the ornamental fish industry.

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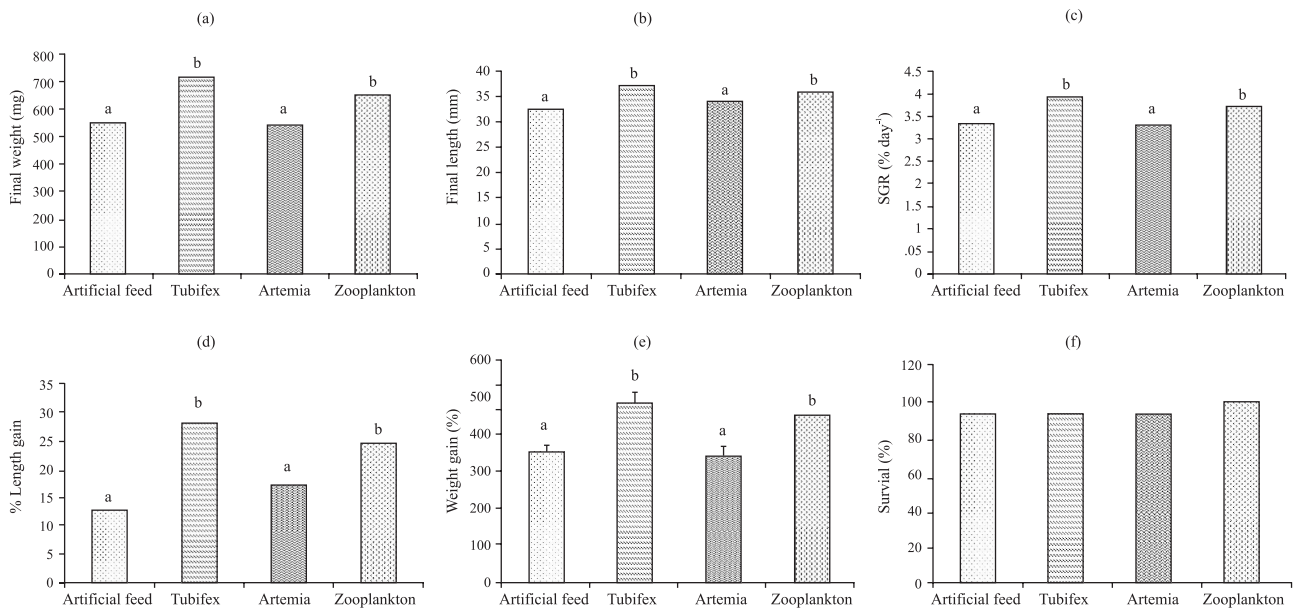


Fig. 1. Growth performance (Mean  $\pm$  SE) of *P. filamentosus* fry fed on different diets (a) Final weight (mg); (b) SGR (% day<sup>-1</sup>); (c) Final length (mm); (d) % Length gain; (e) % Length gain; (f) Survival %

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