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LENGTH-WEIGHT RELATIONSHIP OF GOLDEN MAHSEER *TOR PUTITORA* (HAMILTON) FROM PONG DAM RESERVOIR, HIMACHAL PRADESH

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Growth studied of *Tor putitora* (Ham.) using length-weight relationship was conducted on the specimens obtained from the Pong reservoir. The statistical relationship between length-weight of the fish was derived as suggested by parabolic equation by Lecren (1951). The value 'n' of length-weight relationship was 3.150, 3.313 and 2.958 from pooled, females and males specimens, respectively.

INTRODUCTION

Studies on the length-weight relationship of fishes are conducted primarily to facilitate the conversion of one measurement into another basically to have an assessment of growth rate of the fish crop. In certain cases the relationship is very useful in differentiating small taxonomic units, for variation may occur with the population of different localities (Lecren, 1951; Chonder, 1972). Length-weight relationship of fish is profoundly influenced by the environmental conditions. The variation of the relationship provides a measurement of condition of the fish and the suitability of the environment. The length-weight relationship in some fish species was studied by workers like Jhigran (1959), Pandey (1995 & 1998), Singh et al. (1998), Mohan & Saraswat (2000) and Mohan & Jhaghria (2001). In view of the utility of this relationship in the fishery management, the length-weight and condition factor of this fish *Tor putitora* was estimated to have the specific knowledge of growth pattern of the fish inhabiting a specific lentic ecosystem in the foothills of Himachal Pradesh.

MATERIALS AND METHODS

Samples were collected once in a month from the Khatiyar landing station of Pong dam reservoir which is situated at a latitude of $30^0 25'$ North and latitude $75^0 45'$ East. Length-weight relationship of 260 fish were recorded pooled and sex-wise during the period of August 1998 to January 2000. The statistical relationship between length-weight of fishes were established by using the parabolic equation by Lecren (1951).

$$W = aL^n$$

W= Weight of fish
L = Length of fish

a = Constant
n = An exponential expressing relationship between length-weight

The relationship ($W = aL^n$) when converted into the logarithemic form gives a straight line relationship graphically.

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

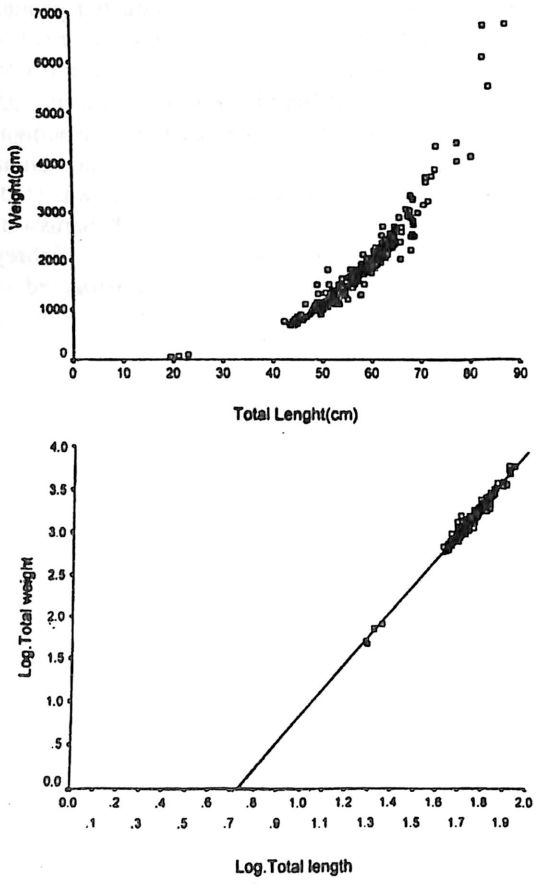
Where (n) represents the slope of the line
Log a = constant

Condition Factor was calculated using (Fulton, 1891) $K = \frac{W \times 10^5}{L^3}$

W = Mean weight calculated from emperical length-weight
L = Mean back-calculated length in each year
10^5 = Factor to bring the value of L neared to unity.

RESULTS AND DISCUSSION

The specimens for their total lengths ranged between 19.6 cm to 84.0 cm those were deguted immediately and weighed 51gm to 6575 gm. The curvilinear relationship was observed when original deguted weights were plotted the respective total length of the fish (Fig. 1). However, linear relationship was obtained when the values were converted to logarithermic value (Fig. 2).



Figs. 1-2 : 1. Length-weight relationship between total fish length and weight of *Tor putitora*; 2. Log total length and log weight relationship.

An analysis of samples of males and females was done separately and pooled data obtained following as :

Male Log	$W = -1.970199 + 2.958025 \text{ Log } L$ $W = 0.17102\ L^{2..958025}$
Female Log	$W = -2.288424 + 3.313970 \text{ Log } L$ $W = 0.0051472\ L^{3..313970}$
Pooled Log	$W = -2.30664 + 3.150243 \text{ Log } L$ $W = 0.0049358\ L^{3.150243}$

The value of 'n' of length-weight relationship of pooled data was 3.1502. However, value of 'n' in female was 3.313 as compared to male and pooled one. This may be due to large number of female specimens in the population. According to Hile (1936) the exponent 'n' usually varies between 2-5 in the majority of case the values of n = 3. The length-weight relationship *of Tor putitora* has been described by Lal & Nautiyal (1980), Johal & Tandon (1981) and Nautiyal (1983) for few of the reverine and reservoir populations. They found the value of 'n' of length-weight relationship is either 3 or very near to 3. The present results are more in confirmity to Chaturvedi (1976) and Nautiyal (1985) in *Tor tor* from southern and eastern Rajasthan and Garhwal Himalayas. Hile (1936), Sarojini (1957) and Tandon (1961) in their observation on the length-weight relationship expressed the view that cubic relationship hold good only when the form of the fish and its gravity remain constant throughout life. However, Sultan (1981), Pandey (1998), Kulshrestha *et al.* (1993) reported some significant deviations in the length-weight relationship on the basis cube law as applied for fishes.

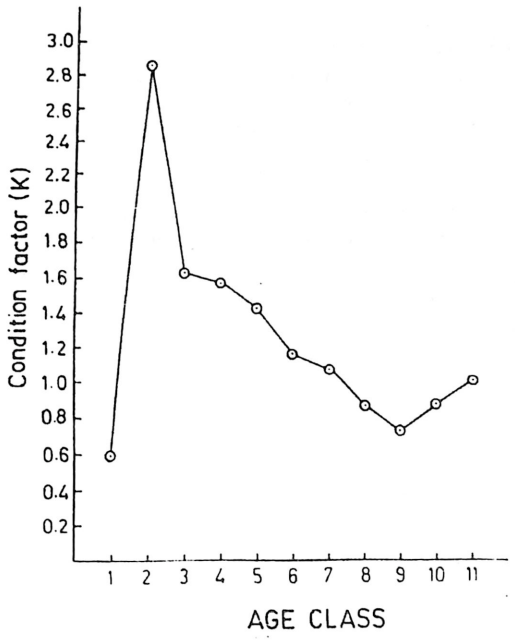


Fig. 3 : Condition Factor showing age classes along X-axis and K-values along Y-axis.

A perusal of Fig. 3 shows that the fish is in the very fit condition *i.e.* robust health during the second year of its life, thereafter the fish growth rate has declined. The decline is maximum in the

9th year, after which the fish shows some recuperation. The increasing value following the 9th year onwards show that the rise in K-factor may be on account of an increased number of recuperating individual in 3rd and 4th stage of maturity, as also suggested by few earlier workers *viz.* Jhingran (1959), Johal (1982), Johal & Tandon (1979). On the basis of from length-weight relationship and Condition Factor of *Tor putitora* as obtained here, it can be inferred that its growth pattern follows the cube law and therefore may be considered an ideal for this fish.

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REFERENCES

CHATURVEDI, S.K. 1976. Spawning biology of Tor mahseeer, *Tor tor* (Ham.). *J. Bombay nat. Hist. Soc.* **73**(1) : 330-334.

CHONDER, S.L. 1972. Length-weight relationship of mature female *Labeo gonius* (Ham.) from the Keethan reservoir. *J. Inland Fish. Soc. India.* **4** : 216-217.

FULTON, T.W. 1891. The comparative fecundity of seafishes. *Reg. Fishery Bd. Scotland.Part III.* : 243-268.

HILE, R. 1936. Age and growth of the cisco, *Leucichthys artedt* (Le Sueur) in the north-eastern high lands, wisconsin. *Bull. US. Bur. Fish.* **48** : 211-317.

JHINGRAN, V.G. 1959. Studies on the age and growth of *Cirrhina mrigala* (Ham.) from the river Ganga. *Proc. Natl. Inst. Sci. India.* **B 25**(3) :107-137.

JOHAL, M.S. & TANDON, K.K. 1979. Monograph on fishes of re-organised Punjab (I). *Pb.Fish Bull.* **3** : 144.

JOHAL, M.S. & TANDON, K.K. 1981. Age, growth and length-weight relationship *of Tor putitora* (Ham.) from Gobindsagar, Himchal Preadesh, India. *Pb Fish Bull. Special Coldwater Fisheries Issue* : 43-48.

KULSHRESTHA, S.K. , SRIVASTAVA, M.P., GEORGE, R., SAXENA, R.K. & TIWARI, A. 1993. Length-weight relationship of a major carp *Catla catla* (Ham.) from two water bodies of Bhopal. *Adv. in Limnology* (Edited). Narendra Publishing House, Delhi. 329-332.

LAL, M.S. & NAUTIYAL, P. 1980. Eco-biological studies of some hillstream fishes of Garhwal Himalaya-II. Length-weight relationship of *Tor putitora* (Ham.). *Indian J. Zool.* **21**(1-3) : 107-110.

LE CREN, E.D. 1951. The length-weight relationship and seasonal cycle in gonad weight and condition in perch, *Perca fluvitilis. J. Anim. Ecol.* **20** : 201-219.

MOHAN, D. & SARASWAT, P. 2000. Length-weight relationship of *Cyprinus carpio* from Rawti Pond, Jodhpur. *J. Natcon.* **12**(2) : 211-216.

MOHAN, D. & JHANGHRIA, A. 2001. Comparative growth and production studies of carps in Shekhawat Pond, Jodhpur. *J. Natcon.* **13**(2) : 123-130.

NAUTIYAL, P. 1984. Natural history of the Garhwal Himalayan mahseer *Tor putitora* (Ham.). II. Breeding biology. *Proc. Indian Acad. Sci. (Anim. Sci.)* **93**(2) : 97-106.

NAUTIYAL, P. 1985. Observations on the length-weight relationship and relative condition factor of Garhwal Himalayan mahseer with reference to its fishery. *Indian J. Anim. Sci.* **55** : 65-70.

PANDEY, B.L. 1995. Length-weight relationship and relative condition of *Catla catla* (Ham.) from the river Padma. *Him. J. Env.* 77-78.

PANDEY, B.L. 1998. Length-weight relationship and relative condition of *Cirrhinus mrigala* from the river Padma. *Fish Bull.* **20**(1) : 39-42.

SAROJINI, K.K. 1957. Biology of grey mullet of Bengol *Mugil persia. Indian J.Fish.* **4** : 160-207.

SINGH, S.L., SHARMA, L. & SAINI, V.P. 1998. Age, growth and harvestable size of *Labeo rohita* (Ham.) from the lake Jaismad, Rajasthan, India. *Indian J. Fish.* **45**(2) : 169-175.

SULTAN, S. 1981. Length-weight relationship in catfish *Mustus vittatus* (Bloch). *Geobios.* **8** : 140-141.

TANDON, K.K. 1961. Biology and fishery of Choo Parai *Selaroides leptolepis* (Gray). *Indian J. Fish.* **8**(1) : 96-108.