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Influence of Different Type of Feeds on Growth Performance in Black Molly, *Poecilia sphenops*

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Abstract

Ornamental fish keeping and its propagation has been an important activity for many, which provide not only aesthetic pleasure but also financial openings. The industrial development of freshwater ornamental fish culture has been hampered by the lack of suitable live feed for rearing the fish at the various production stages. Black molly, *Poecilia sphenops* is the most popular of the domesticated variety of ornamental omnivorous and viviparous fish. The fries of *P. sphenops* readily fed on all small-sized live food. An attempt was made to determine the influence of different live feeds [rotifer (*Brachionus plicatilis*), cladoceran (*Ceriodaphnia reticulata*), copepod (*Apocyclops dengizicus*) and mixture of these live food organisms] on the growth of this fish in comparison to pelletized feed. In the present study, molly fries were fed with different types of live feed for 35 days and their performances in terms of growth and survival were determined. Length and weight gain and specific growth rate was higher in fishes fed with mixed live feed, followed by copepod, and rotifer feeds. Survival rate was also higher in fishes fed with mixed feed, followed by rotifers and copepods. It is observed that desirable growth and survival might not be achieved with pelletized feed in rearing early fries of molly.

Keywords: *Poecilia sphenops*, live feed, ornamental fish, growth, survival.

1. Introduction

Ornamental fish keeping is one of the most popular hobbies in the world today. The growing interest in aquarium fishes has resulted in steady increase in aquarium fish trade globally. The start of the millennium projected an annual global exports of USD 176 million which compounded annually at a growth rate of 6.2% and reached around 342 million USD in 2010^[1]. Besides enjoying the rich piscine diversity, the Indian exports are hardly 0.3% of the global exports. But, around 90% of them exported are wild caught indigenous fish^[2]. The industrial development of freshwater ornamental fish culture has been hampered by the lack of suitable live feeds for feeding the fish at the various production stages. No export industry can sustain in long run depending upon wild capture, so it is very important to find ways to grow/culture fishes in captive protected areas. This demand is a sure sign of possibility of ornamental fish farming in India. In order to meet the increasing demand from export industry, more and more farming hubs needs to be developed. Various ornamental live bearer fishes such as molly, guppy, platy etc., and egg layers such as gold fish, koi carp, zebra fish, etc., show increased demand in India and all over the world. The success in the development of fries and fingerlings is largely dependent on the availability of suitable live food organisms. The present study evaluates the growth and survival of fries and fingerlings of *P. sphenops* using live feed (rotifer, cladoceran and copepod) and pelletized feed.

2. Materials and methods

Live food organisms such as rotifer (*Brachionus plicatilis*), cladoceran (*Ceriodaphnia reticulata*) and copepod (*Apocyclops dengizicus*) of size range 200–700µm were selected and mass cultured by fertilizing the medium with chicken manure to serve as live feed for mollies^[3, 4]. Chicken manure was dried and micronized and required quantity was dissolved in water and this suspension was used to fertilize the zooplankton culture medium at 500 ppt and also mixed algae were introduced. All the three live feed organisms were cultured in 100 liters of filtered water for 35 days. Salinity of 17–25 ppt for *B. plicatilis* and *A. dengizicus* and 2–4 ppt for *C. reticulata* was maintained in the culture medium. The inoculum of each species was introduced in the tanks at the rate 100 ind./L for culture. The different live food organisms were harvested

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and used in 35 days feeding trials for fries and fingerlings of black molly. Individual live feed (rotifer, cladoceran and copepod) their mixture in equal volume and pelletized feed were experimented to ascertain feed acceptability, growth, and development. Parameters like survival, length and weight, specific growth rate (SGR) were determined following standard protocols^[5]. Temperature, pH and DO of the medium were maintained at 25 ± 1 °C, 7.85 ± 0.11 and 4.1 ± 0.2 (mg/L), respectively, during the experimental period. Experimental data was analyzed for One-way ANOVA to record statistical differences using SPSS 17.0 ver. package.

3. Results

Results of growth and survival of mollies with different feeds are presented in table-1. Mollies showed the highest gain in length of about 1.12 cm when fed with mixed feed, followed by fishes fed with copepods, and then by rotifers. The length

gain was less when fishes were fed with cladocerans and pellet feed. Similarly, maximum weight gain of 0.14 g was recorded when mollies were fed with mixed feed, followed by fishes fed with copepods, and then by rotifers. The weight gain was the same in fishes fed with cladocerans and pellet feed. One-way ANOVA showed significant differences in length ($F=17.37$; $df=4$; $P=0.000$) and weight ($F=8.54$; $df=4$; $P=0.000$) when the fries fed with different feeds ($p<0.05$ level). Specific growth rate was maximum in fishes fed with mixed feed, followed by fishes fed with copepods, and then by rotifers. It was observed to be the same in fishes fed with cladocerans and pellet feed. The survival rate of 100% was recorded in fishes fed with mixed feed, followed by fishes fed with rotifers, and then by fishes fed with copepods and cladocerans. The fishes fed with pellet feed showed the lowest survival rate (6.67%). Mortality rate was maximum in fishes fed with pellet feed and minimum in fishes fed with mixed feed.

Table 1: Growth performance of mollies fed with rotifer, cladoceran, copepod live feeds and pelletized feed in 35 days feeding trials.

Parameters	Rotifer feed	Cladoceran feed	Copepod feed	Mixed feed	Pelletized-feed(Control)
Initial length of fishes (cm)	1.27±0.14	1.22±0.12	1.25±0.11	1.21±0.10	1.26±0.13
Final length of fishes (cm)	2.29±0.34	1.53±0.19	2.30±0.06	2.33±0.24	1.50±0.00
Gain in length (cm)	1.02	0.31	1.05	1.12	0.24
Initial weight of fishes (g)	0.03±0	0.02±0	0.02±0	0.02±0	0.02±0
Final weight of fishes (g)	0.12±0.006	0.06±0.001	0.15±0	0.16±0	0.06±0
Gain in weight (g)	0.09	0.04	0.13	0.14	0.04
Specific growth rate (SGR) (%)	0.26	0.11	0.31	0.4	0.11
Survival rate (%)	93.33	46.67	80	100	6.67
Mortality rate (%)	6.67	53.33	20.00	0.00	93.33

4. Discussion

Provision of live feed is required for few days for the fish larvae and fries immediately after spawning as formulated feeds are not preferred by them during this stage. The duration of requirement of live feed varies in different species of fishes as there is species specific difference in the development of digestive, sensory and swimming devices. According to Govoni et al.^[6] assimilation efficiency may be lower in larvae than in the adult fishes due to the lack of morphological and functional stomach in larvae. Length, weight, specific growth rate, survival and mortality are influenced by the type of live feed provided for fishes. Rotifer is the most important live food organism for use in larviculture. Due to their small size and slow swimming velocity, it is recognized as a suitable live feed for feeding fries and fingerlings of fishes and the fishes with small mouth size^[7,8]. Copepods are nutritionally suitable for fish fries and fingerlings^[9] and constitute a large percentage of the natural diet of fish larvae^[10]. When compared to rotifers, various species of copepods offer different size ranges of nauplii and copepodid stages which are suitable for the first feeding of fishes. Improved growth and survival have been documented for several fish species fed

with copepods alone or as supplement to the rotifers^[5, 11, 14]. The cladocerans are considered to be suitable live feed for fish larvae and they were mass cultured successfully by many investigators, using different cheap organic waste products^[15-18]. Nevertheless, their short, jerky, and hopping movement in water makes them less suitable feed for fish fries than rotifers and copepods. The larvae fed with copepods exhibited better growth and survival than those fed with artificial diets^[19]. Malnutrition is one of major responsible factors for failure in larval growth and survival^[20].

It has been recorded in the present study that feeding the fish fries with mixed feed of suitable sized rotifer, copepod and cladoceran is advantageous for the survival of fish since a variety of size range of nauplii, copepodid and neonates of zooplankton to adults will be available as larval feed. It also proved to be a better feed than individual live feed for gaining length and weight and for attaining high specific growth rate. The fries fed with copepods revealed better length and weight gain and specific growth than fishes fed with rotifers and cladocerans. Rotifers (*B. plicatilis*) was noted as a suitable live feed for the first feeding in fish larvae rearing due to its small size and slow swimming activity. Its high nutritional value

promotes the growth and survival of fries of molly fish. Fishes fed with rotifers showed better growth in terms of length and weight and specific growth rate than fishes fed with cladocerans. Fishes fed with cladoceran shows less length and weight gain, specific growth rate and survival rate than mixed feed, copepod and rotifer. This could be due to its thick shell, unsuitable movement and low nutritional value than that of the others live feeds. As reported in many edible and ornamental fishes present study also indicated that live feed is inevitable for the rearing of early developmental stages of mollies. Based on the present study, it is suggested that for high growth and survival of fries and fingerlings of mollies rotifer and copepods live feed either individually or in mixture should be used in their rearing in the hatchery.

5. Conclusion

Brachionus plicatilis is a suitable first feed for rearing the early fish fries as they showed higher survival rate than copepods and cladocerans. Copepods also proved to be a better feed for growth and survival of fish fries as their population contains a wide size spectrum of larval forms. Cladocerans were found to be less advantageous than the other live feeds. Perhaps, mixed feed of suitable sized rotifer, copepod and cladoceran might be more advantageous for length and weight gain, specific growth rate and survival of fishes than when fed with single type of zooplankton. Pellet feed shows poor growth parameters like length and weight gain and specific growth rate. It also showed maximum mortality and least survival in fishes and hence not suggested for the rearing of molly fries.

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