Cost Reduction of Brine Shrimp by Replacing of Low Cost Live Cultures (*Moina*, microworms) for Fresh Water Fish Guppy (*Poecilia reticulata).*

G.W.H.P.N. De Silva, S.C. Jayamanne
Uva Wellassa University of Badulla, Sri Lanka

and

M. Hewavitharana
Tropical Fish International(Pvt). Ltd.

Introduction

Ornamental fish farming is an expanding industry and its global export trade has grown steadily and today it is a multimillion dollar industry in many countries (Andrews, 1990). Sri Lanka contributes approximately 1% of the world's demand for ornamental fish. The demand for the fresh water fish is quite does not meet the demand because there are so many constraints related with the fresh water ornamental fish farming. The major constraint is the cost of feed especially during the stage of the post larva and fry. *Artemia* (brine shrimp) nauplii is the most common live food used in commercial larviculture of fresh water ornamental fish (Dahlgren and Phang. 1985; Kim *et al.*, 1996) and the cost of 400 g of cysts is nearly Rs.4000.00. The present study aimed to find a suitable low cost live food which can replace high cost *Artemia* in aquariums giving more profits to the ornamental fish traders. Two live food species, Moina and Micro worms, which can be reared easily with very low cost are selected for the study and their suitability in rearing post larval stage and fry stage of guppy (*Poecilia reticulata*) was tested under aquarium conditions.

Methodology

The experiment was carried out at the Tropical Fish International Private Limited, Wagawatte, Horana. Mass culture of Moina and micro worms were carried out prior to conducting feeding trials.

Three types of live food cultures namely, Artemia, Moina and Microworms were maintained for 21 days during feeding trials. Fifteen aquarium tanks of same size were used for the experiment and three tanks each were used for control and four treatments. Two hundred and fifty numbers of day-old fry were stocked in each tank and were fed six times a day according to the feeding schedule given in Table 1. Three types of live feed, Brine shrimp, Microworm and Moina and powder feed were used for feeding and the fry were fed ad libitum at each time.

Table 1 Feeding schedule of the fish for control and 4 treatment tanks

Control		Treatment 1		Treatment 2		Treatment 3		Treatment 4	
Time	Feed	Time	Feed	Time	Feed	Time	Feed	Time	Feed
8.00	PF	8.00	M	8.00	M	8.00	M	8.00	M
9.00	PF	9.00	MW	9.00	PF	9.00	PF	9.00	BS
11.00	PF	11.00	M	11.00	MW	11.00	MW	11.00	PF
1.00	PF	1.00	MW	1.00	PF	1.00	M	1.00	M
3.00	BS	3.00	M	3.00	M	3.00	BS	3.00	PF
4.30	PF	4.30	MW	4.30	MW	4.30	MW	4.30	MW

PF - Powder Feed BS - Brine Shrimp M- Moina MW - Microworms

Water quality was checked daily at 7.30 a.m. before feeding the fish. He appearance of the water in the tanks was observed visually and the quality of water was ranked. Unionized ammonia, NH_4^+, pH, Nitrate (NO_3^{-}) was measured using test kits. Mortality was checked daily and recorded promptly.

Lengths (mm) and weights (mg) were measured using a top loading balance (Sartorius) with a precision of 0.0001 and a Vernier caliper respectively in 100 fry randomly selected from each tank at weekly intervals.

The differences in weight gain, mean weight gain, length, mean length, specific growth rate, condition factor, survival rate and water quality parameters (water appearance, Ammonia, pH, Nitrate) were tested using one way ANOVA.

Comparison of means was done by using the Turkey test to find out the significance between the means.

The parameters were calculated according to the equations given below.

$$\text{Mean Weight} = \frac{W2 - W1}{F}$$

W2 - Weight of 100 fries+ water bowl, W1- Weight of bowl +water, F – Number of fry

$$\text{Mean weight gain} = \frac{(W2 - W1)}{W1}$$

W2 -Final mean weight, W1-Initial mean weight

$$\text{Mean length} = \frac{L1 + \cdots \ldots \ldots \ldots \ldots \ldots + Lx}{F}$$

L – Length of individual fish, F – Number of fish fry

$$\text{Specific growth rate (SGR \%)} = (log_e W2 - log_e W1 \times 100)/(T2 - T1)$$

Log_e - log to base e, T2- time of final weight in days, T1- time of initial weight in days

$$\text{Survival rate (SR \%)} = \frac{\text{Number of fry that survived} * 100}{\text{Number of fry stocked in the tank}}$$

Cost of feed for 21 day rearing period was calculated based on the cost of production for Moina and microworm and based on the market price of Artemia (Brine shrimp). The amounts used for daily feeding was recorded and the cost for each treatment was calculated.

Results and discussion

The growth performance of the guppy in control tank and four treatment tanks is shown in Table 2.

Table 2: The performance of guppy in control and treatment tanks (The values given are means of three replicates mean of three replicates

Parameter	Cont.	**Treatment Tanks**			
		T1	T2	T 3	T4
Mean wt gain (mg)	17.66± 1.15	19.00± 2.00	16.33 ± 1.15	22.66 ± 0.57	18.33± 1.15
Final length (mm)	12.70 ± 0.26	13.63 ± 0.23	10.40± 1.15	15.53± 0.25	13.33± 1.06
Specific growth rate	13.93 ± 0.29	14.25 ± 0.47	13.577± 0.32	15.202± 0.23	15.202± 0.23
No.of fish stocked	250	250	250	250	250
No. of harvested	209.67± 5.51	222.33± 3.51	185.67± 7.23	236.00± 3.00	166.67± 10.50
Survival rate (%)	83.60	88.8	74.0	94.4	66.4

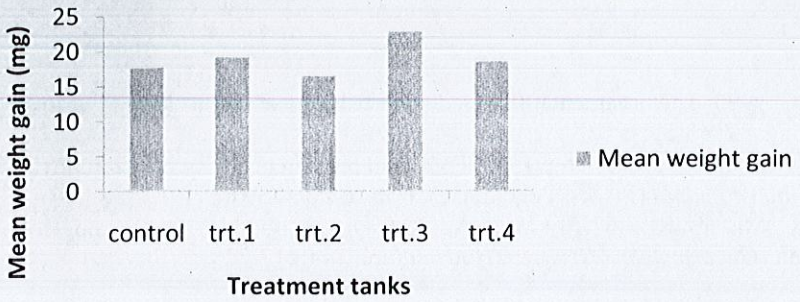

Figure 2: Mean weight gain (mg) of guppy fish fry in relation to treatments

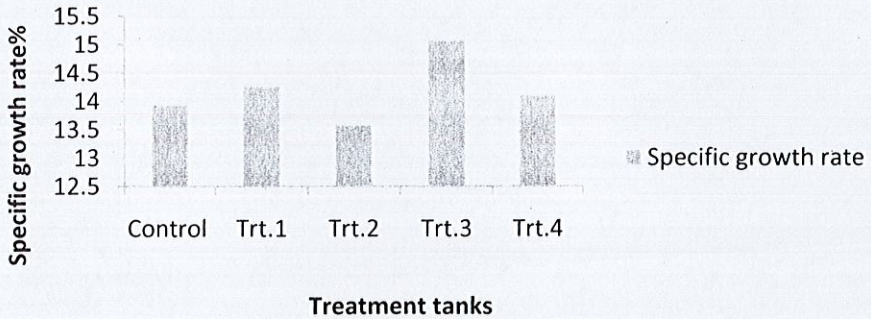

Figure 3: Specific growth rate of guppy fish fry in relation to treatments

Treatment 3 showed the best mean weight gain, specific growth rate, length gain and survival rate (Figures 1 and 2 and Table 2) compared to other treatments. Therefore the combination of *Moina*, microworm, Brine shrimp is selected as the best feed among the tested feed for guppy fry. All treatments except treatment 2 showed a better growth and specific growth rate than control which is the currently practiced feeding strategy of the aquarium. Mean comparisons showed that there is no significant differenc between control and Treatment 1, 2 or 4 but there was a significant difference between control

and the Treatment 3 ($P<0.05$). Treatment 2 showed the worst results while other treatments fared well in comparison to Control. Reduction of feed cost was highest in Treatment 1 (95.88%) and 47.36% in Treatment 3.

Cost for feed during the rearing period for control, T1, T3 were Rs. 820.00, Rs. 33.71, Rs. 431.18 respectively. Lowest cost was observed in Treatment 1 where only Moina and microworms were used as feed. The cost reduction was 98% by using live feed as in Treatment 1 and 48% using feed as in Treatment 3 (all four types of feed).

Conclusions

The present study showed clearly that the cost incurred by aquarium traders using *Artemia* as live food for fry can be reduced using other low cost live food. *Moina* and microworms can be used in aquariums for feeding fry stages successfully. Different combinations of *Moina* and microworms could be used in this regard and the aquarium traders can select the suitable combination considering the cost. However, It is also advantages to feed *Artemia* once a day to gain better growth. Findings of this study will be useful for the development of fresh water ornamental fish farming in Sri Lanka.

References

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