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Dietary Supplementation of Seaweed as Growth Promoter of Molly fish

Chelladurai. G.[1*] and J. Selvarani[2],

[1]*Department of Zoology, G.Venkatasamy Naidu College, Kovilpatti, Tuticorin, Tamilnadu, India*
[2]*Department of Zoology, Kamaraj College, Tuticorin, TamilNadu, India*

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[*]Author to whom corresponding should be addressed
Email: gcd.zoology@gmail.com

Abstract: An experiment was conducted to study the influence of seaweed diet *K. aluarezii* on growth and survival of molly fish reared in plastic tank over a period of 45 days. Three different feed namely, Control, F1 (Seaweed 10%), F2 (Seaweed 20%) were applied to treatments. By the end of the experiment, fish growth parameters (weight gain, SGR and FCR) were evaluated. Fish fed on 20% seaweed diet tended to have higher growth performance than those fed to the control and 10% seaweed diet ($p>0.05$). Conclusion of the study showed the seaweed meal can be included as supplement ingredient in the diet without impairing growth performance and survival of molly fish.

Keywords: *Kappaphycus alvarezii*, growth performance, formulated diet, *Mollienisia sphenops*

1. INTRODUCTION

Aquarium fish keeping in aquarium tank and rearing have now turned out to be a commercial aqua business in the form of an industry. It was in the early decade of the last century that the aquarium fish keeping was started in Mumbai as a hobby on a small scale. The world ornamental fish industry has been growing steadily over the years. The recent values of the entire industry has been estimated to be about US $ 150 billion with an annual growth rate of about 8 percent. The molly (*Mollienisia sphenops*) is a tropical fish that prefers a little salt in their water. A teaspoon of aquarium salt per 5 gallons of water will go long way in helping them. This is a very attractive tropical fish that comes in many different colors such as organ, green and black. Some of the more popular varieties include the sail fin, balloon and the dalmation. This is alive bearing tropical fish that can be fairly easy to breed. The seaweeds with good protein level are receiving considerable attention as novel feeds with potential nutritional benefits (Buschman *et al.*, 2011). However the presence of high crude fiber and low protein content are issues for low inclusion of seaweeds in aqua feeds. Fermentation is a simple and cheap method which might considerably decrease crude fiber content and increase protein value. Several nutritional trials with partially incorporated macro-algae meal were conducted focusing to the development of fish viability, disease resistance and carcass quality (Hamauzu and Yamanaka, 1997). The supplementation of the fish diet with seaweed ranged between 2% up to 28%. Differences between levels of seaweeds may be variable depending on the feeding habits, age and the species of both algae and fish (Güroy et al., 2007; El-Tawil, 2010). Nevertheless, information concerning seaweed use in fish culture remains very limited and needs further investigation. The present work aims to investigate the effect of

the seaweed *K. alvarezii*, collected from the Tuticorin coast, as a dietary supplement on growth performance, feed utilization and survival of molly fish.

2. MATERIAL AND METHODS

The seaweed (*Kappaphycus alvarezii*)) were collected form Tuticorin coast of Gulf of Mannar marine National Park and sundried. The dried species were finely ground and passed through a fine meshed sieve to ensure homogeneity. The groundnut oil cake, rice bran and other ingredient brought form local market were finely ground and sieved. The dry ingredients were weighted individually and missed well. Water was added and moist mixture was hand kneaded till dough was formed. The dough was cooked in cooker for 10-15 minutes. Then vitamin and mineral premix were added. The feed formulation was done using parson's square method. The above procedure was followed to prepare three sets of experimental diets Control (without sea weed meal), F1 (10% seaweed meal) and F2 (20% seaweed meal) Table.1.

Table 1: Basal and experimental diet

Ingredients	Control	(F1) 10%	(F2) 20%
Ground nut oil cake	71	68	62
Rice bran	13	10	8
Wheat flour	10	7	5
Tapioca flour	4.2	3	3
Premix vitamin and mineral	1	1	1
Seaweed (%)	Nil	10	20

The experimental was conducted under laboratory condition for 45 days. The prior to the start of the expedient, healthy juvenile of the molly fish purchased form Tuty aquarium, Tuticorin and were acclimatized in two concrete tank ($0.8m^2$) in the model aquarium, Kamaraj College, they were fed basal feed two times daily for 2 weeks. Then they healthy molly fish were distributed in to 9 plastic tanks (20l) with initial stocking density of 10 fish per trough in the model aqua form, Kamaraj College, Tuticorin for 45 days. Fish were fed tow times daily at 10:00, 16:00 with each feed. Daily feeding rate was about 5 % of total body weight and properly regulated according to actually intake of ornamental fish each day the diet remains of each trough were collected by siphoned before the second daily feeding to further analysis and minimized leaching. A daily record was partially cleaned including the fish feces and the water partially changed (50 %) the water quality parameters were measured weekly.

2.1 Growth parameters

Weight gain $\dfrac{\text{FW (g)-IW(g)}}{\text{IW(g)}} \times 100$

Where,

FW(g) - Final weight

IW(g) - Initial weight

Feed conversion ratio (FCR)

$$\frac{\text{Dry weight of feed consumed (g)}}{\text{Total wet weight gain (g)}} \times 100$$

Specific growth rate

$$\frac{\text{Final wet weight- Initial wet weight}}{\text{Duration}} \times 100$$

Survival (%)

$$\frac{\text{No of fish introduced}}{\text{No of fish survived}} \times 100$$

2.2 Statistical analysis

Data were analyzed using one-way analysis of variance (ANOVA) A Duncan's multiple range tests was performed at a 5% level to detect any significant difference among treatments. This Statistical analysis was performed using SAS software version 9.1.

3. RESULT AND DISCUSSION

The molly fish fed with the experimental diets (control, F1 and F2) for 45 days were weighed weekly and were presented in Table. 2. F2 (20%) diet allowed the highest fish growth (Weight gain, SGR and FCR) when compared to control and F1 (10%) diets. However, differences between treatments were not statistically significant ($p>0.05$). The fish mortality that occurred during the trial was mostly related to handling during sampling. The highest survival rate (97.5%) was obtained using 20%diet, followed by 10%S diet (80%), and then by control diet (80%). However, the difference between treatments was not significant ($p>0.05$). According to Felix and Alan Brindo, 2014 observed the suggest that the raw *K. alvarezii* could be incorporated in freshwater prawn diets up to 10 % and 20 % better growth and survival.The evident from the present study that seaweed that (*Kappaphycus alvarezii)* can be utilized as a feed ingredient in the diet for molly fish due to its protein sparing action. According to Gohl (1981) reported that water hyacinth contains 13.1% crude protein and 18.2% crude fiber.

Table.2 Growth performance and deed utilization of molly fish for 45 days

S.No	Parameters	Control	F1	F2
1	Initial weight (g)	0.91 ± 0.15^{a}	0.96 ± 0.14^{a}	0.94 ± 0.14^{b}
2	Final weight (g)	2.54 ± 0.23^{a}	2.78 ± 0.06^{b}	2.93 ± 0.16^{a}
3	Weight gain (%)	179 ± 0.01^{a}	189 ± 0.15^{a}	211 ± 0.17^{a}
4	FCR (%)	4.5 ± 0.23^{b}	4.27 ± 0.07^{a}	3.83 ± 0.06^{a}
5	SGR	0.08 ± 0.17^{a}	0.09 ± 0.03^{c}	0.10 ± 0.18^{a}
6	Survival (%)	80 ± 0.03^{a}	80 ± 0.01^{a}	90 ± 0.32^{a}

^{a,b,c} All values are means of three replicates ± SD for triplicate feeding groups and values in the same row with different superscripts are significantly different ($p<0.05$).

The present study further showed that the growth performance was marginally less in the control diet with in comparison to the experimental site with seaweeds. But one important criterion to be marked here was that the molly fish fed with formulated seaweed meal grew more in weight than in length thus adding more flesh to the fish. Apart from the survival rate was found to be 80% in this case. Liang *et al.*, (1971) reported that of favorable use of water hyacinth was a supplement to vitamin deficient diets when if added at the rate of 5%-10%. Its increased growth and reduced the mortality of the cat fishes. The seaweed in that respect was established to better than commercial meal. However, Yone et al., (1986) reported that huge amount of algae supplement suppressed excessively the absorption of nutrients and resulted in a decrease in growth and feed efficiency. Nakagawa *et al.*, (1993) reported that optimum feed efficiency and protein efficiency was attained in black sea bream when the supplementation level of Ulva meal was 2.5-5.0% of the diet. On the other hand the percentage of the weight gain, SGR, survival was found to be best in the fish fed with seaweed (20%) formulated diet. The weight gain was observed to be 211, SGR (0.10%) and the survival rate was 80%.

Similarly, the marine green seaweed (*Ulva lactuca*) could be supplemented to Nile tilapia diet at an optimum level of 15% and lead to a significant improvement in growth performance without any negative effect on feed efficiency or survival rate (Güroy *et al.*, 2007; El-Tawil, 2010). The study revealed the incorporation of seaweed mean up to 20% protein level of showed positive result. From the present study it is evident that the aquatic seaweed *(K. alvarezii)* might be used in the feed for the ornamental fish to given positive results and

this might be diet the presence of nutritional factor which enhance the direct use of weed as a dietary ingredient. It may be thus conclude that this seaweed locally available in abundance can be used as dietary feed ingredient to produce a cost effective feed for ornamental fish.

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