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Evaluation of the Aquatic weed (*Ipomoea aquatica)* meal as partial replacement for fish meal on the growth performance of *Labeo rohita* (Ham.) fingerlings

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Abstract : An experimental of 80 days was conducted to evaluate the nutritional quality and acceptability of *Ipomoea aquatica* meal as component in the diets of *Labeo rohita* fingerlings under the laboratory culture condition. Five different comprising of Ipomoea fish meal, GNOC, rice bran, vitamin, fish oil, were used to formulate compound diets by replacing fish meal with *Ipomoea aquatica* at 0%, 20%, 30%, 40% and 50%, inclusion level of *Ipomoea aquatica* meal for 80 days. Fish fed supplemented with *I. aquatica* meal showed significantly improved growth performance and feed utilization over the control diet. The weight gain, feeding rate growth rate, specific growth rate feed intake, feed conversion ratio were measured, Result indicated that growth performance and feed utilization values were significantly ($p< 0.01$) higher in fish fed diets containing 40% *Ipomoea aquatica* meals, whereas fish fed diets containing 50% *I.aquatica* meal had lower performance, The study shows that fingerlings fed diet of 40% *I.aquatica* inclusion performs best result and fishmeal was completely non replacement but can be supplemented with *I.aquatica* up to an optimum level to produce cost effective feed.

Keywords *: Ipomoea aquatica*, feed ingredients, fish meal, growth performance, *Labeo rohita*.

Introduction

Feed represent the single largest input in aquaculture production. At present both protein and energy rich conventional dietary ingredients are of short supply. Therefore there is a need to incorporate unexplored unconventional locally available cheaper feed stuffs in fish feed. To reduce the dependence on animal based protein in fish diet, plant based protein food stuffs are used to decrease artificial fishmeal cost (1).

Labeo rohita belongs to the family cyprinidae and is common in rivers and freshwater lakes of south Asia and south-East Asia (2). Among all indian major carp, *L.rohita* is the most popular delicious food fish in Asia and rich in protein

content On other hand ,water spinach or morning glory, *Ipomoea aquatica* is a common emergent aquatic plant that can grow freely over the water surface or over marshy ground. Morning glory can play significant role providing a natural substratum for periphyton, which is the ideal food for many species. Ipomoea species are widely used as a model plant both for treatment of waste water (3,4) and for partial replacement of fishmeal on the growth performance of indian major carp (5,6).

In the present study water spinach (*Ipomoea aquatica*) is used as model plant to determine optimum inclusion level of the leaf meal in formulated feed of *Labeo rohita* and examine the growth performance of the same in various levels of inclusion and also discussed in terms of different feed ingredients with and without supplemented fishmeal.

Materials and methods

The experimental animal *Labeo rohita* were collected from the rajan fish farm in Tirunelveli, and immediately transported to the lab in separate tank with the same water. These fishes were acclimatization the animals were fed with dry pellets. The water of rearing tank was changed periodically. After that they were transferred to the experimental tanks which are grouped in to two tanks as one set.

Experimental Diet

For the experimental supplementary feed, *Ipomoea aquatica* plant powder was added along with chosen ingredients. The plant were collected from the aquatic pond at Maramangalam village near palayakayal , Thoothukudi district of tamilnadu. leaf only collected from the plant ,then leaves were dried in without sunlight for 10 days. After complete drying, they were ground and made it to a powder , then the powder was mixed with chosen ingredients at different levels. The experimental diets were prepared by according to Hardy (7) method. Diets were formulated by including *I.aquatica* powder at 0%,20%,30%,40%,50% and designated diets as D_1, D_2, D_3, D_4, D_5. Growth parameters such as weight gain, Feed conversion ratio (FCR), Specific growth rate (SGR),Feeding rate (FR),Conversion rate, weight of fish and Feed intake were calculated as follows

Weight gain = Final body weight – Initial body weigh

$$FCR = \frac{\text{Total dry weight of food consumed(mg)}}{\text{Total wet weight gain (g)}}$$

$$SGR = \frac{\text{Final wet weight – initial wet weight (g)}}{\text{No of days (t)}} \times 100$$

$$CR = \frac{\text{Weight gain(mg)}}{\text{Initial wet weight(g)} \times \text{duration of days(t)}}$$

$$FR = \frac{\text{Feed consumed(mg)}}{\text{Initial weight of fish(g)} \times \text{duration of days(t)}}$$

All data were expressed as the mean ± SD. Growth parameter data of groups were analyzed for significant differences by student "t" test ($p<0.01$).

Result and Discussion

The proximate composition of *Ipomoea aquatica* meal is shown in table 1.

Components	Amount (%)
Crude protein	32.2 %
Crude lipid	6%
Crude fiber	10.8%
Ash	30%

The present experimentation the efficiency of *I. aquatica* meal 20%,30%,40%,50% as fish fed had been evaluated using edible fish, *Labeo rohita* as the experimental species. During the feeding trial the fishes accepted different levels of experimental diets (0%,20%,30%,40%,50%). The result has shown that final wet weight of fish, weight gain, specific growth rate, feed intake, feed conversion rate, feeding rate,of *Labeo rohita* were affected significantly ($p< 0.01$) and conversion rate, were obtained with the fish maintained at 40% of experimental diets. They were found to be (52.62±0.19, 12.77±0.04,3.39 ± 0.004, 40.08±0.09,3.19±0.04,75.08±0.17,23.69±0.15) respectively.

Specific growth (SGR) improved with increasing the inclusion rate of *Ipomoea aquatica* meal in the diet (table 2). The significant improvement ($p < 0.01$) in SGR were achieved in 40% of experimental diets.

Feed conversion ratio was decreased with increasing level of *Ipomoea aquatica* diets. At the same time growth rate was increased. (11&12) was observed that low feed conversion ratio (FCR) and high growth rate of fish *H.fossilis* and *Channa striata* respectively in different diets. The present result shows FCR value was recorded in 40% of diets which was (3.19±0.04). However, the contrast values of FCR were recorded in fish maintained with 50% of diets.

Evaluation of the Aquatic weed (*Ipomoea aquatica)* meal as partial replacement for fish meal on the growth performance of *Labeo rohita* (Ham.) fingerlings

In the past few two decades, feeds from plant origin have been accepted for Indian major carps because the body growth observed has been reported to be a good as that obtained with the traditional feed. In tropical countries ,where algal production rate are high, algae have been receiving increasing attention as an alternative protein possessing relatively high protein content (50-60%),which may be regarded as balanced fish feeds(8,9). The present study demonstrated that the inclusion level of aquatic weeds experimental feed supported the growth of *L.rohita*.

The present investigation demonstrated the different concentration of aquatic weeds *(Ipomoea aquatica*) experimental feed supported the growth performance for *L.rohita* fingerlings. This statement accept to the [10] reported that inclusion level of duck weeds experimental feed supported the growth for *L.rohita*. The present study demonstrated the level of aquatic weeds experimental feed supported the growth for *L.rohita* fingerlings.

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Table 2: Growth performance and feed utilization of *Labeo rohita* fingerlings fed Aquatic weed meal based diet for 80 days.

Wet weight of fish (g)

Rearing days	D_1	D_2	D_3	D_4	D_5
0	26.75 ± 0.20	27.1 ± 0.16	27.70 ± 0.45	26.7 ±0.44	26.78 ± 0.12
20	29.75 ± 0.44	29.74 ± 0.37	30.06 ± 0.77	30.23 ± 0.04	29.49 ± 0.11
40	33.52 ± 0.65	32.43 ± 0.74	34.22 ± 0.31	37.24 ±0.31	35.43 ± 0.16
60	37.23 ± 0.24	37.58 ± 0.04	39.09 ± 0.43	45.62 ± 0.31	39.14 ± 0.25
80	42.10 ± 0.20	41.24 ± 0.26	45.62 ± 0.24	52.62 ± 0.19	43.54 ± 0.25

Weight gain (g)

Rearing days	D_1	D_2	D_3	D_4	D_5
20	2.63 ± 0.03	2.44 ± 0.01	2.51 ± 0.01	2.99 ± 0.02	2.73 ± 0.01
40	4.75 ± 0.02	4.42 ± 0.02	5.51 ± 0.04	5.97 ± 0.04	5.5 ± 0.04
60	7.2 ± 0.08	6.81 ± 0.03	7.44 ± 0.09	8.68 ± 0.03	7.67 ± 0.04
80	10.49 ± 0.04	9.51 ± 0.04	11.40 ± 0.12	12.77 ± 0.04	9.59 ± 0.04

Feed intake (g dry matter)

Rearing days	D_1	D_2	D_3	D_4	D_5
20	34.86 ± 0.28	36.83 ± 0.45	38.34 ± 0.28	38.39 ± 0.04	36.65 ± 0.08
40	36.69 ± 0.39	37.79 ± 0.46	38.70 ± 0.01	38.94 ± 0.42	38.68 ± 0.06
60	37.8 ± 0.16	38.67 ± 0.04	39.1 ± 0.08	39.25 ± 0.42	39.1 ± 0.48
80	37.9 ± 0.08	38.8 ± 0.16	39.15 ± 0.04	40.08 ± 0.09	39.17 ± 0.48

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Feeding rate (mg g-1 live fish day-1)

Rearing days	**D_1**	**D_2**	**D_3**	**D_4**	**D_5**
20	65.23 ± 0.06	67.85 ± 0.08	62.27 ± 0.06	71.82 ± 0.05	68.55 ± 0.04
40	68.42 ± 0.12	69.42 ± 0.01	69.8 ± 0.04	72.89 ± 0.02	72.37 ± 0.06
60	70.60 ± 0.03	71.38 ± 0.03	70.02 ± 0.04	73.49 ± 0.08	73.19 ± 0.08
80	70.81 ± 0.02	71.42 ± 0.13	70.71 ± 0.04	75.1 ± 0.04	73.23 ± 002

Feed conversion ratio (FCR)

Rearing days	**D_1**	**D_2**	**D_3**	**D_4**	**D_5**
20	13.30 ± 0.04	15.20 ± 0.09	15.32 ± 0.04	12.80 ± 0.02	13.47 ± 0.04
40	7.73 ± 0.01	8.59 ± 0.04	7.07 ± 0.04	6.58 ± 0.05	6.95± 0.008
60	5.35 ± 0.08	5.70 ± 0.02	5.30 ±0.04	4.49 ± 0.02	5.20 ± 0.09
80	3.67 ± 0.04	4.20 ± 0.12	3.49 ± 0.05	3.19 ± 0.04	3.37 ± 0.04

Conversion rate (%)

Rearing days	**D_1**	**D_2**	**D_3**	**D_4**	**D_5**
20	4.74±0.14	4.51±0.14	4.52±0.19	5.54±0.12	5.02±0.17
40	8.75±0.08	8.07±0.14	9.73±0.15	11.15±0.13	10.15±0.21
60	13.15±0.21	12.26±0.23	13.21±0.25	16.06±0.19	0.015±0.09
80	19.3±0.35	17.46±0.16	20.3±0.22	23.69±0.15	22.0±0.11

Specific growth rate (% day-1)

Rearing days	**D_1**	**D_2**	**D_3**	**D_4**	**D_5**
20	0.55 ± 0.02	0.47±0.01	0.41±0.01	0.44±0.01	0.48±0.004
40	1.13±0.0008	0.88±0.004	1.15±0.08	1.67±0.008	1.39±0.004
60	1.66±0.012	1.64± 0.012	1.76±0.036	2.69±0.02	1.89±0.004
80	2.28±0.02	2.09±0.004	2.48±0.008	3.39±0.004	2.43±0.02