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Effect of Partial replacement of fish meal with aquatic weed *Pistia stratiotes* meal on Growth and Feed conversion in Indian majar carp *Labeo rohita*

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Abstract : This experiment was carried out to study the effect of aquatic weed (*Pistia stratiotes*) as feed supplementation in fish diet on growth performance and feed conversion in Indian major carp *Labeo rohita* for periods of 80 days. Six different levels of *P.stratiotes* (0%,10%,20%,30%,40% and 50%) of fish diets were fed to groups of 25 fingerlings. At the end of the experiment, the results showed that final body weight (68.72 ±0.02), length 6.08±0.004, feed intake (42.10± 0.08), feeding rate (67.39±0.01), Feed conversion ratio (3.50±0.02), conversion rate (19.21±0.03) and specific growth rate (0.98±0.002) increased significantly ($P<0.01$) with increase *P.stratiotes* level in the fish up to 30%. Therefore, aquatic weed (*P.stratiotes*) could be supplemented to Indian major carp (*Labeo rohita*) diet at optimum level of 30 % to improve growth performance without any adverse effect on feed efficiency.

Key words : *Pistia stratiotes, Labeo rohita.*

Introduction

Aquaculture is an important business in many countries around the world (Lin and 1996). The economics of most modern aquaculture operations require that aquatic animals be cultured at high densities (Wei *et al.*, 2001).

The Indian major carp *Labeo rohita* is the most important commercial fishes in Indian with a maximum market demand and acceptability as food by the consumers due to their taste and flesh. Feed plays a vital role in aquaculture. Profitable fish farming depends a lot on cheap and nutritionally balanced feed that will enhance the growth rate. Dietary completion and to technological treatment of plant feed stuffs could increase their use in fish feeds and may reduce reliance on fish products (Mbonge 2007).

To indentify economical and locally available feed stuffs. This study was designed to evaluate the use of aquatic weed *P.stratiotes* leves in formulated diets for carp.

Materials and Methods

Diet formation and Preparation

Fresh colonies *P.stratiotes* were collected from the water body of Tuticorin district, Tamil nadu India and thoroughly washed to remove dirt. They were then dried at room temperature for 5 days. After 5 days these sample were powdered. Six dry diets were prepared in which fishmeal was replaced with *P.stratiotes* meal at 0%, 10%, 20% ,30%, 40% and 50% level using the method of Hardy (1980) at 40% crude protein level.

Experimental animal

The *Labeo rohita* fingerlings were collected from the local fish farm in Tirunelveli District and transported to the Laboratory. They were acclimatize for 3 days before the take off the experiment .

Experimental Procedure

After that, the same size and weight of *Labeo rohita* fingerlings were carefully selected and rearing and feeding experiments were conducted with different concentrations of feeds (0%, 10%, 20%, 30%, 40% and 50%). The experimental tanks which one grouped into two tanks as one set. They were fed at 5% body weight twice daily morning and evening at equal ration. This study was conducted for 80 days. Every day to remove remain of the feed and faecal mater with the help of the siphoned.

Sampling

Sampling was carried at once in 20 days and the growth parameters were measured and recorded.

Growth Parameters:

Weight gain= Final weight-Initial weight

Length = Final Length-Initial Length

Feed intake=Total given feed-total dry weight of feed (g)

$$\text{Feeding rate} = \frac{\text{Amount of feed consumed (mg)}}{\text{Initial wet weight (g) X No. of days}}$$

$$\text{FCR} = \frac{\text{Feed consumption (mg)}}{\text{Weight gain(mg)}}$$

$$\text{Conversion rate} = \frac{\text{weight gain(g)}}{\text{Initial wet weight of fishes(g) X Duration}}$$

$$\text{Specific growth rate} = \frac{\ln w_2 - \ln w_1}{t} \times 100$$

Student's "t" test was applied to determine the significance values between the 30% & and 40% experimental diets. The significant results were obtained 30 % level of *P.stratiotes* diet.

Results and Discussion

The growth response of *Labeo rohita* fed the experimental diets in shown in (Table 1).The six inclusion level of experimental feed supported the growth *Labeo rohita* fingerlings. However, growth performance and feed utilization was favared by low inclusion level of feed. The weight gain, length, feed intake, feeding rate, FCR, conversion rate and specific growth rate of fish improve significantly($P<0.001$) with increasing *P.stratiotes* level in the diet up to 30%. Increasing *P.stratiotes* level beyond 30% had no significant effects on growth.These results are in agreement with those reported in previous studies. Kalita *et al*.,(2008) found that, supplementation of four nonconventional aquatic weeds to the basal diet to *Catla catla* and C*irrhinus mrigala* fingerlings. Also the Ray AK., Das I (1995) reported that, the dried aquatic weed *P.stratiotes* meal as a feed stuff in pelleted feed for *Labeo rohita* fingerlings. And Abu Zead (2001) found that, the dry matter of tilapia and common carp increased replacement by aquatic plant less than 20 % for tilapia and less than 30 % for common carp where that contents were opposite trend by protein content.

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Para meters	**20 DAYS**						**40 DAYS**					
	0	**10%**	**20%**	**30%**	**40%**	**50%**	**0**	**10%**	**20%**	**30%**	**40%**	**50%**
Initial weight (g)	30.69 ± 0.08	30.70 ± 0.04	30.95 ± 0.12	31.15 ± 0.04	31.07 ± 0.06	30.65 ± 0.12	33.70 ± 0.08	34.66 ± 0.03	35.88 ± 0.08	38.08 ± 0.06	34.15 ± 0.04	33.65 ± 0.12
Final weight (g)	33.70 ± 0.08	34.66 ± 0.03	35.88 ± 0.08	38.08 ± 0.06	34.15 ± 0.04	33.65 ± 0.12	37.55 ± 0.04	39.27 ± 0.02	40.88 ± 0.02	46.72 ± 0.02	38.32 ± 0.02	36.84 ± 0.02
Initial length (cm)	4.83 ± 0.04	4.93 ± 0.09	4.96 ± 0.04	4.76 ± 0.04	4.73 ± 0.04	4.73 ± 0.04	4.90 ± 0	5.01 ± 0.004	5.02 ± 0.004	5.03 ± 0.009	4.8 ± 0.04	4.8 ± 0.04
Final length (cm)	4.90 ± 0	5.01 ± 0.004	5.02 ± 0.004	5.03 ± 10.09	4.8 ± 0.04	4.8 ± 0.04	5.02 ± 0.004	5.04 ± 0	5.06 ± 0.004	5.07 ± 0.004	5 ± 0	4.96 ± 0.04
Feed Intake	18.6 ± 0.47	23 ± 0.81	25 ± 0.47	27 ± 0.81	21 ± 0.81	18 ± 0.81	21.6 ± 1.24	24.6 ± 0.47	26.3 ± 0.94	29.6 ± 0.47	24.0 ± 0.81	20.3 ± 1.24
Feeding rate	30.93 ± 0.02	37.44 ± 0.08	40.39 ± 0.08	41.72 ± 0.02	35.39 ± 0.09	30.98 ± 0.01	37.47 ± 0.02	39.02 ± 0.004	4.38 ± 0.09	48.16 ± 0.02	38.61 ± 0.09	35.89 ± 0.09
FCR	6.29 ± 0.01	5.80 ± 0.01	5.02 ± 0.03	3.71 ± 0.03	5.83 ± 0.02	6.30 ± 0.02	5.94 ± 0.03	5.15 ± 0.03	5 ± 0.01	3.41 ± 0.03	5.73 ± 0.02	6.90 ± 0.01
Conversion rate	4.95 ± 0.004	6.46 ± 0.03	7.97 ± 0.02	11.07 ± 0.05	4.94 ± 0.03	4.81 ± 0.05	6.24 ± 0.03	7.52 ± 0.02	8.05 ± 0.04	13.85 ± 0.08	6.72 ± 0.02	5.21 ± 0.05
SGR %	0.42 ± 0.02	0.62 ± 0.02	0.73 ± 0.02	1.02 ± 0.02	0.51 ± 0.02	0.46 ± 0.08	0.54 ± 0.04	0.62 ± 0.09	0.66 ± 0.02	1.02 ± 0.02	0.58 ± 0.01	0.45 ± 0.02

Para meters	60 DAYS						80 DAYS					
	0	**10%**	**20%**	**30%**	**40%**	**50%**	**0**	**10%**	**20%**	**30%**	**40%**	**50%**
Initial weight (g)	37.55 ± 0.04	39.27 ± 0.02	40.88 ± 0.02	46.72 ± 0.02	38.32 ± 0.02	36.84 ± 0.02	42.58 ± 0.05	45.27 ± 0.02	49.33 ± 0.10	56.72 ± 0.02	45.22 ± 0.66	40.55 ± 0.04
Final weight (g)	42.58 ± 0.05	45.27 ± 0.02	49.33 ± 0.10	56.72 ± 0.02	45.22 ± 0.06	40.55 ± 0.04	50.62 ± 0.13	54.15 ± 0.10	59.33 ± 0.01	68.72 ± 0.02	53.30 ± 0.12	46.55 ± 0.04
Initial length (cm)	5.02 ± 0.004	5.04 ± 0	5.06 ± 0.004	50.7 ± 0.004	5 ± 0	4.96 ± 0.04	5.4 ± 0.04	5.7 ± 0.04	5.9 ± 0.04	6 ± 0.009	5.05 ± 0.004	5.01 ± 0.009
Final length (cm)	5.4 ± 0.04	5.7 ± 0.04	5.9 ± 0.04	6 ± 0.009	5.05 ± 0.004	5.01 ± 0.009	5.7 ± 0.04	6 ± 0	6.05 ± 0.004	6.08 ± 0.004	5.07 ± 0.004	5.02 ± 0.004
Feed Intake	28.37 ± 0.49	32.71 ± 0.50	34.35 ± 0.46	34.39 ± 0.43	29.56 ± 0.32	28.03 ± 0.12	31.92 ± 0.05	33.93 ± 0.02	37 ± 0.08	42.10 ± 0.18	33.06 ± 0.04	30.03 ± 0.04
Feeding rate	45.60 ± 0.08	52.07 ± 0.04	54.95 ± 0.02	56.09 ± 0.06	47.47 ± 0.02	45.95 ± 0.04	52.07 ± 0.005	55.38 ± 0.01	59.32 ± 0.03	67.39 ± 0.01	53.02 ± 0.05	48.86 ± 0.05
FCR	5.56 ± 0.001	4.54 ± 0.03	3.91 ± 0.01	3.47 ± 0.02	4.22 ± 0.05	7.01 ± 0.07	3.94 ± 0.03	3.80 ± 0.02	3.67 ± 0.02	3.50 ± 0.02	4.06 ± 0.04	5.08 ± 0.06
Conversion rate	8.19 ± 0.04	11.41 ± 0.02	13.97 ± 0.02	16.02 ± 0.02	11.03 ± 0.05	6.32 ± 0.02	13.08 ± 0.02	14.41 ± 0.02	10.73 ± 0.02	19.21 ± 0.03	12.97 ± 0.02	9.77 ± 0.02
SGR %	0.61 ± 0.09	0.69 ± 0.01	0.93 ± 0.09	0.96 ± 0.009	0.81 ± 0.08	0.49 ± 0.08	0.88 ± 0.02	0.90 ± 001	0.94 ± 0.01	0.98 ± 0.02	0.81 ± 0.09	0.69 ± 0.09