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STUDIES ON THE SEXUAL VARIATION IN ALLOMETRIC CONDITION OF INDIAN MAJOR CARP, *Labeo rohita* (HAMILTON)

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ABSTRACT

Both male and female specimens of *Labeo rohita* (body weight, 230-250 gm) have been assessed during monsoon period, 2011. This season is particularly chosen because both male and female fishes attain their sexual maturity as well as optimum growth. The study reveals that the values of gastrosomatic index (GSI), gonadosomatic index (GnSI), hepatosomatic index(HSI) and conditional factor (K) in male and female sexes were 0.5 and 0.7, 0.4 and 0.9, 0.9 and 1.0 and 1.4 and 1.8 respectively. In support of above index values and conditional factors, sexual variation during monsoon period have been observed to be high in female than male. Endeavors and achievements of this work show that the growth rate of both the sexes is proper and aquatic condition (pH,8.0, alkalinity,66.0mg/lit, free CO_2, 9.5mg/lit, dissolved O_2, 6.5mg/lit, total solid, 114.0mg/lit, total hardness, 60.0mg/lit, total suspended solid, 4.0mg/lit, Chloride,10.6mg/lit) is favourable . Further female shows the faster growth than the male.

KEYWORDS : Sexual Variation, Algometric Condition, *Labeo rohita*

It is very well known fact that knowledge on fish biology particularly morphometry, length-weight relationship, condition factor, gastrosomatic index, gonadosomatic index, hepatosomatic index, breeding behaviour , food and feeding habit is of upmost importance in increasing the technological management (Evans, 2000; Russel and Yonge, 2002). Further data on age and growth, length-weight relationship and condition factor are valuable in describing the general biology of a fish (Soranganba and Saxena, 2007). Also estimation of the mortality rate and assessment of the recuperation of a given stock under natural or exploited condition have been studied (Leveque, 2005).

In this regard, an attempt has been made to present a comprehensive account on the conditional factor and allometry of Indian major carp, *Labeo rohita.*

MATERIALS AND METHODS

The study was carried out during monsoon period of 2011. A total of six freshly killed matured specimens (3males and 3females) of *Labeo rohita* (Hamilton) within weight ranging from 230-250gm were studied after being procured from local fish market located in Bhubaneswar city. Then the fishes were identified up to the species level following the comprehensive account of taxonomic description and identification keys (Talwar and Jhingran, 1991; Ghosh,2006) . Before commencing dissection , the total length and total body weight were recorded properly .Under 100 watt illuminations , the internal organs (i.e., stomach ; liver ; ovary and testis) were exposed , carefully detached from the main body and their specific weight were determined by Afcoset Electronic balance (Reheman et al., 2002) .

Morphometric features

The morphometric features like total length, standard length and biological parameters were measured and determined following the standardized protocols.

a.Total length

It is the maximum elongation of the body from end to end .Thus, from the anterior projecting part of the head to the posterior most tip of the caudal fin is included in total length (Biswas, 1985).

b.Standard Length

It is the distance from the anterior most part of the head to the end of the vertebral column (i.e. caudal peduncle) (Dasgupta, 2004).

Condition Factor

It is represented by relating the standard length of the fish to its weight (Evans, 2000).

It is calculated by the formula: $K = 100(W/L^3)$

where,

'K' is the coefficient of condition.

'W' is the weight of fish (in gm).

'L' is the standard length of the fish (in cm).

Anatomical Peculiarities

a.Gastrosomatic Index

It is defined as the weight of gut(stomach+ intestine) aspercentage of the total body weight of fish

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(Desai,1970) .

It is expressed as :

Wt. of gut and its contains (in gm) X 100 / wt. of fish (in gm)

b.Hepatosomatic Index

It is defined as the ratio of liver weight to the body Weight .It is expressed as:

Wt. of liver (in gm) x100 / wt. of fish (in gm)

c.Gonadosomatic Index

The development of gonads is estimated by deterrmining its weight relative to the body weight of the fish (Hopkins, 1979).

This is expressed as :

Wt. of gonad (Testis or ovary) (in gm) x100 / wt. of fish (in gm)

RESULTS AND DISCUSSION

In both male and female finfishes it has been observed that there exists certain variation in the value of biological parameters. In this study, GSI values of the male and female have been recorded as 0.5 and 0.7 ,GnSI values 0.2 and 0.9, HSI values 0.9 and 1.0 and 'K' value 1.4 and 1.8 respectively (Table 1, Figure.1 and 2) .

GSI of *C.punctatus* normally varies from 1.1-3.5. Parameswaran (1975) indicated that feeding activity of fish (matured) becomes high during February-April. In present study the higher GSI values in female than the male indicates that the female growth is faster than male during breeding period. Considering the GnSI values, the female attains early maturity than the male. Similarly HSI values of female establishes higher than male, that again signifies the growth and maturity in female is faster and earlier than male. However the mean GSI value (0.6) of both the sexes is higher than GnSI value (0.55). Such results indicate that the spawning season of the fish commences little later (July-September, 2011). Pillay (1954) expressed that the spawning season of Liza tade may start in May-June and continue till September. With regards to 'K' value the female again shows little higher fecundity than the male. The same opinion has been made by Dasgupta (2004). Rehman et al., (2002) have mentioned that in *Liza parsia* (35gms) the gastrosomatic index value (1.48) was much higher than the gonadosomatic index value (0.45). The present study agrees with the above observation.Generally gastrosomatic index is low during the spawning season of fish species (Rehman, 2002). In *Colisa fasciatus*, Sarkar and Deepak (2009) observed a gradual increase in gonadosomatic index value during pre-spawning period and its peak was reached during spawning period.

An idea could also be developed about the carnivorous, omnivorous or herbivorous nature of the finfish by analyzing the values of relative length of intestine and the shape and size of the gill rackers (Soranganba and Saxena, 2007). It is agreed that a firm statement cannot be made about the spawning season of the fish unless the fishes are analysed for condition factor of gonads and parameters like gastrosomatic index, gonadosomatic index and condition factor for a continuous period of twelve months. Endeavours and achievements of this short piece of study is only a modest beginning; much more in depth study is under progress to have complete understanding about the anatomy, spawning behaviour and biological parameters of any single less studied less found (threatened) finfish species, which will be praiseworthy and of real value.

Table 1: Index Values and Condition Factors of *L.rohita*

Morphometric Features	Male	Female
Body weight (gm)	230±3	250±4
Total length (cm)	27.5±0.55	30±0.58
Standard length (cm)	21.2±0.36	26±0.39
Weight of stomach (gm)	1.0±0.03	1.7±0.04
Weight of gonad (gm)	0.4±0.01	2.2±0.02
Weight of liver (gm)	1.8±0.04	2.5±0.08
Gastrosomatic index (GSI)	0.5	0.7
Gonadosomatic index (GnSI)	0.2	0.9
Hepatosomatic index (HIS)	0.9	1.0
Conditional Factor (K)	1.45	1.8

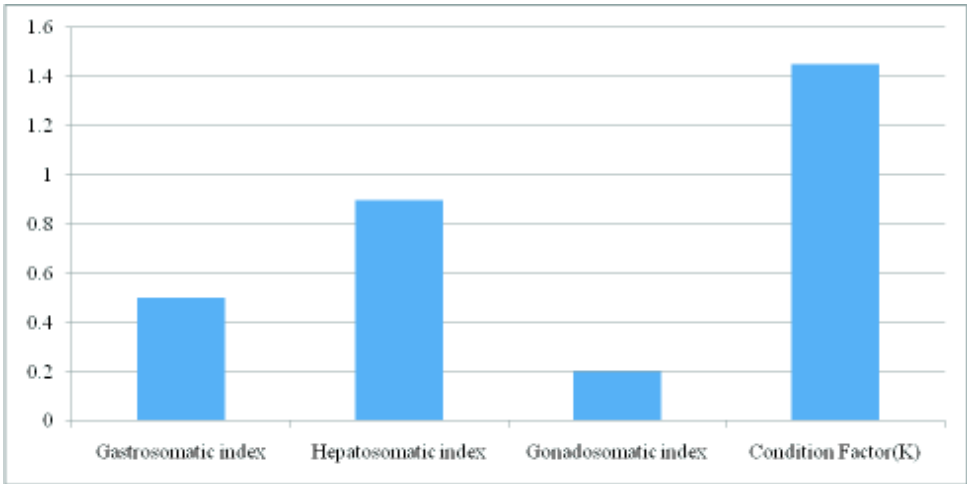

Figure 1 : Gastrosomatic Index, Hepatosomatic Index, Gonadosomatic Index And Conditional Factor of *L.rohita* (male)

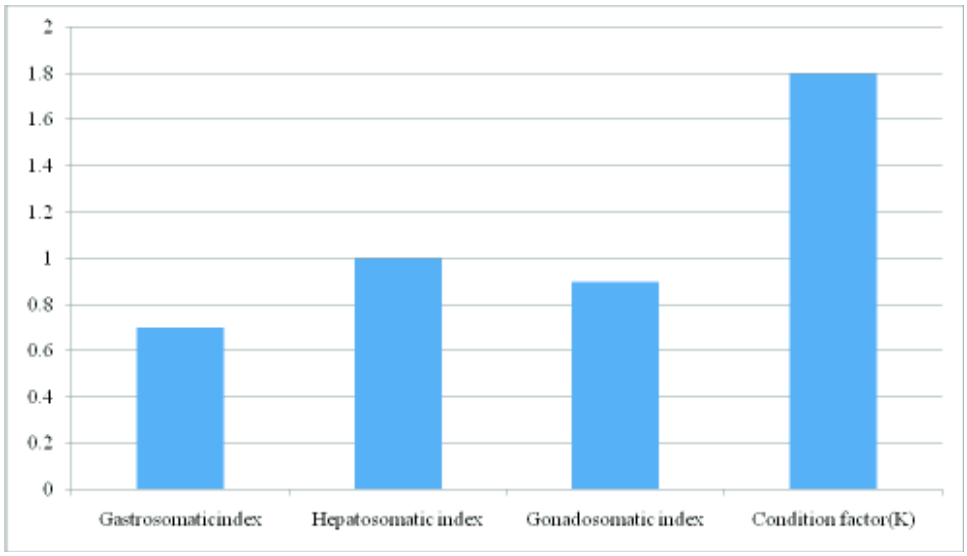

Figure 2 : Gastrosomatic Index, Hepatosomatic Index, Gonadosomatic Index and Conditional Factor of *L.rohita* (female)

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