ISSN: 0975-833X

Available online at http://www.journalcra.com

International Journal of Current Research
Vol. 9, Issue, 12, pp.63038-63041, December, 2017

INTERNATIONAL JOURNAL OF CURRENT RESEARCH

RESEARCH ARTICLE

LENGTH AND WEIGHT RELATIONSHIP OF *ETROPLUS SURATENSIS* (BLOCH, 1790) IN LOWER ANICUT, SOUTH INDIA

Jenny, K. and *Pragash Raj, R.

PG and Research Department of Zoology and Biotechnology, A.V.V.M. Sri Pushpam College, Poondi, Thanjavur

ARTICLE INFO

Article History:
Received 27th September, 2017
Received in revised form
16th October, 2017
Accepted 11th November, 2017
Published online 31st December, 2017

Key words:
Lower Anicut, *Etroplus suratensis*, Cichlidae, Length–weight relationship, Allometric.

ABSTRACT

The present study aimed to analyze the length and weight relationship of Pearl spot *Etroplus suratensis* in Lower Anicut. The study area of Lower Anicut (11^0 15 N Latitude and 79^0 30' E Longitude) is one among the major fishing point in Cauvery river system in Tamil Nadu. The *E.suratensis* is one of the commercially important fish species of the family Cichlidae (Local name "Papai Meen"). A total of 120 specimens comprising of 60 males and 60 females were collected and analyzed during the period of November 2015 to October 2016. The fishes ranged in length from 84 mm to 212 mm of male and 82 mm to 196 mm of female, weight ranged from 15g to 260g of male, 18 g to 208 g for female. The results of length and weight relationship of 120 specimens of r^2 value is 0.752 and 0.926 of male, 0.557 of females respectively. The r^2 values of male are higher than females and it shows allometric growth of both sexes. The slope value was compared here could be very useful for comparison with the freshwater species in other geographical locations.

Citation: Jenny, K. and Pragash Raj, R. 2017. "Length and weight relationship of *Etroplus suratensis* (Bloch, 1790) in lower anicut, South India", *International Journal of Current Research*, 9, (12), 63038-63041.

INTRODUCTION

Pearl spot (*Etroplus suratensis*) is of one the most popular and very important fish species throughout in India having a high commercial value. *E.suratensis* is used as a food fish in India and it is wild species in Tamil Nadu. The family Cichlidae comprises over 700 species of fishes that occur in freshwater as well as brackish water habitats (Vaitheeswaran, 2016). Among the Cichlid group, *Etroplus* is the only genus endemic in India and other three species have been reported from Indian backwaters viz., *E.cararensis, E.maculatus* and *E.suratensis*. *E.maculates* and *E.suratensis* has potential for both food and ornamental values (Bindu, 2012). The Length–Weight (LWR) relationships are the basic study used to assess the fish stocks and populations (Ricker, 1968). It also help to evaluate the condition, reproduction, history, life cycle and the general health of fish species (Pauly, 1993) and are also useful in local and interregional morphological and life historical comparison in species and populations. Length and weight data are useful standard methods for fish sampling programs (Moratoa, 2001). The exact relationship between length and weight differs among the individuals due to food availability and growth within weeks prior to sampling, sex and gonad development are also influences the length and weight of fishes (Ecoutin, 2005). Knowledge on this relationship also helps to identify energy investments for growth or reproduction as a natural cyclic phenomenon of natural population (Bolger, 1998). Length - weight relationship are the great importance in fisheries research because they provide information on population parameters (Krause, 1998; Ovredal, 2002). In fish, size is biologically important feature age, mainly because several ecological and physiological factors are size-dependent than age dependent. Consequently, variability in size has important implications for diverse aspects of fisheries science and population dynamics (Erizini, 1994; Pauly, 1984). The size attained by the individual fish may vary because of variations in food supply and may reflect variations in climatic parameters and in the supply of nutrients or in the degree of competition for food (Luff, 2000). The Length–weight regressions have been used frequently to estimate weight from length because direct weight measurement can be time consuming in the field (Sinovcic, 2004). It provides a mathematical means of determining the weight from known length and vice-versa. The length- weight relationship is very useful in fisheries research to estimate the weight of individual fish (Li, 2016). One of the most commonly used method for analyses of fisheries data is Length-weight from length relationship (Mendes, 2004). The estimation of yield per recruit in prediction models, and in estimation of biomass from length observations and limited studies has been made on population dynamics of *E.suratensis*. The knowledge helps to determine the growth pattern of the particular species, whether

***Corresponding author:* Pragash Raj, R.**
PG and Research Department of Zoology and Biotechnology, A.V.V.M. Sri Pushpam College, Poondi, Thanjavur

it is isometric (growth with unchanged body proportions) and specific gravity or allometric. Hence the present study aimed to assess the length and weight relationship of *Etroplus suratensis*.

MATERIALS AND METHODS

The Lower Anicut built by Sir Arthur Cotton in 19th Centuary AD across Coleroon, the major tributary of Cauvery is said to be replicated structure of Grand Anicut (Kallanai). Nearly 2000 families live in Anakarai with the main occupation of agriculture and fishing. 120 specimen of *Etroplus suratensis* were collected by weekly twice, from fish landing centre of Lower Anicut (Anakarai) during November 2015 to October 2016. The size ranges in length from 84 mm to 212 mm total length of male, 82mm to 196 mm of female and total weight of 15gm to 260gm of male, 18gm to 206gm of female were recorded. The Total Length (TL) of the fishes were measured in millimeters by digital Vernier callipers and weight in grams by digital balance.

A total of 120 specimens of different size range were examined. Total length (TL) and standard length (SL) of each individual was measured from it tip of the snout to tip of the caudal fin. The cube law is widely used to describe length and weight relationship in all specimen (Le Cren, 1951).

$W = a L^b$ Where,

W = The total weight of fish in grams,

L = The total length of fish in millimeters,

a= Exponent describing the rate of change weight with length (= the intercept of the r regression line on the Y axis)

b = The slope of the regression equation.

The log transformed data gave a regression equation.

$$\text{Log } W = \text{Log } a + b \text{ Log } L$$

Where, a = constant, b= regression co-efficient

Table 1. Statistics of mean and SD for the Length – weight relationship of males and females of *Etroplus suratensis*

	MALE				FEMALE			
	MEAN		SD		MEAN		SD	
	TL	TW	TL	TW	TL	TW	TL	TW
NOV	132.476	73.6	23.66	37.38	133.606	71	21.245	36.79
DEC	116.8	44.5	9.859	9.539	112.704	49.4	16.27	8.792
JAN	152.8	118.8	41.051	93.494	103.32	64.24	54.735	27.553
FEB	139.02	93.2	30.295	59.357	104.877	62.6	51.748	15.469
MAR	115.06	58.4	19.046	31.126	144.142	91	31.935	67.926
APR	143.236	82.2	11.16	15.834	134.642	69.2	21.197	38.022
MAY	144.542	100.2	13.448	28.297	135.142	61.8	8.695	16.423
JUN	114.522	45.6	29.259	32.792	130.624	64.6	12.803	24.193
JUL	147.102	90.6	28.549	40.47	119.738	45.4	10.155	12.837
AUG	108.502	34	15.357	12.45	111.898	36.4	24.67	25.324
SEP	107.962	36.2	21.962	19.537	152.52	116.8	29.027	49.363
OCT	128.972	79	50.835	103.271	126.298	56.8	14.536	13.517

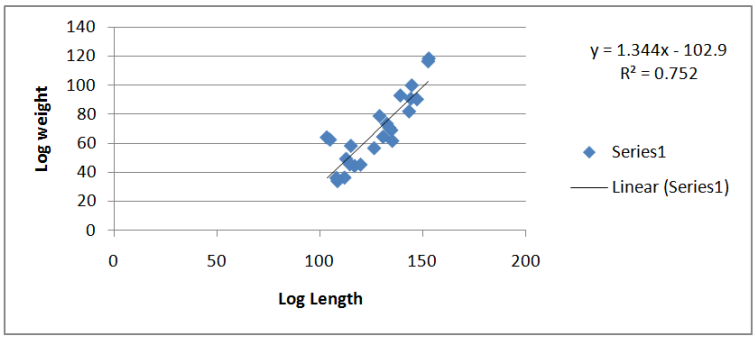

Fig 1: Logarithmic relationship between length-weight of male and female *E.suratensis*

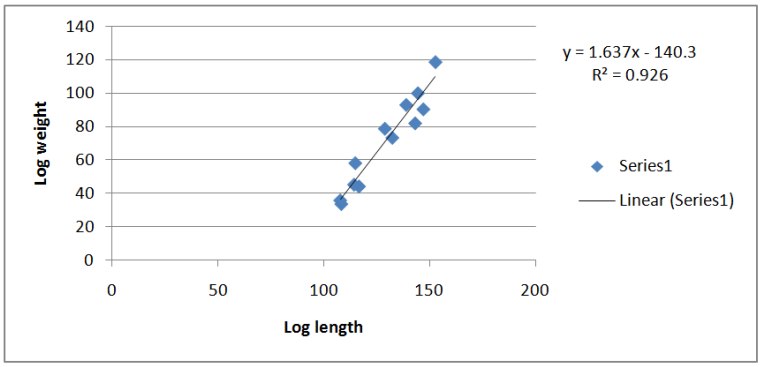

Fig. 2. Logarithmic relationship between length –weight of male *E.suratensis*

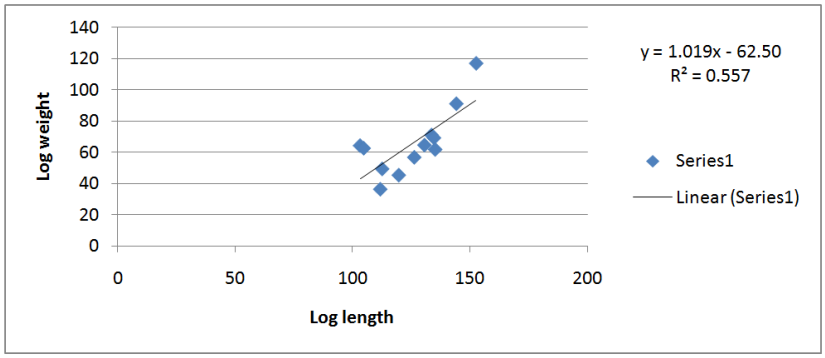

Fig. 3. Logarithmic relationship beween length–weight of female *E.suratensis*

RESULTS

The length - weight relationship of pooled sample of *Etroplus suratensis* can be expressed by the equation: Log W= 1.344 – 102.9log L. The correlation co-efficient between length and weight was found to be 0.752. The regression equation of male was estimated as Log W 1.637 – LogL-140.3 (r = 0.926) and female as Log W 1.019-LogL-62.50 (r=0.557) (Fig. 2 and 3). The 'b' value of male and female beyond the standard value (3.0). From the present investigation, mean and standard deviation (SD) for male and female *E. suratensis* are given Table 1. Correlation coefficient derived for Length-weight relationship curve of pooled sample and both the sexes are presented below Figure 1, 2 and 3.

DISCUSSION

Many researchers from different regions of India as well as from world have been carried out length-weight relationship studies on various fish species. This relationship is very beneficial for comparison of different fish species from different water bodies. The 'b' value of pooled sample is 1.344 and r^2 value 0.752 in *E.suratensis*. The pooled sample values were correlated with earlier findings (3.0). The present observation indicates that the length–weight relationship in *E. suratensis* does not follow the cubes law or exhibit an allometric growth. Several authors observed such departures of the cubes law in variety of fishes (Jhingran, 1952; Rao, 1974; Choudhary, 1982; Mohan, 1988). A similar variation for cube law was also reported for *E. suratensis* in Veli Lake (Jayaprakash, 1981), although a more drastic and significant departure was indicated for female fishes (Jones, 1976). Degree of variation of exponential value of length-weight relationship indicates by 'b' value in male (1.637) and (1.019) female. The lower value of 'b' is observed in female than male of *E.surstensis*. Variation in 'b' value may be due to feeding, developmental stages of gonads (Weatherly, 1972; Hile, 1936). Specially the ovary affect the weight and state of maturity (Frost, 1945) etc. In the present investigation, the regression co-efficient (b value) for the male and female are 1.637 and 1.019 respectively.

The value of correlation co-efficient of r estimated for the male and female was 0.962, 0.557 which indicate that the relationship between length and weight of the fish is significant. The slight variation in r^2 values that exhibits anatomical and physiological differences among the male and female. From the result, it clearly shows that the reproductive cycle of male and female fishes were varied. Hence, the present results concludes that, the growth of *E. suratensis* is positive allometric.

Conclusion

The present study concluded that the fish shows high value of significant correlation coefficient between Total Length (TL) and Total Weight (TW). The anatomical, physiological particularly reproductive stages of male and female fishes where differ. Hence the exponent value in this study indicates positive allometric growth in *Etroplus suratensis* from the Lower Anicut which is not obeying the cube law. Lower anicut needs conservation and management efforts from fishery aspects. Therefore, Tamil Nadu Government should develop conservation strategy to stabilize the declining population of *Etroplus suratensis*. In the present study thus provides valuable information very useful for the fisher man and the management of capture fishery resources.

Acknowledgement

The authors are thankful to the Head, Department of Zoology and Bio-technology, A.V.V.M Sri Pushpam College, Poondi, Thanjavur, Tamil Nadu, for providing the laboratory facilities to carry out research my work. For the research work, we thank Dr. R. Sivakumar, Dept. of Zoology, Govt. Arts College (Autonomous) Kumbakonam helping for fish identification.

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