Lengh-Weight Relationship In Channa Striatus

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Abstract

The study evaluated the Length-Weight Relationship of the Channa striatus constitutes a most common teleost of the rivers and ponds and a very important group as regards their fishery and biology and a most common teleost. Fish species were taken to the laboratory in large glass jars and total lengths were measured in centimeters and weights were measured in grams. The relationship of weight with total length was calculated by least square method using the curvilinear formula$Y = a^{rb}$or Logy= Antilog a+ b Log x. The log total length showed a linear relationship with the log total length but the total weight showed a curvy linear relationship with the total length. The correlation coefficient and analysis of variance showed that there exists a high degree of correlation ship between the total length and the total weight of the fish and highly significant for the increase in total length in relation to total weight respectively.

Keywords

Length-Weight Relationship, Channa striatus.

Introduction

Organisms generally increase in size (Length, Weight) during development. Every animal in its life exhibit growth both in length and in weight and the relationship between these two has both applied and basic importance(Kuriakose, S.2014). The LWR forms an important criterion for studying the growth of fish populations (Agarwal and Saxena, 1979). According to Saxena and Kulkarni (1982), the factors such as the nutrient level of reservoirs, production of fish food organisms and depth are influencing the growth of fish. The present study was undertaken to study the LWR of the *Channa striatus*. It grows to a maximum of 90cm and is known for its practical utility in fish management and conservation. The fishery biology of freshwater riverine, pond fishes and marine fishes have been made by various workersDhasmana and Lal(1993)., Patgiri, *et.al.,* (2001), Kar and Barbhuiya (2005), Hanif *et.al.,*(2019), etc. This work is done particularly to facilitate the conversion of one measure into another and also for calculating condition factors to know the wellbeing of the fish and used to measure variation from the expected weight on length of the individual or relevant group of individuals (Lecren,1951). It has been used extensively in fishery analysis due to difficulties in getting data from the field (Ayoade,2011. Froese, 2006 and Yusuf *et. al.,* 2003). Besides providing means for calculating weight from the length and a direct way of converting logarithmic growth rates calculated on length into growth rates. The variation in this relationship provides a measure of the condition of the fish and its suitability to its environment (Zaher*, et. al.,* 2015). There is still potential scope for knowing the length-weight relationship of majority of fish inhabiting tropical and subtropical waters.

Materials and Methods

Spp. of *Channa striatus* were collected from the fish market and carried to the laboratory in the glass jars and preserved in 5% formalin. After two weeks total length was measured in centimeter and weight were measured in grams after removing the body moisture.

The relationship of weight with total length was calculated by least square method using the curvilinear formula.

$$Y = ax^{b} \text{or } Logy= Antilog\ a+ b\ Log\ x$$

Where

Y	=	Body weight in grams
x	=	Total length in cm
a	=	aConstant
b	=	an exponent to which ‘x’ can be raised.

The linearity of the equationswastested by analysis of variance and significance of difference was tested at a 5% probability level.

Result

The value of the exponent 'n' (b) was found 2.477039 and the correlation coefficient, r,0.998057 showed that there exists a high degree of correlation ship between the total length and the total weight of the fish species. The total length was found highly significant for the increase in the total weight of the fish. The log total length showed a linear relationship with the log total length but the total weight showed a curvy linear relationship with the total length. The analysis of variance showed that the increase in the total weight is highly significant for the increase in total length.

Observation

Table.1

Regression analysis of the total weight of fish with respect to the total length

Regression

A	0.57484
b	2.477039
r	0.998057

Regression equation: y=-0.57484+2.477039x

Table.2

Regression Data

$LogEx^2$	$LogEy^2$	legacy	A	b	r
37.139	79.123	54.10355	-0.57484	2.477039	0.998057

Table.3

Analysis Of Variance

Source	df	SS	MS	Obs. F	5% F	Significance
S.S. due to Regression	1	78.82	78.82	501.639	4.28	Highly Significant
Residual S.S.	23	30	2.044			
Total	24	79.123				

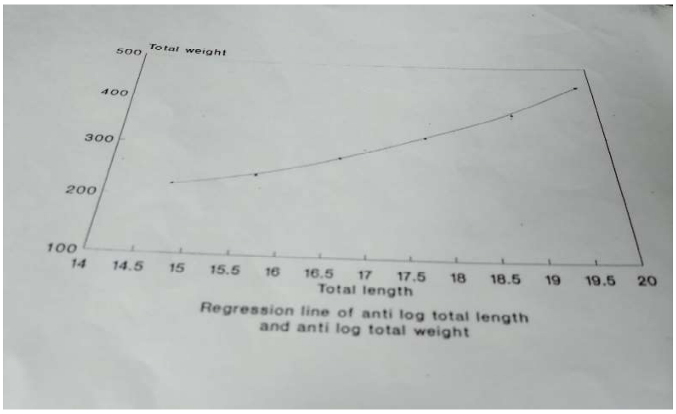

Fig.1

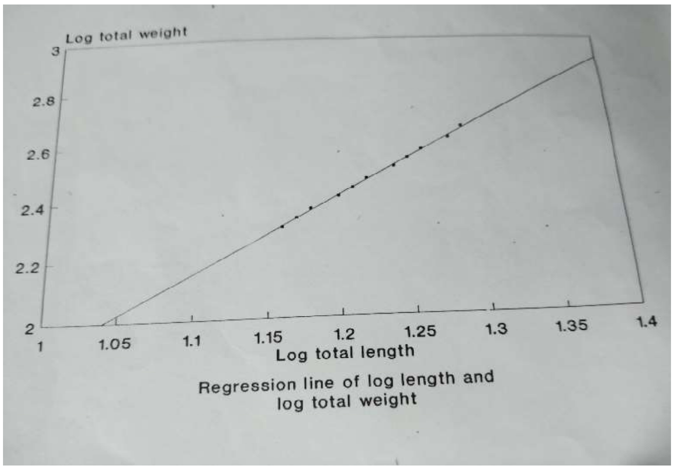

Fig.2

Discussion

A length weight relationship is an important tool that provides information on growth patterns and growth of animals.Ighwela*et.al*.,(2011).Allen (1938) has shown a cubic relationship between the total length and total weight of the fish, if the fish maintains the same shape and specific gravity throughout its life. But it has been pointed out by martin(1949) That the fishes do change their shape as they grow.In fish bioecology, the Length-weight relationship of fish show variations depending upon the condition of life in aquatic environment (Nagesh, *et. al.,* 2004) because it helps in understanding growth patterns and the general well-being of a fish population.

Hile (1936) and Martin (1949) illustrated that the values of the regression coefficient 'generally lie between 2.5 and 4.0 and in majority of the cases the value n = 3. Beaverton and Holt in1957 was pointed out that the departure from n=3.0 is rather rare. WhileAllen in 1938, suggested that the value of 'n' remains constant at 3.0 for an ideal fish and it follows the cube law.The length-weight relationship was considered to follow the cube law (Allen, 1938) but Martin (1949) reported that changes occur in the shape and size of fishes as they grow and thus the parabolic relationship was considered to be superior by Lecren (1951) and Sarojini (1957). According to Rickers(1937),Cube Law, as stated by Jhingran (1968), the weight of fish equals to the cube of its length (W=CL"). According to Rounseefell and Everhart (1985), as the specific gravity or outline of the fish are subject to changes, the cube law does not necessarily hold good always. According to Dhasmana and Lal (1993), environmental conditions such as water quality may be responsible for this deviation from cube law and the value differs with sex, season ad year and locality, the range being 2.5 to 3.9 in hill-stream fish *Gara gotylagotyla*. The length-weight relationship was found parabolic and has no significant differences between the sexes. These observations were in close conformity with Lal (1980) and Krishnamoorti (1971). There are reports of significant deviation from the cube law in the case of different fishes (Sultan, 1981. Sultan and Khan, 198l. Hoda, 1987. Sivakami 1987). In the present investigations, the value of the exponent 'n' (b) was found 2.477.In *Channa striata* a relatively less value of 'b' was observed which may be due to less somatic growth and more gonadal growth as fishes increase in size. (Chakraborty, *et.al.,*2017).

The correlation coefficient showed that the total length is highly correlated to the total weight. The growth in the total weight was found highly significant for the increase in the total length of the fish.Our observations were found in close conformity to the findings of LeCren(1951), Lal (1969,1980), and Dhasmana and Lal (1993). Hile (1936) expressed that in most of the fishes this relationship was found general parabolic relationship ($w=CL^n$). The superiority of the general parabolic relationship over the cubic relationship has been shown by Lecren(1951).The value of 'n' may change with locality, sex, maturity and with metamorphosis(Lecren,1951). The value varies between 2.5 to 4.0 (Hile,1936. Martin,1949).The value was hence, near to the ideal value of n=3.0 in Fish species and it resembles to that of Lal and Nautiyal (1980),Lal (1980) in which the value of exponent 'n' was reported to be 2.8807 for *Tor putitora* and 2.964 for *S. plagiostomus*respectively. According to Nautiyal (1985), the exponent 'n' usually varied between 2.3 and 3.1 in Garhwal Himalayan Mahseer. The growth in the total weight was found highly significant for the increase in the total length of the fish.Our observations were found in close conformity with the findings of LeCren(1951), Lal (1969,1980), Bhagat and Sunder (1983), Nagesh, T. S., *et. al*.,(2004)and Bhatt *et. al*., (2010). Dhasmana and Lal(1993). Hile (1936) expressed that in most of the fishes this relationship was found general parabolic relationship ($w=CL^n$). The superiority of the general parabolic relationship over the cubic relationship has been shown by LeCren(1951).The value of 'n' may change with locality, sex, maturity and with metamorphosis (Lecren,1951).In the present study, a significant positive correlation 'r 0.998057was observed between the length-weight relationship. Similar kind of results was noticed During morphometric studies of *Schizothoracines*in river Lidder of Kashmir thesimilar kind of results were obtained and results revealed a positive correlation coefficient of total length with other parameters under comparison and the correlation coefficient 'r' of total length with standard length was observed to be maximum (r =0.999) compared to all other parameters studied (Bhatt, F. A., et. al.,2013).

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