Vol. 1 Issue No. 4, October-December 2017 e-ISSN 2456-7701

Journal of Science and Technological Researches

A Peer Reviewed Journal

Origin of Innovation

Domain: www.jstr.org.in, Email: editor@jstr.org.in

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Date of Received	**28 September, 2017**
Date of Acceptance	**30 September, 2017**
Date of Publication	**1 October, 2017**
No. of Reviews	**2**

To link to this article: http://jstr.org.in/downloads/pub/v1/i4/7.pdf

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e-ISSN 2456-7701
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ABSTRACT

In this research work we study the length-weight relationship and condition factor in *Cirrhina mrigala* (Ham.).These parameters correlated with growth, management and marketing of the fish population. In the last two years of study period (2014-16) we studies total 52 specimens of *Cirrhina mrigala*. Correlation coefficient r and Kn value (condition factor) has been computed and departure from cubic law have also been studies. A close relationship between length and weight was found, which is a very important aspect to investigate fish biological factor.

Keywords: *Length-weight relationship, condition factor, Cirrhina mrigala.*.

INTRODUCTION

In fishery science, the knowledge on the length-weight of fish has a vital importance, as it is not only helps to establish the mathematical relationship between the two variables-the length and weight, but also to convert one variable into another. The body parameter of a fish continually changes with ageing. The weight of a fish is a function of its length (Hile, 1936). The condition factor (Kn) in fishes is significant in understanding their nutritional and biological cycles. It has wide application in delineating the growth patterns during their developmental pathways and is also employed in setting up of yield equations. The length-weight relationship can be used to express the relative health, robustness and therefore, the economic value of the fish. The value of condition factor is useful in explaining differences among individuals of the same length, differences arising from seasonal changes in relation to the age and sex of the fish and differences between conditions of individuals of same species in different habitat conditions. Condition factor or ponderal index or more popularly K factor is another important derivative of growth.

The values of K differ with the season and are influenced by maturity of gonads and spawning season. Since Kn is a function of fatness, feeding and function of gonada, the factor indicates the general well being of the fish and a study of the changes in its values with increase in length may yield evidence concerning the size of the fish at first maturity, while its seasonal fluctuation my reflect the number of spawning during its life span. Some of the important studies on the said field are from Le Cren (1951), Chatterji (1980), Rao (1983), Lazarus *et al.* (1986), Powell *et al.* (1986), Devadoss (1989), Gupta (1991), Swain (1993), Srivastava *et al.* (1993), Mahapatra (1998), Ujjania *et al.* (1999), Begum *et al.* (2000) and Sherly (2002).

MATERIALS AND METHODS

The present study has been done at Sanda Saidanpur Fish Farm Centre, Salon, Raebareli. During the study period (2014-2016), 5-15 specimens of C. *mrigala* were observed in all the three seasons, i.e. monsoon, winter and summer. The total length and body weight were measured immediately after collection with the help of measuring board and weighing balance. The length-weight relationship was estimated by using the parabolic equation given by Le Cren (1951) :

$W = a L^n$

Where

W = Weight

L = Length

'a' and 'n' are constants.

a =multiplying constant. n= Exponent of length (usually lying between 2.5 to 4.0)

The values of an average total length were plotted against their respective weights. Condition factor have also been computed.

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e-ISSN 2456-7701
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RESULTS AND DISCUSSION

During the two years study period (June 2014 to May 2016) total fifty-two specimens of C. *mrigala* were studies seasonally. Its average total length and weight ranged from 17.20 cm/102.09 g (monsoon 2014) to 38.24 cm/722.24 g (summer 2015) in the year 2014-2015 and from 17.24 cm/102.23 g (monsoon 2015) to 38.58 cm/724.32 g (summer 2016) in the year 2015-2016 (Table-1)

The mathematical expression of length and weight relationship generally follows the Cube law, which signifies that the weight of the fish equals to the product of cube of its length. The parabolic form of C. *mrigala* is given below:

C. *mrigala*: W = 0.0014L1.7536

The perusal of length-weight equation of this fish in present pond revealed that the value is less than 3 and in a sense, deviated from Cube law. Whether the length-weight relationship will follow the cube law or not remained a subject of investigation and it has been found that it is perhaps dependent upon various environmental factors, besides body shape, outline and contour, Dietary, topographical and taxonomic factors influence 'n' (Le Cern, 1951). Environmental conditions such as winter-quality be responsible for this deviation from Cube law.

The coefficient correlation 'r' between length and weight in C. *mrigala* is 0.9968. This high value of significant positive correlation between length and weight in the present case revealed that applicability of equation derived is high. The study intend for indicating inter-seasonal variation by change of weight in relation to length. A numerical representation providing an index of condition of fish is therefore, desirable. The Kn value was found to be increased in monsoon months and decreased in summer season in C. *mrigala.* The increased Kn value indicative of increased deposition of fat as a result of adaptability and high feeding activity of the individuals. The decreased Kn value on the other hand is in indication of poor condition of the individuals.

ACKNOWLEDGEMENTS

The authors are thankful to the Fish Farm Managers of Sanda Saidanpur Fish Farm Centre, Salon, Raebareli for their cooperation.

Table 1 : Length-weight relationship in Cirrhina mrigala.

Season of collection	Average observed length L (cm)	Log length Log L	Average observed weight W(g)	Log			Calculated				Index of condition of C.mrigala	No. of Fish examined
				Log W	Log L *Log W	$(\text{Log L})^2$	Log a	'n'	Log W	Weight in (g)		
Monsoon2014	17.20	1.2335	102.09	2.0124	2.4663	1.5265	0.0014	1.7536	2.1651	146.24	1.9871	12
Winter 2014-15	26.48	1.4229	352.26	2.5469	3.6239	2.0246	0.0014	1.7536	2.4938	311.74	1.8972	7
Summer 2015	38.24	1.5825	722.24	2.8587	4.5239	2.5043	0.0014	1.7536	2.7737	593.84	1.2915	9
Monsoon 2015	17.24	1.2365	102.23	2.0096	2.4849	1.5289	0.0014	1.7536	2.1663	146.85	1.9951	8
Winter 2015-16	27.20	1.4346	352.00	2.5465	3.6580	2.0581	0.0014	1.7536	2.5143	326.82	1.7492	6
Summer 2016	38.58	1.5864	724.32	2.8599	4.5369	2.5167	0.0014	1.7536	2.7805	603.27	1.2614	7
Total		Σ Log L= 8.4984		Σ Log W= 14.8342	Σ(Log L × Log W) =21.3092	Σ $(\text{Log L})^2$ = 12.1591						N = 49

The value of correlation coefficient (observed length and calculated weight) r = 0.9968 ($p < 0.01$)

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e-ISSN 2456-7701
Vol. 1 Issue No.4, October-December 2017

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