Punjab Univ. J. Zool., Vol. 24 (1-2), pp. 41-47, 2009

LENGTH-WEIGHT RELATIONSHIP, MERISTIC AND MORPHOMETRIC STUDY OF *CLUPISOMA NAZIRI* FROM THE RIVER INDUS, PAKISTAN

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Abstract: To study length-weight relationship, condition factor, meristic and morphometric characteristics of *Clupisoma (C) naziri*, twelve specimens were collected in the month of May, 2007 from the river Indus near Attock Khurd, Pakistan. The mean total length and wet body weight were measured as 30.03±0.41cm and 205.5±20.12g, respectively. Log transform regression was used to study the length weight relationship. Growth coefficient (b) of *C. naziri* was 4.19 indicated positive allometric growth pattern. Rostral barbels were surpassing the posterior edge of eyes, while mandibular barbles were not reaching the posterior edge of head.

Key words: Growth coefficient, Attock Khurd, Bachwa

INTRODUCTION

Meristic and morphometric analyses are important tools used to differentiate closely related species of organisms having huge similarity indices of various parameters. *Clupisoma (C) naziriri (*Naziri bachwa) is an important catfish (family schilbeidae) present in the river Indus, Pakistan. This species is very similar to *C. garua*, inhabitant of the same river (Mirza, 2004).

In Pakistan, only limited data is available on the length weight relationship, meristic and morphometric characteristics of this important fish. In view of the importance of this fish, there is a need of the day to study its biological performance in natural water bodies of Pakistan. The

0079-8045/09/0041-0047 $ 03.00/0

present work was planned to assess the growth profile by the length weight relationship, morphometric and meristic characteristics. It is for the first time that this species is being studied from this point of view in Pakistan.

MATERIALS AND METHODS

The specimens of *C. naziri* were collected from the river Indus near Attock Khurd in the month of May, 2007 and were preserved routinely. Twelve fish specimens of variable sizes were analyzed. Total length of each fish specimen *i.e.,* from maxilla to the longest caudal fin ray; standard length *i.e.,* from head to start of tail were measured using millimeter scale. Weight of wet body of each specimen was recorded using digital electric balance. The meristic and morphometric measurements of the samples were done with the help of a magnifying glass, measuring tray, scale and digital vernier caliper. Growth coefficient (b) was determined using log transform regression equation (Log W=log a+b log L) and relationship between wet body weight (W) and total length (L) was established as $W= aL^b$ where a =intercept = regression coefficient, b = slope = growth factor/growth coefficient. Condition factor (K) was calculated by standard relation, $K= (W \times 100)/ (L)^3$.

Study of meristic characteristics

Meristic characteristics were studied according to Hubbs and Lagler (1958) and included dorsal fin rays, pectoral fin rays, pelvic fin rays, anal fin rays and caudal fin rays. Each fin ray number was derived from principal rays.

Study of morphometric characteristics

Morphometric characteristics were also studied according to Hubbs and Lagler (1958) with slight modifications as described below:

Head length *i.e.,* from snout tip to most posterior edge of fleshy operculum; rostral barbelll length; maxillary barbelll length; mandibular barbelll length; dorsal fin length; dorsal fin base; adipose fin length; adipose fin base; pectoral fin length *i.e.,* measured from joint to tip of spinous portion, not including filamentous extension ; pectoral fin base; pelvic fin length *i.e.,* from pelvic fin origin to tip of longest ray; pelvic fin base; anal fin length; anal fin base *i.e.,* from anal fin origin to posterior base of last anal fin ray and caudal fin length.

RESULTS AND DISCUSSION

Mean total wet body weight of *C. naziri* was recorded as 205.5±20.12g. While mean total length of the sampled specimens of *C. naziri* was measured as 30.03±0.41cm, whereas standard length of sampled fish specimens ranged from 25.5cm to 27.6cm with mean value of 26.55±0.86cm. The mean condition factor (K) was 0.76±0.06 g/cm^3 (Table I). Wootton (1998) reported that fish with high value of K are heavy, while fish with a low K value are lighter with respect to their lengths. Results of the present study show 'K' value less than 1 indicated that available feed to fish might be inadequate. Nikos (2004) reported that the fish which sufficiently fed had 'K' equal or greater than 1 while undernourished fish had 'K' less than 1. The value k<1 might be due to difference of body weights among fish who have laid eggs before the other ones resulting in loss of overall body weights. Similar findings regarding release of eggs and reduction of body weights had also been reported by Hussain *et al.* (2008). It si suggested that future work on these lines must include the parameter of somatic indices of different organs especially ovaries. The latter information may partly be helpful in explaining varying values of 'K' among the specimen of a fish species representing the same location. Inter species and intra species fluctuation of 'K' due to feeding differences, reproductive season, climate and environmental conditions have also been reported by Lizama *et al.* (2002).

Mean length and body weight were used to study the growth coefficient (b) for the sampled specimens. The value of 'b' was estimated 4.19 for *C. naziri* (Table II). When fish retains the same shape, its specific gravity remains unchanged during lifetime and "b" would be exactly 3.0 indicating isometric growth (Ricker, 1975). A value significantly larger or smaller than 3.0 indicates allometric growth. A value less than 3.0 shows that the fish becomes lighter (negative allometric) while greater than 3.0 indicates that the fish becomes heavier (positive allometric) for a particular length as it increases in size (Wootton, 1998). The value of "b" may vary with feeding (Le Cren, 1951), state of maturity (Frost, 1945), sex (Hile and Jobes, 1940) and further more between different populations of a species (Hile, 1936; Jhingran, 1952) indicating taxonomic differences in small populations. In the present study, all sampled fish species showed 'b' value greater than 3 showing that weight of the fish increases greater than cube of

its length (Positive allometric growth). Many researchers have reported allometric growth in same or different fish species (Chatterji *et al*., 1977; Salam and Janjua, 1991; Shakir *et al.*, 2008).

Table I: Biometric characters of *C. naziri* from the river Indus.

Sr. #	Index	Range	Mean±SEM
1.	Total body weight (g)	158-278	205.5±20.12
2.	Total length (cm)	29.6-32.2	30.03±0.41
3.	Standard length (cm)	25.5-27.6	26.55±0.86
4.	Condition factor (g/cm^3)	0.60-1.00	0.76±0.06

Table II: Statistical analyses of total length and wet weight of *C. naziri.*

Sr. #	Parameters	*C. naziri*
1.	Exponential equation $W_t=a(TL)^b$	$W_t = 0.00013(TL)^{4.19}$
2.	Regression equation Log W=Loga + bLogL	Log W = - 3.88 +4.19LogL
3.	Regression coefficient (R^2)	0.36

Table III: Meristic counts of *C. naziri* from the river Indus

.Sr. #	Index	Number
1.	Dorsal fin rays (DFR)	8
2.	Pectoral fin rays (PcFR)	11-12
3.	Pelvic fin rays (PeFR)	6
4.	Anal fin rays (AFR)	45-46
5.	Caudal fin rays (CFR)	24

Among meristic counts, dorsal fin rays were eight in number. While pectoral fin rays ranged from 11-12, whereas 6 and 24 pelvic and caudal fin rays, respectively were recorded in all the sampled specimens. The number of anal fin rays varied from 45-46 in the sampled specimens of *C. naziri* (Table II), while literature of Chen *et al.* (2005) reported that number of anal fin rays varied from 26-33 in *C. garua.*

Morphometric parameters of the present study are listed in detail in the Table IV. Comparison of morphometric characters between *C. naziri* and *C. garua* indicated a striking difference specifically in barbels' lengths between these two species showing rostral barbell surpasses the posterior edge of eye (vs. not reaching anterior edge of eye) and mandibular barbell not reaching posterior edge of head (vs. extending to pectoral fin).

Table IV: Morphometric characters of *C. naziri* from the river Indus.

Sr. No.	Index	Size range (cm)	Mean±SEM
1.	Head length	3.9-4.6	4.13±0.19
2.	Rostral barbel length	2.4-2.6	2.5±0.08
3.	Maxillary barbel length	4.2-5.0	4.6±0.33
4.	Mandibular barbel length	4.0-4.8	4.4±0.33
5.	Dorsal fin length	3.9-4.4	4.13±0.07
6.	Dorsal fin base	1.6-1.8	1.69±0.05
7.	Adipose fin length	0.7-0.9	0.78±0.04
8.	Adipose fin base	0.7-0.8	0.77±0.03
9.	Pectoral fin length	3.7-4.4	3.99±0.18
10.	Pectoral fin base	0.3-0.5	0.4±0.08
11.	Pelvic fin length	2.2-2.4	2.3±0.06
12.	Pelvic fin base	0.3-0.5	0.4±0.07
13.	Anal fin length	2.3-2.5	2.33±0.03
14.	Anal fin base	9.6-9.8	9.7±0.06
15.	Caudal fin length	6.0-6.6	6.3±0.18

Acknowledgement

The help of Mr. Iftikhar Ahmad, Deputy Director of Fisheries, Rawalpindi Division, for providing fish specimens for this study is highly acknowledged.

REFERENCES

CHATTERJI, A., SIDDIQUE, A.Q. AND KHAN, M.A., 1977. Length-weight relationship of a carp, *Labeo bata* (Ham.). *Proc. Indian Acad. Sci. (Sec.B)*, **86:** 189-194.

CHEN, X., FERRARIS, C.J. AND YANG, J.X. 2005. A New Species of Catfish of the Genus *Clupisoma* (Siluriformes: Schilbidae) from the Salween River, Yunnan, China. *Copeia.*, **3**: 566-570.

FROST, W.E., 1945. The age and growth of eels (*Anguilla anguilla*) from the Windermere catchment area. Part 2. *J. Anim. Ecol*., **4:** 106-124.

HILE, R. AND JOBES, F.W., 1940. Age, growth and production of the yellow perch. *Perca flavescens* (Mitchill), of Saginaw Baya. *Trans. Am. Fish Wash*., **48:** 211-217.

HILE, R., 1936. Age and growth of Cisco, *Leucichthys artedi* (Lesuer) in the lakes of North Eastern high land, Wisconsin. *Bull. U.S. Bur. Fish Wash*., **48:** 211-217.

HUBBS, C. L. AND LAGLER, K.F., 1958. *Fishes of the Great Lakes region.* 2nd ed. Univ. Mich. Press, Ann. Arbor, pp: 213.

HUSSAIN, A., QAZI, J.I. AND MIRZA, M.R., 2008. A note on fecundity of bachwa (*Clupisoma naziri*) from the river Indus near Attock Khurd. *Punjab Univ. J. Zool.,* **23**(1-2): 091-094.

JHINGRAN, V.G., 1952. General length- weight relationship of three major carps of India. *Proc. Natl. Inst. Sci. India*., **18**: 449-460.

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

LIZAMA, M., DELOS, A.P. AND AMBROSIO, A.M., 2002. Condition factor in nine species of fish of the Characidae family in the upper Parana River flood plain, Brazil. *Brazilian J. Biol.*, **62:** 113-124.

MIRZA, M.R., 2004. *Freshwater fishes of Pakistan.* 2nd Ed. Urdu Science Board, Lahore, Pakistan.

NIKOS, D. 2004. The farming of Arctic Charr. Condition factor 25 February, 2004. www.holar.is/aquafarmer/node101.html

RICKER, W.E., 1975. Computational interpretation of biological statistics of fish population. *Bull. Fish. Res. Bd. Can.*, **191:** 382.

SALAM, A. AND JANJUA, M.Y., 1991. Morphometric studies in relation to body size of farmed Rohu, *Labeo rohita*, a culturable major carp from Multan. *J. Res. (Sci.),* **3:** 59-63.

SHAKIR, H. A., MIRZA, M. R., KHAN, A. M. AND ABID, M. 2008. Weight length and condition factor relationship of *Sperata sarwari* (Singhari) from Mangla Lake, Pakistan. *J. Anim. Pl. Sci.*, **18**(4): 158-160.

WOOTTON, R.J., 1998, *Ecology of teleost fishes*. 2nd Ed., Dordrecht, Kulwer.

(Received: May 21, 2009; Revised: November 03, 2009)