Khulna University Studies **Volume 11 (1&2) and 12(1&2) : ??-?? : December 2013**

LIFE SCIENCE

SOME ASPECTS OF BIOLOGY OF SNAKE HEAD *Channa striatus*

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KUS: 12/18-060612

Manuscript received: June 06, 2012 Accepted: February 20, 2013

Abstract: Some biological aspects of *Channa striatus* viz., length-weight relationship, fecundity and condition factor were observed in the laboratory. Sample of 20 individuals of *Channa striatus* was collected randomly from local market in the Khulna city. The regression equation was found in case of total length and body weight, W = -416.46 + 23.19T (r^2=0.896). The arithmetic regression equation of the relationship between the standard length and weight was, W = -382.05 + 26.0371 S (r^2=0.908). The regression equation of the relationship between the total length and fecundity was, F = -16046 + 959.671 T (r^2=0.859), standard length and fecundity was estimated as F = -14424 + 1070.25 S (r^2=0.865) and body weight and fecundity as F = 3965.43 + 32.9612 W (r^2=0.764). Among the different linear relationships, total length and body weight relationship was the strongest. Relationship between condition factor and fecundity was the weakest. The fecundity of the species was ranged from 4939 to 22723 and the mean fecundity of the 20 fishes was 14836.050 ± 4019.9612. Maximum fecundity was found in the fish having total length of 38 cm, body weight 475 g and minimum fecundity was found in the fish having total length of 26 cm, body weight 190 g. Condition factor of *Channa striatus* was found to vary from 0.68167 to 1.35073 with a standard deviation of 0.1748 and the mean value was 0.979 ± 0.1748.

Keywords: Length-weight relationship, fecundity, condition factor, *Channa striatus*

Introduction

Bangladesh is blessed with vast inland waters in the form of ponds, canals, ditches, lakes, rivers, estuaries, beel, floodplain, hoars, boars, etc covering an area of 5,332,657 hectares. (DoF, 2002). The total production of Inland fisheries was 1,475,039 mt. (DoF, 2002). Fish accounts for about 80% of the country`s animal protein supply (Rubbi *et al*., 1987) and 5.3% of its gross domestic production (GDP). So fish and fishery products play an important role in the economy of the country and hence it is rightly rewarded as silver crop of Bangladesh.

Channa striatus is an important edible freshwater fish of Bangladesh. It is locally familiar with the name Shol and commonly known as Snake head. It is one of the most favorite, tasty, commercially important and highly demanded fish due to its high nutritive and market values, palatability and ability to tolerate adverse water quality conditions.

The body of *C. striatus* is streamlined; compressed posteriorly, head depressed, there are 9 scales between orbit and angle of preopercle, 54-60 scales on lateral line. Body colour is dark grey superiorly, becoming yellowish beneath. The fry are orange red in color. It is a fresh water species, bottom feeder and lives in the muddy bottoms of canals, lakes, ponds, hoars, boars etc.

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DOI: https://doi.org/10.53808/KUS.2013.11and12.1218-L

This species is commonly found in Bangladesh, India and Pakistan. The species attains its maturity at the age of one year. The breeding season of *C. striatus* is rainy season. (Siddque and Chowdhary, 1996). The gravid females were found during May to July.

Systematic position of *Channa striatus*

Kingdom: Animalia
Phylum: Chordata
Class: Osteichthyes
Order: Channiformes
Family: Channidae
Genus: Channa
Species: *Channa striatus*

Knowledge of length-weight relationship is essential to establish growth equation in production computation. It can also provide data of seasonal variation, multiple spawning and variation in food consumption. (Lagler, 1956). The length-weight relationship is used in fishery biology to investigate environmental adaptability, racial discrimination as well as to estimate growth of species.

Fecundity and spawning habits are the important aspects of fish biology which must be understood to explain the variation at population level as well as to increase the amount of fish harvest. To evaluate the commercial potentiality of fish stock, information on the fecundity of the species composing the stock is essential.

Fecundity of fishes varies from species to species, also within the same species due to different factors such as age, size, body conformation, etc. Variation in fecundity is primarily a reflection of variation in the size of the fish at maturity. Considering the economic importance, an investigation on the fecundity of *Channa striatus* was undertaken.

Condition factor (K) serves as a useful index of the nutritional and biological cycle viz., gonadal development, spawning etc. of the species. Relative condition factor (Kn) is also a useful index for estimating the physical well being as well as nutritional and biological cycle. A cycle change in condition occurs annually as the fish; particularly the female develops its gonad. While upon growth the fish become relatively heavier, so that 'n' increases and may be greater than 3 directly; after spawning the fish is thin and poor in condition so value of 'n' drops down to less than 3 (Le Cren, 1951). Thus the research was conducted to determine the length-weight relationship, fecundity and condition factor of snake head *Channa striatus*.

Materials and methods

Twenty specimens of snake head *Channa striatus* were collected randomly from local market of Khulna during 7 August to 25 October 2009. After cleaning and washing the specimens total length, standard length was recorded in centimeter (cm) and the weighs were measured by means of a sensitive (3 decimal places) electric balance in gram (g). Before weighing the specimens; the excess moisture was carefully dried off with the help of a blotting paper and dried in the air for some time for taking the accurate weight. Eye observation and common morphological symptoms like swollen abdomen and red color of the anus was used for identifying the maturity stages. Enlarged and Yellowish abdomen of the female specimens could be easily distinguished for gravid stage. The ovaries were dried off by removing excess fluid with the help of blotting paper and then were measured to the nearest g by an electric balance. The two lobes were also measured separately. Randomly selected eggs were measured taking from anterior, middle and posterior parts of each of the lobes.

Length-weight relationship: The length--weight relationship was described by the following formula given by Le Cren (1951).

$$W = aL^n \quad \text{..... (1)}$$

Where `a' is a constant or intercept and 'n' is an exponent or slope. This formula has been followed in the present study.

The exponential form of relationship in formula (I) can be expressed in the logarithmic form: Log W = Log a + n Log L ..... (II)

Estimation of condition factor: The condition factor was calculated by the following formula:

$$K = \frac{W \times 10^2}{L^3} \quad \text{(King, 1997)}$$

Where, W = Weight (g), L = Length (cm), K = Condition factor

Fecundity estimation: Gravimetric method was applied in the present study. From the ovary six cross-sectional samples, were removed along with the accompanying membranes from the anterior, central, posterior regions of the lobes of ovaries of each fish. Thus the fecundity was obtained by using the following formula

$$F = \frac{\text{N x Gonad weight (g)}}{\text{Sample weight (g)}}$$

Where F is the fecundity and N is the number of eggs in the sample.

Results

Total length and body weight relationship: The regression line of the weight on the total length was found to be linear and positive (Fig. 1) and the coefficient of correlation tested with t-test was found significant at 5% level of probability for 19 degrees of freedom. The regression of total length and weight yielded the following equation W = -416.46 + 23.19T, r^2 = .896 and the t value was found to be -14.798.

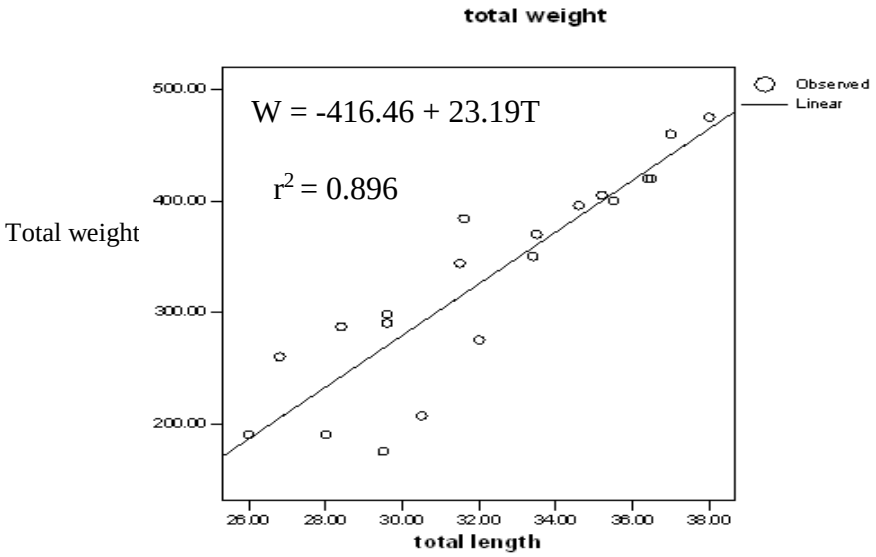

Fig. 1: Total Length-weight relationship of *Channa striatus*

Standard length and body weight relationship:

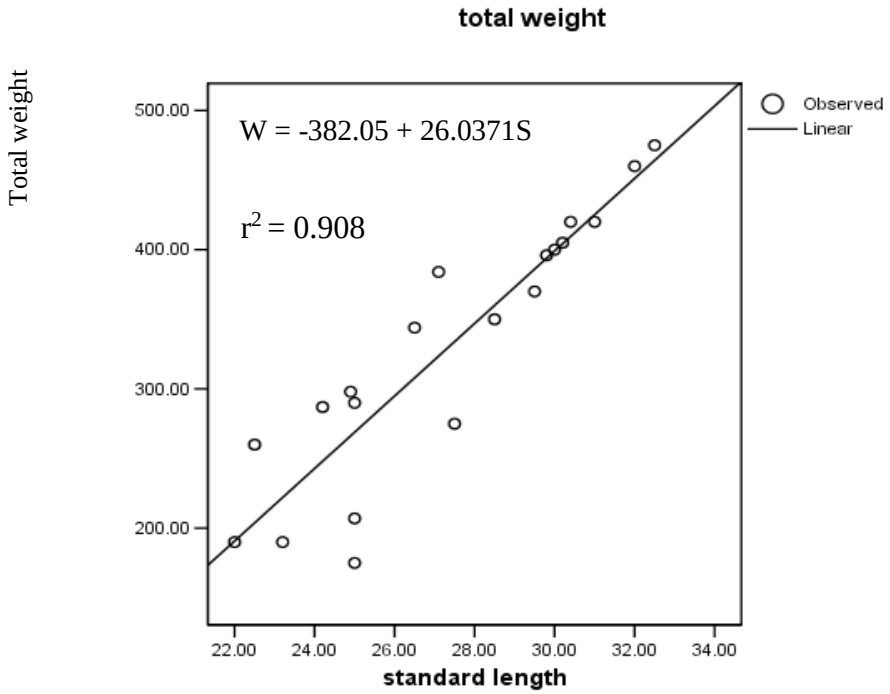

Fig. 2: Standard length -weight relationship of C*hanna striatus*

A linear and positive regression line (Fig. 2) of the weight on the standard length was found and the coefficient of correlation tested with t-test was found significant at 5% level of significance for 19 degrees of freedom. The regression of standard length and weight yielded the following equation of W = -382.05 + 26.0371S, and the t value were found to be -14.998.

Estimation of fecundity: The number eggs were ranged from 4939 to 22723 approximately in the specimen of length ranging from 26 to 38 cm respectively. The maximum number of eggs was obtained from a specimen of 38 cm in total length and 475 g of body weight whereas minimum number of eggs was obtained from a specimen measuring 26 cm in total length and 190 g in body weight. The average fecundity in the species was observed to the 14836.050 with the standard deviation of 4019.9612.

Relationship of fecundity with other biological characters: A linear and positive regression line of fecundity on the total length (Fig. 3), standard length (Fig. 4) and body weight (Fig. 5) of *Channa striatus* was found and the coefficient of correlation tested with t-test was found significant at 5% level of significance for 19 degrees of freedom. The regression of total length and fecundity yielded the following equation F= -16046 + 959.671 T, r^2 = .859 and the t value was -16.482. The regression of standard length and fecundity yielded the following equation of F = -14424 + 1070.25 S, r^2 = .865 and the t value was -16.486. The regression of body weight and fecundity yielded the following equation of F = 3965.43 + 32.9612 W, r^2 = .764 and the t value was 16.427.

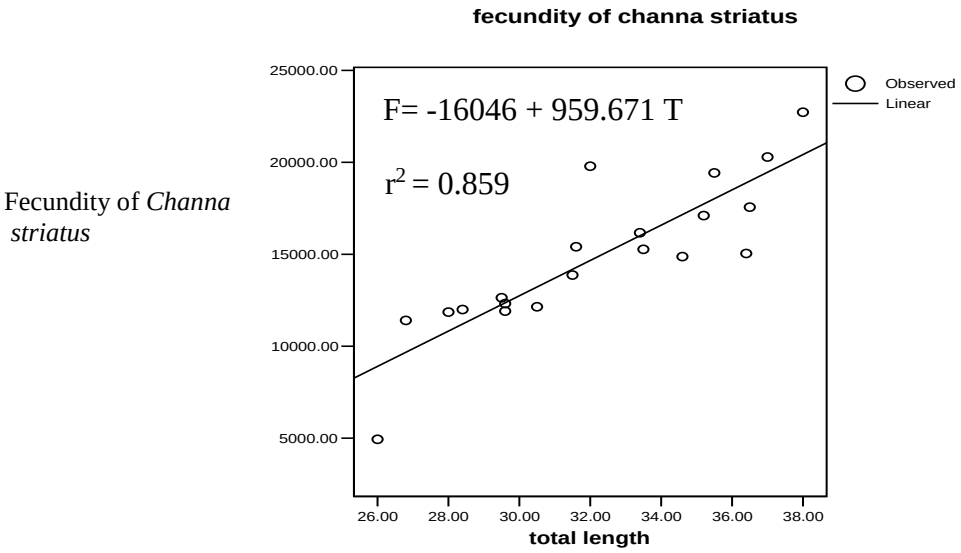

Fig. 3: Total Length-fecundity relationship of *Channa striatus*

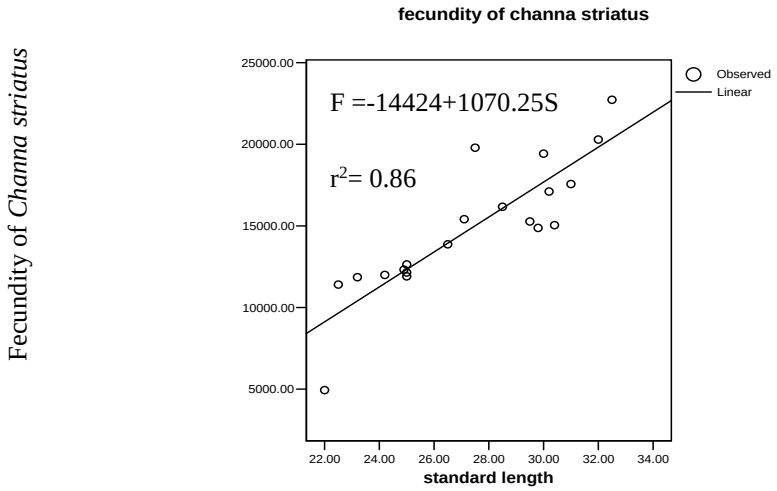

Fig. 4: Standard Length-fecundity relationship of *Channa striatus*

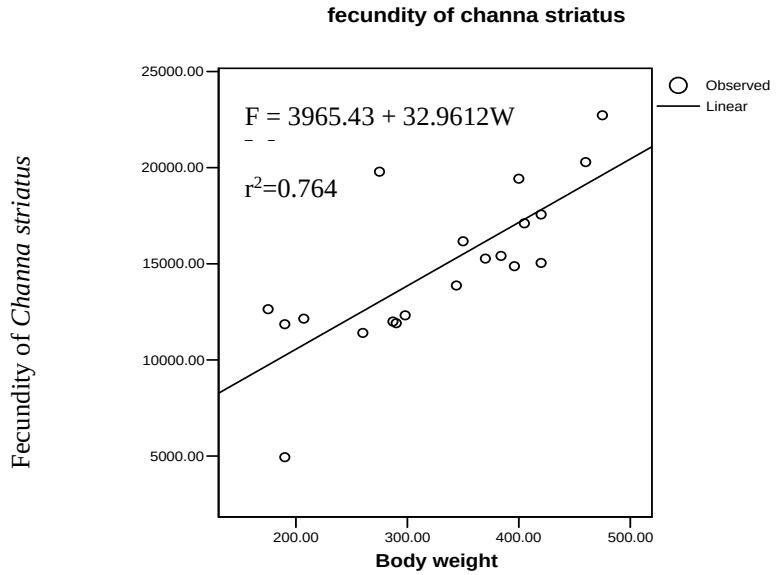

Fig. 5: Body weight-fecundity relationship of *channa striatus*

Condition factor: Condition factor (K) of *Channa striatus* was determined. The values of K varied from 0.68167 to 1.35073 with a standard deviation of 0.1749 and the mean value was 0.979 ± 0.1748.

Condition factor and fecundity relationship: The regression of body weight and fecundity yielded the following equation in the arithmetic scale was F = 23404.7 – 8745.2 cf, r^2 = -0.380 and the t value was 16.503 (Fig.6).

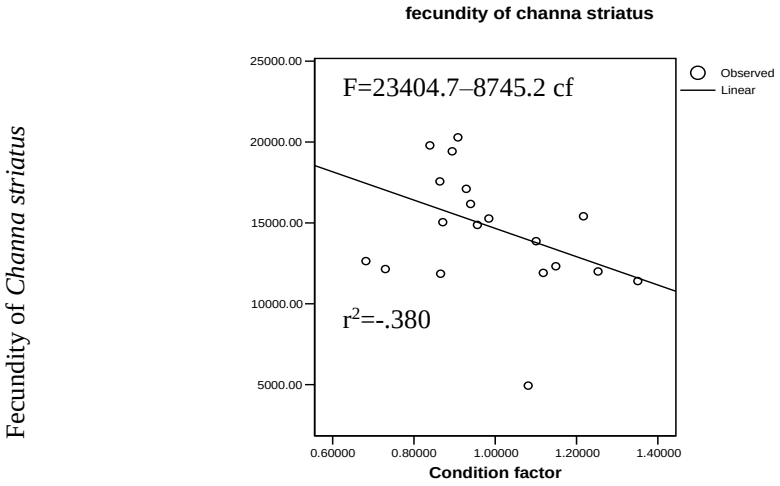

Fig. 6: Condition factor-fecundity relationship of *channa striatus*

Discussion

The fecundity of *C. striarus* varied from season to season. The variation of fecundity is very common in fish and has been reported by many workers like Nikolsky (1963), Doha and Hye (1970), Healy and Nicol (1975) and numerous factors including nutritional state stated by Scott (1961) and McFadden *et al*. (1965) and the time of sampling and maturity stage stated by Healy (1971) to have been explanation for variation in fecundity both within and between fish populations. The regression line in both the arithmetic and logarithmic relationship showed that the fecundity and total length was linearly related (Fig. 3). A marked increase in fecundity was noticed with the increase in length. The increased fecundity with the increase in length was also found by Doha and Hye (1970) for *Hilsa tenualosa*, Karim and Hossain (1972) for *Anabus testudineus* (Bloch, 1792), Mustafa *et al*. (1980) for *Nandus nandus*, Mustafa *et al*. (1983) for *Puntius sarana*.

The relationship of body weight and fecundity was calculated and expressed by the arithmetic and logarithmic formula (Fig. 5). The estimated lines showed that the relationship between body weight and fecundity was linear. Increase in fecundity with the increase in body weight is also reported by Mustafa *et al*. (1983). The co-relation coefficient between fecundity and body weight in both arithmetic and logarithmic expression was found significant. From the significant t values in the present study it may be stated that fecundity increased in *C. striatus* with the increase of its total length, standard length and body weight.

The peak condition factor values for combined sexes, male and female *Channa striatus* decreased gradually with increasing size is reported by Akter (2000). But there is no significant relationship (r^2 found between fecundity and condition factor. Some of the fish in present investigation was not matured and fecundity also varied with the seasons, climate conditions and environment habitat, nutritional status and genetic potential.

Conclusion

The major limitation of the present study was sample size and data that were collected for only three months. So, variation in the value of fecundity during different months could not be observed. Moreover, some of the fish specimens used in the present investigation were not with full of eggs in their ovaries and related environmental parameters were not studied. Therefore, round the year systematic study for at least three consecutive years is recommended in different aqua-ecological regions to arrive at conclusion.

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