

IMPACT OF *Cynodon dactylon* MIXED DIET ON GROWTH PERFORMANCE OF THE GRASS CARP *Ctenopharyngodon idella*

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Abstract

In the present investigation alive freshwater grass carp *Ctenopharyngodon idella* fingerlings were collected from Himalayan fish farm near Thanjavur from June 2015 to May 2016. The fishes were fed with control and the plant *Cynodon dactylon* mixed experimental diet. The growth performance such as ABW, ABL, BWG (body weight gain) and SGR (specific growth rate) were thoroughly studied adopting standard procedure. The result of the study clearly indicates that there was a significant variation in growth parameter of control and experimental fish. The fish fed *C. dactylon* mixed diet showed elevated level in body weight, body length, weight gain and specific growth rate. The study reveals the fact that plant material mixed diet is more suitable for grass carp culture practice.

Keywords: *Cynodon dactylon*, *Ctenopharyngodon idella*, Specific growth rate.

Introduction

Fish are chief sources of animal protein and good for human consumption and health. In culture practice the growth of the fish mainly depends on the nutrition quality of the diet. Protein is the most expensive component in fish feed and also the most important factor affecting growth performance of fish [14]. The maximum increase in length and weight were observed in fishes fed with *Ocimum basilicum* supplemented diet [17]. New substances are added in fish feed to improve feed conversion efficiency that result in fish growth [4, 8, 9]. The medicinal plant contain lot of primary and secondary metabolites which improve survival and growth of fishes [12, 18]. The quality and quantity of dietary nutrients influence digestibility, growth performance, and body biochemical composition of fish [13]. Dietary medicinal plants improve the feed conversion ratio and growth performance [6, 7, 10, 11, 19]. Commercial feed additives and bioactive components in diet also improve the growth performance of fishes [2, 3, 15, 16]. The present study is aimed to investigate the effect of the plant *Cynodon dactylon* powder mixed diet on the growth performance of freshwater grass carp *Ctenopharyngodon idella*.

Materials and Methods

Alive freshwater grass carp *Ctenopharyngodon idella* fingerlings (50 g) were collected from June 2015 to May 2016 at Himalayan fish farm near Thanjavur, Tamil Nadu, India. The fishes were brought to laboratory in alive condition acclimated and reared in glass tank (15 × 90 × 60 cm) for 7 days. The fishes were grouped into two groups namely control and experimental group each group consists of 20 fishes. The fish were fed 10% of the body weight daily, which was split into two equal rations in the morning and evening. The control group fed with formulated feed and experimental group fed with *Cynodon dactylon* powder mixed diet. Continuous aeration was done with help of aerator. The water in both aquaria were changed every alternate days. The feeding trial were conducted for 60 days in replicate.

In the present study for the preparation of experimental diet and phytochemical analysis the plant *Cynodon dactylon* was collected from in and around College Campus, Thanjavur district, Tamil Nadu, India. The plant sample were brought to the laboratory, clean and shade dried for a week. The dried plant were powdered by tissue homogenizer and passed through 20 μ mesh sieve. The powder were used for preparation of experimental diet and phytochemical studies. The extract was prepared by using organic solvents such as methanol and chloroform. The concentrated extract were kept in refrigerator at 4°C until further use. The phytochemical screening of various fractions from methanolic and chloroformic extract of *Cynodon dactylon* were carried out by using standard procedure (AOAC method, 1995).

Preparation of control and experimental diet

The common ingredients in control diet were rice bran, groundnut oil cake, fish meal, wheat flour, tapioca flour and vitamin and mineral mix. The ingredients were ground well to a fine-powder and mixed thoroughly with water to get smooth dough. This was extruded through a pelletizer, the pellets were dried and then stored in dry air tight container at 28°C. The experimental diet was prepared along with formulated feed ingredients 10 per cent of *Cyanodon dactylon* plant powder and pellets were stored.

Growth parameters

In the present investigation, the growth performance of the fish was evaluated using Halver's procedure (1972). The fishes in control and experimental tanks, weighed individually and separately nearest 0.1 mg at 10 days intervals, the entire period of 60 days of feeding trial. The length of the fish was measured by using Vernier Calliber. The fishes were weighed with help of top pan balance. From the data, the average length and weight of the fishes were calculated and other parameters were determined by using the following formula.

$$\text{Body weight gain (BWG)} = \frac{\text{Final weight} - \text{Initial weight}}{\text{Initial weight}} \times 100$$

$$\text{Specific growth rate (SGR)} = \frac{\text{In final weight} - \text{Initial weight}}{\text{Number of days}} \times 100$$

Result

In the present study, the percentage of fish feed ingredients used in control and experimental diet are given in the table 1. Both control and experimental diet the fish feed ingredients were rice bran, groundnut oil cake, fish meal, wheat flour, tapioca flour, vitamin and mineral mixture used in different percentage, but in experimental diet in addition to above ingredients *Cynodon dactylon* powder (10%) was added. The proximate composition of feed ingredients were analysed and given in the table 2. From the table protein, carbohydrate, fat and ash content of various feed ingredients significantly varied. The proximate composition of control and experimental diet showed a slight variation. The variation may be due to the adding of *C. datylon* powder in experimental diet.

The result of phytochemical screening of methanolic and chloroformic extract of *Cynodon dactylon* indicates the presence of primary and secondary metabolites such as protein, carbohydrates, fat, reducing sugar, amino acids, alkaloids, flavonoids, anthroquinone, anthocyanin, benzaconone, qnercetin, coumarins, Ephedrine, Glycosides, Kaemferol, Phenol, Myricetin, Phlobatannins, Phytosteroides, Saponin, terpenoids and tannins. The presence of lot of primary and secondary metabolites in *Cynodon dactylon* increased the growth of grass carp *C. idella* fed with experimental diet.

The growth performance of grass carp *Ctenopharyngodon idella* exposed to control and experimental diet is given in the table 3. The weight and length of the fish were used as measures of growth. The growth performance of *C. idella* showed a significant variation in control and experimental diet. An elevated growth rate was recorded when the fish fed with *Cynodon dactylon* mixed diet than control diet during experimental period.

Discussion

In the present investigation, the differences in growth of grass carp, *Ctenopharyngodon idella* could be attributed to the quality, nutritive value of diet, ingestion and digestion. The proximate composition of various fish fed ingredients significantly varied. The percentage of total protein content slightly higher than other components in both control and experimental diet. Similar observations were reported by various workers [10, 14]. The experimental diet contain plant *Cynodon dactylon* powder (10%) resulted in elevated growth performance than control diet. In the present study, the increase in growth of grass carp fed with experimental diet is may be due to presence of plant materials with lot of primary and secondary metabolites. Similar observations were reported by earlier workers [2, 7, 9, 14, 15, 17].

Luo *et al.* [14] stated that the protein is the most important factor affecting growth performance of fish and feed cost. New substances are added in fish feed to improve food conversion efficiency that result in fish growth [4]. Takaoka *et al.* [7] obtained better growth in sea bream with dietary medicinal herbs mixed diet. John *et al.* [8] used different plants as feed additives which enhance the growth and improved survival of *Oreochromis niloticus*. A significant variation in growth performance and body composition of juvenile perch was observed when the fish fed with medicinal herbs mixed diet [19]. Usually plant materials having lot of phytochemicals. In the present study, the medicinal plant *Cynodon dactylon* having lot of primary and secondary metabolites such as protein, carbohydrate, fat, amino acids, alkaloids, flavonoids etc. Similar observation were reported by earlier workers [12, 18].

In *Catla catla*, *Cynodon dactylon* mixed diet improved growth, feed efficiency, body composition, digestive enzymes and antiprotease activity [10]. Sivagurunathan *et al.* [16] observed that the mixing of lotus in diet improved the growth and haematology of *Cirrhinus mrigala*. Dietary green tea extract improved growth performance, body composition and stress of fish [6]. The plant leaves as feed ingredient showed significant variation in growth performance of Tilapia [3, 11]. In the present study observed that the grass carp fed with *Cynodon dactylon* mixed diet have better growth and weight gain. Hence, it suggested that plant powder mixed diet is more suitable for *C. idella* culture practice.

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Table 1. Proportions and proximate composition of feed ingredients

Ingredients	Proportions		Proximate composition			
	Control feed (%)	Experimental feed (%)	Protein (%)	Fat (%)	Carbohydrate (%)	Ash (%)
Rice bran	40	35	7.43	4.08	11.79	13.28
Groundnut oil cake	30	25	48.97	11.69	8.56	9.04
Fish meal	15	15	54.22	12.13	9.42	21.65
Wheat flour	7	7	16.37	8.59	6.91	7.49
Tapioca flour	7	7	9.16	5.74	7.08	4.17
Vitamin mineral mix (powder)	1	1	-	-	-	-
<i>Cynodon dactylon</i> (powder)	-	10	29.88	4.93	8.11	16.13

Table 2. Composition of control and experimental diet

Ingredients	Control feed (%)				Experimental feed (%)			
	Protein (%)	Fat (%)	Carbohydrate (%)	Ash (%)	Protein (%)	Fat (%)	Carbohydrate (%)	Ash (%)
Rice bran	2.97	1.63	4.72	5.31	2.60	1.43	4.13	4.65
Groundnut oil cake	14.69	3.51	2.57	2.71	12.24	2.92	2.14	2.26
Fish meal	8.13	1.82	1.41	3.25	8.13	1.82	1.41	3.25
Wheat flour	1.15	0.60	0.48	0.52	1.15	0.60	0.48	0.52
Tapioca flour	0.64	0.40	0.49	0.29	0.64	0.40	0.49	0.29
<i>Cynodon dactylon</i> (powder)	-	-	-	-	2.99	0.49	0.81	1.63
<i>Total</i>	27.58	7.96	9.67	12.08	27.75	7.66	9.46	12.60

Table 3. Growth performance of grass carp *Ctenopharyngodon idella* fed with control and experimental diet

Days	Average body weight (g)		Average total length (cm)		Weight increase (g)		Total length increase (cm)		Body weight gain (%)		Specific growth rate	
	Control	Experimental diet	Control	Experimental diet	Control	Experimental diet	Control	Experimental diet	Control	Experimental diet	Control	Experimental diet
Initial	49.75 ± 0.59	50.01 ± 0.61	15.22 ± 0.30	16.10 ± 0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
10 th	64.30 ± 0.68	65.33 ± 0.76	17.02 ± 0.36	17.95 ± 0.37	14.55	15.32	1.80	1.85	29.24	30.63	1.11	1.16
20 th	87.44 ± 0.64	90.08 ± 0.91	18.91 ± 0.38	19.88 ± 0.39	23.14	24.75	1.89	1.93	35.98	37.88	1.33	1.39
30 th	118.24 ± 0.92	121.16 ± 0.93	20.81 ± 0.39	21.87 ± 0.40	30.80	32.08	1.90	1.99	35.22	35.61	1.31	1.32
40 th	158.20 ± 0.94	163.75 ± 0.95	22.75 ± 0.45	24.05 ± 0.44	39.96	41.59	1.94	2.18	33.79	34.04	1.26	1.27
50 th	206.63 ± 0.98	213.70 ± 1.00	24.95 ± 0.46	26.40 ± 0.46	48.43	49.95	2.20	2.35	30.61	30.50	1.15	1.16
60 th	270.55 ± 1.06	281.15 ± 1.07	27.35 ± 0.49	29.02 ± 0.51	63.92	67.45	2.40	2.62	30.93	31.56	1.17	1.19