Morphometric study of freshwater fish *Tilapia mossambicus*

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Abstract: The present study was conducted to determine the morphometric characterists of 1000 freshwater fish, *T.mossambicus*. The experimental fish ranged from 0.50 to 150 cm and 3.00 to 350 g in length and weight respectively. The obtained correlation coefficient for different morphometric parameters was ranged between 0.40 and 1.00. There was a significant correlation between their relationships (P≥0.01). Among the 13 parameters noted standard length showed high level of significant positive relationship with total length when compared to all other parameters. The different level of significance between body features of various variants reveals the possibility of segregation of variants of this experimental fish.

Key words: *T.mossambicus* , morphometry, regression and correlation

INTRODUCTION

Morphometric analysis is based on a set of measurements which represent size and shape variation and are continuous data. Which represents one of the major keys for determining their systematic growth variability and various population parameters. Morphometric variation between stocks can provide a basis for stock structure and may be applicable for studying short –term environmentally induced variation geared towards successful fisheries management [1-3]. These studies are widely used to identify differences between fish populations [4-7] and remains the simplest and most direct method of species identification [8-11].In general, the body shape of an organism is determined by both genetic and ecological (or environmental) factors. Fish are known to exhibit a large component of environmentally induced morphological variation.

Morphological plasticity according to environmental variability is commonly found among many fish species, predominantly in freshwater fish species. Phenotypic variation according to environmental variability has been widely used by ichthyologists to differentiate among species and among populations within a species [12]. Morphological variability of fish is considered as an important adaptive strategy for populations experiencing inconsistent environments [13]. *Tilapia mossambicus* could be easily identified by dark bands or stripes found on their bodies are most prominent in mature forms. They inhabit freshwater and water bodies of low salinity, as it is typical of most *Tilapia species* [14]. Hence, the present study aims to preliminary investigate on the relationships between total length and various morphometric parameters of *T.mossambicus*.

MATERIALS AND METHODS:

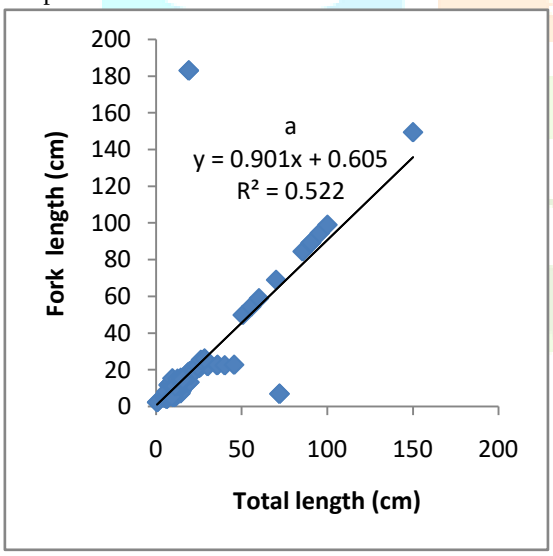
In this study, 1000 individuals of (both males and females) of *T mossambicus* were caught in river Thamirabarani from January – March 2016. After collection, the specimens were transported to the laboratory in the large polyethylene bag with 5% formalin. The collected specimens were washed and mopped on filter paper to remove excess water from the body surfaces. They were subjected to measure the different morphometric characters such as total length (TL), fork length (FL), standard length (SL), pre-orbital length (POL), snout length (SnL), eye orbit length (EOL), post-orbital length (PoOL), pectoral fin length (PL), pelvic fin length (PeL), anal fin length (AL), caudal fin length (CL), dorsal fin length (DL) and total weight (TW). Total length of the fish and other morphometric characters was measured to the nearest cm and weight by using scale and digital weighing balance. The size of the experimental fish were ranging from 0.5-150 cm in total length (TL) and 3-350 gm in weight respectively.

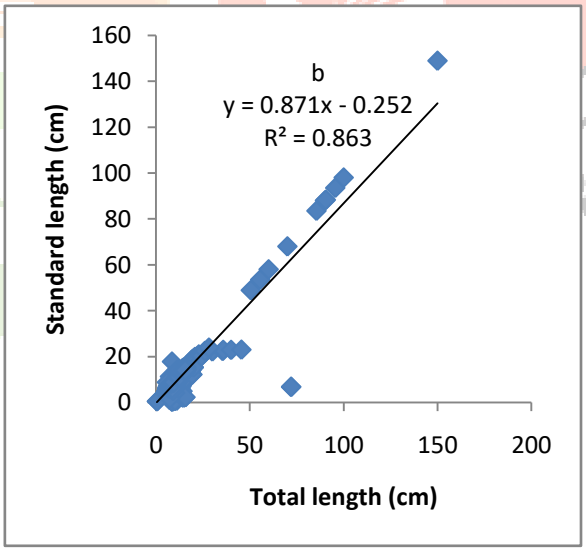
RESULTS AND DISCUSSION:

In the present analysis, all the morphometric characters are assumed as Y, show a positive correlation with the total length (X). Table 1 shows the minimum, maximum and the derived regression equations of total length with different morphometric relationships of *T.mossambicus* . the observed minimum and maximum total length was 0.5 and 150 cm. the relationship of various morphometric measurements compared with TL of experimental fish was given in Figure 1 & 2. It can be seen from the graph that the points are more or less very close to the line and hence it can be assumed that there is a close relationship between the total length with the other body measurements. From this linear relationship it is observed that all length increases with increase of TL which is the expected linear relationship. The linear regression analysis showed that among all the characters compared with total length, total weight (b=2.78), fin length (b=0.901), standard length (b=0.87), showed high growth rate and dorsal length (b=0.238), snout length (b=0.171), caudal length (b=0.117), post orbital length (b=0.109), pre orbital length (b=0.188), pectoral length (b=0.103) showed slow growth rate while anal length (b=0.096), pelvic fin length (b=0.079) and eye orbit length (b=0.017) indicated very slow growth rate. The results revealed that the symmetrical growth obtained in relation to different body lengths *i.e* the relationships with TL among FL, SL, POL, SnL, EOL, PoOL, PL, PeL, AL, CL, DL and TW.

It is also observed that the "r" values are being > 0.472 for *T.mossambicus* . This indicates that the growth of individual organs in relation to overall growth of the fish. But the varying significance at different levels indicates the disproportionate growth of these organs studied, when compared to total length.

The inter relationships among a forementioned length measurements were also found a significant relationship. The correlation between TL and SL as well as TL and PL was highly significant (0.863 and 0.77). The values of the equations clearly showed that the lengths of the body parts are proportional to the total length which agreed with Tandon *et al.*, [15] in *Cirrhinus reba* and Saad Ahmad *et al.*, [16] in *P.sophore* and *P.ticto*. The observed findings of morphometric analysis are similar to the findings of Sinovcic *et al.*, [17] Hossain *et al.*, [18] Dadzie *et al.*, [19] and Dars *et al.*, [20] . This study gives information to fishery biologist about morphometric characteristic studies of *T.mossambicus* in the river Thamirabarani in Tamilnadu.





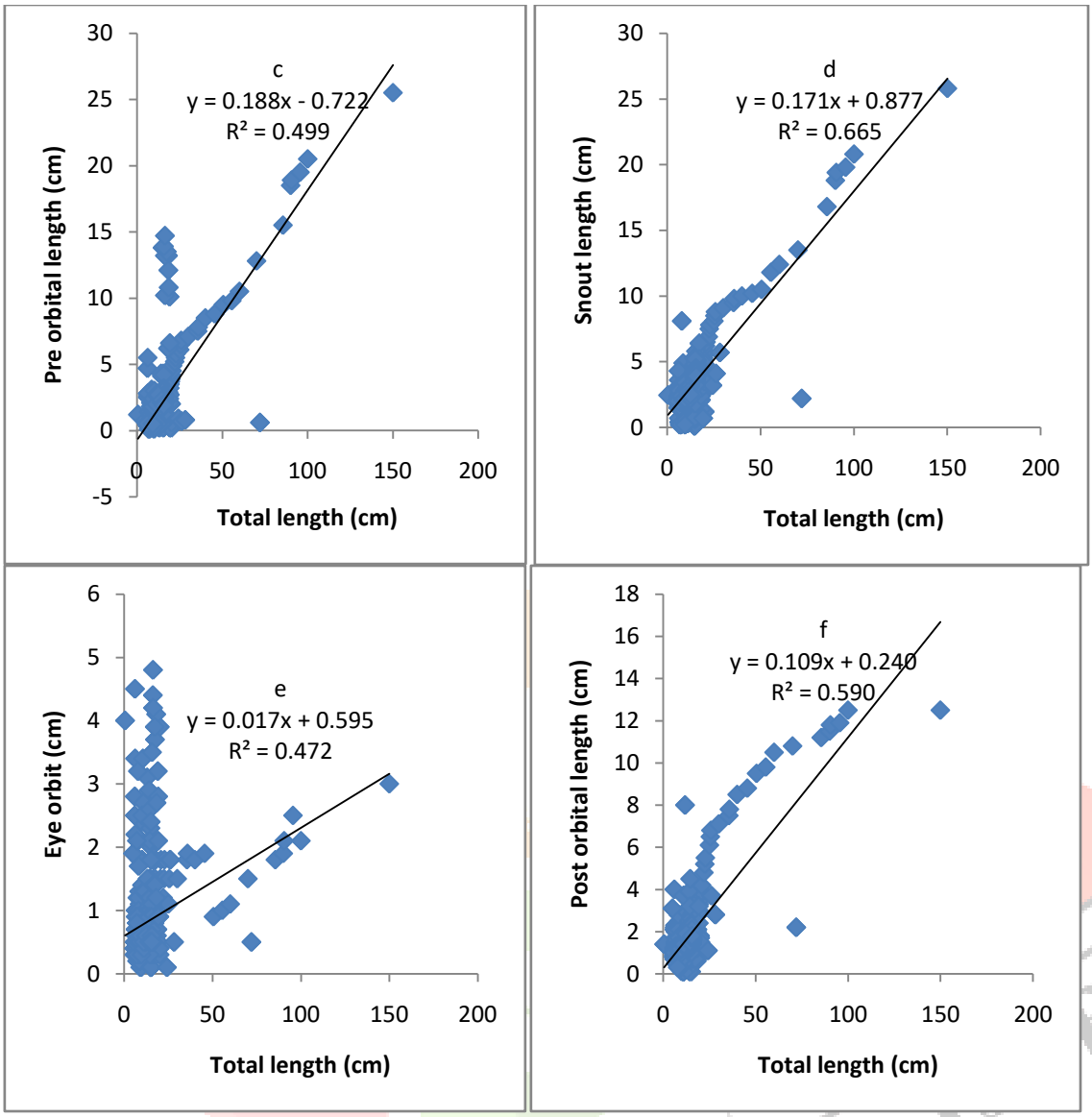
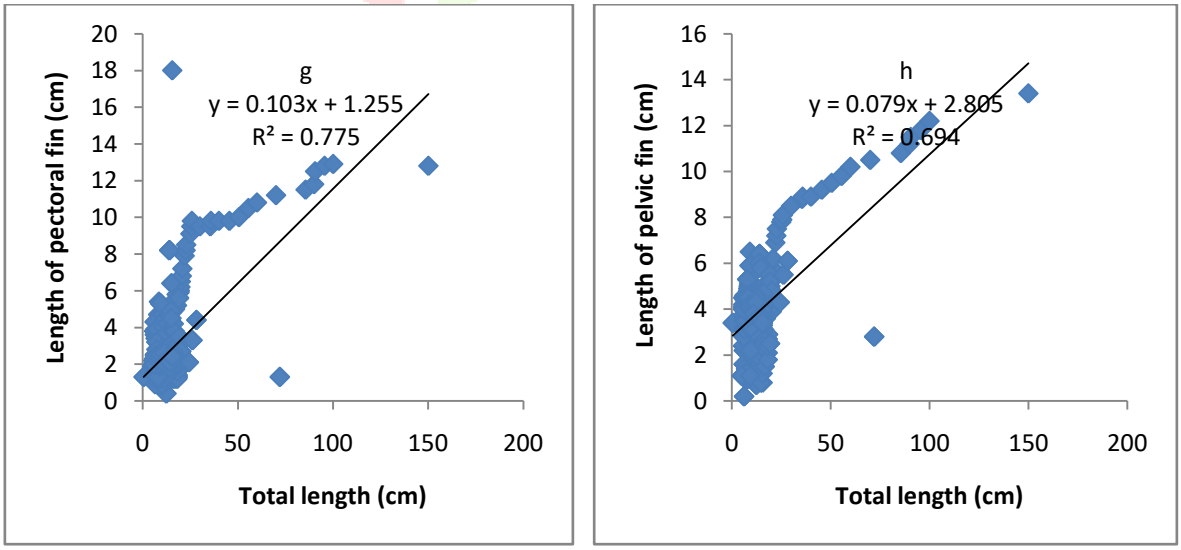


Figure 1(a-f): Linear regressions between TL and different morphometric measurements in *T.mossambicus*



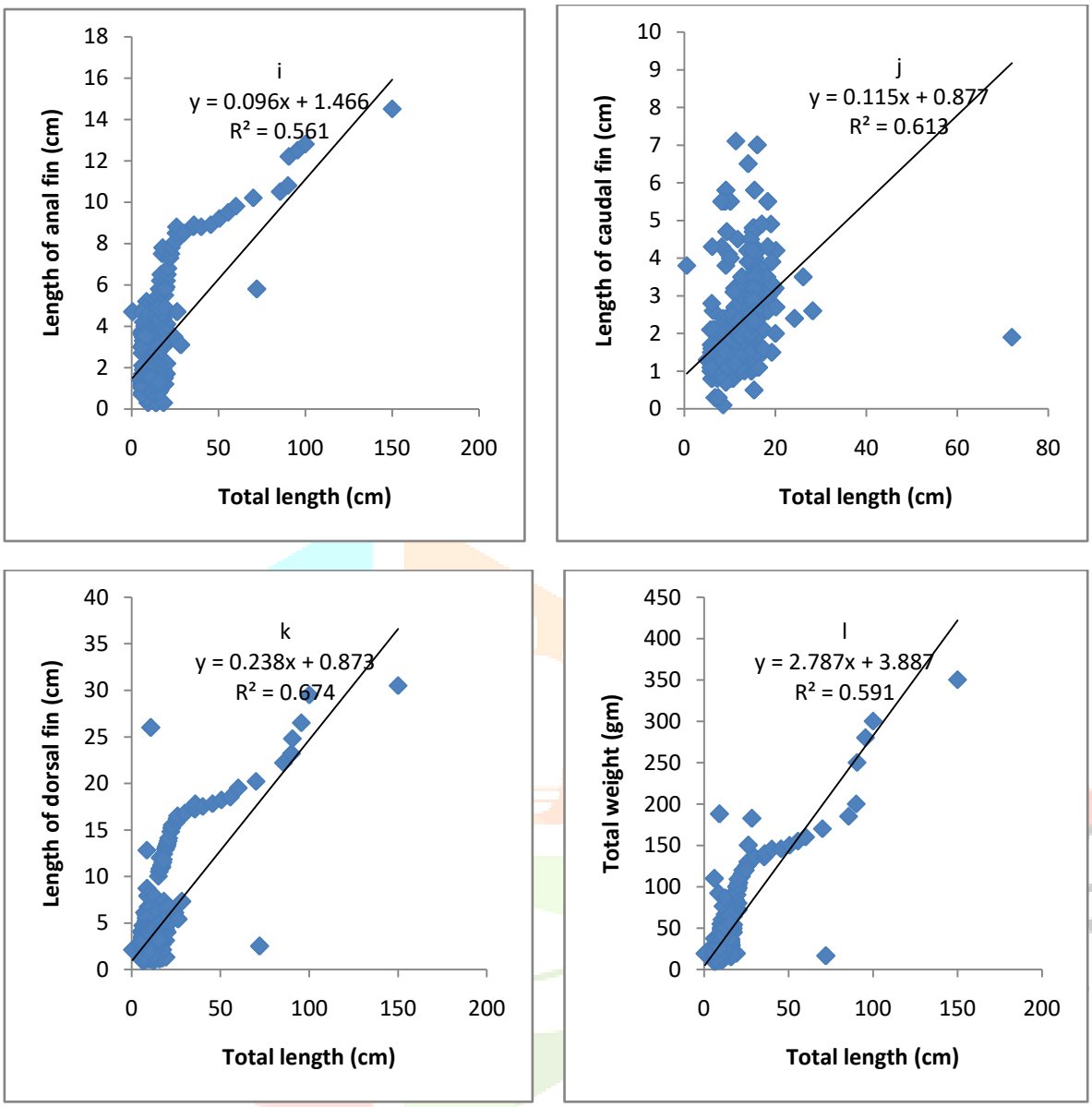


Figure 2(g-l): Linear regressions between TL and different morphometric measurements in *T.mossambicus*

Morphometric parameters	Minimum (cm)	Maximum (cm)	Regression equation	
TL	0.5	150	-	
FL	2.4	183	TL vs. FL	y=0.901x + 0.605
SL	0.3	148.9	TL vs. SL	y=0.871x – 0.252
POL	0.1	25.5	TL vs. POL	y=0.188x – 0.722
Sn.L	0.1	25.8	TL vs. Sn.L	y=0.171x + 0.877
EOL	0.1	4.8	TL vs. EOL	y=0.017x + 0.595
Po.OL	0.1	12.5	TL vs. Po.OL	y=0.109x + 0.240
PL	0.4	18.0	TL vs. PL	y=0.103x + 1.255
Pe.L	0.2	13.4	TL vs. Pe.L	y=0.079x + 2.805
AL	0.3	14.5	TL vs. AL	y=0.096x + 1.466
. CL	0.1	12.5	TL vs. CL	y=0.115x + 0.877
DL	0.9	30.5	TL vs. DL	y=0.238x + 0.873
TW (gm)	9.7	350	TL vs. TW	y=2.787x + 3.887

Table- 1: Minimum, maximum and regression equations with TL among different body lengths of *T.mossambicus*.

Table-2: Correlation coefficient ("r" values) of different body lengths of *T.mossambicus*

	TL	FL	SL	POL	SnL	EOL	PoOL	PL	PeL	AL	CL	DL	TW
TL	1.000												
FL	0.522	1.000											
SL	0.863	0.757	1.000										
POL	0.499	0.647	0.717	1.000									
SnL	0.665	0.597	0.857	0.583	1.000								
EOL	0.472	0.456	0.585	0.481	0.482	1.000							
PoOL	0.590	0.562	0.744	0.596	0.709	0.543	1.000						
PL	0.775	0.484	0.612	0.479	0.628	0.485	0.717	1.000					
PeL	0.694	0.532	0.581	0.549	0.636	0.475	0.518	0.517	1.000				
AL	0.561	0.559	0.516	0.525	0.498	0.474	0.569	0.544	0.563	1.000			
CL	0.613	0.488	0.631	0.515	0.640	0.484	0.663	0.602	0.567	0.535	1.000		
DL	0.690	0.525	0.691	0.579	0.686	0.472	0.735	0.715	0.551	0.504	0.630	1.000	
TW	0.591	0.626	0.796	0.661	0.726	0.476	0.646	0.546	0.477	0.480	0.583	0.682	1.000

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