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Some aspects of the reproductive biology of *Rita rita* (Hamilton)

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Abstract

Some aspects of the reproductive biology of riverine catfish rita, *Rita rita* (Ham.) were studied from January to December, 2006. Gonado-somatic index was calculated and fecundity was determined by gravimetric method. During the study period, the highest monthly average value of gonado-somatic index was observed to be 0.52±.04 for the month of July, followed by 0.43±.05 for the month of June. The lowest fecundity of 9,646 was recorded in the fish having 21.50 cm in length and 345.25g in weight. The highest fecundity of 70,200 was recorded in the fish having 41.55 cm in length and 1,350.50 g in weight. The fecundity was found to increase with the increase in total length following the equation, Y= 3,287.7X-71,984 with r = 0.97 and the fecundity was also found to increase with the increase in body weight following the equation, Y= 63.666X-14,302 with r = 0.94. It was found to increase with the increasing ovary weight following the equation, Y=13,025X+5,896.4 with r = 0.99. The relationship between fecundity and total length, body weight and ovary weight of the fish was found to be linear and significant.

Keywords: Reproductive biology, Gonado-somatic index, Gravimetric, Fecundity, Linear

Introduction

Knowledge of reproductive biology of fish is essential for evaluating the commercial potentialities of its stock, life history, culture practice and management of its fishery (Doha and Hye, 1970). Reproductive potential of a population is one of the basic elements to designate the individuals of that population in respect to their gonadal conditions (Jhingran and Verma, 1972). The information on different aspects of biology of this species is of great importance in fishery research programme as it plays the vital role both in economy and in nutrition. The study of gonado-somatic index determines the state of maturity and onset of spawning season. Knowledge of fecundity may also be used to asses the reproductive potential of the spawning stock. This is important from the point of biology and management of the local fish. To evaluate the commercial potentialities of a fish stock, information on the fecundity of the fish composing the stock is essential.

The main objectives of the present study was to address some biological aspects of female *R. rita* i. e., to determine the month-wise change in gonado-somatic index and ovary weight, its fecundity and relationship between total length-fecundity, body weight-fecundity and ovary weight-fecundity.

Materials and Methods

Study area and duration: Samples of *Rita rita* were collected from the old Brahmaputra river adjacent to Bangladesh Agricultural University campus, Mymensingh from January to December 2006. Fishes were collected monthly and brought to the laboratory to measure the total length and body weight of individual fish.

Ovary collection: A total of 96 females were used for the determination of GSI and fecundity. The ovary of each fish was taken out very carefully and preserved in 10% buffered formalin in labeled vials for further study. The weight of the ovary was measured very carefully with the help of a sensitive portable electric balance.

Ganado-somatic index (GSI): The GSI was calculated according to the following formula:

$$GSI = \frac{\text{Weight of ovary}}{\text{Weight of body}} \times 100$$

Fecundity estimation: Gravimetric method was used to estimate fecundity. A total of 36 females were used to estimate the fecundity in the month of June and July 2006, the ovaries were dissected out by a pair of scissors, external connective tissues were removed from the surface of each pair of ovaries and moisture of the ovaries was removed with the help of a blotting paper. Weight of the ovaries of each fish was recorded with the help of an electronic balance. Then 20 mg of ovarian part was taken out from each of anterior, middle and posterior portions of both the ovarian lobe accurately. The number of mature and maturing eggs from both portions was found out separately by actual counting. The mean number of eggs in 20 mg was calculated. The fecundity was estimated by the following formula:

$$F = \frac{N \times \text{Gonad weight}}{\text{Sample weight}}$$

Where, F = Fecundity of fish
N = Number of eggs in sample

Data analysis: Microsoft Excel was used to determine linear relationship and correlation coefficient (R) between total length and fecundity, body weight and fecundity, gonad weight and fecundity.

Results and Discussion

Description of the ovary

Two lobes of the ovary were found connected along their dorsal surfaces by a thin mesentery from which they are suspended in the abdominal cavity. Two lobes were elongated and usually of the same size. The size and extent of occupancy of the body cavity were found to vary with the stage and condition of sexual maturity of the female. At the initial stage, the ovaries were thin, elongated, slightly flattened and semi transparent in appearance. Later, they gradually took characteristic and specific colour and the middle portion of the two ovarian lobes became broader than the anterior and posterior region. Immediately before breeding season and during breeding season especially from May to July the ovaries became much expanded and occupied almost the entire body cavity. The anterior part of the ovary was more or less triangular. The colour of the developing and maturing ovaries was creamy,, brownish and yellowish, respectively.

Gonado-somatic index

Month-wise changes in mean GSI values are presented in Fig. 1. GSI value ranged from 0.12±.01 to 0.51±.03 during January to December. Higher mean values of GSI were observed during May to July ranging from 0.31±.01 to 0.51±.03. The gonado-somatic index showed increasing trend from November to July, and then it decreased suddenly in August. This indicates that the breeding season of R. *rita* started from May and continued up to July. The present findings agree with the findings of Khan (1934), Das (1964) and Saxena (1972). Karamchandani and Motwari (1955) concluded from the larvae and juveniles collected during July and August months that the fish most probably breeds in the river Ganga from March to August. Barua *et al.* (1986) reported the single spawning season of *Clarias batrachus* that exists from May to July. Banu *et al.* (1992) reported the peak spawning season of *Mystus tengara* to be in July. Faruq (1995) worked on four species of catfish *viz. Heteropneustes fossilis, Clarias batrachus*, *Mystus cavasius* and *Mystus vittatus,* and found these species to breed during June and July.

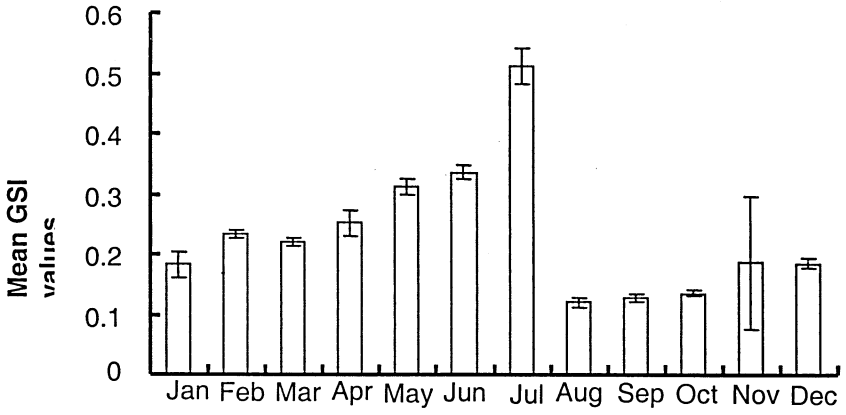

Fig. 1. Monthly mean of gonado-somatic index (GSI) of *Rita rita.*

Fecundity

The average fecundity estimated on the basis of 36 randomly collected fish samples ranging in total length from 21.50 to 42.45cm, and in weight from 335.50 to 1450.33g and ovary weight from 0.55 to 5.75g was found to vary from 9721± 75 to 69950 ± 350.

Relationship between fecundity and total length, and fecundity and body weight of fish

The relationship between total length and fecundity was found to be linear and highly ($P<0.01$) significant (Fig. 2 and Fig. 3, respectively).

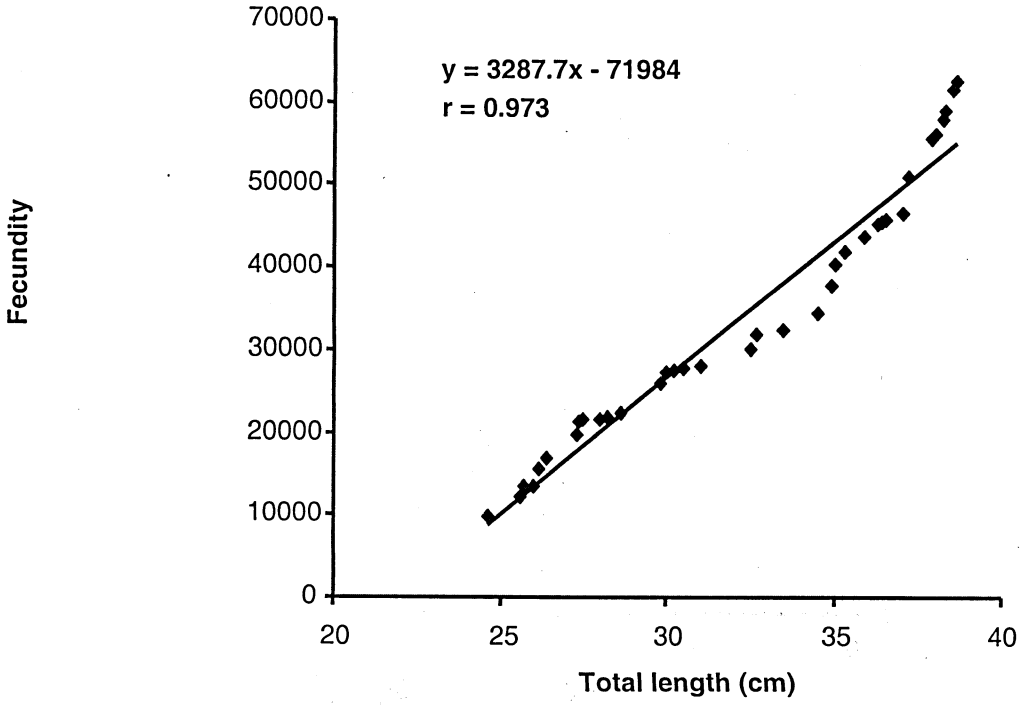

Fig. 2. Relationship between fecundity and total length of *Rita rita.*

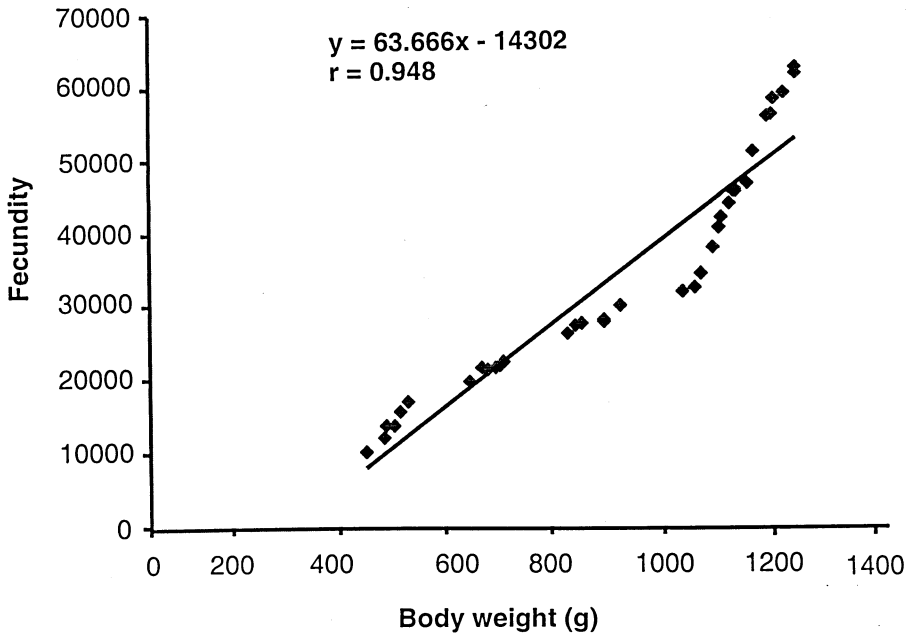

Fig. 3. Relationship between fecundity and body weight of *Rita rita.*

Relationship between fecundity and ovary weight of fish

A highly ($P<0.01$) significant linear relationship was found to exist between fecundity and ovary weight (Fig. 4).

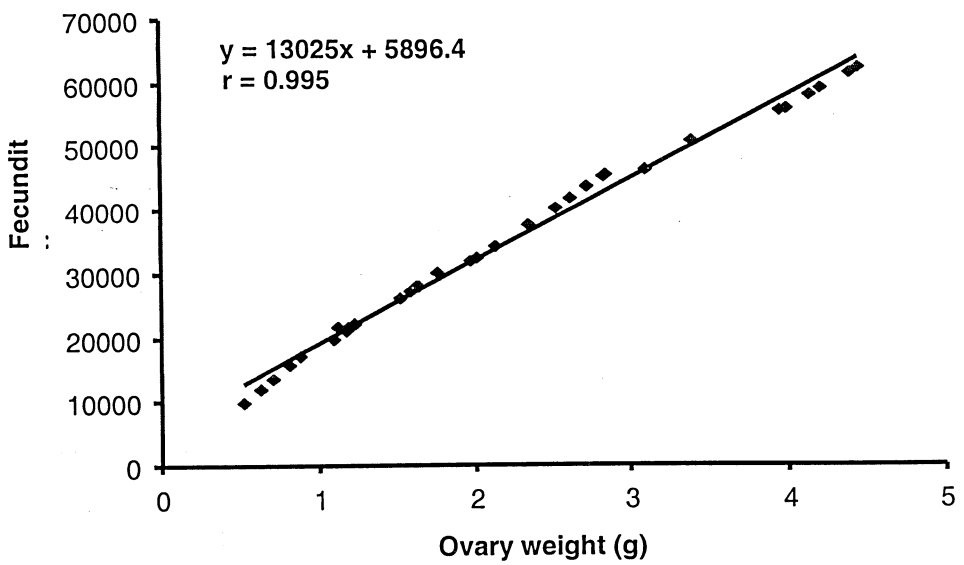

Fig. 4. Relationship between fecundity and ovary weight of *Rita rita.*

The existence of linear relationships between fecundity and body length, fecundity and body weight, and between fecundity and ovary weight in case of different catfishes was reported by many workers: Azadi and Siddique (1986) in case of *Heteropneustes fossilis,* Thakur and Das (1985) in case of *Clarias batrachus* and Azadi *et al* .(1987) in case of *Mystus vittatus.* Although linear relationship was found to exist between fecundity and body length, fecundity and body weight and fecundity and ovary weight during the present study, the relationship between fecundity and ovary weight was found to be the most prominent among all the relationships and the correlation coefficient, r (0.99) between fecundity and ovary weight was highly significant ($P<0.01$). These findings agree with the findings of Das *et al.* (1989) in case of *Heteropneustes fossilis.*

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