

Scientific Note

Fecundity of fresh water fish *Cirrhina reba* (Hamilton, 1822) (Cyprinidae: Cypriniformes)

Sarmin Akther* and Shirin Akther

Department of Zoology, University of Rajshahi, Bangladesh.

Key words: Fecundity, Fresh Water Fish, *Cirrhina reba*.

The freshwater fish, *Cirrhina reba* (Ham.) is one which is commonly known as “Raikhor” or “Aikhor” or Bangla. Although the fish is rarely available in the eastern part of the country but it is abundant available in the western and north western part of Bangladesh. The fish in these areas are cultured in ponds along with major carps like *Labeo rohita*, *Catla catla* etc. Perhaps because of the availability of its spawn in the rivers, the Padma and the Jamuna. The species is generally silverish in color. The scale is darkest on the upper and lower edges formally. Bluish bands above and 2 or 3 rows below the lateral line. Ventral side is white, dorsal and caudal grey or yellowish. Tip of the pelvic and anal are orange.

The number of eggs contained in the ovary of a fish in a breeding season is called as the fecundity. Bagenal (1971) defined it as, fecundity is the number of ripe eggs in the ovary prior to the next spawning. The present investigation reveals that the breeding season of *C. reba* is April, May, June and July. In reproductive biology information about the fecundity is essential (Hossain *et al.*, 1997, Roy and Hossain, 2006 and Lashari *et al.*, 2007). But the estimation of fecundity based on the number of eggs in the ovary is liable to be inaccurate for the following reasons: i) Not all the ova contained in an ovary are released. ii) Some of the ova are reabsorbed in the ovary which are known as atretic oocytes. iii) Constituents of the germinal strand which is present all the times are retained after egg laying. Fecundity has relationship with the degrees of parental care. The fecundity of an individual female varies according to many factors, including her egg size, types of species, age and condition such as food availability, water temperature and season etc. Recent estimate suggest that worldwide 20% of all freshwater species are

extinct, endangered or vulnerable (Moyle and Leidy, 1992). As a result, fish stocks, particularly those dwelling in the inland open water areas, have gradually become endangered. IUCN, Bangladesh (2000) has been enlisted *Cirrhina reba* as critically/endangered. The present work was undertaken to estimate the fecundity and to find out its relationship with total length, body weight, ovary length and ovary weight of this carp.

This present study was conducted from September 2004 to July 2005 at different fish market in Rajshahi (Shahed Bazar, New market, Horogram Bazar, Shalbagan Bazar, Laxmipur Bazar, and Talaimari Bazar). Among 160 gravid females were identified and studied for fecundity. Eye observation was used in identifying the gravid females. After collection the specimens were preserved in 10% formalin. Lengths of the fishes were measured in mm and their weight in g. The ovary of the fishes were removed carefully intact, which not only preserved the ovary but made it much easier to separate the eggs from the ovarian wall. Acm scale took the ovary length and an electronic balance took ovary weight of females. The fecundity estimated only mature and ripe ovaries were considered by gravimetric method (Lagler 1956) The relations between fecundity and total length, total weight, ovary length and ovary weight of the fish were obtained by using bio-metrical formula: $Y = a + bX$.

Fecundity of the gravid female was estimated for 4 months (April, May, June and July) and the relation between the fecundity (F) with total length (TL), total weight (TW), Ovary length (Ov.L) and ovary weight (Ov.W) were calculated. In the present study on the fecundity of *C. reba*, it was recorded that the maximum number of eggs (58721) were recorded in a sample in the month

*Corresponding author: sarminhamim@gmail.com

of July which measured a length of 183.00mm and weight of 67.92g and the minimum number of eggs (38146) were found is a sample in the month of April having a length of 127.80 mm and weight of 21.78g. The mean fecundity of *C.reba* was 48659.86 ± 8721.97 for a mean total length 155.17 ± 20.83 mm and total weight of 38.29 ± 17.63 g respectively (Table 2). The relationship have been shown in Fig. 1,2,3,4. The fecundity and the total length, fecundity and total weight, fecundity and ovary length, fecundity and ovary weight were estimated from the observed

data and the values of intercepts (a), regression co-efficient (b) and co-efficient of correlation (r) were estimated by the least square method (Table 1). In all the cases straight line linear relationships were found. The t-test was applied and found to be statistically significant. This indicates that the fecundity supports positive relationship with each variable of this fish. The relationship between fecundity and total length (mm) is presented in Fig. 1. The fecundity and total length showed a linear relationship.

Table 1: Values of intercepts (a), co. efficient of regression (b) and co-efficient correlation (r) in F/TL, F/TW, F/Ov.L, F/Ov.W.

Relationship		Values of 'a'	Values of 'b'	Values of 'r'	Values of 't'	Significant of 'r' at 5% level of significance
Ordinate Y	Abcissa X					
Fecundity (F)	TL	-15328.39	412.384	0.985	12.764	Significant
Fecundity (F)	TW	31262.19	454.281	0.918	5.176	
Fecundity (F)	Ov.L	27794.92	577.771	0.904	4.728	
Fecundity (F)	Ov.W	38886.06	1414.735	0.915	5.071	

Table 2: Size groups, mean total length, total weight, ovary length, ovary weight and fecundity of *C. reba*.

Size group (mm)	Length Total (mm)	Total weight (g)	Ovary length (mm)	Ovary weight (g)	Fecundity
120-130	127.80	21.78	20.13	1.75	38146
130-140	135.42	22.91	24.11	2.00	38852
140-150	142.71	25.93	30.08	3.12	42717
150-160	155.00	31.62	35.00	4.00	49927
160-170	167.50	43.79	37.24	9.11	56076
170-180	174.75	54.13	46.02	12.38	56180
180-190	183.00	67.92	60.21	16.00	58721
Mean	155.17	38.29	36.11	6.91	48659.86
SD	± 20.83	± 17.63	± 13.65	± 5.64	± 8721.97

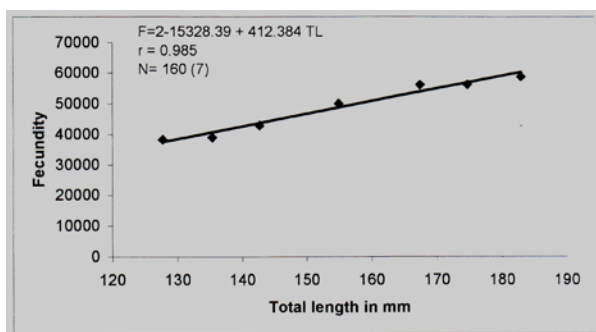


Fig. 1: Relation between total length and fecundity of *C. reba*.

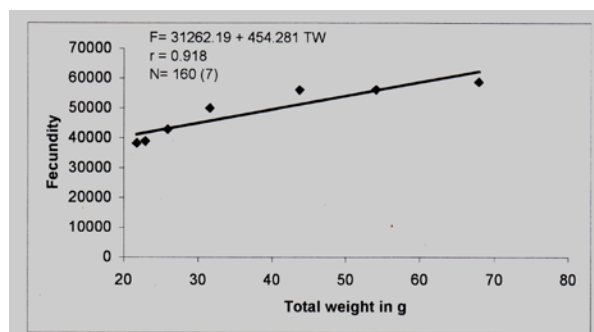


Fig. 2: Relation between total weight and fecundity of *C. reba*.

Fig. 3 shows that the relationship between fecundity and ovary length was curvilinear in nature. From the linear correlation value $r=0.904$, the regression equation is $F = 27794.92 + 577.771 \text{ OV.L}$

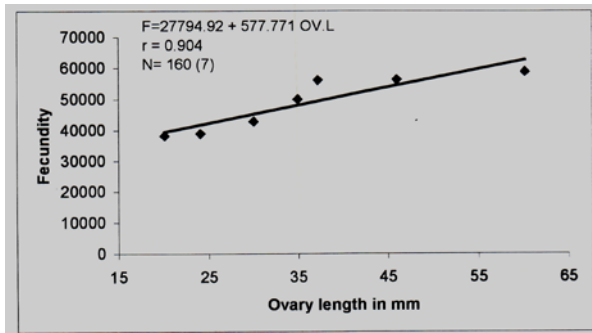


Fig.3: Relation between ovary length and fecundity of *C. reba*

The fecundity and total body weight of *C. reba* has been shown in Fig.2. Table 2 is presented to establish the best mathematical relationship between fecundity and total body weight. The regression equation of fecundity on body weight was found to be represented by $F = 31262.19 + 454281 \text{ TW}$.

Fig.4 shows that the scatter diagrams of fecundity and ovary weight relationship of *C. reba*. A highly ($r = 0.915$) significant linear relationship was found to exist between fecundity and ovary weight. Where the equation was $F = 38886.06 + 1414.735 \text{ OV.W}$

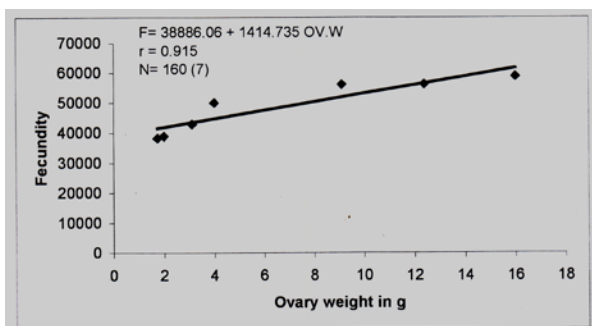


Fig.4: Relation between ovary weight and fecundity of *C. reba*.

The variation of fecundity is very common in fish Doha and Hye (1970). Lagler *et al.*, 1967 reported that the number of eggs produced by an individual female is dependent on various factors like size, age, condition and type of species. It was also noted that fecundity increased with the increase in ovary weight of the fish. Lashari *et al.* (2007) also

observed similar findings in *Cirrhina Reba*. Bhuiyan and Islam (1990) observed that the average fecundity of *Xenentodon cancila* was 1432 eggs. Bhuiyan and Rahman (1982) estimated the mean number of fecundity of snakeheaded fish *Channa gachua* as 2307 eggs. Ahmed *et al.* (1978) made relations between fecundity and total length, total weight and ovary weight of *Tilapia nilotica*. Das (1977) showed relation between fecundity and total length, total weight and ovary weight is gray mullet, *Mugil Cephalus* along the Goa coast. Kader and Talukder (1978) studied the fecundity of *Polynemus indicas*. Bhuiyan and Akther (2002) studied the fecundity of *Cyprinus carpio*. Hussain *et al.*, (2007) studied the fecundity of *Botia dario*, and recorded the average number of eggs to be 1620 per gram body weight of the female.

In the present investigation the fecundity value was plotted against total length, body weight and ovary weight. It was observed that the fecundity-ovary weight gives strong relations as compared to fecundity total length and fecundity-body weight relationship and was found to be linear and highly significant ($P < 0.01$). Shafi and Quddus (1974) reported similar findings in case of *Puntius stigma* in which eggs varied from 1242 to 6831. Kabir and Quddus (2013) also observed in *Labeo calbasu* which eggs varied from 37454 to 427030. The present investigation indicates that the relationship between fecundity and other variables were linear and positively significant. Chakraborty *et al.*, (2005) from the above results it can be concluded that fecundity increases with the increase in ovary weight of the fish.

Acknowledgement

The author is very much thankful to Professor Dr. NIM Abdus Salam Bhuiyan, Department of Zoology, University of Rajshahi, Rajshahi-6205 for valuable guidance during the research work.

References

- Ahmed A.T.A., Mostafa G. and Alam G.M (1978) Fecundity and larval development of *Tilapia nilotica* (Lin). *J. Asiatic Soc.* 4(1&2): 61-71.
- Alam M.R., Mortuza M.G., Islam M.S. and Hossain M.A. 1994. The fecundity of *Ailia coila* (Hamilton-Buchanon) (Siluriformes: Schilbeidae) from the river Padma near Rajshahi city. *J. Bio-Sci.* 2: 113-116.
- Bagenal T.B. 1971. Eggs and early life history, part I. Fecundity. In: Methods for assessment of fish production in fresh waters. W.E. Ricker, Ed. Oxford. Blackwell. 3: 101-136

- Bhuiyan A.S. and Rahman K. (1982) On the fecundity of snake headed fish, *Channa gachua* (Hamilton) (Chandidae: Channiformes). *Bangladesh J.Zool.* **10(2)**: 101-110.
- Bhuiyan A.S. and Islam M.N. 1990. Fecundity of *Xenotodon cancila* (Hamilton) (Belonidae: Beloniformes). *Environment and ecology (India)* **8(3)**: 1004-1007.
- Bhuiyan A.S. and Akther S. 2002. Fecundity and sex-ratio of *Cyprinus carpio* var. *communis* (Lin.) (Cyprinidae: Cypriniformes). *J. Bio-Sci.* **10**: 109-111.
- Chakraborty B.K., Miah M.I., Mirja M.J.A. and Habib M.A.B. 2005. Estimation of fecundity of endangered indigenous sarpunti, *Puntius sarana*. *J. Bangladesh Agril Univ.* 3(1): 107-113.
- Das H.P. 1977. The fecundity of grey mullet, *Mugil cephalus* L. along Goa coast *Mahasagar Bull. Nat. Ins. Oceanograph.* **11(1 & 2)**: 63-71.
- Doha S. and Hye M.A. (1970) Fecundity of the Padma river *Hilsa ilisha* (Hamilton). *Pakistan. J. Sci.* **22**: 176-183.
- Hossain M.A., Taleb, A. and Rahman M.H. 1992. Reproduction and fecundity of Ompak pabda (Ham.) *Bangladesh J.Sci.Res.* **101**: 49-52.
- Hossain M.A., Parween S. and Rahman M.A. 1997. Fecundity of *Nandus nandus* (Hamilton-Buchanon) (Nandidae : Perciformes). *J.Bio-Sci.* **5**: 305- 307.
- Hussain A.M., Khatun M.R. and Hossain M.A. 2007. On the fecundity and sex-ratio of *Botia dario* (Hamilton) (Cyprinidae: Cobitidae). *Univ. J. Zool. Rajshahi Univ.* **26**: 27-29.
- IUCN Bangladesh, 2000. Red book of threatened fishes of Bangladesh.
- Kabir M.A and Quddus M.M.A. 2013. Fecundity and gonadosomatic index of *Labeo Calbasu* (Hamilton) from a stocking pond of a hatchery at Faridpur, Bangladesh. *Bangladesh J. Zool* **41(1)**: 43-48.
- Kader M. A. and Talukder S. R. (1978).The fecundity of *Polynemus indicus* (Show). *J. Asia Soc. Bangladesh.* **4(1&2)**: 15-20.
- Lagler, K.F. 1956. Fresh water fishery biology 2nd ed. W.MC: Brown Co. Dubuque. pp. 421.
- Lagler K.F., Bardach, J.F.Z. and Miller, R.R. 1967. *Ichthyology*, John Wiley ad Sons, Inc. New York, London, Sydney, 59-301 pp.
- Lashari, P.K., Narejo. N.T., Laghari. M.Y. and Mastoi. A.M. 2007. Studies on the gonadosomatic index and fecundity of a carp. *Cirrhina reba* (Ham.) from fish ponds of District Jacobabad. Sindh. *Pakistan J. Zool.* **39(2)**: 95-98.
- Moyle P.E. and Leidy R.A. 1992. Loss of biodiversity in aquatic ecosystem: evidence from fish fauna. In: Fielder, P.L. and Jain, S.K.(eds.), Conservation of biology; the theory and practice of nature conservation, preservation and management . Chapman and Hall, New York.
- Roy P.K. and Hossain M.A. 2006. The fecundity and sex-ratio of *Mystus cavasius* (Hamilton) (Cypriniformes: Bagridae), *J. Life-Earth Sci.* **1(2)**: 65-66.
- Shafi M. and Quddus M.M.A. 1974. The fecundity of the common punti, *Puntius stigma* (Cuvier and Valenciennes) (Cypriniformes: Cyprinidae). *Bangladesh J. Zool.* **2(2)**: 133-145.

Manuscript accepted on 25.06.2015