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EFFECT OF LIVE FEEDS ON GROWTH OF *POECILIA LATIPINNA*

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ABSTRACT

Gravid, diseased free and active feeder of *Poecilla latipinna*, were kept in laboratory for obtaining juveniles. All were divided into four groups and stocked @ 40 juveniles per aquarium. The initial weights of control (0.595±0.244g), *Artemia* treatment (AT) (0.811±0.416g), mosquito larvae treatment (MLT) (0.780±0.350g) and Drosophila larvae treatment (DLT) (0.780±0.350g) were taken. Prior to feeding all live feeds were cultured separately and fed to experimental juveniles @ 3% of average body weight twice a day. The % mortality was found to be lest 2.139±2.959 in control. % Weight gain was significantly high (44.34±34.17g) in DLT followed by 36.48±20.09 g in AT and MLT. The coefficient of correlation of daily feed allowance (DFA) to % weight gain was negative (-0.095) in MLT while negative correlation of % length gain to SGR, ADG, K, and FCR were negative compared to control, MLT, and DLT. Among chemical features of experimental water ammonia is found (0.12±0.207 mg/l) when baby pellets were supplied as food for juveniles in control.

Key words: Live feed, ornamental fish culture, *Artemia*, Mosquito larvae and *Drosophila* larvae.

INTRODUCTION

Ornamental fish production for the aquarium industry is a multimillion-dollar industry. Annual sales from this are estimated at over 17 million dollars in retail values because the vast majority of fish varieties sold originate from tropical regions of the world (Watson and Shireman 1996). Live food is considered to be a necessity for raising fish fry especially during the weeks of feeding. Most fish require a food item that shows independent movement. This live food must also be appropriate for the mouth size of the fry and must provide a nutritionally complete diet. Fish culturists have used historically newly hatched brine shrimp almost exclusively as the initial food for juveniles. (Sorgeloos *et al*., 1986).

Ornamental fish comprise two broad categories i.e. live bearer include guppies, mollies, platies and swordtails while egg layers include Cyprinids, Barbs, Danios, Tetras, Rasboras, Anabantids, Cichlids and Angel fishes. The most common types of live bearers are cultured in numerous colour finnage varieties and belong to two genera Poecilia, and Xiphophorous, which includes the Platies, Swordtails and Variatus. The present study was focused to find out the effects of live food on growth of *Poecilla latipinna*.

MATERIALS AND METHODS

Gravid females of *Poecilia latipinna* were purchased from local fish hobbyist and the juveniles were obtained. They were divided into four groups @ of 40 juveniles per aquarium with the initial weight of 0.595±0.224 g (Control), 0.651±0.347 g (*A.* nauplii), 0.811±0.416 g (Mosquito larvae) and 0.780±0.350 g (*Drosophila* larvae) and total initial length of 2.121±0.764 cm (Control), 1.743±0.388 cm (*A. nauplii*), 1.864±0.530 cm (Mosquito larvae) and 1.964±0.726 cm (*Drosophila* larvae). (Table 1 & 2). Prior to the feeding, mosquito larvae, *A. nauplii*, *Drosophila* larvae were cultured separately. Mosquito larvae of genus *Culex* were collected from stagnant water pits within the premises of Karachi University and its vicinity. The cultivation of *Drosophila* larvae in the laboratory was carried out by the procedure described by Guyenot (1917) and Baumberger (1919). The usual breeding place for wild specimens was decaying fruits. Various kinds of fruits like banana were peeled and placed in a yeast suspension and allowed to stand for about 24 h. The whole set up was kept open at somewhat dark place. Adult *Drosophila* visited frequently and laid their eggs over this suspension and banana skin. After few days small sized *Drosophila* larvae were hatched out. Using software Minitab V.11 including t-test and correlation (r) between growth variables and effectiveness of experimental diets statistically carried out comparison of the experimental results.

RESULTS

Newly hatched juveniles of *P. latipinna* having 0.595 (0.224 g weight and 2.121 (0.764 cm length) were fed with hikari baby pellets. The % mortality was found to be least 2.139 (2.959 with % weight gain of 27.09 (20.88 and

% length gain of 10.63 (11.14 cm (Table 1& 2). Daily feed allowance (DFA) was calculated @ of 3% of body weight. The correlation of DFA (0.93gm) to % weight gain and % length gain obtained as 0.103 and –0.359 (Table 3). The SGR, ADG, K and FCR were calculated (2.095, 0.016, 11.32 and 8.313 respectively) and showing that there was a negative correlation observed between % length gain to SGR, ADG, and FCR (Table 4). Nitrite nitrogen and nitrate nitrogen were found to be absent followed by TDS 228 (70.4 mg/l, temperature 25.85 (3.18 (C, pH 6.96 (0.131, DO 1.35 (0.32 mg/l and ammonia 0.120 (0.207 mg/l. (Table 5).

***Artemia* Treatment**

40 juveniles of *P. latipinna* 0.65 (0.347 gm and 1.743 (0.388 cm) were fed with *A. nauplii*. An increase of 31.85 (20.16 % of weight gain and 7.81 (8.74 % of length gain was observed with 7.27 (12.55% mortality (Table 1 & 2). 0.65 gm of *A. nauplii* (Wet weight) was given to juveniles as DFA. The correlation of DFA to % weight gain and % length gain were found to be significant (Table 3). 31.8% weight gain and 7.81% length gain were negatively correlated with SGR, ADG, K and FCR (Table 4). Nitrogen based water characteristics were entirely absent except TDS 236.4 (44.8 mg/l), temperature 26.14 (2.95C), pH 7.17 (0.46) and DO 1.44 (0.33 mg/l) (Table 5).

Mosquito larvae

Juveniles of *P.latipinna* with initial weight of 0.811(0.416 gm and initial length of 1.86(0.530 cm were examined to asses the growth. They showed 36.48 % weight gain and 8.40(7.96 % length gain with maximum mortality of 15.17(19.02 (Table 1 & 2). DFA, 0.93 gm of mosquito larvae (Wet weight) was provided. Negative correlation was observed in case % weight gain while the correlation of DFA to % length gain was significant 9Table 3). Physico-chemical characteristics of water include TDS 232.9(47.0 mg/l, temperature 25.92(3.02 (C, pH 7.17(0.46, DO 1.37(0.34 mg/l were recorded. Nitrate, nitrite and ammonia were absent.

Drosophila larvae

0.780 (0.350 gm and 1.964 (0.7026 cm) juveniles of *P.latipinna* respond significantly throughout the experiment. 44.34 (34.17 %) weight gain and 11.36 (11.61%) length gain was observed with 15.16 (20.48%) mortality (Table 1 & 2). DFA (0.94 gm) of Drosophila larvae was given and positive correlation was exists between DFA to % weight gain and % length gain (Table 3). The results of Drosophila larvae as a live feed clearly indicated that a highly significant correlation between % weight gain to SGR, ADG, K and FCR were obtained. Nitrate, nitrite and ammonia were absent while TDS 237.9(41.7 mg/l, temperature 26.07(2.94 (C, pH 7.03(0.30, and DO 1.29(0.29 mg/l were recorded (Table 5).

DISCUSSION

Live food is considered to be a necessity for raising fish juveniles, especially during first week of feeding. Most fish juveniles require a food item that shows independent movement (Depauw *et al*., 1981; Martineau and Nati, 1993). The live food must also be appropriate for the month size of the fish and must provide a nutritionally complete diet. They maintain an important link in the sustenance of food chains as such their role is significant and are extensively used in the rearing of larvae and fry of commercially important fishes. Techniques for the mass rearing of live foods are still in their infancy as most of the reports related to its culture are only preliminary (Ventura *et al.*, 1980; Lee *et al*., 1985; Rajbanshi *et al*., 1987; Shirgar and Indulkar.1987; Shim.1988; De Pawu *et al*., 1981; Lee, 1982; Tay, 1980).

The growth response of *P. latipinna* juveniles was determined when all the live feeds (*A. nauplii*, Mosquito larvae, and *Drosophila* larvae) were fed for 14 weeks and their results were compared with control (Pelleted feed). The efficiency of pelleted feed has been proven that better growth rate as the SGR, ADG, K and FCR calculated positively. The coefficient of correlation of DFA to % weight gain was 0.103 but it was –0.359 in case of % length gain, means length was not increased according to weight gain (Table 3). The free ammonia was ranged from 0.001-0.240 mg/l, throughout the experiment (Table 1,2).

Among the live feeds used in the culturing of ornamental fish, *A. nauplii* of the brine shrimp constitute the most widely used food item as it is available in the form of cysts and hatched simply because of a very efficient osmoregulatory system. They have the tendency to survive at very low oxygen level at high salinity. *Artemia nauplii* posses high amounts of total lipids and fatty acids composition, as well as the metabolization of fatty acid. (Sorgeloos *et al*., 2001). *P.latipinna* juveniles have 7.27 (12.55 %) mortality. SGR & ADG were significantly affected by the feeding organism while SGR noted as maximum among other experimental live feeds (4.801, Table 4). The correlation coefficient of DFA to % weight gain and % length gain indicated that both of these growth variables were in accordance with food provided (Jobling, 1994).

The mosquito larvae used in ornamental fish industry as a feed organism found to be very rare. Some work has been done related to another fish Gambusia, which is oftenly called as the predatory ornamental fish of mosquito larvae (Dhert and Sorgeloos, 1994). The larvae can be easily culture in wastewater. The findings of experiment were satisfactory with respect to SGR (4.727) and FCR (2.708). The correlation coefficient of DFA to % weight gain (-0.095) and % length gain (0.125) show there must be some increases in DFA probably @ of 4% of body weight (Jobling, 1994).

The larvae of Drosophila were eagerly accepted by most live bearers as well as other species of ornamental fish as reported by Wtanabe *et al*., (1983); Hoff and Snell (1987). In the present feed trials the findings proved that the juveniles of *P. latipinna* grew well and showed 44.34 (34.17 g, % weight gain 11.30, 11.61 cm % length gain (Table 1& 2). Although 15.17 (19.02 % mortality noticed which may be reduced by proper handling during feeding and measurement. All the criteria (SGR, ADG, K and FCR) on which a food can be suggested as the best, found to be significant throughout the experiment (Table 4).

CONCLUSION

The advantages of live food over frozen and prepared foods are:

1. The uneaten food will not immediately decay and load up the filtration system.
2. Foods can be raised in controlled conditions and free of pathogenic (disease causing) bacteria.
3. Fish love-grabbing things that fry to run away and fish owners love watching their fish chase live food organisms.

Table 1. % mortality and % weight gain of juveniles of *Poecilia latipinna* in different treatments.

Treatments	Mean initial Weight (gm)	Mean final Weight(gm)	Mean difference (gm)	% Mortality	% Weight gain
Control	0.595(0.224	0.645(0.274	0.05(0.163	2.139(2.959	27.09(20.88
Artemia	0.651(0.345	0.582(0.372	0.002(0.24	7.27(12.55	36.48(20.09
Mosquito Larvae	0.811(0.416	0.804±0.421	-0.011±0.404	15.17±19.02	36.48±20.09
Drosophila Larvae	0.78±0.35	0.866±0.394	0.085±0.341	15.16±20.48	44.34±34.17

Table 2. % length gain of juveniles of *Poecilia latipinna* in different treatments.

Treatments	Mean initial Length(cm)	Mean final Length(cm)	Mean difference (cm)	% Length gain
Control	2.121±0.764	2.286±0.703	0.164±0.133	10.63±11.4
Artemia	1.743±0.388	1.857±0.354	0.114±0.094	7.81±8.74
Mosquito Larvae	1.864±0.53	1.993±0.495	0.128±0.091	8.4±7.96
Drosophila Larvae	1.964±0.726	2.171±0.808	0.207±0.236	11.36±11.61

Table 3. Correlation-coefficient (r) of daily feed allowance (DFA) to % weight gain and % length gain in different treatments.

Daily feed allowance(DFA)				% Weight gain				% Length gain			
Control	Artemia	Mosquito Larvae	Drosophila Larvae	Control	Artemia	Mosquito Larvae	Drosophila Larvae	Control	Artemia	Mosquito Larvae	Drosophila Larvae
0.93	0.65	0.93	0.94	0.103	0.411	-0.095	0.248	-0.359	0.303	0.125	0.090

Table 4. Correlation-coefficient (r) of % Weight gain/ % Length gains to SGR, ADG, K, and FCR in different treatments.

Weight gain %	**Treatments**	**SGR (r)**	**ADG (r)**	**K (r)**	**FCR (r)**
27.09	Control	2.095 (0.178)	0.016 (0.179)	11.32 (0.027)	8.313 (0.169)
31.8	Artemia	2.602 (-0.247)	0.023 (-0.242)	15.102 (-0.168)	4.801 (-0.250)
43.42	Mosquito Larvae	4.725 (0.285)	0.042 (0.258)	20.55 (0.005)	2.708 (0.205)
44.34	Drosophila Larvae	4.219 (0.356)	0.037 (0.344)	17.465 (0.199)	2.931 (0.180)
Length gain %					
10.6	Control	2.095 (-0.705)	0.016 (-0.726)	11.32 (0.188)	8.313 (-0.187)
7.81	Artemia	2.602 (-0.403)	0.023 (-0.351)	15.102 (-0.687)	4.801 (0.288)
8.402	Mosquito Larvae	4.725 (0.199)	0.042 (0.207)	20.552 (0.596)	2.708 (0.199)
11.35	Drosophila Larvae	4.219 (0.074)	0.037 (0.070)	17.465 (0.192)	2.931 (-0.077)

Values in parenthesis indicated as Pearson's coefficient of Correlation.
SGR, Specific growth rate; ADG, Average daily weight gain; K, Condition factor; FCR, Food conversion ratio.

Table 5. Physico-chemical features of water in different treatments.

Treatments	TDS (mg/l)	Temperature (°C)	pH	DO (mg/l)	Nitrite (mg/l)	Nitrate (mg/l)	Ammonia (mg/l)
Control	228.6±70.4	25.85±3.18	6.96±0.13	1.35±0.32	NIL	NIL	0.12±0.207
Artemia	236.4±44.8	26.14±2.95	7.17±0.46	1.44±0.33	NIL	NIL	NIL
Mosquito larvae	232.9±47.0	25.92±3.02	7.17±0.46	1.37±0.34	NIL	NIL	NIL
Drosophila larvae	237.9±41.7	26.07±2.94	7.03±0.30	7.03±0.30	NIL	NIL	NIL

TDS, Total dissolved solids; DO, Dissolve oxygen.

REFERENCES

Baumberger, J.P. (1919). A nutritional study of insects with special reference to microorganisms and their substrate. *J.Exper.Zool*., 28: 1.

Craig A Watson and J.V. Shireman (1996). *Production of ornamental aquarium fish*. F.A - 35. Department of fisheries in aquatic sciences. Florida Co operative extension service University of Florida.

De Pauw, N.L., P.Laureys and J. Morales (1981). Mass cultivation of *Daphnia magna* stratus on rice bran. *Aquaculture*, 25:141-152.

Dhert P., P. Sorgeloos (1994). Live feeds in aquaculture. Proceedings of Aquatech 1994.

Guyenot, E. (1917). *Researches, sur la vie aseptique et le development d' un organisme en fonction du milieu*. Thesis, Paris, 330pp.

Hoff, F.H. and T.W Snell (1987). *Plankton culture manual*, first edition. Florida Aqua Farms, Inc., Florida, USA.126pp.

Jobling, M. (1994). *Fish bioenergetics* Chapmen and Hall, New York, 308pp.

Lee, H.L. (1982). *Preliminary studies on the culture of Moina* sp., using organic waste. University of Singapore, 107 pp.

Lee, H.L., T.W Chen, L.H Teo, and K.F Shim (1985). Culture of *Moina* sp., with waste materials, p.207-222. In: *Proceedings of the Second Asian Workshop on Technology of Animal Feed Production Utilizing Food Waste Materials.*

Martineau, C.D. and M.B.E. Nati (1993). *Rearing of freshwater tropical fish using live food*. ECOLE NATL. VETERENAIRES, TOULOUSE (FRANCE), 128 pp., order number: 93_Tou3 _4012, Thesis.

Oseni, M. M. (2000). *Feed development and feeding practices: Brood stock and grow out 3rd training program on responsible aquaculture development.* South Asian Fisheries Development Center. Tigbauan, Iloilo, Philippines.

Rajbanshi, V.K., P Jayapala, and L.L Shama (1987). Monoculture of *Moina dubia*: 1. Effect of varying doses of poultry manure. In: *23rd congress of Intl.Asso. Of Limnology, Hamilton*, New Zealand 106p.

Shim, K.F. (1988). Mass production of *Moina* in Singapore using pig waste. *World Aquaculture Report*, 19:59-60.

Shirgar, G.A. and S.T Indulkar (1987). Continuos mass culture of cladoceran *Moina micrura* in plastic pool for daily exploitation. Punjab *Fish Bull*., 11:43-48.

Sorgeloos, P., P Dhert, and P. Candreva (2001). Use of the brine shrimp, *Artemia* sp., in marine fish larviculture. *Aquaculture*, 200:147-159.

Sorgeloos, P., P.Lavens, P.Leger, W.Tackaert and D.Versichele (1986). *Manual for the culture and use of Brine shrimp Artemia in Aquaculture*. FAO Manual User's Guid.

Tay, S.H. (1980). *Experiments on the cultivation of Moina micrura Kurz*. Pri.Prod.Dept.Singapore, (Unpubl.).4p.

Ventura, Berrtalanffy and Ludwig (1983). Preliminary studies on *Moina* sp., production in fresh water tanks. *Aquaculture*, 21:93-96.

Watanabe, T., C Kitajina and S. Fujita (1983). Nutritional values of live organisms used in Japan for mass propagation of fish: A review. *Aquaculture*, 34:115-143.

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