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AGE AND GROWTH OF INDIAN WHITING *SILLAGO SIHAMA* (FORSKAL) FROM KARWAR WATERS

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ABSTRACT

Age and growth studies for *Sillago sihama* (Forskal) from Karwar waters revealed that the fish attained a total length of 175 mm at the end of first year and 295 mm at the end of second year. von Bertalanffy growth equation derived for length at age for the species by analytical and graphical methods are

$$L_t = 519.16\,[1-e^{-0.2179(t-0.08909)}] \text{ and } L_t = 508\,[1-e^{-0.2110(t-0.0500)}]$$

respectively.

Key-words : Age and growth, *S. sihama*, Karwar waters

Knowledge of the age and growth of commercially important fishes is essential for understanding the dynamics of the fishes. Though information is available on the age and growth of few well known fishes, the same is lacking in some lesser known species. As there is paucity of information on the age and growth of *Sillago sthama* (Forskal) from Karwar waters, the present study was undertaken.

Samples for the study comprised 5308 specimens ranging in length between 11 mm and 340 mm in total length collected randomly from commercial catches of hook lines, shore seines and cast nets from Kali estuary and inshore waters of Karwar between November 1986 and October 1987. The length frequency data were analysed by the method of Petersen (1922). The fishes were measured for their total length and monthly length frequency data were grouped into size classes with a class interval of 10mm and percentage frequency polygons were prepared. The growth was estimated by tracing the progression of modes during different months.

von Bertalanffy (1938) growth equation as given by Beverton and Holt (1957) for fishes was employed to estimate various growth parameters. Asymptotic length (L_α) was also calculated by the graphical method of Walford (1946).

Length frequency distribution

Monthly size range and modal values are depicted in Fig.1. The rate of growth was estimated by following the progression of modes.

The mode '*a*' of December 1986 at 35 mm gained 20 mm in January 1987. This mode was represented by new recruits which initially grew very fast upto May 1987 at an average 20 mm per month. Thereafter, the growth rate slowed down and mode '*a*' could be traced at 175 mm in October 1987. Mode '*b*' at 45 mm of February 1987 could be traced only upto June

at 95 mm. The average monthly growth rate was found to be 14 mm for mode '*a*' and 12 mm for mode '*b*'. Individuals of mode '*c*' at 195 mm encountered in January 1987 could be traced upto a length of 235 mm in May 1987 with an average monthly growth of 10 mm. Thereafter, this mode could not be traced.

The fish of mode '*a*' that occurred in catches may be approximately one month old. Based on this assumption the fish of mode '*a*' would be completing one year by October 1987 while the fish attaining a length of 175 mm.

The fishes of mode '*b*' when represented in fishery during February 1987 could be approximately 2 months old and complete seven months after growing to a length of 95 mm. Based on the pattern of modal shifting established through mode '*a*' and '*b*'; mode '*c*' of January 1987 may be approximately 14 months old when occur in commercial catches. This mode could be traced upto May 1987 at 235 mm as 19 months old fish with an average increase of 10 mm per month. Hence, based on the above modal progression it can be concluded that fish attains an average length of 175 mm at the end of first year and 295 mm at the end of second year. The growth rate is faster during the first year (1.46 mm/month) than in the second year (1 mm/month). Retardation of growth with the advancement of age is a common phenomenon in many tropical fishes.

Table I – Expected lengths (mm) of *S. sihama* obtained by von Bertalanffy's growth equation (Length at age obtained by Petersen's length frequency analysis)

t (Half year)	$(t-t_o)$	$-k^{(t-to)}$	$e^{-k(t-to)}$	$1-e^{-k(t-to)}$	$L_t = L_\alpha[1-e^{-k(t-to)}]$
			Analytical method		
1	0.91091	-0.1985	0.8200	0.1800	93.45
2	1.91091	-0.4164	0.6594	0.3406	176.83
3	2.91091	-0.6343	0.5303	0.4697	243.85
4	3.91091	-0.8522	0.4265	0.5735	297.74
			Graphical method		
1	0.95	-0.2005	0.8183	0.1817	92.30
2	1.95	-0.4115	0.6627	0.3373	171.35
3	2.95	-0.6225	0.5366	0.4634	235.41
4	3.95	-0.8335	0.4345	0.5655	287.27

Estimation of parameters of von Bertalanffy equation

The von Bertalanffy (1938) equation for growth in length of fishes as given by Beverton and Hold (1957) is expressed as

$$L_t = L_\alpha\,[1-e^{-k(t-to)}]$$

where L_t = Length at age 't'

L_α = Maximum or asymptotic length that the fish can grow theoretically

e = Base of the Naparian logarithm

k = A constant related to coefficient of catabolism

t_o = Age of the fish at which the length was intially zero.

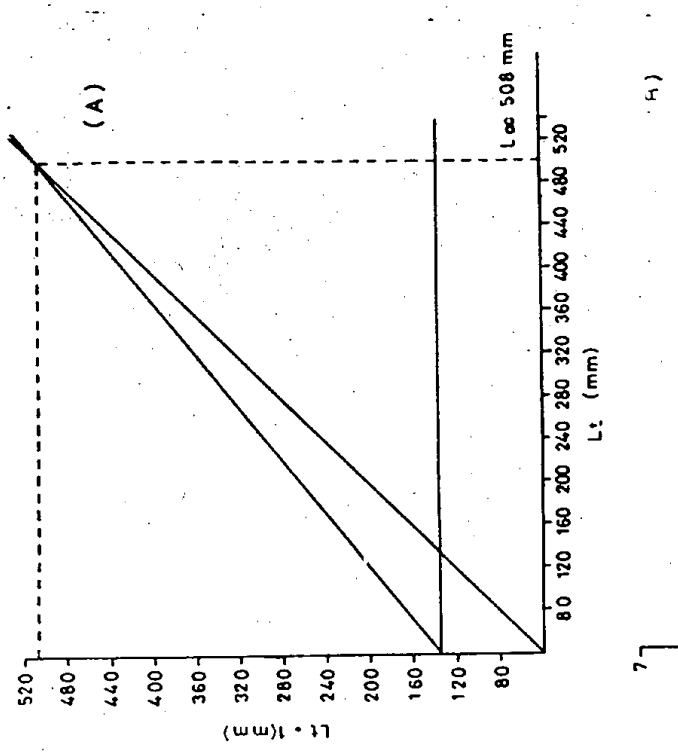

Fig. 2. Walford technique of estimating L_∞ (A) and t_0 (B) for data obtained by Petersen's length frequency polygons of *S. sihama*.

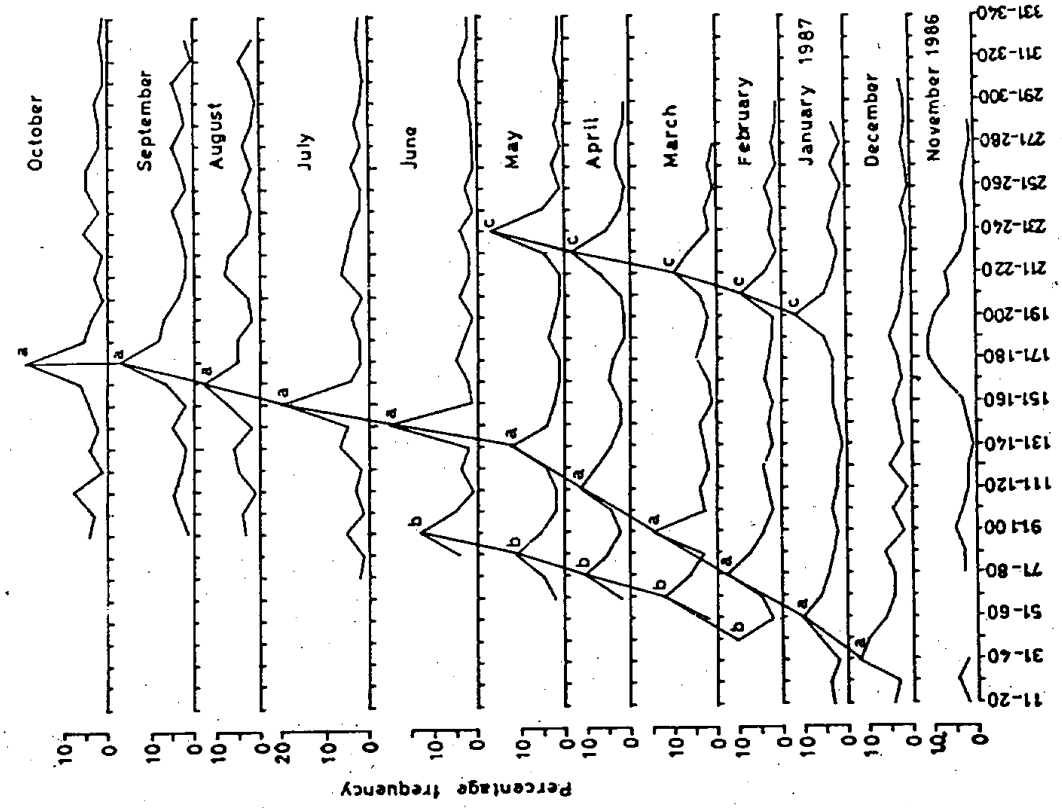

Fig. 1. Length frequency polygons of *S. sihama*.

The estimates of various growth parameters after fitting the above equation to the growth in length of *S. sihama* were found to be 't_o' = 0.08909, k = 0.2179 and L = 519.19

Estimation of L_α by Walford plot

The length at 't' against '$t+1$' for *S. sihama* on the basis of length attained at intervals of 6 months was plotted and the asymptotic length (L_α) was found to be 508 mm (Fig. 2A).

Thus the fitted equations obtained by analytical and graphical methods can be expressed as $L_t = 519.16\ [1-e^{-0.2179(t-0.08909)}]$ and $L_t = 508\ [1-e^{-0.2110(t-0.0500)}]$ respectively.

The expected length of *S.sihama* obtained by von Bertalanffy equation are presented in Table I; the results of which almost correspond with the values calculated by length frequency distribution method.

The t_o was calculated graphically according to the method given by Ricker (1958) as shown in Fig. 2B.

The average length at first maturity for males and females of *S.sihama* was found to be 181-190 mm for both the sexes from Karwar waters. This indicates that *S. sihama* of Karwar waters starts spawning when it enters into the second year of growth.

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