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Fecundity of the lesser baril, *Barilius bendelisis* (Hamilton, 1807) from Manas River, Assam, India

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Abstract

The present investigation deals with the fecundity study of *Barilius bendelisis* collected from the river Manas. Relationship of fecundity with body weight (TW), total length (TL), ovary length (OL) and ovary weight (OW) was calculated and found to be linear. The value of correlation coefficient (r) was estimated to be 0.72, 0.61, 0.042 and 0.807 respectively for the above relationships. As indicated by the value of 'r' (0.807), the fecundity is more closely related to ovary weight and hence the ovary weight may be a better index of fecundity compared to the other studied parameters.

Keywords: River Manas; Correlation coefficient; *Barilius bendelisis*

Introduction

The lesser baril, *Barilius bendelisis* (Hamilton, 1807) locally known as 'Korang' is an ornamental fish having food value. It was found to inhabit the sandy and pebbly bottom of the hill streams of Manas River. This species belonging to the order Cypriniformes and family Cyprinidae is a potential cultivable fish species.

The 'fecundity' of a fish is defined as the number of eggs that are likely to be laid during a particular spawning season [1]. It is an important biological parameter in studying the reproductive biology of a fish and plays an important role in evaluating the commercial potentials of its stocks [2]. Fecundity and its relation with different body parameters of female fish make it possible to estimate the potential of egg output [3] and the potential number of offspring in a season and reproductive capacity of fish stocks [4]. The regression studies are more common for TL-TW relationship; however, such studies are on a limited scale with respect to fecundity. Some important contributors to the fecundity studies on fresh water fish species are available [5-8]. However, only a single report [9] on reproductive biology including the fecundity of *B. bendelisis* from Garhwal Himalaya, India is available till date. The present study was carried out to find if there is any variation in fecundity studies between the fish species collected from Garhwal Himalaya and present study area due to variation in geographical region having different climate, annual temperature and difference in availability of food. Present work will play a significant role in proper management and conservation of *B. bendelisis* in its wild habitat. In addition, it will help a lot to study the breeding biology and population dynamics of the studied fish species.

Materials and Method

In the present study, 32 mature specimens were examined, collected during the spawning and pre spawning season in the year 2014-2015 and procured with the help of cast net (90´, 1"; 9´, 1/2") and gillnet (75x1.3x1.3 m, 2") from three sampling sites of Manas River-Mothanguri (26°46′90.2″N, 90°57′41.9″E, and altitude 87.5 m MSL), Narayanguri (26°39′63.0″N, 90°59′43.2″E and altitude 56.7 m MSL) and Bekipar (26°29′71.1″N, 90°55′16.7″E and altitude 40.8 m MSL) (Figure 1). Total length (TL) and ovary length (OL) were measured with the help of a digital slide calliper (Mitutoyo, CD-8″CSX) to the nearest 0.01 cm and body weight (TW) and ovary weight (OW) was taken with an electronic balance (SPT-600, Prime Technologies, India) nearest to 0.01 g. The morphometric measurements of the fish were recorded in fresh condition and the ovaries were preserved in 10% formalin for further analysis.

The method of Bagenal [1] was employed to calculate the absolute fecundity. The linear relationship between the fecundity of the fish and the body parameters i.e. total weight, total length, ovary length and ovary weight were calculated individually by applying the regression equation: Log Y=log a + b log X, where, Y = Fecundity (F), X=TW, TL, OL and OW, a and b are constants. The correlation coefficient (r) was calculated with the help of Microsoft excel software.

Results

The number of ova varied from 440.05 (8.39 cm TL; 5.97g TW) to 2652.93 (10.74 cm TL; 13.41g TW). Table 1 provides data for fecundity with different body parameters for gravid females of *Barilius bendelisis*. A linear relationship was established between Log F and Log TL, Log F and Log OW, Log F and Log TW, and Log F and Log OL and presented in Figures 2a, 2b, 2c and 2d respectively.

Relationship between F and TL: The number of eggs contained was directly proportional to the total length of the fish body. Regression analysis showed that the relationship ($p<0.05$) was significant. The correlation coefficient (r) was 0.61 which indicates positive correlation.

Relationship between F and TW: The correlation coefficient (r) was measured 0.72 ($p<0.001$) which also corresponds to a close and positive correlation between fecundity and total body weight.

Relationship between F and OL: The correlation coefficient (r) was found to be 0.042 ($p>0.05$) which suggested that the relationship between ovary length and fecundity is not significant.

Relationship between F and OW: Regression analysis showed that there is a significant relationship ($p<0.001$) between fecundity

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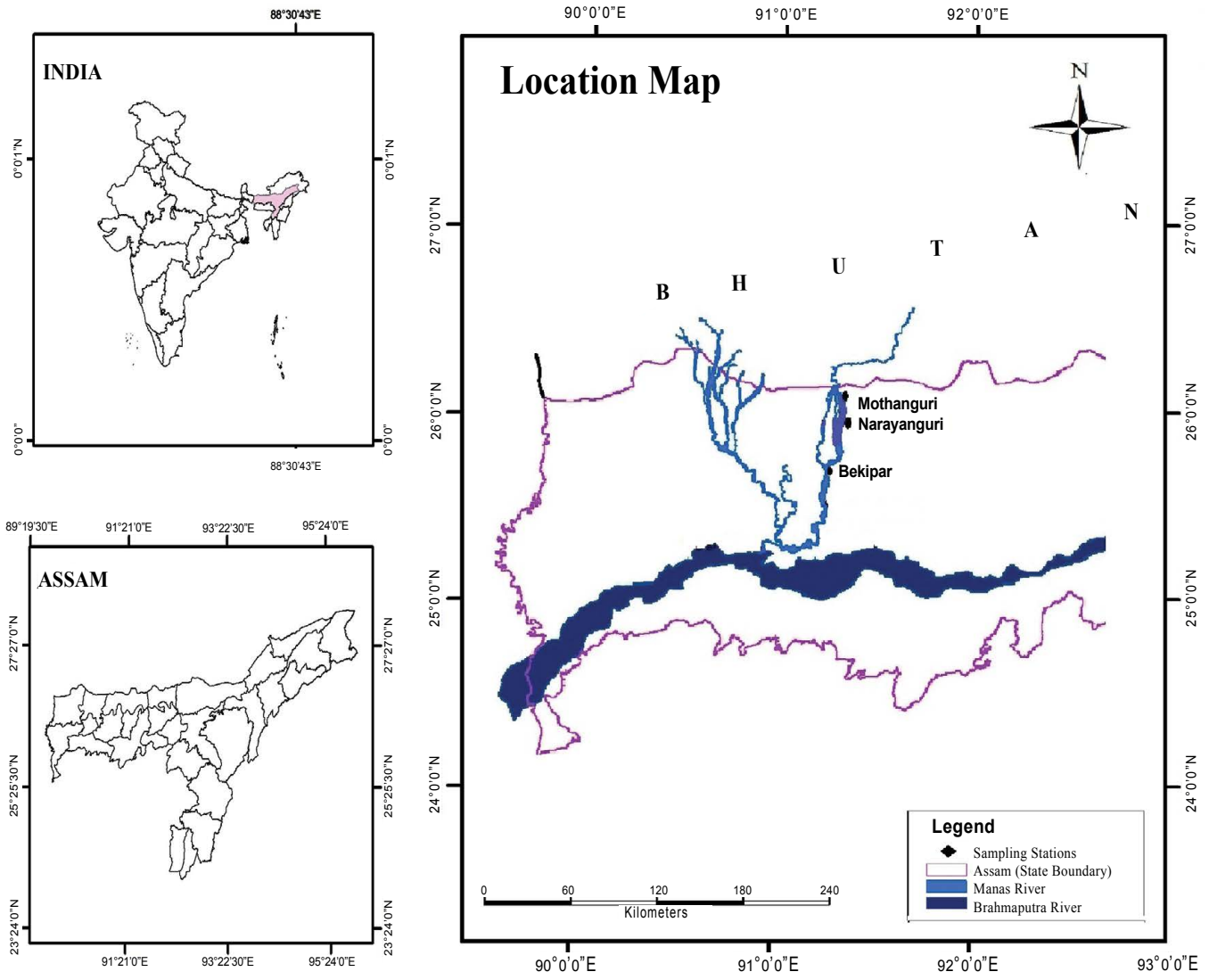
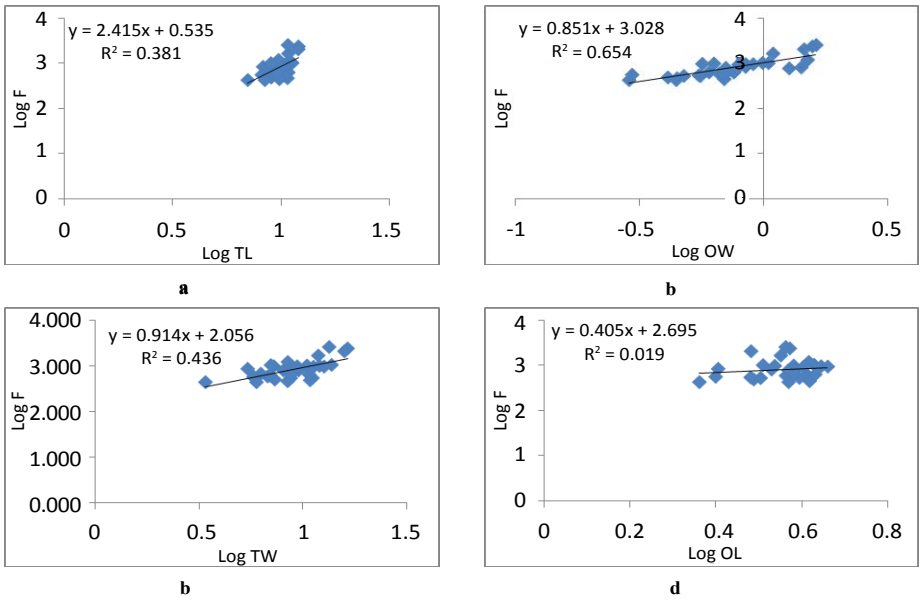


Figure 1: Map showing study area showing sampling sites.

Sl.No	Total Length (cm)	Total Weight (g)	Gonad Length (cm)	Gonad Weight (g)	Absolute Fecundity
1	10.06	11.15	3.92	0.48	546.25
2	12.03	16.48	3.72	1.56	2471.12
3	12.	15.9	3.03	1.45	2139.69
4	10.70	10.84	4.13	0.45	484.67
5	10.65	10.47	3.8	0.63	1029.92
6	10.34	11.26	4.01	0.84	965.52
7	11.25	13.78	4.24	0.99	1063.8
8	10.1	9.39	4.4	0.84	990.27
9	10.79	10.72	4.07	0.6	654
10	9.1	9.08	3.84	0.7	824.87
11	8.94	6.75	3.75	0.69	589.96
12	8.24	5.41	2.54	0.84	870.04
13	10.94	12.03	3.44	0.56	1011.42
14	10.79	11.88	3.55	1.09	1717.46
15	10.74	13.41	3.64	1.62	2652.93
16	6.99	3.38	2.29	0.29	441.38
17	8.12	5.78	2.5	0.29	579.18
18	8.99	7.31	3.07	0.41	504.3
19	9.85	9.55	3.81	1.26	804.11
20	8.69	6.95	3.65	0.66	614.13
21	9.82	8.05	3.7	0.78	806.53
22	10.48	12.68	4.56	0.79	976.97
23	10.42	8.74	3.18	0.55	542.92
24	8.64	6.26	3.81	0.71	679.73
25	9.71	8.46	4.12	1.5	1236.69
26	8.95	7.24	4.04	0.9	994.40
27	9.80	8.44	4.14	0.69	462.97
28	10	9.04	3.38	1.41	841.9
29	9.55	8.77	4.27	0.76	650.16
30	8.2	5.8	3.02	0.55	560.56
31	8.39	5.97	3.7	0.44	440.05
32	8.96	7.01	3.23	1.04	1051.41

Table 1: Data for absolute fecundity with other body parameters for gravid females of *Barilius bendelisis*.



*R^2 - coefficient of regression

Figure 2: Relationship between (a) - Fecundity (F) and total length (TL); (b) – Fecundity (F) and ovary weight (OW); (c) – Fecundity (F) and total weight (TW) and (d) – Fecundity (F) and ovary length (OL) of *Barilius bendelisis*.

and ovary weight. The correlation coefficient (r) was found to be 0.807. Thus, the number of eggs per female increased with increasing ovary weight.

Discussion

Variation in egg production among individuals and populations of fish species results due to differences in age and size [10]. Due to differential growth of gonads, the fecundity of individual fish of the same size drawn from the same spawning population within the same spawning season sometimes show considerable deviation [9].

Previous study on fecundity of *B. bendelisis* showed that fecundity ranged from 900 to 5048 [9]. However, in the present study, fecundity was observed to be in the range of 440.04 and 2652.93. This variation may be attributed to the difference in the length groups under study as well as different geographical region having different climate, annual temperature and difference in availability of food which further affects the individual physiology of the fish.

The number of eggs, in the present study was found to increase linearly with the increase in TL, TW, OL and OW. These findings are in accordance with the findings of earlier workers, [4-7,11-14].

The values of correlation coefficient 'r' in the present study indicate that among the four studied parameters, fecundity was observed to be most closely correlated with ovary weight (r=0.807) followed by total body weight (r=0.72), total body length (r=0.61) and total ovary length (r=0.042). Hence ovary weight is a better index of fecundity than the other parameters [12]. However, in previous studies [9] it was reported that fecundity in *B. bendelisis* was more closely related to fish length and ovary length compared to fish weight and ovary weight which did not corroborate with the present findings. Different geographical region, environmental factors and food supply might have resulted in such variation [15].

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