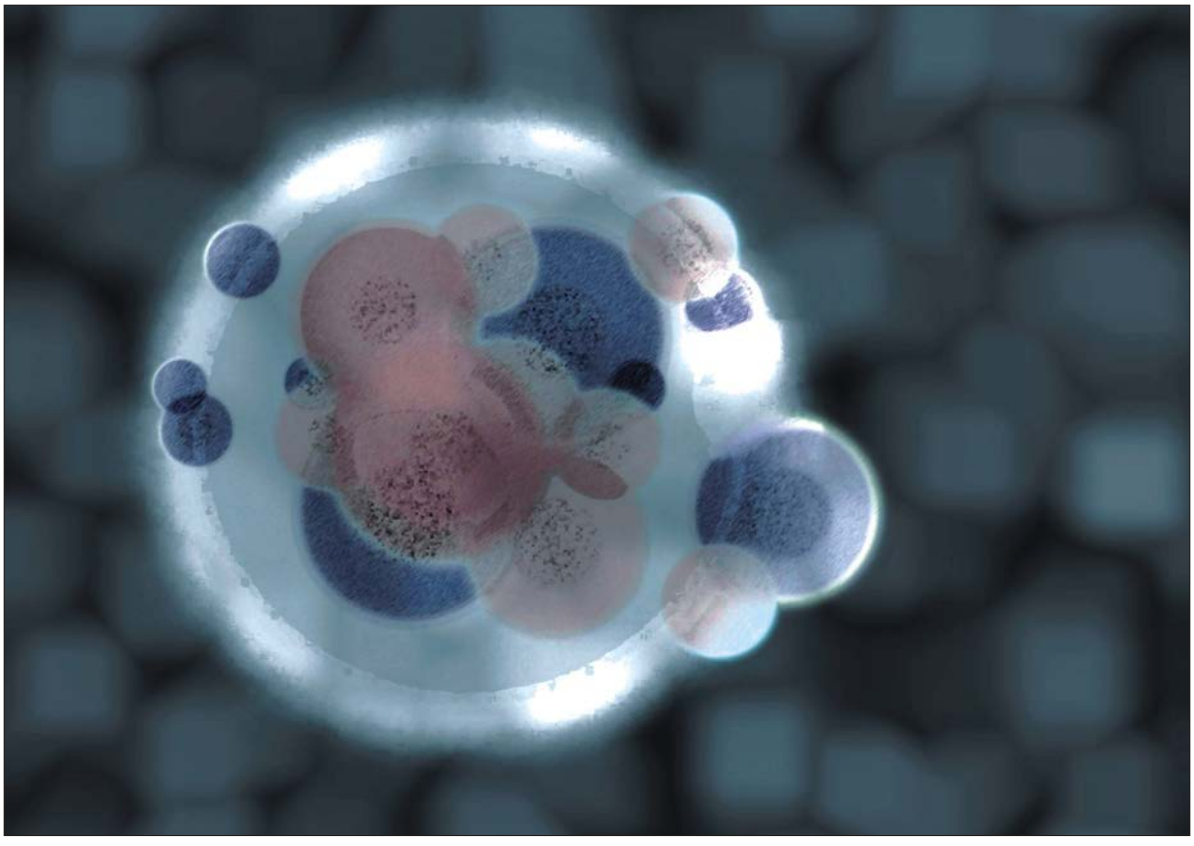

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Studies on Age, Growth and Virtual Population Analysis of *Coilia dussumieri* from the Neritic Water of Bangladesh

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Abstract: In the present study age, growth and virtual population analysis (VPA) has been estimated by the FiSAT program from length-frequency data collected from the Kutubdia channel of the Bay of Bengal. Growth parameters L_∞ and K were found to be 16.80 cm and 1.30/year, respectively. This fish attained 12.06 cm at the end of one year. The estimated length-weight relation for the combined sex was found to be $W=0.00383TL^{2.801}$. The asymptotic weight (W_∞) was 10.36 g. The highest peak of fishing mortality (F) occurs in the length range between 12 and 14 cm.

Key words: Age, growth, *C. dussumieri*

INTRODUCTION

Coilia dussumieri is popularly known as gold spotted grenadier anchovy in England as mandeli in Bombay. It is locally familiar as "olua mach" in the costal districts of Bangladesh and is commonly found in the shallow coastal water and estuaries. The gold spotted grenadier anchovy *Coilia dussumieri* is widely distributed in the Indian Ocean (coast of India from Bombay to Calcutta, probably also Myanmar, Thailand and Malaysia) and western pacific area (Thailand to Java, presumably also Kalimantan). Anchovy is a very soft fish of low standing quality. Due to its perishable body composition, a large part of the catch, particularly during peak season, is sundried; a small portion is sold fresh in the market. The highest percentage of carbohydrate (0.06%), fats (2.38%) and ash (3.48%) were observed in the maturity in fish while the highest percentage of protein (16.85%) and moisture (78.24%) was observed in the gravid and spent fishes, respectively[1]. The fresh fish has great demand among the people of coastal districts. Due to lack of proper transport and processing facilities, the fish is not very well-known to the people of the interior districts.

It is caught mainly with beach seines, purse seines, bamboo-stack traps and incidentally with bottom trawlers. It marketed in fresh, dried salted forms, or made into fish sauce or fish balls[2]. In India it is caught with a variety of other fishes by the indigenous dolnets (fixed bagnets) and set back net (S.B.N) on the coast of Bombay, Maharashtra and Gujarat[3].

Although *Coilia dussumieri* is an economically important fish and has a gradually increasing demand in fresh and dry conditions at home and abroad but there is no published report on age and growth of this species in Bangladesh[4,5]. So, an attempt was made to study the age and growth of *Coilia dussumieri* from the Kutubdia channel of Bangladesh coastal water.

MATERIALS AND METHODS

Fortnightly samples were collected during the period August 1995 to July 1996 from the Kutubdia channel (Lat. 21°53′36′′N and long. 91°54′54′′E) of Bangladesh cost. Samples were collected from Estuarine Set Bag Net (ESBN) with mesh sizes 10 cm at the month, 5 cm at the middle, and 1.5 cm at the cod end. Total lengths (TL) at 0.5 cm interval for 1260 specimens were measured and length frequency data were pooled month wise. The growth parameters L_∞ and K were estimated by using the ELEFANT software package[6,7].

For the study of length-weight relationship 190 specimens were analyzed. Total length varied between 6.75 cm and 14.75 cm and body weight varied between 0.75 and 6.94 g during the year. Total length was measured with the help of a meter scale to nearest millimeter and weight was taken by electronic balance of 0.0001 g accuracy. The total length and weight relationship was determined by the equation $W= a.L^b$ given by Lecren[10] where 'a' is a constant and 'b' is exponent. The equation was transformed into the logarithmic form Log W = Loga + b.Log TL. The values of 'a' and 'b' were determined empirically.

The length-frequency data were used to carry out Virtual Population Analysis (VPA) using the FiSAT (FAO-ICLARM Stock Assessment Tools) as explained in detail by Gayanilo *et al.*[8] is the soft ware computer package. The values of L_∞, K, and F, a (constant) and b

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(exponent) for the species were used as inputs to VPA analysis. The t_0 value was taken as zero.

RESULTS AND DISCUSSION

Age and growth: The length range obtained in the fishery was 6-15 cm. In addition the length range which contributed significantly to the fishery was 8-14 cm. The estimated von Bertalanffy growth parameters were found to be L_∞ = 16.80 cm and k =1.30/year, respectively. It has assumed in the ELEFAN-I analysis that the value of the third parameter of the von Bertalanffy growth function t_0 be zero[6]. Therefore, the sizes attained by *Coilia dussumieri* were 7.76, 12.06 and 14.34 cm at the end of 0.5, 1 and 1.5 year of age, respectively. The absolute increase has presented in Fig. 1. The growth rate of *Coilia dussumieri* showed 6.55 cm from one to six month of age and 4.30 cm from six to twelve month of age. Similar study have been observed by Amin *et al.*[5] and Blaber *et al.*[9] on the *Tenualosu ilisha* through length converted age method which also been followed in the present study.

Length-weight relationship: The length-weight relationship for the individual ranging in size from 5.5 to 15.5 cm was estimated. The exponential form of equation obtain for the length-weight relation of *Coilia dussumieri* was $W = 0.00383 \cdot TL^{2.801}$. The value of co-efficient of correlation (r) estimated for the Species was 0.994, which indicated that the relationship between length and weight of the fish was highly significant. The exponent (b) value obtained for *Coilia dussumieri* indicated the allometric growth pattern. It has observed from the Fig. 2 that the weight bears a curvilinear relationship with the length, which becomes linear after logarithmic transformation (Fig. 3). The maximum weight or asymptotic weight was found to be 10.36 g.

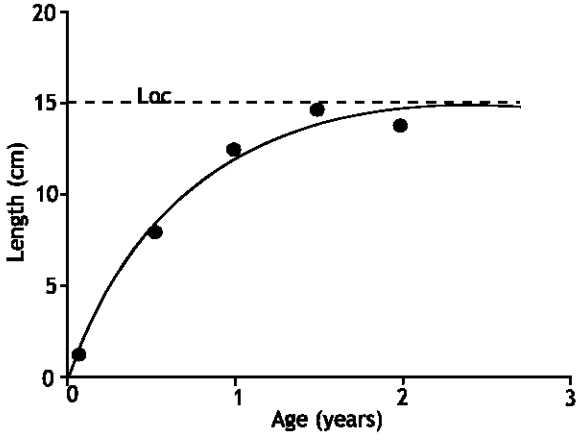

Fig. 1: Calculated growth curve of *C. dussumieri* (with L_∞ = 16.80 cm and K= 1.30/year)

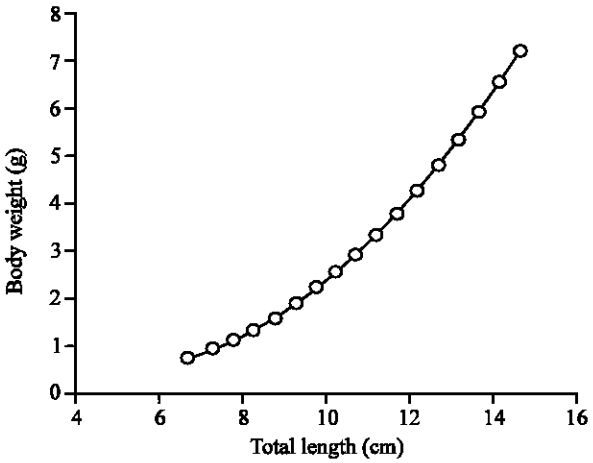

Fig. 2: Total length and body weight relationship of *C. dussumieri*

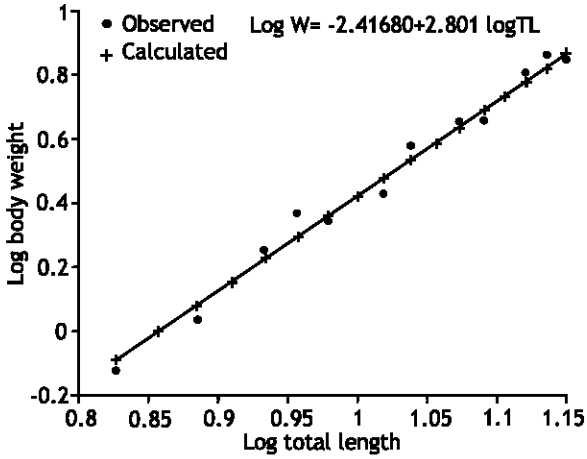

Fig. 3: Relationship between log total length and that of body weight in *C. dussumieri*

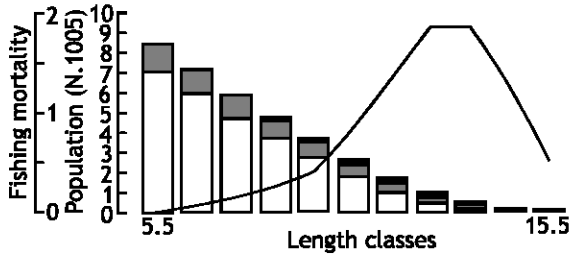

Fig. 4: Length structure Virtual Population Analysis of *C. dussumieri*

Virtual population analysis (VPA): The length structure VPA is a powerful tool for the stock assessment by which the size of each cohort is estimated along with the annual maturity caused by fishing. The result of length structured VPA indicated one peak (Fig. 4) of fishing mortality (F). The peak of F occurs in the length range between 12 and 14 cm length during the study period.

This is the first report on the age, growth and virtual population analysis of *Coilia dussumieri* from the neritic water of Bangladesh. Present findings indicated that the species attain 12.06 cm length at the end of one (1) year of age and growth rate was higher up to six month of age. Fishing mortality was observed higher in the length range between 12 and 14 cm. The maximum age and length in the sample were 1.5 years old and 14.34 cm for both sexes. Age and growth are important in stock management of this species.

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