To study the effects of different food ingredients on growth of *Labeo rohita*

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Abstract
Fish and fisheries cultivation is well developed in India, on the economic point of view it is necessary to find out the different technique to enhancing the rate of production as well as proper growth of fishes with in short time. In this research article we are also focusing the rate of production and growth effects on *Labeo rohita* species by using the different feed. So it was recommended that fingerlings of *Labeo rohita* can be successfully raised on diets containing soyabean flour. It is therefore suggested fingerlings of *Labeo rohita* and should be of cardinal importance to the fish farmers for formulating new strategies to employ the food for acceleration of the growth of fish. Soyabean meal, the most commonly used plant protein in feed for fishes, has been found to be relatively good protein source for fish. It provides better growth of juvenile that fishmeal. Soyabean meal, levels of 20-20% of the diet has been suggested for replacement of fishmeal.

Keywords: effects, food, ingredients, growth, *labeo rohita*.

1. Introduction
India is one of the major country in the world which having the largest productive costal area, for Fisheries and aquaculture. Fishery is an important economic activity in developing countries like India. This country presents a vast scope for fish product from marine and inland resources. Aquaculture is the farming of aquatic organisms in inland and coastal areas. For several decades aquaculture has been the fastest growing food production sector in the world.

Fish is pre-eminent as an internationally traded animal source food of the human diet in almost all countries of the world. A break down showed, fish accounts for more than fourty percent of the protein diet of two third of the global population [1-2] (Eyo, 1992 and FAO 1999). Due to increase in human population, demand for fish as a source of protein is on the increase [3] (Abolarin, 1996). It is highly nutritious; it can provide vital nutrients absent in typical starchy staples which dominate poor people's diets [4-5] (FAO, 2005, 2007). Fish provides about 20% of animal protein intake [6] (Thorpe *et al.,* 2006) and is one of the cheapest sources of animal proteins as far as availability and affordability is concerned. for the people in the other extreme of the nutrition scale, fish is a health food owing to its proteins, oils, vitamins (A, D, E), iron, calcium and minerals and the benefits associated with the consumption of small indigenous fishes [7] (Mohanty *et al.*, 2010).

The knowledge of the specific protein requirement of the fish is essential for the formulation of well-balanced feeds for successful intensive culture. The results of the proposed research will help fish feed industrialists to prepare cheap and specific feed from the locally available raw materials for the better growth and survival rate of fish *Labeo rohita* and also helps the fish formers to get maximum yield in a minimum period of time for the carps fed with cheap and proper feed.

2. Material and Methods
2.1. Collection and Acclimatization of Fish Seed
For experiment the large fingerlings of Indian major carp, *Labeo rohita* of fairly uniform size were obtained from Government Fish Seed Farm of Mahan Dist. Akola. The large fingerlings of size 50-55mm were selected and transported in large plastic bags containing the pond water in which oxygen was prior to transport. The fingerling were brought to laboratory where they were observed for any pathological symptoms and then dilute bath (1%) of potassium permanent (KMnO4) for 15 minutes so as to any dermal infection. The fingerlings were then rinsed in water and acclimatized for a period of one week. The acclimatization was carried out following the various recommendations for the maintenance every effort was made to provide optimum condition to fish. General behaviour of normal fish was observed. If mortality occurred under these conditions, dead fishes were removed immediately for fear that such mortality might deplete dissolved oxygen to great extent with resultant effect on fish.

2.2. Stocking and feeding up of Fingerlings
For the purpose of experimentation, five nylon net hapas of size 4x2x3 ft were constructed and out of these, four were installed at four corners of the rearing pond and fifth was in the middle of the pond. Four different food ingredients viz. Rice bran, ground nut hapas were named after the name of food ingredients used. The hapa installed in the middle of the pond was used as Control. 50 fingerlings were stoked in each of the hapa and were fed with the above said food ingredients. Feeding was regularly carried out twice a day i.e. at 9:00 AM and 4:00 PM. For four months i.e. from October to January. Every month ten individuals from each hapa were taken out the further studies of length, weight and biochemistry.

2.3. Growth Study
The length – weight relationship of the major carp *L. rohita*, was studied for four months i.e. October 2010 to January 2011. During the study period length and weight of 10 specimens from each hapa were recorded separately at biweekly intervals. The total length and the body weight were recorded immediately after the collection with the help of measuring board and weighing balance. The values of length and weight were determined to the nearest mm and mg respectively. The length- weight relationship was determined using the parabolic equation.

$$W=a\ L^{b}$$

Where,

W = weight of the fish,

a = Multiplying constant,

b = exponent of length, the growth factor and

L = length of fish for a given season.

The correlation co-efficient 'r' was calculated by using following formula

$$R = -\sum XY - X\sum Y/(\sum X^2 - X\sum X)(\sum Y^2 - Y\sum Y)$$

The relative condition factor (Kn) was computed by using formula

$$Kn. = W_0 / Wc,$$

Wherein W_0 = Observed weight of the fish,

And Wc = Calculated weight of the fish.

3. Result and Discussion

The term growth will signify change in magnitude. The variable undergoing change may be the length or other physical dimensions, including volume, weight, or mass either of an organism's whole body r its various tissues or it may relate to lipids, protein content, or other chemical constituent of the body. Growth may also relate to the change in the number of animals in population Average body weight gain by the fish after feeding with respective feed is tabulated in Table 1. Statistical analysis revealed that effect of diets on body weight, total body length was significant. The average weight and length of the fish increased considerably from the initial values 2.60 g and 5.5cm respectively) in all the dietary treatments. However, the highest attainment in fish body weight was recorded in the group of fish fed on Soyabean flour.

It indicates that mean body weight of rohu fingerlings fed on diet containing soyabean flour was significantly higher from diets containing rice bran, GNOC and Amaranthus. The comparison of mean values of total body length revealed that total body length of rohu fingerlings fed on diet containing soyabean flour was significantly higher compared to diets containing rice bran, GNOC and Amaranthus. The body length for diet containing ricebran, GNOC, Amaranthus was not significantly different among each other but was significantly different from diet containing soyabean flour.

Table 1: Overall comparison of average body weight (in gms) of *Labeo rohita* fed on different diets.

Day	Control	Experimental			
		RICE-BRAN	GNOC	Soya Flour	Amaranthus
0	2.62	2.61	2.59	2.6	2.6
15	6.4	7.2	7.8	8.52	6.8
30	13.7	17.11	16.54	20.12	15.12
45	22.4	25.41	28.62	33.52	23.56
60	32.35	37.2	42.5	51.42	35.32
75	43.6	56.20	58.3	65.18	52.62
90	59.26	67.42	71.6	78.46	64.2
105	68.3	82.4	84.4	94.9	75.2

The average weight and length of the fish increased considerably to the final values 94.9gms and 16.9cm for rohu fingerlings fed with soyabean flour. For control group values recorded are 68.3gms and 14.2cm respectively. For different diets i.e. rice bran, GNOC, Amaranthus the final values of average weight and length are 82.4gms and 15cm; 84.4gms and 15.7cm; 75.2gms and 14.7cm respectively. The results of the present study demonstrate that the highest growth was obtained in fish fed on soyabean flour comparable to that of other food ingredients. Similar observations were reported by many researchers. Amongst several plant protein sources, soyabean oil cake was reported to be most efficiently utilized by fingerlings Labeo rohita. Demonstrated the superiority of soyabean flour in terms of weight over traditional feed mixture of groundnut oil cake rice bran in their experiment on Indian major carp spawns. They recorded a high survival of 88% and weight increment of 4.71mg in *catla* spawn fed on soyabean meal as a protein source in the diet of grass carp fry and record the average body weight of each individual being 0.4gm during the 70 days of the experiment conducted an experiment to study and compare the survival and growth of common carp from spawn and fry when fed on soyabean flour and conventional feed of rice bran and groundnut oil cake. It is clear that soyabean flour is proved to be superior to conventional feed for common carp spawn.

Table 2: Overall comparison of average body Length (in cm) of *Labeo rohita* fed on different diets

Day	Control	Experimental			
		RICE-BRAN	GNOC	Soya Flour	Amaranthus
0	5.5	5.5	5.5	5.6	5.5
15	6.2	6	6.1	6.5	5.9
30	7	6.9	6.9	7.3	6.7
45	8.2	8.2	8.1	8.3	7.9
60	9.1	9.4	9.2	9.3	9.2
75	10	10.1	10.1	10.4	10.1
90	12.3	11.9	12.4	13.1	12.2
105	14.2	15	15.7	16.9	14.7

3.1. Length- weight relationship

Length-weight relationship models are to predict growth (in terms of growth as some function of length) and to assess nutritional status as denoted by condition. The importance of a model for determining both growth and condition is immense. Daily feed ration is based on the estimated weight and length of fish. Length and weight data are useful standard results of fish sampling programs. In the fish, size is generally more biologically relevant than age, mainly because several ecological and physiological factors are more size-dependent. Consequently, variability in size has important implications for divers' aspects of fisheries science and population dynamics. Length-weight regressions have been used frequently to estimate weight from length because direct weight measurement can be time-consuming in the field**.** Length-weight relationship observed in this investigation is shown in Table 3.

Table 3: Length-weight regressions

Ingredients	Parameter	October	November	December	January
Rice Bran	No. of Fish Studied	10	10	10	10
	Growth coefficient(b)	1.9488	1.9557	1.9880	2.0555
	Calculated (a)	0.45181	0.45187	0.45197	0.45100
	$W=aL^b$	0.45181L2.24267	0.45187L3.30474	0.45197L3.3030	0.45100L3.3508
	Correlation co- efficient(r)	0.92512	0.92571	0.9879	0.9985
GNOC	No. of Fish Studied	10	10	10	10
	Growth coefficient(b)	2.24267	2.29001	2.2985	2.3578
	Calculated (a)	0.01697	0.01718	0.01788	0.01877
	$W=aL^b$	0.01697L3.304	0.01718L3.3546	0.01788L3.3789	0.01877L3.3568
	Correlation co- efficient(r)	0.8742	0.8794	0.8879	0.8999
Soya Flour	No. of Fish Studied	10	10	10	10
	Growth coefficient(b)	3.30474	3.3457	3.4985	4.05001
	Calculated (a)	5.12964	5.12999	5.12512	5.13440
	$W=aL^b$	5.12964L1.52285	5.12999L2.98760	5.12512L30.3584	5.13440L2.2587
	Correlation co- efficient(r)	0.87426	0.87418	0.8979	0.9125
Amaranthus	No. of Fish Studied	10	10	10	10
	Growth coefficient(b)	3.34729	3.3587	3.3789	4.1245
	Calculated (a)	0.67138	0.67441	0.67115	0.67889
	$W=aL^b$	0.67138L2.09001	0.67441L2.0457	0.67115L2.0479	0.67889L2.0456
	Correlation co- efficient(r)	0.60046	0.60104	0.6502	0.6888

4. Conclusion

Based on the results of this study, we recommend that fingerlings of *Labeo rohita* can be successfully raised on diets containing soyabean flour. It is therefore suggested fingerlings of *Labeo rohita* and should be of cardinal importance to the fish farmers for formulating new strategies to employ the food for acceleration of the growth of fish. Soyabean meal, the most commonly used plant protein in feed for fishes, has been found to be relatively good protein source for fish. It provides better growth of juvenile that fishmeal. Soyabean meal, levels of 20-20% of the diet has been suggested for replacement of fishmeal. The variation in the amount recommended may reflect differences in species, size, and quality of test ingredients, nutrient content of basal diet and feeding practices, as well as culture conditions.

5. References

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