

www.ijabpt.com Volume-3, Issue-4, Oct-Dec-2012 Coden : IJABPT Copyrights@2012

Received: 28th July-2012

Revised: 08th August-2012

ISSN : 0976-4550 Accepted: 12th August-2012

Research article

LENGTH-WEIGHT RELATIONSHIP AND CONDITION FACTOR OF Aorichthys aor (HAMILTON-BUCHANAN) IN LOWER REACHES OF RIVER BRAHMAPUTRA

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ABSTRACT: The studies were conducted during 2008–2010 to evaluate length-weight relationship and condition factor of *Aorichthys aor* in lower reaches of River Brahmaputra. 750 nos of fishes having weight of 20g to 1250 g and total length of 10 cm to 55 cm were recorded. The Cube law or Length–weight relationship was calculated as $W = 0.00352 L^{3.246}$. The coefficient of correlation (r) between observed length & weight and calculated length & weight was 0.96 and 0.93 respectively, which indicated highly significant relationship between length and weight. The exponent (b) value obtained indicating the positive allometric growth pattern. The relative condition factor (K_n) value was found higher in fishes of above 650 g weight groups.

Key words: Aorichthys aor, River Brahmaputra, condition factor, allometric growth.

INTRODUCTION

The Long-whiskered catfish *Aorichthys aor* (Hamilton-Buchanan) locally known as *Arii* belongs to the family Bagridae under order Siluriformes. It is distributed in India, Pakistan, Myanmar and Bangladesh (Vishwanath, 2002). In Assam, they are mostly found in the lower reaches of Brahmaputra River particularly in Goalpara and Dhubri districts up to Bangladesh. In recent years, due to overexploitation, pollution and heavy siltation, the growth of this fish has been decreases drastically. Growth has been one of the most important aspects of fish biology which means a change in length or weight or both with the increasing age. To estimate the growth rates, length, age structures and other components of fish population dynamics length and weight data are needed (Kolher, et. al., 1995). The length-weight relationship of fish is an important fishery management tool. Its importance is pronounced in estimating the average weight at a given length group and in assessing the relative well being of a fish population (Beyer, 1987). It can give information on the stock composition, life span, mortality, growth and production.

Condition factor (K_n) compares the well being of a fish and is based on the hypothesis that heavier fish of a given length are in better condition (Bagenal and Tesch, 1978). It has been used as an index of growth and feeding intensity (Fagade, 1979). Many workers have studied the length and weight relationship of fishes in different river system (Le Cren, 1951; Dhakal and Subba, 2003; Amin and Zafar, 2004; Abowei, 2009). However, nothing has been reported on length-weight relationship of *Aorichthys aor* in the Brahmaputra River particularly from its lower reaches. Therefore, in the present investigation attempt has been to study the length-weight relationship of this fish along with its relative condition factor from the lower reaches of river Brahmaputra.

MATERIALS AND METHODS

Samples were collected during the period of two years from 2008 to 2010 from various fish landing centres of the regions. Secondary data were collected through observation and interviews with fishers through questionnaire. Market survey was also made at various markets of Goalpara and Dhubri district on monthly basis. The Total Length (TL) of the fish was measured from the tip of the anterior or part of the mouth to the tip of caudal fin using meter scale calibrated in centimeters. Fishes were measured to the nearest centimeter. Fish weight was measured after blot drying with a piece of clean hand towel. Weighing was done with a tabletop weighing balance, to the nearest gram. A total of 750 specimens having total length of 10 cm to 55 cm and weight of 20 gm to 1250 gm were taken for the calculation. The relationship between the length (L) and weight (W) of the fish was expressed by the equation (Pauly, 1983) as follows:

 $W = a L^b$ or Log $W = \log a + b \text{ Log } L$ Where,

W = Weight of fish in (g)

- L = Total Length (TL) of fish in (cm)
- a = Constant and b = The Length exponent

The degree of association between the variables was also computed by determination of coefficient of correlation (r). The relative condition factor of the experimental fish was estimated from the relationship (Le Cren, 1951):

$$K_n = \frac{W}{W'}$$

 K_n = Condition factor, W = Observed Weight and W' = Calculated Weight of the fish.

RESULTS AND DISCUSSION

The equation obtained for the length-weight relationship of *Aorichthys aor* was $W = 0.00352 L^{3.246}$ or Log $W = \log 0.00352 + 3.246 Log L$. The correlation coefficient (r) between observed length & weight and calculated length & weight was found to be 0.96 and 0.93 respectively. It indicates that the relationship between length and weight of the fish in both the cases was positively correlated and highly significant. These results are comparable to earlier reports in *Coilia dussumieri* (Amin and Zafar, 2004) and *Lepidocephalichthys guntea* (Dhakal and Subba, 2003). Student's t-test was applied to verify whether the declivity of regression (constant "b") presented a significant difference of 3.0, indicating the type of growth: isometric (b=3.0), positive allometric (b>3.0) or negative allometric (b<3.0) (Spiegel, 1991).

In the present investigation, the exponent value (b) observed was greater than 3 *i.e.* 3.246, which indicate the positive allometric growth pattern. King (1995) reported allometric growth patterns for *Tilapia species* from Umuoseriche Lake. Similar observation was also reported in case of *Lepidocephalichthys guntea* (Dhakal and Subba, 2003). According to them, the exponent values 'b' were higher in females than those of males may be due to the enormous growth of ovaries in the females as compared to that of testes in the males. On the other hand, high values of 'b' in juveniles may be due to the high feeding intensity of the juveniles. It has been observed from Figure-1 that the weight bears a curvilinear relationship with length, which becomes linear after logarithmic transformation (Figure 2). Earlier Amin and Zafar (2004) reported same kind of observation in *Coilia dussumieri*.



Figure 1. Length-Weight relationship of Aorichthys aor (absolute value)

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Figure 2. Relationship between log total length and body weight of A. aor.

There is a high fluctuation observed in the relative condition factor of *Aorichthys aor* (Figure 3). Abowei (2009) also reported same trend of fluctuation of K_n value in case of *Cynoglossus senegalensis*. Variation in the condition factor of fish may be indicative of food abundance, adaptation to the environment and gonadal development (King, 1995). According to Pantulu (1961), the number of peaks and troughs in the relative condition of *Mystus gulio* may well be an index of the number of spawning during the life cycle of a fish. Variation in K_n values in different size of *Aorichthys aor* in present finding is in conformity with the above findings. In present investigation, K_n value was found high in fishes of above 650 g weight groups. According to Choudhury, et. al. (1990), a sudden increase in K_n values are usually associated with the onset of maturity. Present findings also indicated the same trend. Even though the change of 'b' values depends primarily on the shape and fatness of the species, various factors may be responsible for the differences in parameters of the length-weight relationships among seasons and years, such as temperature, salinity, food (quantity, quality and size), sex, and time of year and stage of maturity (Pauly, 1984; Sparre, 1992).



Figure 3. Plot of relative condition (K_n) of Aorichthys aor (absolute value)

Thus, the length-weight relationship in fish is affected by a number of factors including gonad maturity, sex, diet, stomach fullness, health, and preservation techniques as well as season and habitat which were not taken into consideration in the present investigation. The mean condition factor is observed slightly high indicating that the species studied was in good condition. Therefore, from this study, it can be concluded that owing to different ecological and anthropogenic threat, the growth of *Aorichthys aor* in river Brahmaputra still remain almost unaffected. But mass awareness is highly needed among the fishers about the ongoing threat to permit better survival of this species in near future.

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