Available online at: www.mbai.org.in doi: 10.6024/jmbai.2012.54.1.01316-04

Comparison of condition factor of the ribbonfish *Lepturacanthus savala* (Cuvier, 1829) and *Eupleurogrammus muticus* (Gray, 1831) from Mumbai coast

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Received: 31 Mar 2011, Accepted: 10 Jan 2012, Published: 20 Mar 2012

Original Article

Abstract

Two co-existing species of ribbonfish *Lepturacanthus savala* (Cuvier, 1829) and *Eupleurogrammus muticus* (Gray, 1831) were landed by traditional dol net and trawl net in Mumbai waters with the former contributed more in the landings. Fluctuations in the condition factor have been found in both the sexes of *L. savala* and *E. muticus*. k value of the former species was highly affected by gonadal maturation than feeding activity where as k value of latter species was highly linked up with feeding intensity than sexual maturity. Female specimens had higher condition factors than males in both the species.

Keywords: *Condition factor, length-weight relationship, L. savala, E. muticus*

Introduction

Knowledge of quantitative aspects such as length-weight relationship, condition factor, growth, recruitment, and mortality of fishes is important for the study of fishery biology, especially for fish which are higher in the food web (Lizama and Ambrosio, 2002). In fish, the factor of condition, k reflects through its variations, information on the physiological state of the fish in relation to its well being. From nutritional point of view, it indicates accumulation of fat and gonadal development (Le Cren, 1951). The k values are influenced by reproductive status of fish (Angelescu *et al.*, 1958; Thakur, 1975). The condition factor also provides a comparison on two populations living in the same feeding ground, density, climate and other conditions (Weatherley, 1972; Ricker, 1975). Hile (1936) has stated that k is useful to compare the weights of individual fish relative to length. The *Lepturacanthus savala* and *Eupleurogrammus muticus* are found in the coastal waters off Mumbai and landed by dol netters as well as trawlers.

Narasimham (1972, 1976) has reported the condition factor of *Trichiurus lepturus* and *E. muticus* from Kakinada, east coast of India. As there is no report on condition factor of these two species of ribbonfish occupying the same ecological niche, the present investigation was undertaken.

Material and methods

Samples of *L. savala* and *E. muticus* were collected from trawlers and dol netters operated from New Ferry Wharf, Vasai and Versova landing centres during December 1997 to May 1999. The total length of fishes was measured from the tip of the lower jaw to the tip of the tail in the laboratory using a measuring board and weighed to the nearest of 0.1g on an electronic balance with gonads and viscera in tact. The viscera was then cut open to determine the sex and stage of maturity.

A total of 608 specimens of *L. savala* ranging from 80-623 mm in total length and 0.2-235 g in weight were measured including 265 indeterminate specimens ranging in length from 80-281mm. A total of 400 specimens of *E. muticus* ranging from 194-730 mm in length and 3-142 g in weight were measured including 3 indeterminate specimens ranging from 194-400 mm. The total number, range of length and weight of male and female of both species are given in Table 1.

The parameter 'b' obtained from length-weight relationship of both the fishes shown in Table 2 (Rizvi *et al.*, 2002), was employed in calculating the condition factor. Condition factor was determined by month, length and sex of both the species

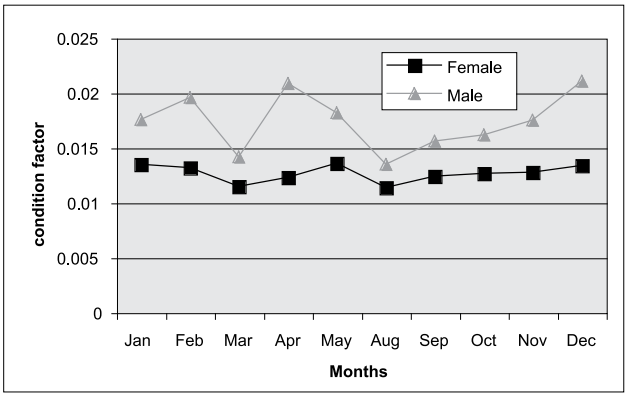

Fig.1. Month-wise condition fator of *L.savala* in males & females

Table 1. Length and weight measurements of *L. savala* and *E. muticus.*

Male			Female		
Total Number	Length range (mm)	Weight range (g)	Total Number	Length range (mm)	Weight range (g)
Lepturacanthus savala					
123	282-585	8.4-104.6	220	315-601	13.5-235.6
Eupleurogrammus muticus					
180	400-692	20-140.8	217	455-725	35-142.5

Table 2. Estimated length weight relationship of *L. savala* and *E. muticus*

Species	Sexes	
	Male	Female
L. savala	LogW=-6.7808+3.1671Log L	LogW=-7.4918+3.4499 Log L
E. muticus	LogW= -6.0649+2.8778 Log L	LogW=-6.9057+3.0747LogL

using the expression:

$k = 100000 \times W/L^b$

Where 'W' is weight in g, 'L' is length in mm and 'b' is exponent of the length-weight relationship.

Results and discussion

The k value of *L. savala* of males was the highest during April but declined in August to rise again in December and February. For females of *L. savala,* the estimated k values obtained in different months followed a similar pattern as males, with maximum in May, December and January (Fig. 1). For males of *E. muticus*, the higher values of k were during January to March and in October and the lower values were recorded from April to September. In the case of females of *E. muticus*, relatively higher k values were noticed during January to March and declined thereafter to reach the lowest in May (Fig. 2).

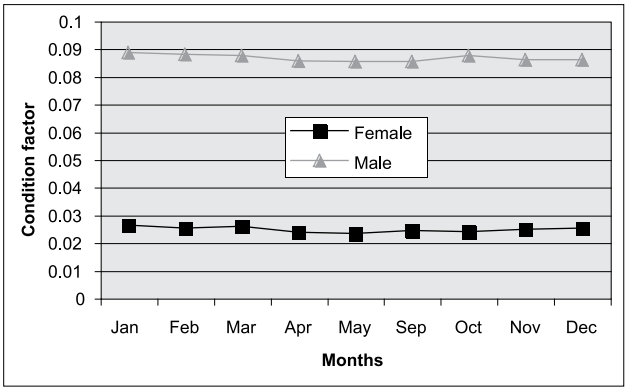

Fig.2. Month-wise condition factor of *E. muticus* in males & females

In the males of *L. savala*, the k values were higher in the length group of 321-340 mm and in 581-620 mm; the values were minimum in 261-300 mm group. For the females, a sharp increase in k value was noticed only after 541-580 mm

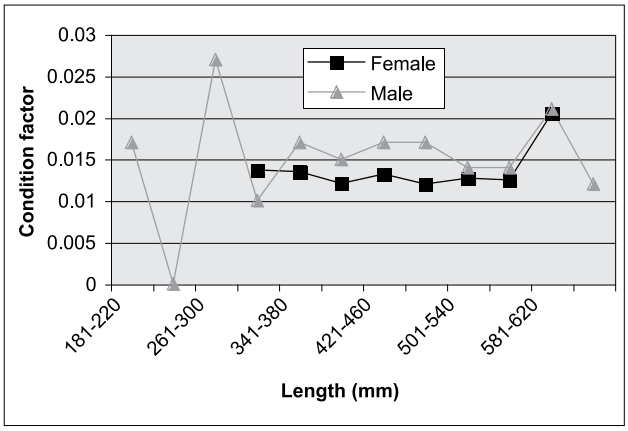

Fig.3.Length-wise condition fator of *L.savala* in males & females

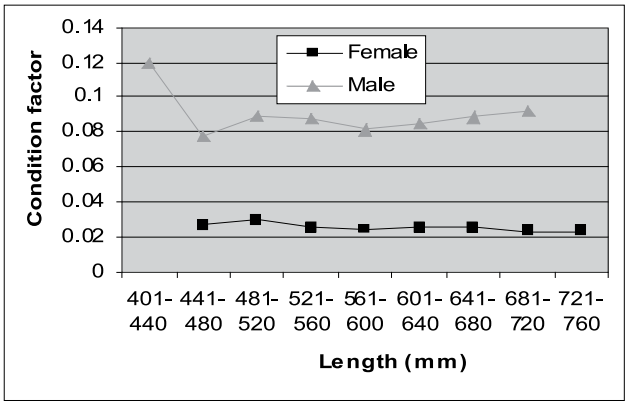

Fig.4. Length-wise condition factor of *E. muticus* in males & females

size (Fig. 3). In *E. muticus* the estimated k values obtained for different sizes of males was higher in 401-440 mm length group; but, no significant fluctuation was noticed thereafter. The k value was high in 481-520 mm and in 641-680 mm groups in the females of *E. muticus* (Fig. 4).

Fluctuations in the condition factor of ribbonfishes during different months have been attributed to many reasons by Gupta (1967) and Narasimham (1972). In male and female of *L. savala* the higher values of k, during April-May and in December-January may be due to higher feeding intensities as shown by gastrosomatic index (Rizvi, 2001). The peak breeding of the species was found during December and May (Rizvi and Nautiyal, 2002). The size at maturity of *L. savala* is 517 mm (Rizvi *et al.*, 2003) and therefore, most of the fishes after this size showed remarkable change in the condition factor. The sharp rise in k, of females larger than 541-580 mm appears to be due to gonadal maturation, as the ovaries attain larger size and weight. Gupta (1967) also stated that in the young ones of *L. savala*, the condition factor is determined by feeding intensity, but in larger individuals, it is largely because of maturation of gonads.

Narasimham (1972) found correlation of feeding and sexual maturity with condition factor in *E. muticus*. In the present investigation *E. muticus* (Fig. 2) showed prevalence of higher k values during January-March and September-October in males but high in the month of December for females. This may be attributed to increased feeding activity from December onwards, as revealed by the higher gastrosomatic index (Rizvi, 2001).

Several researchers have shown that fluctuations occurring in the condition of fishes during different months are directly related to the cycle of sexual maturity. This is, however, not the case in *E. muticus*. A sharp rise in k in the case of females noticed during December does not seem to be related to the maturation of gonads, as the peak-breeding season of the species was found during April and October. The present study showed that the observed fluctuation is related more closely to the feeding intensity than to maturation. The condition factor of males of *E. muticus* showed an inverse relationship with length. Smaller fishes had higher condition values than larger fishes due to higher metabolism. However, males of *E. muticus* larger than 401-440 mm did not show much fluctuation. A higher k value observed in the size 441 –520 mm in the females of *E. muticus* may be due to high feeding activity as females with ripe and running ovaries were seen only from 541-550 mm onwards (Rizvi, 2001). In female of *L. savala* a remarkable rise of k value (0.013-0.021) may be due to gonadal maturation. It is comparatively higher than female of *E. muticus* in the length group of 641-680 mm which may due to higher fecundity of *L. savala* as compared to *E. muticus* (Rizvi, 2001).

The fecundity of *L. savala* varied between 3,113 and 23,188 eggs in the size range of 465-655 mm total length (Rizvi 2001) and correlation coefficient between fecundity and weight of fish was found significant, where as, the fecundity ranged from 1,342 to 6,705 eggs in the size range of 537-700 mm total length did not show significant correlation with body weight in *E. muticus*. James (1967) and Narasimham (1976) have also found low fecundity (1,327- 4,853 eggs) in *E. muticus*. So it is clear from the above mentioned finding that *E. muticus* had larger body cavity with low fecundity than *L. savala*. Therefore, it did not exhibit more fluctuation in its total body weight as well as k value during breeding period.

E. muticus is a slow moving and inshore species inhabiting with its favorite food item i.e., non-penaeid prawns (IP = 59.9) (Raje and Deshmukh, 1989). Moreover, it is inadvertently fished out by large number of 'dol nets' operated in waters of 20-30 m deep as by-catch. At Versova, Arnala and Vasai region, the practice of using smaller cod end mesh of 10-15 mm size for catching non-penaeid prawns are exploiting this

resource very intensively. Hence *E. muticus* showed higher exploitation ratio (0.73) than *L. savala* during the same period. As compared to *E. muticus*, *L. savala* is a fast moving offshore pelagic species (depth > 25-30 m), not inhabiting with favorite food items (Index of Preponderance for fish = 48.8) and having poor catch in dol net fishing. *L. savala* are largely caught by gill net and bottom set shrimp trawlers, which are operated in offshore region (Rizvi, 2001). Therefore, it is evident that condition factor is more fluctuated due to feeding activity in *E. muticus* than *L. savala*.

It may thus be concluded that two pelagic species of family Trichiuridae viz. *L. savala* and *E. muticus* though, inhabiting the same ecological domain, the fluctuation in the condition factor throughout the year in *L. savala* is highly correlated with sexual maturation cycle as well as feeding intensity; whereas in the case of *E. muticus* it appears that k value increased mainly due to feeding activity.

Acknowledgements

The authors express gratitude to Dr. S. A. H. Abidi and Dr. S. Ayyapan former Directors, Central Institute of Fisheries Education for constant encouragement. Sincere thanks are to Dr. R. S. Biradar, Joint-Director, C.I.F.E., for his kind help and advice. The first author gratefully acknowledges the financial support provided by Department of Ocean Development during the course of study and Dr. B. P. Agrawal President of IASc., Allahabad for the support in preparation of the manuscript.

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