

Age determination of minor carp, *Cirrhinus reba* (Hamilton) from Manchar Lake, Sindh, Pakistan

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Abstract

For age determination study of *Cirrhinus reba* (Hamilton) from Manchar, length-frequency analysis and scale method was used. It was determined from 256 specimens (171 male and 85 female) collected during March to June 2013 ranging in length between 95 to 330 mm in total length. The entire data were pooled, male, female and their combined length-frequencies as percentage. It was inferred from the length-frequency analysis that the model length of group 10.0-20.0 cm represents as 0⁺ age group and the subsequent model lengths 20.0- 30.0 cm designated as 1⁺ age group respectively. The peaks of frequency histogram, beyond two years were not found to be distinct. The relationship between total length versus scale length was found to be linear $\text{Log } L = 0.78 + 0.95 \text{ Log } S$. The age estimate from scales resulted in to two groups 0⁺ and 1⁺ at model length 17.5 and 28.0 cm. The age determination from length-frequency and scale method compared very well.

Keywords: Age determination, *Cirrhinus reba*, Length-frequency, Manchar lake

INTRODUCTION

Many methods of age determination in fresh water fishes are known (Das, 1959). Interpretation of annulus formation is laid down on hard parts of fishes such as scales of fishes are examined for the study of age and growth. They play an important role in management of fishery. Determination of age provides mean to understand the composition of population. Schneider *et al.* (2000). There is few published work on the age and growth of fishes in Pakistan. (Narejo *et al.*, 2012).

Bandpei (2010) Kunal and Pathani (2011) studied rate of growth and age estimation through scale method. Many scientists used scale of many fishes for age determination but no work has been done on age and growth of fresh water fish *Cirrhinus reba*(Hamilton) from Pakistan. Giving emphasis on the above deficiency and importance of age study of fish from both scientific and commercially point of view. Present investigation was undertaken on age and growth of *Cirrhinus reba* (district; Jamshoro)

MATERIALS AND METHODS

The material for present study was collected from Manchar Lake district Jamshoro, Sindh total 256 samples of *Cirrhinus reba* from 9.5 to 33.0 mm (TL) were used for the estimation length-frequency and scale method by Peterson (1896). Experimental fish were divided into 50mm length groups for length- frequency analysis. Scale were taken for age determination from the left side of body above the shoulder region .5-10 scales were taken from each fish and Key shoulder scales removed from the experimental fish and preserved between the microscopic slides for further studies. Three scales from each length group of 50 mm interval were selected randomly for age determination study. The selected

scales from a particular fish were mounted on a glass slide in a row. In order to have consistency, these scales from each fish were used for measurements. The present study is based on the examination of 150 scales taken from 50 fishes belonging to 6 length groups. The scales were then measured and inferred through ocular stage under the electronic microscope. Radiuses of scales were measured and plotted versus total length.

RESULT

For the age determination study of *Cirrhinus reba* (Hamilton) from Manchar, length-frequency analysis was performed. A sample of 256 specimens 171 male and 85 female 95 to 330 mm TL showed in (Table 1 and Figure 1). Two groups of age were noted by polygons of length-frequency analysis (Figure 2), on length of 10.1 to 20.0 and 20.1 to 30.0 cm. It indicated that 0⁺ age groups represents 10.1- 20.0 and 1⁺ age group at 20.1-30 cm. Peaks of frequency histogram, beyond two years were not found to be distinct (Figure 2). For the age determination study of *Cirrhinus reba* (Hamilton) from Manchar, length-frequency analysis was performed. A sample of 256 specimens 171 male and 85 female 95 to 330 mm TL showed in Table 1 and Figure 1. The annuli present on the scale either incomplete or complete were taken into account. Estimation of age was determined by counting of annuli of the key scales. Length group (10.1-20.0 cm) possess 0 annulus, while in length group of (20.1-30.0 cm) possess only 1 annuli (Figure 2). Age determination through body-scale relationship was also described; the data is presented in (Table 2). It is noted from the data that L\S ratio increases, the length of scales increases in relation to TL. It was concluded that the age determination of minor carp, *Cirrhinus reba* in the present study from length-frequency and scale method resulted into two groups 0⁺ and 1⁺. The age determination from length-frequency and scale method compared very well. The plot of observed values of scale size versus TL resulted into poor relationship. The log-log relationship resulted into straight line showed in Figure 1 empirical value and Figure 2 log-log. Regression of both the variables is showed by equation given below.

$$\text{Log } L = 1.92 + 1.94 \text{Log } S$$

Where L=total length of fish in mm, and S=is total length of scale in mm.

It is observed from the above equation that the scale length versus total length relationship resulted into ideal relationship.

Table 1. Length frequency distribution of *Cirrhinus reba* from Manchar Lake District Jamshoro, Sindh, according to their sex and combined percentage frequency

Length group (cm)	No. of male	No. of female	Total number of fish	Percentage frequency
5.1-10.0	10	Nil	10	3.9 0 ⁺
10.1-15.0	50	Nil	50	19.6 0 ⁺
15.1-20.0	36	19	55	21.5 0 ⁺
20.1-25.0	35	30	65	25.4 1 ⁺
25.1-30.0	40	30	70	27.3 1 ⁺
30.1-35.0	Nil	6	6	2.3
Total	171	85	256	100%

Table 2. Data on body length (BL) and scale length (SL) and annuli on scale of minor carp, *Cirrhinus reba* from Manchar Lake District Jamshoro Sindh Pakistan

Length group (cm)	Mean length (cm)	Mean scale length mm)	No. of Annuli
5.1-10.0	9.5	2.6	-
10.1-15.0	14.1	6.0	0 ⁺
15.1-20.0	15.1	7.0	0 ⁺
20.1-25.0	22.1	8.0	1 ⁺
25.1-30.0	28.0	9.0	1 ⁺

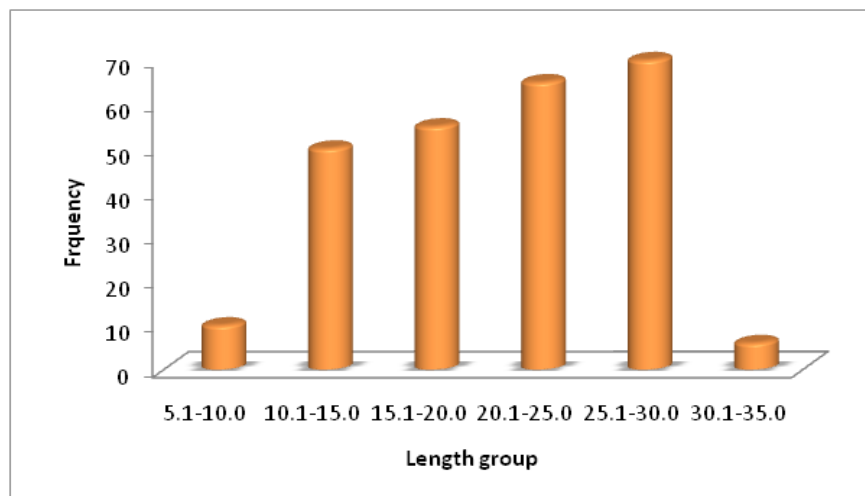


Figure 1. Length-frequency distribution of *Cirrhinus reba* from Manchar Lake District Jamshoro, Sindh, Pakistan

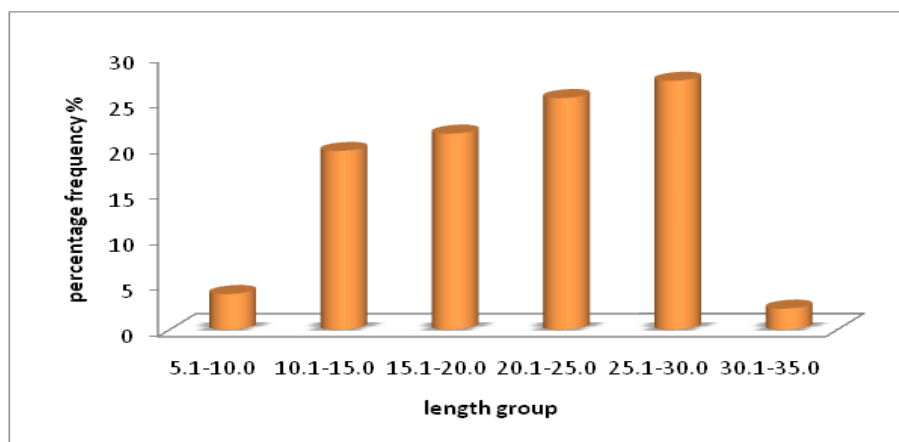


Figure 2. Percentage frequency of *Cirrhinus reba* from Manchar Lake District Jamshoro, Sindh, Pakistan

DISCUSSIONS

For age determination of minor carp, *Cirrhinus reba* (Hamilton) length-frequency calculations were made. Two polygons of age were noticed by L/F method at 10.1-20 cm resulted 0^+ age group and the subsequent model lengths 20.1-30 cm designated as 1^+ group. Jayaram (1977) estimated age in *Cirrhinus reba* commented that 15.8 to 20.0 and 22.0 to 30.0 cm designated as 0^+ and 1^+ of age. Goswami and Devaraj (1992) determine the age and rate of growth of fish *Cirrhinus reba* by L/F method and inferred that the fish at 15.0 cm and 30 cm in 0^+ year and 1^+ years. The results of Jayaram (1977) and Goswami and Devaraj (1992) are similar with the observations of the present investigations. In study scale method was also used to determine the age of the fish *Cirrhinus reba*, resulted into two age groups that is 0^+ and 1^+ at the model length of 10.0 to 20.0 and 20.1 to 30.0 respectively. Narejo *et al.* (2009) used scale for the estimation of age in minor carp *L. calbasu* resulted into six age groups. The difference may be due to the different fish species and environmental conditions of the lake.

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