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ASSESSMENT OF FECUNDITY AND GONADOSOMATIC INDEX OF COMMERCIALLY IMPORTANT FISH, *LABEO ROHITA* FROM RAMGANGA RIVER

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ABSTRACT

Present investigation deals with the assessment of Fecundity and Gonadosomatic index of *Labeo rohita* collected from Ramganga river of western Uttar Pradesh during June 2005 to May 2008. The mean value of fecundity was estimated as 66823.70 ± 4312.39 eggs with a mean total length of 183.06 ± 5.60 mm and mean total body weight of 315.64 ± 16.59 grams. The relationship of fecundity with other parameters such as Total length (TL), Total weight (TW), Ovary length (OL) and Ovary weight (OW) were found to be linear and the values of correlation coefficient (r) was 0.97, 0.97, 0.99 and 0.95 respectively. The average relative fecundity was calculated as 202.78 ± 3.75 Highest value of GSI was recorded in the month of August indicating spawning period of *Labeo rohita.*

KEY WORDS

Fecundity, *Labeo rohita*, Gonadosomatic index, River Ramganga.

INTRODUCTION

The number of eggs contained in ovary of a fish is termed as fecundity. The term fecundity denotes the egg laying capacity of a fish or it refers to the number of ripe eggs produced by a fish in one spawning season. It is an important aspect that must be understood to explain the variation of population as well as to make efforts for increasing the amount of fish yield and also helpful to estimate commercial potentialities of fish stock, life history, fish farming and actual management of the fishery. Fecundity of fishes is species specific and varies from one species to another. Considerable variation in the fecundity of various species is depending upon the length, weight, age and ecological conditions of the habitat including climatic factors of the locality. In a single population, the fecundity may also fluctuate considerable in relation to the availability of food in the natural as well as cultivable environment. Several workers have been made an extensive contribution to investigate the fecundity of the fishes. [1-8]

MATERIALS AND METHODS

The fishes were sampled from six sampling stations selected in the river Ramganga throughout the study period from June 2005 to May 2008. specimens were carried immediately to the laboratory in icebox. Fishes were identified, and total length of each fish was measured to the nearest millimeter and body weight in gram on a digital balance with .001 mg precision. Subsequently, they were scarified to obtain their gonads and the moisture was thoroughly wiped out from the ovaries with the help of blotting paper and weighed individually and fixed in 5 % formalin solution which helped in preserving the ovaries as well as made it much easier to separate the eggs from wall of ovary. Fecundity was determined by gravimetric method.

According to the size of the eggs, three sub samples from the two lobes of each ovary were taken and then the eggs from each sub sample were counted under a magnifying glass and mean value of eggs were computed. The average number of eggs in a sub sample is multiplied by the total weight of the ovary and fecundity was estimated by the following formula

F = n G/ g where "F" is fecundity,

"n" is the average number of eggs, "G" is weight of the gonads and "g" is the weight of sub sample. [9]

RESULTS AND DISCUSSION

All the data obtained were processed statistically to reach on a meaningful conclusion. Descriptive statistic of data is presented in Table 1 while Table 2 represents the correlation among various parameters. Linear regression analysis was applied to determine the relationship among various parameters. Relationship of fecundity (F) with total length (TL), total weight (TW), length of ovaries (OL) and weight of ovaries (OW) were found significant and a linear pattern was obtained. Some workers also reported similar observation on other fishes.[10-13] In present study it was found that the number of eggs increased laniary with the increase of total length (TL), total weight (TW), ovaries length (OL) and ovaries weight (OW).

Table 1

Descriptive Statistics of data obtained from three years of study period on the fecundity and other parameters.

	Min	Max	Mean	± SE	Variance	SD
Total Length (mm)	120	260	183.06	5.604	1570.058	39.62
Total Weight (g)	60	484	315.64	16.590	13761.66	117.31
Length of Ovary (mm)	33	102	68.12	3.016	454.6792	21.32
Weight of Ovary (g)	2.4	36.48	13.645	1.353	91.55289	9.56
Fecundity	25230	124560	66823.7	4312.391	9.3E+08	30493.21
Relative Fecundity	159	257	202.78	3.753	704.2159	26.53
GSI	1.8	7.5	3.8158	0.214	2.28889	1.51

The results revealed that the number of eggs varied from 25,230 (for a fish with total length of 120 mm and total weight of 60 grams) to 1, 24,560 (for a fish with total length of 260 mm and total weight of 484 grams). The mean value of fecundity was estimated as 66823.7 ±

4312.39 eggs for a fish with a mean total length of 183.06 ± 5.60 mm and mean total body weight of 315.64 ± 16.59 grams. During the study it was observed that the ovaries of same size of fishes contained different numbers of eggs, this may be due to the variations in environmental conditions and food intake by the individual. Bhuiyan *et.al* (2006)[14] have reported that the mean fecundity in *Puntius gonionotus* was obtained as 14321 from the fishes having mean total length and mean total weight of 200.13 ± 20.58 mm and 196 ± 34.37 grm respectively. Similar observations were also reported by Hussain *et.al.* (2007)[15] in *Botia dario* (Hamilton). He found that the mean fecundity was 31833.50 ± 10313.42 in fishes ranging in total length from 96 mm to 135 mm and in body weight from 14.51 g to 43.29 g. Recently several other workers have mentioned the fecundity in different fishes.[16-19]

The regression equation representing the relationship between fecundity and total length was found as F = -71233.70 + 754.16 x TL and the value of r^2 = 0.96 which is highly significant. The correlation between fecundity and total weight was calculated as F = -16982.11 + 263.84 x TW, r^2 = 0.97 the value of r^2 is highly significant. The mean value of the length of ovaries was recorded 68.12 ± 3.016 mm. The regression equation was F = - 29732.18 + 1417.44 x OL and the value of r^2 = 0.98 which is highly significant. The mean value of ovaries weight was 13.65 ± 1.353 grams. The regression equation indicating the relation of fecundity and ovaries weight was F = 25119.22 + 3056.39 x OW, r^2 = 0.92 which is highly significant.

Table 2.

Values of correlation coefficient "r" significant at p < .05

	TL	TW	OL	OW	F
Total Length (mm)	1				
Total Weight (g)	0.97	1			
Length of Ovary (mm)	0.98	0.98	1		
Weight of Ovary (g)	0.97	0.92	0.94	1	
Fecundity	0.97	0.97	0.99	0.95	1

Variation in the fecundity among the fishes of same as well as different species is very common depending upon the various factors such as size of the fish, age and condition of the fish and also depends upon the space and food intake by the fish. It was found that the bigger sized fishes have higher fecundity and smaller sized fishes have smaller fecundity. In the present investigation the lowest fecundity is found in the specimen of 120 mm length and 60 grams of weight while the highest fecundity was recorded from the fish of 260 mm length and 484 grams of weight. Variation in the number of eggs was recorded from the fishes of same sizes. In present study it was observed that the fish of length 140 mm of total length contained 32980 eggs in its ovary while another fish of same size contained 33130 eggs. This type of variation was also repeated in the fish of 190 mm of total length where fecundity was 78282 in one fish and 78956 in another of same size. The results revealed that the relationship between fecundity and TL, TW, OL and OW of *Labeo rohita* from river Ramganga was highly significant at 5% ($p<0.05$). The value of correlation co-efficient between fecundity and other parameters shows that variation in fecundity can be best explained in term of ovary length of the fish.

It is concluded that the fecundity of *Labeo rohita* from river Ramganga was significantly correlated with the TL. TW, OL and OW and the fish is highly fecund in this river.

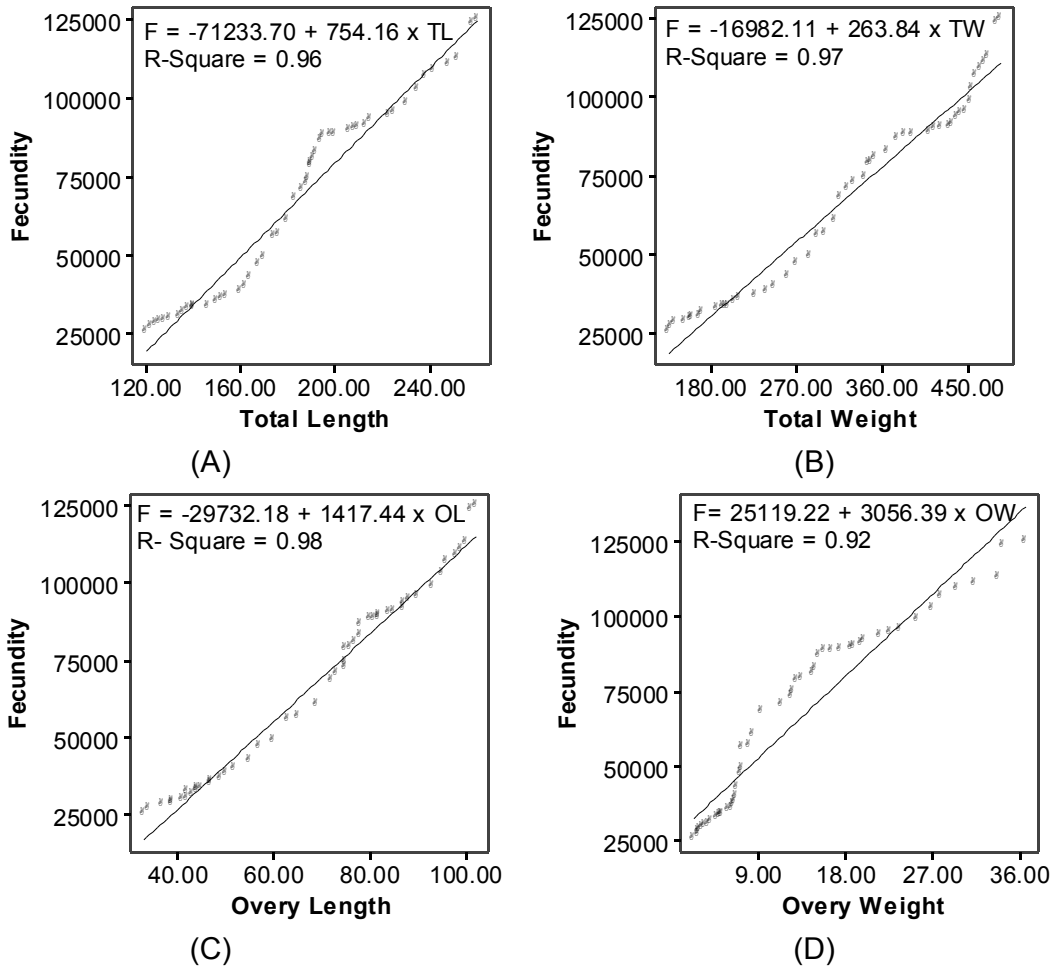

Figure 1

Showing the relationship of Fecundity with (A) Total length of the fish (B) Total weight of the fish (C) Ovary length and (D) Ovary weight.

Gonadosomatic Index (GSI)

The development of gonads can be represented by an index called Gonadosomatic Index. The GSI is widely used by the biologist to indicate the maturity and periodicity of spawning and predicting the breeding season of the fish. GSI is calculated by dividing the weight of gonads by body weight and then multiply the result by hundred. Total 350 specimen of *Labeo rohita* of size range between 120 mm to 260 mm and weight ranged from 60 grams to 484 grams were used to calculate the GSI. Average values of GSI are represented graphically in Figure 2. The values given in the graph are the mean of three-year data collected month wise.

From the figure it is evident that values of GSI were found to increase steadily from January onwards reaching a peak in August. The peak is maintained in August with decline in September slightly and thereafter falls gradually and become least in December. Increasing in GSI value indicates development of the gonads during January to August and a drop in December, which indicates the spent condition of the fish. The GSI of the fishes increases with the maturation of the fish, being maximum during the peak period of the maturity and decline abruptly

after spawning. In the present investigation the value of GSI reached at the peak in the month of August, which indicate the spawning period of *Labeo rohita*. The estimation of GSI revealed that the fish spawned once in a year mainly from June to August. The value of GSI ranged from 7.0-9.0 was reported by Ortaga-Salas and Bustamente (2006)[20] in gold fish *Carassius auratus.* Sarkar et.al. (2002)[21] found in *Mystus gulio* that the highest value of GSI were in the month of July which showed the peak of spawning season of the fish.

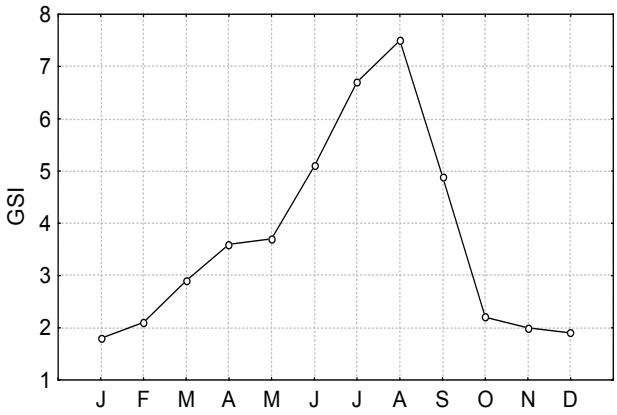

Figure 2.

Gonadosomatic index of Labeo rohita from Ramganga river. Each month represent mean value of three consecutive year data.

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