



Evaluation of soyabean meal supplementation on growth performance

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Abstract

An experiment was conducted to determine the growth performance of Indian Major Carp *Catla catla*, fingerlings for period of 60 days. In the present study to investigate the effects of soya bean on growth performance and survival in common carp (*Catla catla*). Soyabean was incorporated into diets at concentrations of 1%, 2%, or 3%. The control diet contained no supplement. Soyabean at 3% produced the best and statistically significant ($p < 0.05$) weight gain. In general, Soyabean produced better growth than 1% and 2% supplementation. The present investigation shows that incorporation of soyabean in diets for common carp results in increased growth rate. Soyabean diet was most effective in stimulating fish growth.

Keywords: soyabean, *Catla catla*, growth performance

Introduction

Aquaculture is one of the fast growing systems in the world, which has emerged as an industry possible to supply protein rich food throughout the world (Prasad, 1996) [1]. Fish is an important dietary animal protein source in human nutrition. Production of aquatic species through freshwater fisheries and aquaculture for protein supply is being encouraged throughout the world. According to nutritionists, fish is an excellent substitute of protein for red meat. Fish flesh contains all the essential amino acid and minerals viz., iodine, phosphorus, potassium, iron, copper and vitamin A and D in desirable concentrations (Sandhu, 2005) [2].

Presently, aquaculture is facing heavy production loss both in hatcheries and grows out systems due to disease outbreak. In many land animals, growth stimulating microorganisms incorporated in the feed are reported to have beneficial effects. Since, the microorganisms or probiotics are found to have the capability of improving the water quality, their application in aquaculture has gained momentum. The Indian major carps *Labea rohui*, *Catla catla* and *Cirrhinus mrigala* are the most important commercial fishes in India with a maximum market demand and acceptability as food by the consumers due to their taste and flesh. They contribute about 67% of total freshwater fish production. Among this, *Catla catla* contributes a major portion to the freshwater fish production in South India. The aim of the present study was to evaluate the effects of Soyabean on survival and growth performance of *Catla catla* or the period of 60 days.

Materials and Methods

Collection and Acclimation of Experimental Fishes

Fingerlings of *Catla catla* (Average weight 4.70 ± 1.10 g) were procured from Fish farm, Thittai, Thanjavur District, Tamil Nadu, India, using cast net and maintained in the laboratory in a glass aquarium tank and acclimated in aerated tap water with continuous aeration for two weeks

prior to experimentation. During this period, fishes were fed with a known amount of fish food.

Preparation of Diet

The soya bean purchased from Punniamoorthy Pillai Department Stores (PPDS), Near New Bus stand, Thanjavur, Tamil Nadu, India. Soya bean further formulate a fine powder and used to prepare the experimental diet. The fingerlings were fed 3% of their body weight twice a day for 60 days. Every third day, tanks were partially cleaned and water was partially changed. The temperature averaged $28 \pm 1.5^\circ\text{C}$, dissolved oxygen 7.4 ± 0.6 mg/l, and total ammonia 0.5 ± 0.2 mg/l. Table 1 shows the ingredients and proximate composition of formulated diets.

Table 1: Ingredients and proximate composition of formulated diets

Ingredients (%)	All diets
Fishmeal	35.0
Soybean meal	17.0
Rice bran	11.0
Groundnut oil cake	10.0
Tapioca flour	10.0
Mineral premix	1.5
Vitamin premix	0.5

Table 2

Ingredients	Control	Soyabean	Soyabean	Soyabean
		1%	2%	3%
Wheat flour	15	14.0	13.0	12.0
Soyabean		1	2	3
Proximate composition (%)				
Crude protein	36.2	37.2	38.0	38.3
Crude lipid	7.6	8.1	7.2	8.2
Crude carbohydrate	21.2	20.8	21.6	20.7
Ash	8.4	9.2	8.1	8.9

Fingerlings were weighed and measured at 60th day to determine growth performance and survival. Survival percentage was calculated at the end of the experiment by counting the number of fishes in each tub and is calculated as follows:

$$\text{Survival (\%)} = \frac{\text{Total number of animal harvested}}{\text{Total number stocked}} \times 100$$

Statistical Analysis

Values were expressed as mean \pm SD for three trials in the each group and statistical significant differences between mean values were determined by one way analysis of variance (ANOVA) followed by the Tukey's test for multiple comparisons. The results were statistically

analyzed by SPSS ver. 20 was used $p < 0.05$ were considered to be significant.

Results

The results of the growth parameters of *Catla catla* fingerlings with different feeding regimes are presented in Figure 1. Growth parameters (Body weight, Weight gain, length and survival) of *Catla catla* fingerlings with different feed clearly showed significant enhancement with 3% soyabean when compared with other concentrations of and control. Soyabean fingerlings showed maximum increase in body weight ($10.29 \pm 0.04 \text{ gm}$), weight gain ($5.07 \pm 0.04 \text{ gm}$), total length ($69.49 \pm 0.59 \text{ mm}$) and survival (95%) were observed in 3% soyabean compared to control.

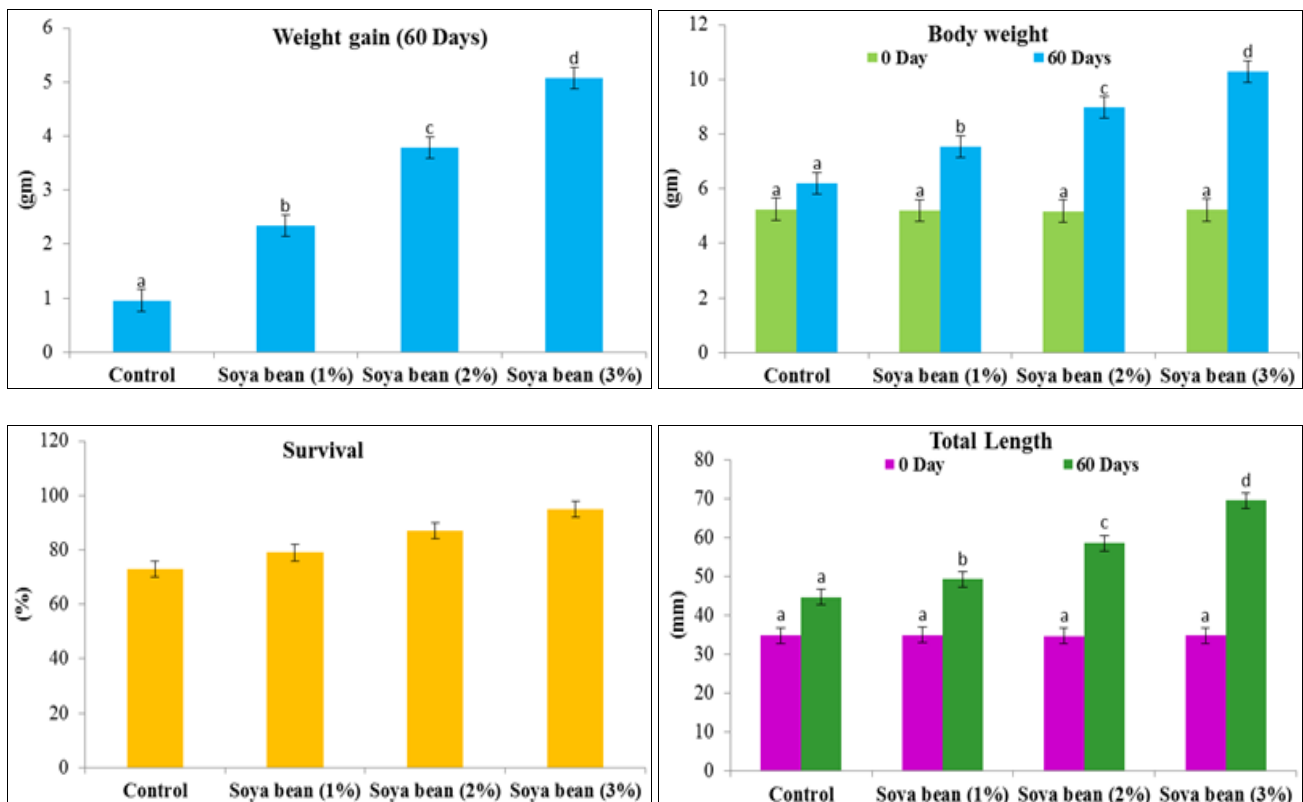


Fig 1: Impact of Soyabean on growth parameters of freshwater fish *Catla catla* (Fingerlings) with different feeding regimes.

Values are expressed as Mean \pm SD (Number of trials 3). Data were analyzed by one-way ANOVA followed by post-hoc Tukey test using SPSS ver. 20. Mean values within the column followed by different letters Superscript (homogeneous subsets) are statistically significant ($P < 0.05$) from each other group and same letter was statistically non-significant ($P > 0.05$). Significant level alpha 0.05.

Discussion

Carp farming has attained commercial culture status in India and many of its neighboring countries. With the intensification of culture, feed has become the most important component of the culture system from the viewpoint of both fish production and cost. Fish-meal based diets generally induce good growth. However, owing to the scarcity and escalating cost of fish meal, research on alternative sources is gaining importance (Shetty and Nandeesh, 1988) [3]. Soybean is regarded as one of the best protein source for having a good amino acid profile. It can be used to replace a considerable amount of fish meal diet in

omnivorous fresh water such as carp tilapia and catfish. Soybean meal can replace about 67 -100% of fish meal depending on species and sizes of fish. Dietary protein level, source, processing methods and culture system employed without negatively influencing growth performance (EL-Sayed, 1999) [4]. When 15% groundnut cake is included in diet, fish growth was depressed relatively. Soybeans protein products can be good substitutes for animal products because, unlike some other beans, soybean offers a complete protein profile that is essentially identical to the protein of other legume seeds and pulses (Tongsiri *et al.*, 2010) [5].

Results of this study substantiate the fact that food supplement have direct growth promoting effects on *Catla catla* which is accordance with the reports of Seenivasan *et al.*, (2012) [6] and Parthasarathy and Ravi, (2011) [7]. Among the various concentrations, 3% soybean diet possess potential growth performance was observed. Soyabean is being commercially cultivated because of its high protein content and as a supplement with many health and economic

benefits for humans and in aquaculture (Ogbonna *et al.*, 2014) [8]. This study also substantiates many other earlier reports on benefits of using soyabean as part of aquaculture diet for various commercially important food fishes. This is an agreement with the work of common carp on Abdul Kadhar *et al.*, (2012) [9] and Ramakrishnan *et al.*, (2008) [10]. The results of this study indicate that the soyabean could be incorporated in feed for *Catla catla* fingerlings as supplement has better growth performance than control.

In conclusion, the incorporation of soyabean in common carp diets improves growth performance and survival rate. The 3% soyabean diet was most effective in stimulating fish growth performance compared to control. This might be due to high nutritional content and synergic effect of soyabean.

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