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EVALUATION OF DIFFERENT CONCENTRATION OF SOYBEAN MEAL DIET ON GROWTH PERFORMANCE OF MAJOR CARP *Catla catla*

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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Short Research Article

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 soy bean on growth performance and survival in common carp (*Catla catla*). Soybean was incorporated into diets at concentrations of 1%, 2%, or 3%. The control diet contained no supplement. Soybean at 3% produced the best and statistically significant ($p<0.05$) weight gain. In general, Soybean produced better growth than 1% and 2% supplementation. The present investigation shows that incorporation of soybean in diets for common carp results in increased growth rate. Soybean diet was most effective in stimulating fish growth.

Keywords: Soybean; *Catla catla*; growth performance.

1. 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 [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 for protein for red meat. Fish flesh contains all the essential amino acids and minerals *viz*., iodine, phosphorus, potassium, iron, copper and vitamin A and D in desirable concentrations [2].

Presently, aquaculture is facing heavy production loss both in hatcheries and grows out systems due to disease outbreak [1]. In many land animals, growth-stimulating microorganisms incorporated in the feed are reported to have beneficial effects. Since

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microorganisms or probiotics are found to have the capability of improving water quality, their application in aquaculture has gained momentum. The Indian major carps *Lobea rohu, 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. Among these, *Catla catla* contributes a major portion to the freshwater fish production in South India. The present study aimed to evaluate the effects of Soybean on the survival and growth performance of *Catla catla* or the period of 60 days.

2. MATERIALS AND METHODS

2.1 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 before experimentation. During this period, fish were fed with a known amount of fish food.

2.2 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 it 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±1.5°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.

Fingerlings were weighed and measured 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:

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

2.3 Statistical Analysis

Values were expressed as mean ± SD for three trials in 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.

3. RESULTS

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

Table 1. Ingredients and proximate composition of diets (Ramakrishnan et al. [10])

Ingredients (gm)	Control Diet	1% Soybean Diet	2% Soybean Diet	3 % Soybean Diet
Fishmeal	35.0	35.0	35.0	35.0
Soybean meal	17.0	17.0	17.0	17.0
Rice bran	11.0	11.0	11.0	11.0
Groundnut oil cake	10.0	10.0	10.0	10.0
Tapioca flour	10.0	10.0	10.0	10.0
Mineral premix	1.5	1.5	1.5	1.5
Vitamin premix	0.5	0.5	0.5	0.5
Wheat flour	15	14	13	12
Soybean	-	1	2	3
Proximate composition (%)				
Crude protein	36.20	39.54	39.57	39.59
Crude lipid	7.60	9.85	9.83	9.84
Crude carbohydrate	21.20	24.45	24.47	24.53
Ash	8.40	9.62	9.87	10.08

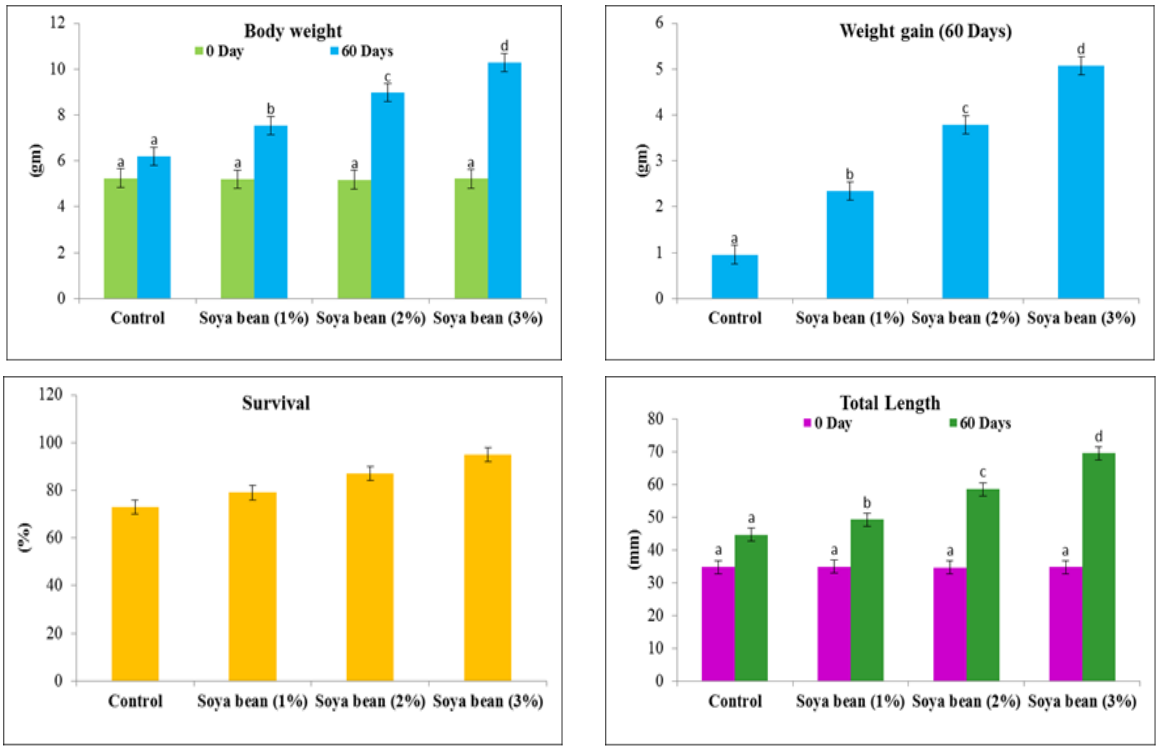

Fig. 1. Impact of soybean on growth parameters of freshwater fish *Catla catla* (Fingerlings) with different feeding regimes

Values are expressed as Mean ± SD (Number of trials 3). Data were analyzed by one-way ANOVA followed by a 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.

4. DISCUSSION

Carp farming has attained commercial culture status in India and many of its neighbouring 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 meals, research on alternative sources is gaining importance [3]. Soybean is regarded as one of the best protein sources 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. The 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 [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 [5].

Results of this study substantiate the fact that food supplements have direct growth-promoting effects on *Catla catla* which is in accordance with the reports of Seenivasan et al. [6] and Parthasarathy and Ravi, [7]. Among the various concentrations, 3% soybean diet possess potential growth performance was observed. Soybean 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 [8]. This study also substantiates many other earlier reports on benefits of using soybeans as part of the aquaculture diet for various commercially important food fishes. This is in agreement with the work of common carp on Abdul Kadhar et al. [9] and Ramakrishnan et al. [10]. The results of this study indicate that the soybean could be incorporated in the feed for *Catla catla* fingerlings as the supplement has better growth performance than control.

5. CONCLUSION

In conclusion, the incorporation of soybean in common carp diets improves growth performance and

survival rate. The 3% soybean diet was most effective in stimulating fish growth performance compared to control. This might be due to the high nutritional content and synergic effect of soybean.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Prasad G. The world aquaculture production: The present and future role of India. Seafood Export Journal. 1996;XXVII(7):13–16.
2. Sandhu GS. A textbook of fish and fisheries. Dominant Publishers and Distributors, New Delhi, India. 2005;39-40.
3. Shetty HPC, Nandeesha MC. An overview of carp Nutrition Research in India. In D Silva, SS (Ed.), Finfish Nutrition Research in Asia: Proceedings of the Second Asian Fish Nutrition Network Meeting. Heinemann Asia, Singapore. 1988;96-116.
4. EL-Sayed AFM. Alternative dietary protein source for farmed tilapia (*Oreochromis* species). Aquacul. 1999;179:149-162.
5. Tongsiri, KringsakMang-A, Yuwadee Peerapornapisal. Effect of Replacing Fishmeal with Spirulina on Growth, Carcass Composition and pigment of the Mekong Giant Catfish. Asian Journal of Agricultural Sciences. 2010;2(3):106-110.
6. Seenivasan C, Saravana Bhavan P, Radhakrishnan S, Muralisankar T. Effects of probiotics on survival, growth and biochemical constituents of freshwater prawn *Macrobrachium rosenbergii* post larvae. Turkish Journal of Fisheries and Aquatic Sciences. 2012;12:331-338.
7. Parthasarathy R, Ravi D. Probiotic bacteria as growth promoter and biocontrol agent against *Aeromonas hydrophila* in *Catla catla* (Hamilton, 1822) Indian J. Fish. 2011;58(3): 87-93.
8. Ogbonna SU, Uhuo CA, Okereke CN, Azi SO, Nwanchor KC. Effects of soybean meal (Glycine max) on the growth performance and feeding habits of *Clarias gariepinus* fingerlings reared under laboratory condition. Sky Journal of Biochemistry Research. 2014;3(3):033–036.
9. Abdul Kadhar M, Saiyad Musthafa M, Chitrarasu P, Arunkumar MS. Jawahar A. Growth response of two Indian major carps *Catla catla* (hamilton) and *Cirrhinus mrigala* (hamilton) fingerlings fed diet containing different nutritional supplements. International Journal of Applied Biology and Pharmaceutical Technology. 2012;280-87.
10. Ramakrishnan MC, Haniffa M, Manohar M, Dhanaraj M, Arockiaraj AJ, Seetharaman S, Arunsingh SV. Effects of probiotics and spirulina on survival and growth of juvenile common carp (*Cyprinus carpio*). The Israeli Journal of Aquaculture – Bamidgeh. 2008; 60(2):128-133.

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