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Study of absolute fecundity of *Mystus carcio* (Hamilton, 1822) of Puthimari River (Hajo) of Kamrup (R) District of Assam, India

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Abstract
Mystus carcio (Hamilton, 1822) is locally known as singorah in Assam (India) belongs to the order Siluriformes and family Bagridae. The present finding of Correlation coefficient 'r' between fecundity (F) and ovary weight (OW) shows the highest significant value ($r=0.90$, $p<0.01$) which was followed by F and body weight (BW) ($r=0.68$, $p<0.01$), and exhibits less significant positive Correlation coefficient between F and total length (TL) ($r=0.60$, $p<0.01$). It was also found that, the value of Correlation coefficient 'r' between F and gonadosomatic index (GSI%) ($r=0.81$, $p<0.01$) shows highly significant value. This little finding will help for commercial farming and induced breeding of this species in near future.

Keywords: *Mystus carcio*, absolute fecundity and correlation coefficient

1. Introduction
The fecundity is termed as number of eggs contained in ovary of a fish (Nikolsky, 1963) [1]. In fishery, a clear knowledge about absolute fecundity is extremely important for evaluating the commercial potentialities of its stock, life history, practical culture and actual management (Lagler, 1956; Doha and Hye, 1970) [2, 3]. In nature, fecundity of fishes is species specific and varies from one species to another and also considerable variation is observed in various species depending upon the length, weight, age and ecological conditions of habitat including climatic conditions of the locality. Sometime variation is also observed in relation to the availability of food in the natural as well as artificial environment. Being apart from its biological significance, the proper study of fecundity data with age, size and weight of the fish has often been used to provide a reliable index of density-dependent factors affecting the population size (Simpson, 1951) [4].

Mystus carcio (Hamilton, 1822) [5] is locally known as singorah in Assam (India) and fresh water fish well known for its food value. Common people preferred this fish, as it is one of the most delicious, fleshy and possesses no scale in their body. The market price and people's demand of this fish is increasing day by day in Assam due to its taste. The species belongs to the order Siluriformes and family Bagridae and are Least concern (LC) under IUCN criteria (www.iucnred.list) [6]. *Mystus carcio* is widely distributed in the Brahmaputra river drainage in India (Assam, West Bengal and Tripura) and the Meghna river drainage in Bangladesh (Darshan *et al.*, 2010) [7]. It occupies flooded wetlands during monsoon and rivers and prefers sandy/muddy bottom (www.iucnred.list) [6]. Previous information on absolute fecundity is very limited and this may be the first report on absolute fecundity of *Mystus carcio* in Assam (India). Till today artificial culture of this species is not well known to the local fish farmer in Assam (India). Various authors worked on different species of *Mystus* namely, *Mystus seenghala* and *Mystus cavasius* (Bhatt *et al*., 1977) [8], *Mystus tengara* (Khan *et al*., 1992) [9], *Mystus vittatus* (Rao & Sharma, 1984; Hoque & Hossain, 1993; Islam *et al*., 2011) [10, 11, 12], *Mystus gulio* (Sarker *et al*., 2002; Dasgupta, 2002) [13, 14], *Mystus cavasius* (Roy & Hossain, 2006) [15] and *Mystus bleekeri* (Musa & Bhuiyan, 2007) [16].

The present study was undertaken to establish relationship between absolute fecundity (F) with total length (TL), body weight (BW), ovary weight (OW) and gonadosomatic index (GSI) of *Mystus carcio*. The present finding will help for studying population dynamics, artificial culture and seed production of *Mystus carcio* in Assam, India.

2. Materials and Methods
A total number of 30 live gravid samples having size ranges 6 – 7.4 cm in length and weight 3- 6.5 g were collected from March, 2017 to August, 2017 from landing station of Puthimari river (Hajo) of Kamrup (R) District (latitudes 26º10/ to 26º29/ N and longitudes 91º26/ to 91º41/ E) of Assam (India) for studying absolute fecundity (F). Immediately after collection, the samples were transferred to the laboratory, washed with clean water and preserved in 5% formaldehyde for study. Total length (TL) were measured from tip of the snout to tip of the caudal fin nearest to 0.01 mm by digital vernier caliper and body weight (BW) and ovary weight (OW) of the fish samples were measured nearest to 0.01 g by digital balance (Systronic Make) individually. Weight of three sub samples of the eggs were taken from the three cross section from anterior, middle and posterior position of the two lobes of each ovary and the pieces were kept in 5% formaldehyde for studying the absolute fecundity. The eggs were counted from the three subsamples and absolute fecundity was calculated by the following the formula (Bagenal and Braum, 1978) [17] as stated:

$$F = n\ G/g$$

Where, F= Absolute Fecundity

n= average no. of ova in the sub samples of the ovary
G= total weight of the ovary (g)
g= weight of the sub sample

For estimation of gonadosomatic index (GSI), following formula is expressed as follows:

$$GSI(\%) = \frac{OW \times 100}{BW}$$

OW= Ovary Weight
BW= Body weight

3. Result

In the present study, the total length, body weight, ovary weight, gonadosomatic index and absolute fecundity of *Mystus carcio* have ranged between 6 to 7.4 cm, 3 to 6.5 g, 0.11 to 1.02 g, 2.44 to 15.69 % and 739 to 5177 numbers of eggs respectively as shown in the Table-1. The value of Correlation coefficient ' r ' of *Mystus carcio* between F and TL (0.60, $p<0.01$), F and BW (0.68, $p<0.01$), F and OW (0.90, $p<0.01$) and F and GSI (0.81, $p<0.01$) shows highly significant value as shown in the Table-2. The regression graph between F with TL, BW, OW and GSI are depicted in the Figure-1.

Table 1: Mean±Standard deviation (SD) of absolute fecundity (F), total length (TL), body weight (BW), ovary weight (OW) and gonadosomatic index (GSI %).

Absolute fecundity	Total length (cm)	Body weight (g)	Ovary weight (g)	Gonadosomatic index (GSI%)
2231±1032.68	6.64±0.35	4.4±0.88	0.42±0.18	9.46±2.68
(739-5177)	(6 -7.4)	(3-6.5)	(0.11-1.02)	(2.44-15.69)
N=30				

Table 2: Value of Correlation coefficient ('r') between absolute fecundity (F) and total length (TL), body weight (BW), ovary weight (OW) and gonadosomatic index (GSI).

Absolute fecundity	Total length(cm)	Body weight (g)	Ovary weight (g)	Gonadosomatic index(GSI%)
Value of Correlation coefficient 'r'	0.60**	0.68**	0.90**	0.81**

**Correlation coefficient is significant at 0.01 level (2-tailed).
*Correlation coefficient is significant at 0.05 level (2-tailed).

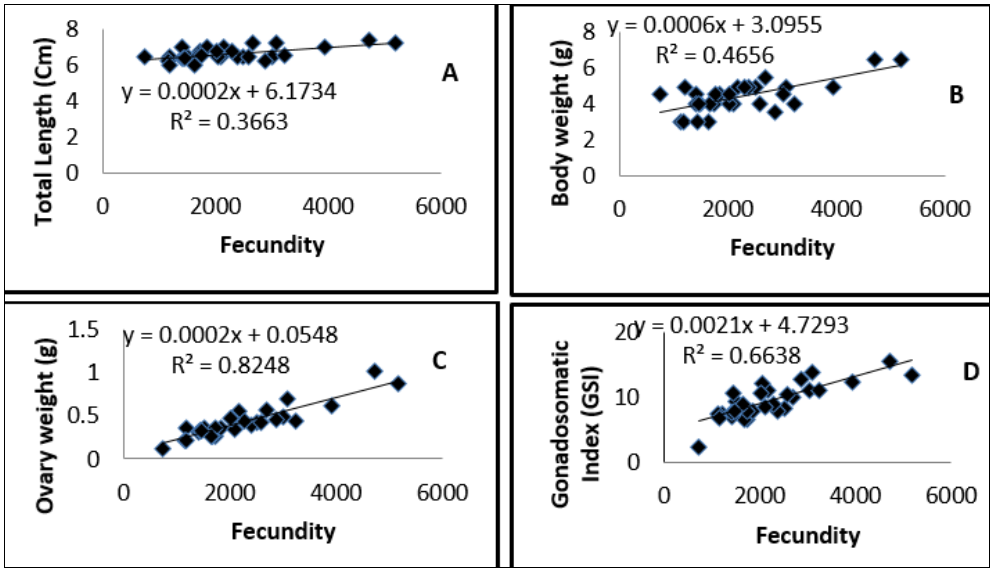

Fig 1: Relationship between Absolute fecundity and Total Length (A), Body weight (B), Ovary weight (C) and Gonadosomatic index (D) of *Mystus carcio*.

4. Discussion

From the present study, it's revealed that the absolute fecundity of *Mystus carcio* varies in different length, body weight, ovary weight and gonadosomatic index. The reproductive capacity of fishes varies depending on the availability of food and space (Mookerjee and Majumder, 1946) [18] and also with spawning time (Ware, 1975) [19] and also it depends upon latitude and location (Cushing, 1968 and Mann *et al*., 1984) [20, 21]. Variation of absolute fecundity is observed, among the same species depending on weight, length, age and various environmental conditions (Biswas *et al*., 1984) [22] and also depending on temperature, salinity and oxygen (Shafi *et al*., 2012) [23]. The present finding of Correlation coefficient 'r' between F with different body parameters (TL, BW and OW) shows the highest significant value in between F and OW ($r=0.90$, $p<0.01$) which is followed by F and BW ($r=0.68$, $p<0.01$), and exhibits less significant positive Correlation coefficient between F and TL ($r=0.60$, $p<0.01$) which was earlier reported in *Channa punctatus* (Saikia *et al*., 2013) [24], *Cyprinus carpio communis* (Shafi *et al*., 2012) [23], *Carassius carassius* (Shafi, 2012) [25], *Puntius sophore* (Phukan and Biswas, 2012) [26], *Cirrhinus*

reba (Lashari *et al*., 2007) [27], and *Mystus bleekeri* (Musa and Bhuiyan, 2013) [28]. The Correlation coefficient 'r' between F and GSI ($r=0.81$, $p<0.01$) is found also highly significant which is not in accordance to the earlier finding in *Clarias gariepinus* (Egwui *et al*., 2007) [29].

From the present investigation of absolute fecundity of *Mystus carcio* in Puthimari river (Hajo) in Assam (India) observed that the fish of this species have minimum 739 and maximum 5177 number of eggs in the species measuring from 6 to 7.4 cm in that river system. This little finding will help for commercial farming and induced breeding of this species in near future.

5. Acknowledgement

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