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AGE DETERMINATION OF A CARP, *LABEO CALBASU* (HAMILTON) FROM KEENJHAR LAKE (DISTRICT: THATTA), SINDH, PAKISTAN.

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Abstract

The age determination of a carp, *Labeo calbasu* (Hamilton) from Keenjhar Lake (District Thatta), Sindh, Pakistan, has been assessed from the 1000 specimens collected between April to September 2006. Using length-frequency method and scale study, it was found that *L. calbasu* attains model length of 275, 332, 370 and 415 mm at the end of zero, 1st, 2nd and 3rd years of life respectively. The relationship between total length (TL) of the fish and scale radius (S) was found to be linear (LogL = 1.313 + 1.3496 Log S). The age estimates from scales resulted into six age groups 0 to 5 at the model length of 150, 275, 335, 375, 415, 505 mm. The age estimates from scale and length-frequency method compared very well.

Keywords: Ageing, Length-frequency, Scale study, Keenjhar Lake, *Labeo calbasu*.

1. Introduction

Scale method, in addition to otoliths, pectoral spines and opercular bones techniques is employed widely for the determination of age and growth of different fishes (Azadi and Kuddus, 1995). Various workers (Rao and Rao, 1972; Gupta and Jhingran, 1973; Azadi and Kuddus, 1995) used scales for age and growth studies of *Labeo calbasu* from different localities of India and Bangladesh. No work so far has been carried done on these lines on *Labeo calbasu* from Pakistan. Giving emphasis on the above deficiency and importance of age study of fish from both scientific and commercial point of view, the present investigation was undertaken on age determination of *L. calbasu* from Keenjhar lake (District Thatta), Sindh, using length-frequency and scale methods. This in turn will help its population biology from the said lake.

2. Materials and Methods

The material for the present study was collected from fish landing centers of Keenjhar Lake (District Thatta), Sindh. A total of 1570 specimens of *L. calbasu* (total length ranging from 12.4 to 54.1 cm) were used for the length-frequency analysis and scale methods. The experimental fishes were divided into 50 mm length groups for length-frequency analysis. For age determination, scales were taken from the same point from each fish (i.e. from the left side of the body above the lateral line, in shoulder region). 5-10 scales were taken from each fish and stored in small coded envelope. Later these scales were washed in tap water and dried on a filter paper. Three scales from each fish were mounted dry between two glass slides, fastened each end by means of cello tape. The examination and measurements of scales were made using a binocular microscope, fitted with ocular micrometer. The total length of scale was recorded from anterior to posterior margin, along a vertical imaginary line passing through the center.

3. Results

Age Determination by Length-Frequency Method

The length of *L. calbasu* during the present study varied from 124 mm to 541 mm. The fishes of sizes between 351 to 400 mm are found in great abundance and constitute 25.6 % of the entire population **(Table-1).** Four length groups are discernible in the length frequency polygons **(Fig. 1)** at modal lengths 275, 332, 370

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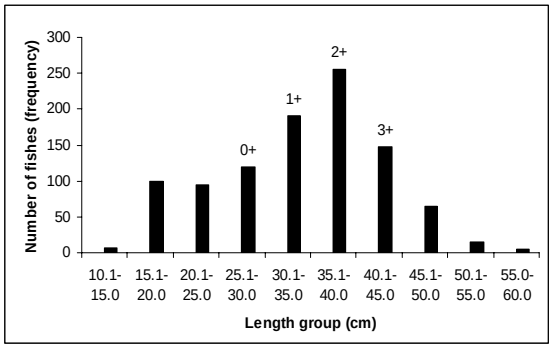
Table-1. Length frequency distribution of *Labeo calbasu* from Keenjhar Lake District Thatta, Sindh, according to sex and their combined percentage frequencies.

Length group (cm)	Number of Male	Number of Female	Total number of fishes	Percentage frequency
10.1-15.0	6	-	6	0.6
15.1-20.0	65	35	100	10
21.1-25.0	60	35	95	9
25.1-30.0	80	40	120	12
30.1-35.0	110	80	190	19
35.1-40.0	150	106	256	25.6
40.1-45.0	60	88	148	14.8
45.1-50.0	15	50	65	6.5
45.1-50.0	15	50	65	6.5
50.1-55.0	4	11	15	1.5
55.1-60.0	-	5	5	0.5
	550	450	1000	100%

Fig. 1. Length-frequency distribution of *Labeo calbasu* from Keenjhar Lake District Thatta,



and 415 mm. The entire data were pooled; both males and females, and their combined length frequencies as percentage are shown in **(Fig. 2).** It is therefore, probable that modal length 275 mm represents as 0^+ age group and the subsequent modal length 332 mm 370 mm and 415 mm as 1^+,$2^+$and 3^+ age group respectively. Beyond three years, the peaks are less distinct. The age estimate from the length-frequency analysis of *L. calbasu* in the present study yielded four age groups i.e. from 0^+ to 3^+.

Reading of scales

The radii on all scales were more or less evenly spaced except a few peripheral ones. Ages were determinate by counting the number of radii.

Fig. 2. Percentage frequency of *Labeo calbasu* from Keenjhar Lake District Thatta, Sindh,

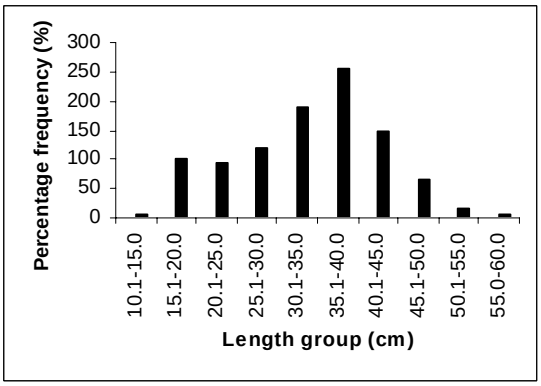


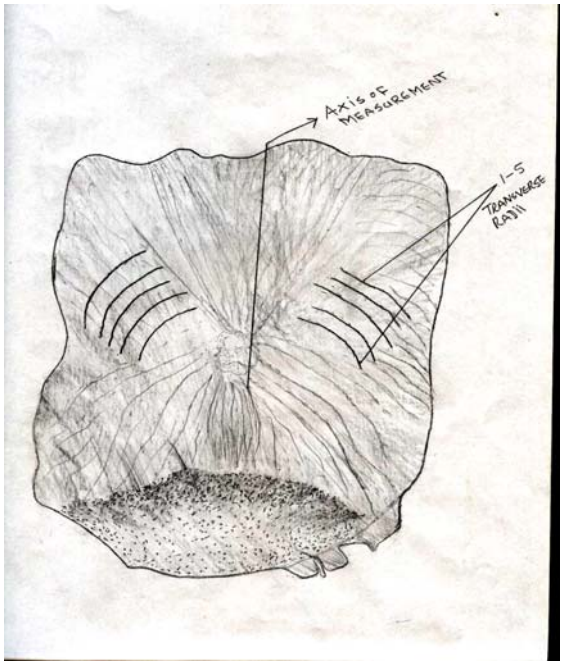
Table-2. Relationship between body length and scale length and the numbers of radii on scales of *Labeo calbasu* from Keenjhar Lake.

Length group (mm)	Mean length (mm)	Mean Scale Length (mm)	Number of radii	Age group assigned
101-150	12 8	3.38	0-1	0+
151-200	18 9	4.75	1-2	1
211-250	22 9	5.68	1-2	1+
251-300	27 7	7.79	2-3	2
301-350	32 8	8.64	2-3	2+
351-400	37 4	9.0	3-4	3+
401-450	42 1	11.95	3-4	3
451-500	46 6	13.67	4-5	4+
501-550	51 5	15.73	4-5	5+
551-600	-	-		-

Both complete and incomplete radii were counted. The analysis of scales, as seen from the **(Table-2),** showed average number of radii on the scales of same fish. The average number of radii, however, increased proportionately with the size of fish. In the length group of (101-150) possess 0 (zero) radii, in the length group (151- 200) and (201-250) possess 1radii, in the size group of (251-300) and (301-350) possess 2 radii, in case of size group (351-400) and (401-450) possess 3 radii, while length group (451-500) possess 4 radii and length group (501- 550) possess 5 radii. **(Fig. 3).** In the scales of largest size group, some sorts of erosion and absorption of tissue was also noticed.

The age determination of *L. calbasu* in the present study from scales method resulted into six age groups i.e. from 0^+ to 5^+.

Fig. 3. Scale from a 520 mm (TL) *Labeo calbasu* from the Keenjhar Lake, having 5 radii; the axis used for total scale length measurement is shown (X15).



Body- scale length relationship

Table-2. Showed the size of scales in mm, the range and average number of radii recorded on scales, and the body length versus scale length ratio for specimens arranged in 50 mm interval size group. It will be seen from this data that, L/S ratio increased as total length of fish increased, or in other words the relative size of scales decreases with the increase in total length of fish. The empirical data of total length and scale length when plotted, gave a weak curve. This relationship was converted into a straight line by log-log relationship. The computed regressions gave the following equation.

$$\text{Log } L = 1.313 + 1.3496 \text{ Log } S$$

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

Thus, the relationship between body length and scale length was observed to be linear.

4. Discussions

In the present study the age determination of the carp, *Labeo calbasu* (Hamilton) from Keenjhar Lake (Distt: Thatta), Sindh, Pakistan, has been assessed from the one thousands specimens. Using length-frequency method and scale study, it was found that *L. calbasu* attains model length of 275, 332, 370 and 415 mm at the end of zero, 1st, 2nd and 3rd years of life respectively. Rao and Rao (1972) used length frequency method for the age determination in *L. calbasu* from River Godavari, India. They concluded that the fish attains modal length of 210, 270, 330 and 410 mm as zero, 1, 2 and 3 years of life. Narejo *et al*., (1999) reported age in *Tenualosa ilisha* from River Indus at modal length of 225, 275, 325 and 375 mm at the end of zero$^+$, 1^+, 2^+, and 3^+ year of life. The results of the present study agreed or very close to the findings of Rao and Rao (1972) in *Labeo calbasu*, little variations might be due to the different environmental conditions where two populations were live.

During the present investigations the scale method was also used for the age determination of *L. calbasu*. The age determination from scale method in the present study resulted in six groups from 0 to 5 at the modal lengths of 150, 275, 335, 375, 415 and 505 mm. Similar observations have been reported by Gupta and Jhingran (1973) used scale method for aging *Labeo calbasu*. They reported seven age groups at the modal lengths of 188, 291, 381, 468, 543, 618 and 681 mm from Allahabad, India, and Narejo *et al*., (1999) reported seven age groups from scale method in *Tenualosa ilisha* from River Indus at modal lengths of 188, 227, 288, 335, 375, 440 and 460 mm. In the present study the body-scale relationship of *L. calbasu* from Keenjhar Lake was calculated and found liner relationship between the two variables. Various workers in different fish species were reported similar linear relationship between the body length and scale length by Rao and Rao (1972), Gupta and Jhingran (1973), Vinci and Sugunan (1981) in *L. calbasu* from India. Narejo *et al*., (1999) in *T. ilisha* from River Indus and Narejo *et al*., (2000) in *Gudusia chapra* from Keenjhar Lake, Sindh, Pakistan.

The efficacy of age determination by the length frequencies depend upon a restricted single spawning season, and growth being such that length of fish of an age group confirm to normal

distribution. In the present study, the length frequency distribution showed model increments with fish size and assuming that *Labeo calbasu* in the Keenjhar has single spawning season, the above age estimates may be regarded as satisfactory. However, there was no direct evidence to prove the accuracy of these estimates. It is difficult to draw any valid conclusions regarding the age of *Labeo calbasu* from the length frequency distribution method unless validated by some other techniques of an age determination. The reason is that extensive overlap of the frequency distribution of the successive age groups, selectivity of gear, poor representation of one or two year classes, deferential rate of growth in males and females.

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