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## Growth performance analysis of *Catla-catla* (Hamilton, 1822) in rural earthen pond with the help of commercial and traditional feed

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**Abstract**

This 60 days experiment was conducted to analyse the Growth Performance of *Catla catla* (Hamilton, 1822) in Earthen Pond with the help of Commercial and Traditional Feed like; commercial available floating feed (FF), Rice Bran (RB) and Mustard Oil Cake (MOC) respectively. The present study was carried out under wild earthen pond with productive black soil at Simradi Village in Umaria district Madhya Pradesh India and the area of pond was 8000 sq. Feet (100 x 80 x 2.50 ft.) and divided into two equal half's with the help of net like; Pond A and B respectively. We collected fry of *Catla catla* from Government fisheries production unit Umaria District (MP) for this experiment. Besides this, stocking density was 800 fry in each pond A and B respectively. Throughout the experiment two distinct kinds of feed stuffs like; traditional ingredient (TF) with (Rice+ MOC) or (1:1) in Pond A and Commercial available floating feed (FF) with in Pond B used as diet respectively. Firstly, the experiment was initiated with mean initial length 2.6 cm and weight 0.35 g of catla fry in both experimental ponds. Randomly we analysed length and weight near about three times throughout the whole experiment. At last day of the experiment we observed a productive growth performance with commercial available floating feed (FF) as compare to traditional ingredient (TF) with (RB+ MOC) in all prospectives like; Survivability rate 77.5%, mean final length 18 cm & weight 25 gm and specific growth rate (SGR) 0.63 except feed conversion ratio (FCR) 0.951 respectively. All in all with commercial feed has a productive result as compare to traditional feed respectively. This experiment will give thrust to the fish farmers.

**Keywords:** Aquaculture, *Catla catla*, growth performance, survivability

**1. Introduction**

Aquaculture in India mostly based upon Indian Major Carps in Freshwater culture practices. Besides this, day by day increasing demand of protein can be full fill with the help of fisheries and aquaculture. *Catla-catla* is a major carp of India. In Madhya Pradesh there is also too much scope of *Catla-catla* production due to its high speed of growth rate, easily culture able low management cost, highly economically and tasty in food and high market demand. Hence, the present study was conducted on the growth of the *Catla-catla* fish for the research purpose. In this region there is a major problem for production of fishes in short interval of time. *Catla-catla* is fresh water fish belonging to *Class Cypriniformes*, *Order Cypriniformes*, *Family Cyprinidae* and indigenous fish of India. Body short and deep, somewhat laterally compressed, its depth more than head length; head very large, its depth exceeding half the head length; body with conspicuously large cycloid scales, head devoid of scales; snout bluntly rounded; eyes large and visible from underside of the head; mouth wide and upturned with prominent protruding lower jaw; upper lip absent, lower lip very thick; no barbells; lower jaw with a movable articulation at symphysis, without a prominent process; gill-rakers long and fine; pharyngeal teeth in three row, 5.3.2/2.3.5 pattern; dorsal fin inserted slightly in advance of pelvic fins, with 14 to 16 branched rays, the simple rays non-osseous; anal fin short; pectoral fins long extending to pelvic fins; caudal fin forked; lateral line with 40 to 43 scales. Food and feeding habits of *Catla-catla* has been a field of interest to fisheries researchers since very long. Natarajan and Jhingran (1961) <sup>[1]</sup> studied the food habits of *Catla catla* and reported a zooplankton dominated food preference for the fish <sup>[1]</sup>. Hora and Pillay (1962) <sup>[2]</sup> reported the feeding habits of *Catla-catla* and. Khan *et al.*, (1971) <sup>[3]</sup> have given a report on the food and feeding habits of an Indian major carp *Labeo rohita* (Ham). Catla is a surface column feeder fish, which feeds on small crustacean, insects, rotifers, algae, and vertebrates. Its growth rate is very fast.

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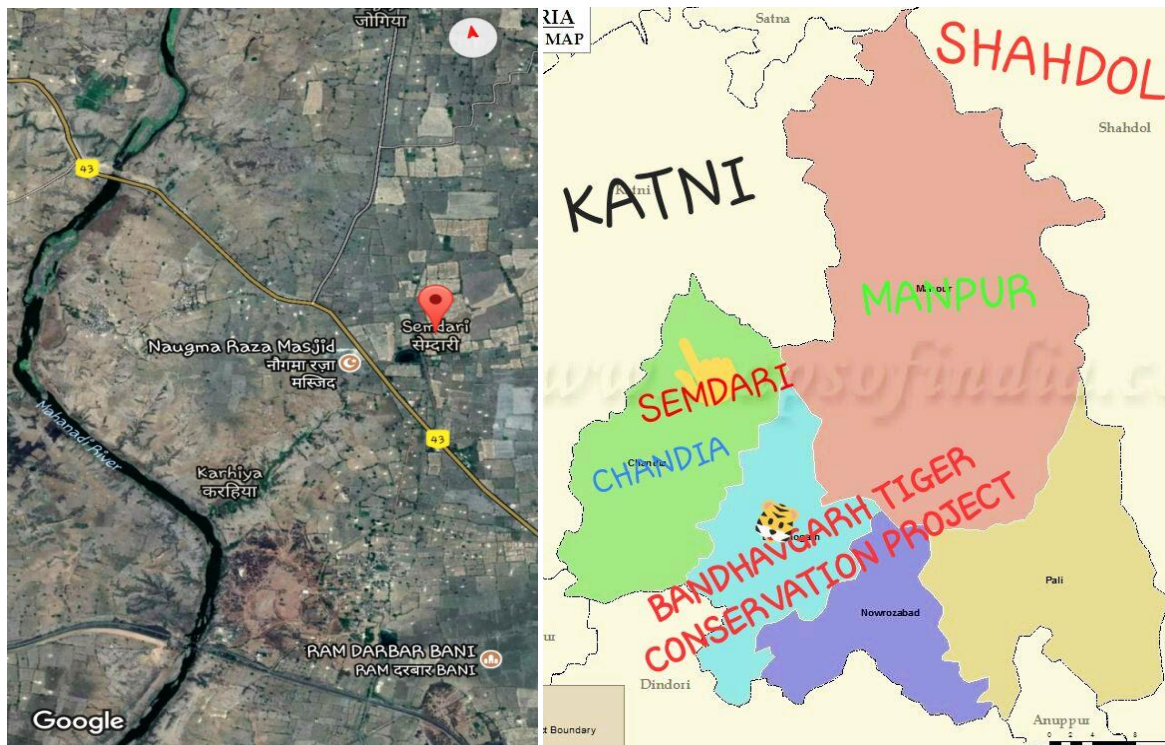
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Generally it attains 800 to 1000 gm by weight in one year. A full grown fish may attain a length of more than 4 feet. In natural conditions it takes 2 years to get fully mature (Awasthi, 2013) [4]. Fish generally grow rapidly before sexual maturity the average growth rates becomes lower than those of immature fishes of same age because of considerable amount of food is utilised for the formation of sperm and ova instead of transforming into muscles and bones. Primary factor which affect the growth of fishes are soil, water, temperature, dissolve gases, etc. Growth studies in teleost from Indian water are largely based on length weight relationship or on direct calculation of growth rate which may be classified as an absolute growth rate (Ricker, 1979) [5]. Fresh water pond total primary fish production depends upon availability of nutrients (primary nutrients) in the form of organic and inorganic fertilization respectively (Moriarity, 1997) [6].

## 2. Material and Methods

### 2.1 Area of Experiment

This research was done in the Simradi Village at Chandia Tehshil Latitude is 23.65°N and Longitude: 80.7°E in Umaria district Madhya Pradesh [Picture no. 1 & 2]. Installation of research setup held in this respective area's farm house. The Soil of this area is much diversified. In this region red soil black soil and red sandy soil is available. In our pond totally black soil is available, near of this research area one local river is also located approx 2 km is Mahanadi. The soil of our pond is very fertile. As this is wild earthen pond, hence rich in organic manure, humus and all fishes natural food. This pond is in area of 8000 sq. feet. By which it's separated through net in equal area of 4000 sq. feet. The dimension of pond is approx 100 x 80 ft. (L and W) and one side is irregular. The average depth of the pond was 2.5 ft.



Picture 1, 2: Google map view of study area

In this study, fry of *Catla-catla* was selected from Government fisheries production unit Umaria District (MP) under the super vision of Mr. Ashish Nayak AFO of Umaria District on the date of 10-Aug-2017, at 4:30pm. This fish feed was purchased from Hoshangabad and for security purpose of this pond we hired 2 worker under the supervision of Mr. Dadu Lal Singh CMO Nowrajabad (MP). During the research we focused on growth analysis of fry of *Catla catla* as per business point of view. Besides this, we used traditional and commercial feed throughout the whole experiment. On the other hand, experimental pond was divided into two equal parts as per recommended area and we stocked 800 fishes in each parts.

## 2.2 Equipments Used During the Research

### 2.2.1 Water Pump

Water pump was placed in culture pond for maintaining the water level during experiment. Besides this, there was two water bore well near the experiment area because of less rainfall in that year.

### 2.2.2 pH Measurement Paper Kit

pH plays an important role in aquaculture and it has great effects on fish growth and survival rate of fish during culture period. We measured pH with the help of pH paper kit with one test tube and we purchased this kit through scientific tools centre Katni M.P.

## 2.3 Pond Preparation and Management

### 2.3.1 Dimension of Experimental Area

The experimental pond comes under wild area with regular shape. This Pond was surrounded with agricultural land and depth of the pond was also recorded as irregular with average depth was 2.5 feet.

- Length: 100 ft.
- Width: 80 ft. (Irregular in size i.e. wild earthen pond).
- Depth: 2.50 ft.

Before stocking we manured the pond properly and now there was sufficient amount of plankton for fish culture. Water level

throughout the experiment was maintained up to 2 feet height. During the rainy season the water level increased but there was proper management of overflow to prevent the fishes escape from experimental pond. But during the study rain was not upto the mark and we faced water problem. To tackle this natural crisis of water we used underground water for maintaining the water level of experiment pond.

### 2.3.2 Drying of Pond

This experimental pond was a wild rural earthen pond and it was very difficult to complete drying the pond during rainy season. We already completed proper netting for the removal for predatory fishes before stocking of fish because the pond was in wild conditions. Besides this during netting we observed some weed fishes like; *Puntius* and various kinds of aquatic insects and aquatic animals also like; water bug, water scorpion and turtle respectively.

### 2.3.3 Liming of Pond

Liming was done at the rate of 300kg/Ha for pH improvement and disinfection of pond before stocking. The optimum pH for fish culture is approx (7.5 to 8.5). Lime stone was mixed with water and spread over the fish pond. Throughout the experiment at regular interval of time limed our pond.

### 2.3.4 Pond Fertilization

Pond fertilization is one of the key factors for maintain the proper nutrient level in pond for fish culture. In present study we manured our pond with proper organic and inorganic manure at regular interval of time.

### 2.3.5 Organic Fertilizers

In present study organic manures we used like; Cow dung 10 kg, SSP 500 gm, Urea 250 gm, Phosphate 500 gm. Mixtures of these manures were kept in tub for 7 days before application. Besides this, we mixed different types of manure in water for better application. During this experiment we used some aquatic plants for shedding to fry in pond because the depth pond was not appropriate.

### 2.3.6 Inorganic Fertilization

During this experiment we used Urea, potash and Single Super Phosphate for proper nourishing the pond because it is beneficiary for pond productivity.

### 2.3.7 Water Filling

Major source of water was rain only, but we have extra two water bore well for continuously water supply. We supplied proper water in the pond throughout the experiment for water depth and oxygen maintenance.

## 2.4 Stocking

We stocked 800 Fry of *Catla-catla* in each pond (@10000/hectare) in the evening hours. The initial length and weight of the fishes were recorded. Packed fish bags firstly we kept on the pond surface for maintenance of internal temperature of packed fish water. After 15 minutes of acclimatization we opened slowly-slowly packed bags with fry of *catla* and stocked in experimental pond. During stocking atmosphere temperature and humidity was also normal.

## 2.5 Feed Ingredients

The different feed ingredients used in our experimental feed

were Rice Bran (RB), Mustard Oil Cake (MOC), and Floating feed (FF). These feed ingredients were grinded and used as experimental feed with equal ratio of RB and MOC (1:1).

### 2.5.1 Feeding rate

Feeding rate should be accurate because growth of the fish depends upon it. Besides this, feeding rate was twice a day during this experiment. Feed calculation was done with the help of 5% body weight in both respective ponds.

### 2.6 Formula used for Growth performance analysis

$$\text{Feeding rate} = \frac{\text{Number of seed} \times \text{Average weight} \times 5}{100}$$

$$\text{Feed conversion ratio} = \frac{\text{Amount of dry feed consumed}}{\text{Live weight gain}}$$

$$\text{Specific growth rate} = \frac{\text{Log final body weight} - \text{log initial body weight}}{\text{Number of days}} \times 100$$

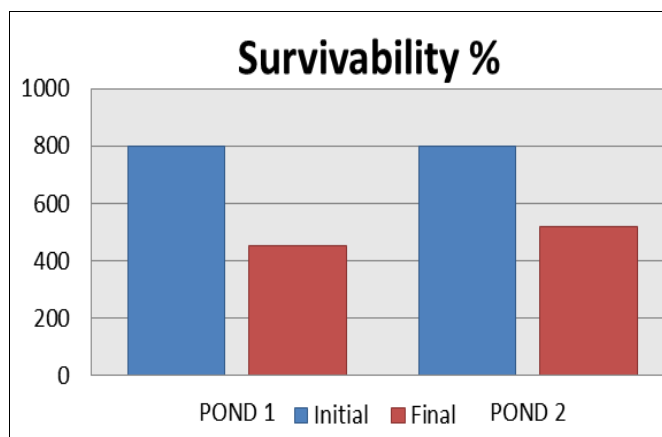
## 3. Results

### 3.1 Survival Rate of Fish

Fish Survival rate was 68.75% in Pond A with Traditional Feed and 77.50% with Commercial feed in Pond B at the end of 60 days experiment (Graph no.1). Highest survival rate was recorded with the Commercial feed in Pond B and lowest with the Traditional Feed (Rice+ MOC) in Pond A respectively (Table no.1).

**Table 1:** Representing survivability rate of fishes in respective ponds

Ponds	Feed / Diet	Initial	Final	Survivability (%)
A	Traditional Feed	800	550	68.75%
B	Commercial feed	800	620	77.5%



**Graph 1:** Representing the Survivability rate of fishes in respective Ponds

### 3.2 Growth performance parameters

**Table 2:** Representing Mean length & weight sampling during experiment in pond A

Pond number	Date of sampling	Mean Weight (gram/gm)	Mean Length (cm)
A	10/08/2017	0.35	2.6
A	09/09/2017	7.5	6.50
A	09/10/2017	18.0	16.0

**Table 3:** Representing Mean length & weight sampling during experiment in pond B

Pond number	Date of sampling	Mean Weight (gram/gm)	Mean Length (cm)
B	10/08/2017	0.35	2.6
B	09/09/2017	7.0	8.0
B	09/10/2017	25.0	18.0

### 3.3 Average Daily Weight Gain

The Highest ADG increment was recorded with Commercial Feed of Pond B and average is 0.41 g/day. The lowest ADG was recorded with Pond A average is 0.29 g/day [Table no.4].

### 3.4 Percentage (%) increment in length and weight

The initial length of fishes in both the ponds were Pond A (2.6 cm), Pond B (2.6) and initial weight of both the fishes were i.e. Pond A (0.35 gm) and Pond B (0.35 gm) [Table no.4]. The% increment of length and weight of both the ponds during the research was Pond A (515.38 cm and 592.30 gm) Pond B (5042.38 cm and 7042.86 gm) respectively [Table no.4].

**Table 4:** representing length weight performance during experiment

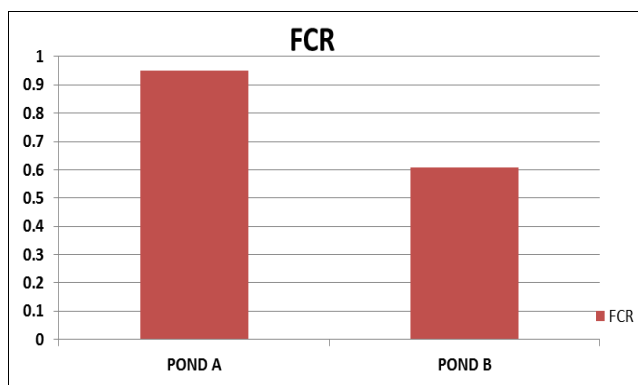
Measurements	Pond A	Pond B
Initial mean length (cm)	2.6	2.6
Final mean length (cm)	16	18
Initial mean weight (gm)	0.35	0.35
Final mean weight (gm)	18	25
Initial minimum length (cm)	2.1	2.3
Final maximum length (cm)	17	18.8
Initial minimum weight (gm)	0.33	0.31
Final maximum weight (gm)	18.70	26.3
% increment in length	515.38	592.30
% increment in weight	5042.38	7042.86
Average wt. Gain (gm)	17.65	24.65
Average daily wt. gain (gm)	0.29	0.41

### 3.5 Food Conversion Ratio (FCR) and Specific Growth Rate (SGR)

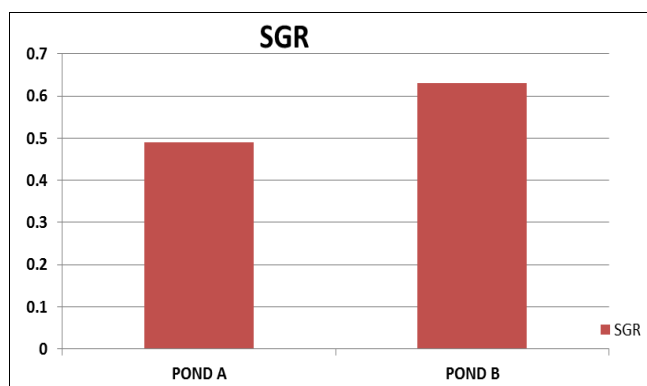
The food conversion ratio was lower with the Commercial Feed of 24% of Protein content feed followed by 0.607 FCR in pond B [Table no. 5 & Graph no.2]. The highest FCR was recorded with Pond A that was 0.951 through Traditional Feed and SGR of pond A (0.491) and in pond B (0.631) respectively [Table no. 5 & Graph no.3].

**Table 5:** representing FCR and SGR during experiment

Pond	Final Mean Wt.	Total Final Wt.	Initial Mean Wt.	Total Initial Wt.	Avg. Wt Gain	Feed Intake	Log Initial Wt.	Log Final Wt.	FCR	SGR
A	18	14,400	0.35	280 g	17.65	9420g	0.455	1.25	0.951	0.491
B	25	19,720	0.35	280 g	24.65	9420g	0.455	1.39	0.607	0.631



**Graph 2:** Representing Food Conversion Ratio



**Graph 3:** Representing Specific Growth Rate

## 4. Discussion

This work was started on 05<sup>th</sup> of August 2017 by the selection of site and other possible facilities which can be possible in that locality. We observed optimum concentration the planktons in both rural wild earthen ponds there water was

rich with level of nutrients with the help of proper liming and manuring during experiment. After first manuring within 4 days pond was full of planktons which was important factor for fish culture. Our major focus was that “how to increase the good table sized fish in short interval of time with help of distinct feed ingredients. Besides this, fry of *Catla-catla* was stocked during the evening time with proper care and precautions. After stocking we maintained regular feeding and monitoring of the culture at regular interval of time period. We observed and maintained proper length and weight recorded with interval of 30days during whole experiment. On the other side, we also maintained proper application of manure and lime throughout the experiment. During our experiment we analysed planktons and zooplanktons quantitative with the help of plankton net. On the other hand, water physico-chemicals parameter also maintained by proper management specially aeration. In this experiment we observed fluctuation of growth and feed acceptability via fishes during power cut for 3 days continuously in this area by MPEB Chandia. Fry of *Catla-catla* fed by traditional feed (Rice + MOC) and commercial feed during the experiment and there was huge variation in the length observation like; 2.6 cm to 16 cm and 2.6 to 18 cm respectively. Similar there was trend founded in weight also. The initial mean weight was 0.035 gm and final mean weight was obtained 25 gm on final sampling in Pond B with Commercial Feed respectively. On the other side, initial mean weight was 0.035 gm and final mean weight was obtained 18 gm on final sampling in Pond A with Traditional Feed respectively. Besides this, FCR was recorded for traditional feed was 0.951 with traditional feed and 0.631 in Commercial Feed with 24% protein content respectively. Abdullah. A. M. & Anisul. I. M., 2014 [7] The initial average weight (g) of catla, rohu and mrigal was 291.07±0.58 g, 230±2.89 g and 198±1.15 g while the final average weight (g) was 469.03±5.77g, 347.9±1.73 g and

321.67±1.15 g, respectively. During the beginning of experiment i.e., at the early January 2008, the initial weight of catla was significantly ( $p<0.01$ ) higher than rohu and mrigal, respectively. The monthly average growth of catla was always higher than those of rohu and mrigal during the entire experimental period. The highest weight gain day<sup>-1</sup> of catla, rohu and mrigal was observed to be 1.49 g in September, 0.74 g in July and 0.92 g in August where the lowest values of the same species were recorded as 0.06 g in January, 0.04 g in January and 0.07 g in February 2008, respectively. The initial weight, the final weight, the average weight gain day<sup>-1</sup> of catla was found higher than those of other two species. The net production (kg ha<sup>-1</sup>/10 months) of pure catla, rohu and mrigal in experiment I was recorded as 307.71±1.15, 223.26±1.73 and 280.01±2.89 kg, respectively.

## 5. Conclusion

During this experiment we reveal the growth performance of catla via using commercial feed and traditional feed respectively. We observed huge difference in length and weight with the help commercial feed as compare to traditional feed. In traditional feed with Rice and MOC, we observed that feed growth is not upto the mark as required as compare to formulated feed which is beneficial for fish growth performances. In this present research found that the fish collected from Govt. Fish Seed Production Centre Umaria takes some time to acclimatize in a new pond environment. It is important that to keep it in monitoring Pond to check the feeding rate and mortality rates also. The Present study also confirmed that *Indian Major Carp Catla-catla* started to take locally available ingredients like (RB+MOC) and also high protein containing floating feeds. Feed with high protein feed ingredients for better growth in terms of FCR, SGR and ADG as compare to traditional feed. In this whole study it is crystal clear that, all the fish farmers prefer good formulated feed as compare to their traditional feed methods. Besides this, traditional feed also effective in prospective of fish growth and development but Commercial feed has high protein content with balanced feed ingredients which is very productive in all prospectives. At the final fish farmer will get good economic strength in fish culture with the help of commercial feed in short time as compare to traditional feeding respectively.

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