# Effect of sewage cultured *Lemna minor* on growth of *Mollinesia latipinna* fed on mixed diets

# D. RADHIKA, C. VEERABAHU and M. MARIPPANDI\*

P.G. Department of Zoology, Government Higher Secondary School, Tharuvaikulam (India).

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### ABSTRACT

Effect of sewage cultured *Lemna minor* on growth of *Mollinesia latipinna* was investigated using three different types of feeds viz.control feed ( $F_1$ ), raw lemna incorporated feed ( $F_2$ ) and decomposed lemna incorporated feed ( $F_3$ ) for 20 days. The feeds were prepared by using sewage cultured *L.minor*. The test animals fed with decomposed lemna incorporated feed showed high production (0.205) ,Gross growth efficiency (11.08 %), Net growth efficiency (11.39 %) ,Assimilation efficiency (97.31) and Metabolism (1.61). Raw *L.minor* incorporated fish feed showed slightly low value of Metabolism (1.58), Assimilation (1.75) and relative growth efficiency.

Key words: Lemna minor, Mollinesia latipinna, sewage, nutrition, molly, food.

#### INTRODUCTION

Fish, orange molly *M. latipinna* is one of the most attractive and economically important among the aquarium fishes . They are marketed all over the world and yield foreign exchange to some extent. Formation of a suitable feed for fishes has become important for potential aquaculture practice and many authors have studied the effects of nutrition on growth of fishes (Mathavan 1976, Degani *et al.*, 1985; Wahlam & Shephared 1988; Khan and Jafri 1994; Kim *et al.*, 1996.) but less attention has been paid to ornamental fishes (Degani and Gur, 1992; Lochmann and Philips 1994; James and Sampath 1998).

Sewage grown micro algae Chlorella vulgaris utilization as a component of compounded fish feed for many cultivable aquatic organisms has been well documented (Becker 1978). Meske and Pfeffer (1977) have been reported that unicellular algae can replace 30- 80 % of commercial fish meal in the fish feed preparation. Edward (1980) stated that there are number of herbivorous fishes which directly consume aquatic weeds. Aquatic

macrophytes have been known to have potential value as human food , live stock fodder, fertilizers and food for herbivorous fishes (Edward, 1980). The growth performance, food conversion ratio and protein efficiency ratio along with nutritional qualities of weeds that are incorporated in pelleted feeds in fish have been reported by Tan (1970), Hajra and Tripathi (1985), Hajra (1987), Patra and Ray (1988) and Das *et al.*, (1989).

# MATERIALS AND METHODS

The sewage sample was collected in three plastic cans ( 35 lit ) from Buckle channel ,KVK Nagar, Tuticorin Town (Tamil Nadu ,India ). After bringing to the laboratory , sample was filtered through a clean cotton cloth and kept in circular plastic trough . Nutrient analysis was done after the sample was filtered with the help of laboratory filter paper. Raw sewage was aerated in order to elevate the oxygen content and reduce the organic load .

Fresh *L. minor* plants were collected and counted before introducing them in to the trough

on 16 th day of experiment .This served as the experimental trough and the trough without plant acted as control one. The nutrients removal efficiency was calculated. At the climax of the experiment plants were counted and biomass also calculated .This plants were allowed to decompose in the laboratory condition and protein content was estimated regularly, at the time of elevation of protein content the plant was taken out and dried in hot air oven.

Fish feed were prepared by using this decomposed L.minor (F2) as one of the ingredients and raw *L.minor* (F3) was also used .The pelleted diet containing 40 % protein was maintained throughout the experimental period ,and was prepared adopting the box model of Ali (1982). Feed trials were conducted with molly fish by feeding them with three types of feeds F1 (conventional control feed ), F2 and F3.

The selected juveniles of M.lattipinna were divided in to three groups and kept in three plastic troughs.Water quality parameters were also maintained.The weighing of fish during and on termination of the experiment was as described by Hasan *et al.*, (1989).

## RESULTS

In the present investigation, three different types of feeds viz. conventional control feed (F1), and raw *Lemna* sp.(F2) and decomposed *Lemna* sp. Incorporated (F2) feeds were used to grow the test animal, molly for the analysis of various growth parameters. From the results of the feed trial experiments conducted, it became conspicuous that minimum energy loss for maintenance and metabolism occurred in test animals fed with experimental diets coupled with high assimilation efficiency (97.31). Gross (11.08) and Net (11.39) growth efficiencies were also appreciably high in experimental feeds than in the control feed.

Ingredients	F1	F2	F3
Rice bran	100	-	-
Tapioca flour	100	50	150
Fish meal	400	200	150
Ground nut oil Cake	400	310	350
Vit.min.mix	500 mg	500mg	500mg
Sun dried Lemna powder	-	440	-
Decomposed Lemna powder	-	-	350
Total	1000	1000	1000

Table 1: Proximate composition of three different types of experimental feed quantity

Students 't' test analysis, conducted on different growth parameters of the test animals fed with three different diets showed the following results. In the case of production there was significant variation between the three feeds. But there was no significant recorded between the three feeds in the case of metabolism. Assimilation efficiency significantly varied among the three feeds (P<0.001, P<0.005, P<0.001). Gross growth efficiency and food convertion ratio recorded in the three test feeds were also significant (P<0.02, P<0.02, P<0.01).

The proximate composition of *L. minor* recorded in the present study was highly comparable to the previous reports of Hyde et al., (1984) and Manimaran *et al.*, 1997. As registered in the present study *L. minor* has been recorded to double in number with in 4 days as reported by Manimaran *et al.*, (1997). The collected *L. minor* was allowed to decompose in quality water for two weeks. Following the decomposition the protein content of Lemma minor was observed to obtained the highest value of 47.2%.

Growth Parameters	Conventional control feed	Raw Lemna incorporated feed	Decomposed Lemna incorporated feed
Initial dry weight (g,w <sub>1</sub> )	0.55	0.55	0.55
Final dry weight $(g,w_2)$	0.742	0.721	0.755
Weighed mean $\frac{w_2 - w_1}{2}(w)$	0.096	0.085	0.103
Production ( $P=w_2 - w_1$ )	0.192	0.171	0.205
Consumption (c)	1.77	1.84	1.85
Faecal output (f)	0.06	0.09	0.05
Assimilation (A=c-f)	1.71	1.75	1.80
Metabolism ( $R = A-P$ )	1.52	1.58	1.61
Assimilation efficiency (A/C x 100)	96.61	95.11	97.31
Gross growth efficiency $(K_1)$ (%)(P/C x 100)	10.85	9.29	11.08
Net growth efficiency (K <sub>2</sub> ) (%)(P/A x 100)	11.25	9.77	11.39
Relative growth efficiency (g/d)(P/w/day)	0.1	0.095	0.095
FCR (C/Live wt. increase)	1.84	2.15	1.80
Cost of Feed preparation	Rs. 6.75 / Kg	Rs. 3.45/ Kg	Rs. 3.45/ Kg

Table 2 : Growth Parameters of molly fish fed with control and experimental feeds



Fig 1: Gross and net growth efficiency of *M. latipinna* fed on three different diets

## DISCUSSION

Raw sewage sludge contain 36% protein Manimaran et al., (1995). In the experimental plant *L.minor* gets the protein content was notably increased (10.4 mg/g). It may be due to nutrient absorption from the sewage which gets converted into plant nitrogen. Though 40% protein content was maintained in all the three types of feed, experiment conducted showed high variation in growth parameters. The highest production value (0.205)





was registered when the test animal was fed with experimental feed (F3). When raw *L. minor* was used as a component of fish feed the recorded production (0.171g) was less than that on the control feed ( 0.192 g). The growth performance ,FCR and protein efficiency ratio along with nutritional qualities of weeds that were incorporated in polluted feeds in fish had been reported by Tan (1970), Hajra and Tripathi (1985), Hajra (1987), Patra and Ray (1988) and Das and Ray (1989). Feed trials conducted with (F3) showed highest assimilation efficiency ,gross and net growth efficiency coupled with nutrient content of *L.minor*, Skilicorn *et al.*, (1983) reported that essential amino acids like methionine and lysine that occurred in Lemna. sp, were not encountered in other terrestrial plants. Thus it could be possible to conclude that if complex carbohydrates, lignin and cellulose like components are broken in to simple sugars and also high level of carotene contents (Skilicorn *et al.*,1993), increased level of crude protein (Hyde *et al.*, 1984). Since the total carotene content of duck weed meal is known to contain higher concentration (10 folds) carotene than other terrestrial plants (Skillicorn *et al.*, 1993). There are 40 different species of duck weed belonging to 4 genus (Lemma, Spinodela, Wolfia and Wolffiella) are known to occuring in India. Similar feed trial experiments need to be conducted with other species of duck weeds in fresh and decomposed condition to identify the right type of duck weed species which can not only Bio process waste water but also can convert the waste nitrogen efficiently into the production of ornamental fishes whith much market value both in India and foreign countries.

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