



## "Evaluating The Effectiveness Of *Spirulina* Algae-Based Feed For Indian Major Carp Fingerlings"

Ankit Chaudhari<sup>1\*</sup>, Kapila Manoj<sup>2</sup>

<sup>1\*</sup>Research scholar, Dept. of Aquatic Biology, Veer Narmad South Gujarat University, Surat 395007, Gujarat, India. [ankitchaudhari.dab19@vnsgu.ac.in](mailto:ankitchaudhari.dab19@vnsgu.ac.in)

<sup>2</sup> Professor and Head, Dept. of Aquatic Biology, Veer Narmad South Gujarat University, Surat 395007, Gujarat, India. [kapilamanojee@yahoo.com](mailto:kapilamanojee@yahoo.com)

**\*Corresponding Author:** Ankit Chaudhari

\*Research scholar, Dept. of Aquatic Biology, Veer Narmad South Gujarat University, Surat 395007, Gujarat, India. [ankitchaudhari.dab19@vnsgu.ac.in](mailto:ankitchaudhari.dab19@vnsgu.ac.in)

<p>CC License CC-BY-NC-SA 4.0</p>	<p style="text-align: center;"><b>Abstract:</b></p> <p>"Nutrition is essential for all living organisms, including fish, supporting reproduction, growth, and overall health. Feeding management significantly impacts the success of fish farming endeavors. Fish farming requires well-balanced, cost-effective feeds for success. The objective of this study was to evaluate the effect of <i>Spirulina</i> feed on growth and meat quality of Indian Major Carps fingerlings [rohu (<i>Labeo rohita</i>) and mrigal (<i>Cirrhinus mrigal</i>)]. The 6-month experiment was conducted to investigate the impact of <i>Spirulina</i> diets on the growth of fingerling Indian Major Carps. Various growth parameters, such as average body weight gain, daily and relative weight gain, feed conversion ratio, survival rate, and flesh quality, were assessed following the experiment. The experimental feed was given to the fish (IMC fingerlings) once a day rate of 10% of their body weight.</p>
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### 1. INTRODUCTION:

In fish farming, it is important to emphasize the supplementation of artificial feed. Given that feed constitutes the primary variable cost in fish farming, accurate knowledge of nutritional requirements is essential. This enables the formulation of cost-effective, nutritionally balanced diets customized to meet the specific needs of the fish. Carp farming accounts for about 85% of India's aquaculture production. Catla, rohu, mrigal, and kalbasu are popular eating fish in India, known for their rapid growth. These carps have become popular in various Southeast Asian nations. Because of their flavour and meat, the three main carps in India—*Catla catla*, *Labeo rohita*, and *Cirrhinus mrigala*—are the most valuable commercial fish in the country and have the highest market demand. As a result, the goal of the current study was to assess how *Spirulina* affected the growth and meat quality of Indian Major Carps fingerlings [rohu (*Labeo rohita*) and mrigal (*Cirrhinus mrigal*)].

### 2. METHODOLOGY:

#### 2.1 Fish collection and maintenance:

Indian large carp fingerlings were obtained from Kosmada Fish Farming and Breeding Center and brought to Department of Aquatic Biology, VNSGU, Surat. The fingerlings were successfully acclimatized and kept as stock.

## 2.2 Fish stocking Density, and Experimental Specimen:

The experiment was set up at the Aquarium Room of the Department of Aquatic Biology at VNSGU in Surat. Four IMC fingerlings were put into 100 L aquarium filled with water. For one week, the fish were fed the experimental meal. The aquaria were covered with a net to prevent fish leaping out and insects from entering. Regular netting was carried out to prevent the build-up of primary productivity. The temperature required by Indian Major Carps (IMC) was kept in the optimum range of 25-30°C, while the pH was maintained between 7 and 8.

Table No:1 Proportion of ingredients in the experimental diets (IMC)	
<i>Spirulina</i>	20 gm
GOC	40 gm
Rice bran	30 gm
Wheat flour	10 gm
<b>Total</b>	<b>100 gm</b>

## 2.3 Preparation of experimental feed:

The experimental feed was prepared using locally available ingredients. Recognizing that no single feed material can provide a complete diet, mixtures of multiple ingredients were used in fish feed production.

## 2.4 Feed trials:

The experimental feed was given to the fish (IMC) once a day at a rate of 10% of their body weight.

## 2.5 Proximate Analysis of Feed and Ingredient Composition:

Table No:2 Proximate analysis of fish feeds and fish (IMC)					
Sample	Protein	Lipid	Sugar	Ash	Moisture
Fish (IMC)	17.02 %	0.007 %	0	0.006 %	13.29 %
<i>Spirulina</i> pellets IMC	28.83%	0.007%	3.69%	0.01%	0.005%

Proximate composition analysis of feed ingredients and prepared feed was conducted using standardized methods: crude protein by the micro-Kjeldahl method (IS: 7219, 2015), lipid by the Folch *et al.*, (1957) method, sugar by the sampling and analysis method for sugar confectionery (IS: 6287, 2015), and ash and moisture by the gravimetric method (AOAC, 2000). The findings of the fish feed and fish proximate analysis (IMC) are displayed in Table No. 2.

## 2.6 Impact of Feed on Ornamental Fish:

Observational Study Measurement of growth performance and Utilization Parameters.

**i. Body weight gain (g/fish)** = Mean of weight (g) at the end of the experimental period – weight (g) at the beginning of the experimental period (Schmalhusen, 1926)

**ii. Daily weight gain (DWG)** = Gain/ experimental period (Schmalhusen, 1926)

**iii. Relative weight gain (RWG %)** = Gain / initial weight x 100 (Brown, 1957)

**iv. Feed conversion ratio (FCR)** = Feed intake / Body weight gain (Uten, 1978)

**v. Survival rate (%)** = Surviving fish number / Initial number of fish x 100

**2.7 Statistical analysis:**

Statistical analysis was conducted using Microsoft Excel. (Mean±S.E)

**3 RESULTS AND DISCUSSION:**

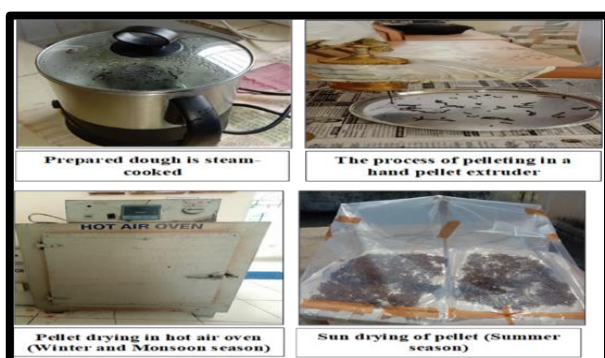
Based on the findings, the inclusion of Spirulina in the diet of Indian Major Carp (IMC) led to notable enhancements in growth parameters, including increased body weight, daily weight gain, relative weight gain, specific growth rate, survival rate.

Table No:3					
No	Average Body Weight gain (g)	Daily Weight gain (g/fish/day)	Relative weight gain (g/day %)	Feed conversion ratio	Survival rate (%)
IMC	1.875 ± 0.271	0.124 ± 0.018	11.062 ± 1.456	4.139 ± 0.469	100

**Figures:**



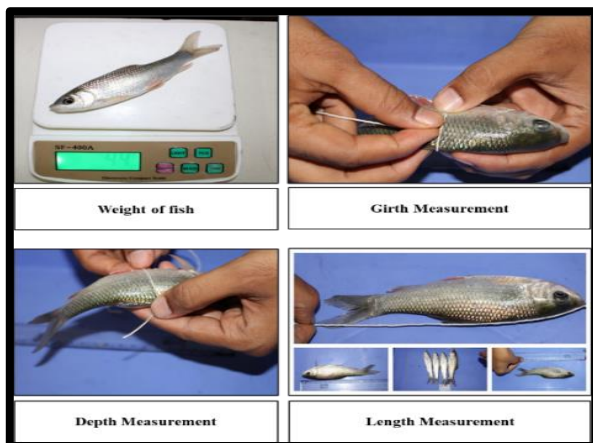
**Figure No:1. Spirulina, Rice bran and Wheat flour**



**Figure No:2. Feed preparation**



**Figure No:3. Spirulina Pellets**



**Figure No:4. Weight of fish, Girth, Depth and Length Measurements,**

#### 4 CONCLUSION:

To evaluate the impact of *Spirulina* on fish, the study involved formulating fish feed incorporating *Spirulina*, yielding positive outcomes for IMC fingerlings.

#### 5 ACKNOWLEDGEMENT:

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#### 6 REFERENCES:

1. Abbas, O. T., Mohammed, A. J., & Al-Hussieny, A. A. (2020). THE ABILITY TO USE SPIRULINA SP. AS FOOD FOR COMMON CARP FISH (CYPRINUS CARPIO L. 1758). *ResearchGate*.
2. AOAC (2000) Official Methods of Analysis. 17th Edition, The Association of Official Analytical Chemists, Gaithersburg, MD, USA.
3. Deka, A., Sahu, N. P., & Jain, K. (2003). Utilization of Fruit Processing Wastes in the Diet of *Labeo rohita* Fingerling. *Asian-Australasian Journal of Animal Sciences (Print)*, 16(11), 1661–1665.
4. Feed Conversion Ratio Of Major Carp *Cirrhinus mrigala* Fingerlings On Feeding Schedule Of Probiotic *Spirulina* Incorporated Experimental Diets. (2018). In *Journal of Emerging Technologies and Innovative Research* (Vol. 5, Issue 9, pp. 177–179) [Journal-article].
5. Habib, M. a. B. (2008). *review on culture, production and use of Spirulina as food for humans and feeds for domestic animals and fish*.
6. Indian standard method for determination of protein in foods and feeds (IS: 7219-1973)
7. Indian standard method of sampling and analysis for sugar confectionery (IS: 6287-1985)
8. Javeed, H. & Department of Fisheries Resource Management, SKUAST-K Rangil University, Jammu and Kashmir, India. (2023). *Spirulina a blue green alga as growth enhancer in fishes*. In *Research & Reviews: Journal of Zoological Sciences* (Vol. 11, Issue 1, p. 001) [Review Article].
9. Nandeesha, M., Gangadhara, B., Manissery, J. K., & Venkataraman, L. V. (2001). Growth performance of two Indian major carps, catla (*Catlacatla*) and rohu (*Labeorohita*) fed diets containing different levels of *Spirulina platensis*. *Bioresource Technology*, 80(2), 117–120
10. Noman, S. (2018). Use of spirulina in fish culture. *Seminar*. <https://bsmrau.edu.bd/seminar/wp-content/uploads/sites/318/2018/05/Use-of-Spirulina-in-Fish-Culture-13-05-3016.pdf>
11. *Therapeutic and Nutritional aspects of Spirulina in Aquaculture*. (n.d.). <https://scientificpublishers.com/therapeutic-and-nutritional-aspects-of-spirulina-in-aquaculture-JAA-03-0027>.