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Study of average growth performance and condition factor of fish (Indian Major Carps) in the sub pond of the Gawala Talab, Maheshwar, Khargone (M.P.)

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Abstract
Average growth performance of fishes (*Catla catla, Labeo rohita and Cirrhinus mrigala)* has been studied in the sub pond of the Gawala Talab, Maheshwar, Khargone (M.P.), and a Semi intensive Carp farming system, during September to November, 2016. Pond management practices (pre-stocking and post stocking managements) were done properly. Highest increase in average length (cm) were noticed for *Cirrhinus mrigala* (48.80%) and lowest for *Catla catla* (30.07%).However, the percentage (%) increase in average growth (gm) were recorded highest and lowest for *Cirrhinus mrigala* and *Catla catla* as 172.42 % and 94.93 % respectively. The Condition Factor (K) was calculated in the range of 0.931-1.342 for the studied fishes. Results reveal that sub pond of the Gawala Talab is suitable for Carp farming system and aquaculture for Carp fishes can be done on large scale to increase their productivity.

Keywords: growth performance, condition factor (k), carp fishes and gawala talab

Introduction
Water is found to be most important factor for fish farming system and the quality and quantity of water available for this purpose should most be taken in consideration (Summerfelt, 2000) [1]. It has been reported that an inadequate environmental conditions are found to be one of most important factor that limits the fish production. The rate of metabolism *viz;* growth rate, egg formation and maturation, food consumption and digestion are affected by water temperature (Jonassen *et al.,* 1999) [2]. It was noticed that the pond shape is also an important factor that determines rate of fish growth and its health (Imsland *et al.,* 2006) [3]. Fish is an excellent source of protein in most part of the world and their swimming, feeding, breeding, digestion and excretion takes place due to physical support of water (Bronmark and Hansson, 2005) [4]. It has been noticed that monthly physico-chemical variations in aquatic bodies have also influence the fish growth and their biotic potential (Araoy, 2009 and Ovie *et al.,* 2011) [5, 6]. Previous report reveals that younger fish are capable to make double their weight than older in a short duration due to a decrease in potential growth rates (Alyshbaev, 2013, Kefi *et al.,* 2014) [7, 8]. It has been reported that the growth and specific growth rate of major carps were found to be higher in fertilized pond than in control (Azim *et al*., 2002) [9]. Since fish is an important dietary source of animal protein, required by human population in large scale worldwide, therefore present work has been aimed to evaluate an average growth performance and Condition Factor of fish in the sub pond of the Gawala Talab, Maheshwar, Khargone (M.P.).

Materials and Methods
Study Area
The sub pond of the Gawala Talab is situated in Gram Mahetwada (Block Maheshwar) District Khargone (M.P.). It is also known as "Katar Wali Talai" in local. The sub pond is spread around 1.5 hectare. This sub pond is used for rearing the fishes and is mostly based upon rain water. It consists of a short outflow. The sub pond of the Gawala Talab consists of the maximum depth; maximum length and maximum width as 3 m, 430 m and 33 m respectively (Figure-1).

Fig 1: Photograph of sub pond of the Gawala Talab Maheshwar, District Khargone (M.P.), taken with android mobile.

Fig 2: Process of liming

Fig 3: Removal of insects and Weeds with the help of cast net

Fig 4: Process of Manuring

Fig 5: Process of seed stocking

Pond Management

It includes pre-stocking and post stocking managements.

Pre-stocking management

Dewatering and Drying: The water of Gawala Talab allowed to evaporate during summer till cracks developed at the bottom. It helps in removing all the previous stock of fish fry and fingerlings including predatory and weed fishes, eradicating the insects and other unwanted biota.

Desilting: The loose bottom soil and silt, accumulated during the process of Manuring are removed periodically. But this pond is not so old and this steps was not undertaken generally.

Deweeding: Since the ponds are seasonal and are not very old, so this procedure was also overlooked but the marginal grasses were just cut in short to avoid erosion.

Liming: It was done @ 300 kg/ha as the soil is medium alkaline. It helps to destroyed all the microbes and different life stages of parasites (Fig-2).

Watering of pond: This pond are totally depends upon rain water.

Eradication of weed and predatory fish: These ponds were free of these unwanted fishes since the ponds were fully dried and cracked, so these procedures were not employed (Fig-3).

Eradication of crabs: Crabs were mostly seen in this area. It was eradicated during pouring out of the water from the ponds.

Manuring: Cow dung was added @10, 000 kg/ha and superphosphate @ 50 kg/ha to enhance the plankton growth in the pond (Fig-4).

Post-stocking management

Seed introduction in pond: There are 3 species of carp were introduced as seed, bought from fish farm (Table-1). Approximately, 50,000 seeds were put into the pond and cared properly (Fig-5).

Table 1: The ratio of different species introduced in the Pond

S. No.	Species	Ratio
1	Catla	30
2	Rohu	30
3	Mrigal	40

Feeding: The feeding was provided 5 times in week; one in the morning at 8 am and other at 5 pm in alternative way. Mustard oil cake, corn bran and some amount of cattle manure was also added to enhance the plankton's growth.

Seed analysis and harvesting: Fish seed were collected monthly from different area of the pond with the help of small drag nets of mesh size. Their length was measured with the help of scale (minimum graduation up to 0.5 mm) and the weight of the seeds fish was measured by using the digital weighing machine.

Finally, the fishes were collected through bigger drag nets and were first placed in hundies. Those fishes which were not sold in the market, stocked in the large pond of the Gawala by fishermen itself for the development of brood-stock for the next breeding season.

Condition Factor (K)

Condition Factor (K) was calculated by the following standard formula-

$$K = (W/L3) \times 100$$

Where, W=final weight gain (g) and L=final length (cm)

Results and Discussion

In present investigation, an average weight of *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were studied during September to November, 2016 (Table-2 and Figure). An average weight of *Catla catla* was noticed maximum as 111.29(2.110±6.680) gm (exhibits maximum growth) and minimum as 57.04(1.528±4.832) gm whereas, average weight of *Labeo rohita* was observed maximum as 65.65(1.964±6.212) gm and minimum as 30.504(1.255±3.971)

gm and maximum average weight of *cirrhinus mrigala* was noticed as 47.43(0.838±2.650) gm and minimum as 17.41(0.472±1.493) gm, illustrates minimum growth during September to November, 2016. However, the maximum length of *Catla catla* was noticed as 21.93 (0.223±0.704) cm and minimum length was estimated as 16.86 (0.158±0.499) cm. The maximum length of *Labeo rohita* was analyzed as 18.38 (0.293±0.928) cm and minimum as 13.81 (0.233±0.736) cm. Whereas the length of *Cirrhinus mrigala* was observed maximum as 16.74 (0.170±0.538) cm and minimum as 11.25 (0.172±0.544) cm (Table-2 and Figure-6). The Condition Factor (K) for *Catla catla, Labeo rohita* and *Cirrhinus mrigala* were estimated in the range of 1.054-1.342, 1.057-1.242 and 0.931-1.222 respectively. Further, the highest percent (%) increase in length (cm) and weight (gm) were noticed as 48.80 and 172.42 respectively for *Cirrhinus mrigala* and these values were calculated lowest as 30.07 and 94.93 respectively for *Catla catla* (Table-3 and Figure-7).

A good water quality is most important factor for growth and survival of the fish. It has been noticed that an average fish productivity of of Korrir and Laelay Wukro dams were estimated as 13.99 and 14.47 quintal/ha/year respectively and the physico-chemical properties of these micro dams were reported as good for fish productivity and agriculturist should used the micro dams through good management of the water bodies (Zebib andTeame, 2017) [10]. The mean weight gain values reported between 21.30 g and 29.43 g and the specific growth rate were noticed in the ranges between 1.99 to 2.26% during study the water quality parameters, nutrient utilization and growth of African catfish, *Clarias gariepinus,* (Ajiboye *et al*., 2015) [11]. The physical, chemical and biological qualities of water are main determinants of optimum production in fisheries sector (Bhatnagar and Devi, 2013) [12]. A mean total length was estimated as 54.081±1.139 cm, 51.601±0.754 cm and 51.723±0.541 cm) and mean weight was noticed as 3197.971±157.814 gm, 1853.333±82.959 gm and 1701.250±52.123 gm observed for catla, rohu and mrigal, respectively during study of length weight relationships and condition factors of Indian major carps in Jaisamand lake, India (Balai *et al*., 2017) [13]. However, it has been also noticed that the health and subsequent growth of fish are directly related to the quality of water bodies (Viadero, 2005) [14]. The Indian major carps was also studied in relation to growth parameters by (Ujjania *et al.,* 2013, Negi, 2013, Patel *et al.*, 2014; Barrich and Kaur, 2015 and Verma, 2015) [15, 16, 17, 18, 19]. Condition factor (K) is used as an index to moniters the feeding intensity, age and growth rates of fish species (Anene, 2005) [20]. The approximate value of K around 1.0 illustrates about the suitability of the environment for fish growth. The findings of present investigation are also in support of Gandotra *et al*., (2009) [21]. Gandotra *et al*. (2018) [22] also noticed that the varied condition factor (K) as 1.2268, 1.1015, 1.1008, 1.0343 respectively in different age groups, 0+, 1+, 2+ and 3+ age groups respectively and also found that these values decreases with advancing the age during study of *Labeo dero* from stream in Sunderbani, Jammu. However the decreasing trend in Condition factor has been noticed with increase in length, observed by Zakaria *et al*., (2000) [23], Olurin (2002) [24], Kanwal and Pathani (2011) [25], Saxena and Saksena (2013) [26] and Pawar *et al.,* (2017) [27]. Thus results of present investigation are found to be more or less similar to the findings of previous authors.

Table 2: Average growth rate of *Catla catla, Labeo rohita and Cirrhinus mrigala* during three month, September to November (2016).

S. No.	Fish Species	Month	Length(cm) Mean(SEM±SD)	Weight (gm) Mean (SEM±SD)	Condition Factor (K)
1	*Catla catla*	September	16.86 (0.158±0.499)	57.04(1.528±4.832)	1.190
2		October	19.27 (0.175±0.552)	96.03(1.641±5.189)	1.342
3		November	21.93 (0.223±0.704)	111.29(2.110±6.680)	1.054
4	*Labeo rohita*	September	13.81 (0.233±0.736)	30.504(1.255±3.971)	1.158
5		October	15.99 (0.281±0.890)	50.797(1.829±5.784)	1.242
6		November	18.38 (0.293±0.928)	65.65(1.964±6.212)	1.057
7	*Cirrhinus mrigala*	September	11.25 (0.172±0.544)	17.41(0.472±1.493)	1.222
8		October	13.91 (0.183±0.578)	25.07(1.268±4.012)	0.931
9		November	16.74 (0.170±0.538)	47.43(0.838±2.650)	1.011

Table 3: Percentage (%) increase in average growth rate of *Catla catla, Labeo rohita* and *Cirrhinus mrigala* during three month, September to November (2016).

Fish Species	% increase in length(cm)	% increase in weight (gm)
Catla catla	30.07	95.10
Labeo rohita	33.09	115.21
Cirrhinus mrigala	48.80	172.42

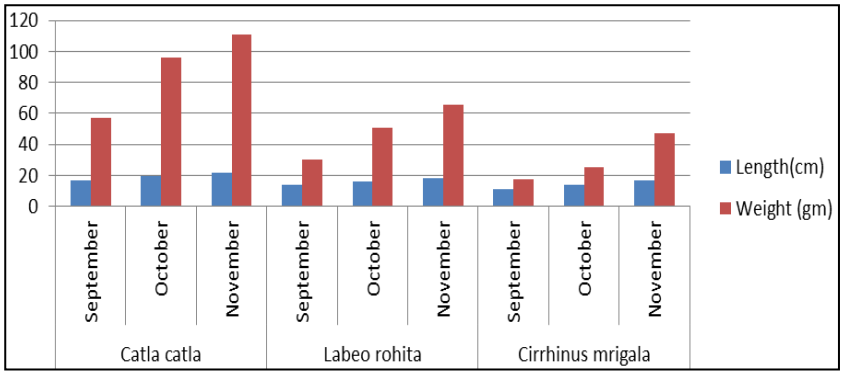

Fig 6: Average growth rate of *Catla catla, Labeo rohita and Cirrhinus mrigala* during three month, September to November (2016).

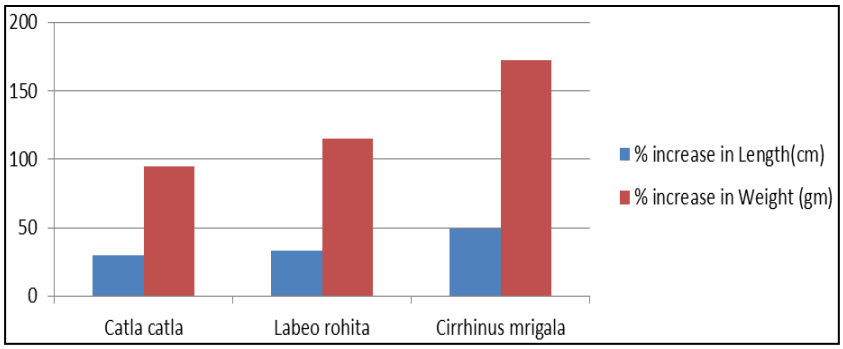

Fig 7: Percentage (%) increase in average growth rate of *Catla catla, Labeo rohita* and *Cirrhinus mrigala* during three month, September to November (2016).

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