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Growth study of *Oreochromis mossambiccus* with relation to physical parameters of a freshwater medium during the Post-monsoon season

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Abstract

Growth of the *Oreochromis mossambiccus* was slight improvement during the Post-monsoon season to the different physical parameters of the water in a fresh water habitat, Kullursandhai reservoir in Tamilnadu. Recorded atmospheric temperature is very low with rise of only 2^0C from the month of December to February. Surface water temperature is naturally lesser than the atmospheric temperature and it was found to be one degree raise during the study period. Electrical conductivity rose from 312 µS/cm to 356.0 µS/cm. Transparency value of the water increased by 1.16 cm. In accordance with the slight rise in the physical parameters the specific growth rate of the fish declined from 5.16 to 3.0. Percentage weight gain is only by 5.42 % value. This may be due to the unsettled nature of the fresh water habitat during the Post-monsoon that is after the rainy season. Therefore from the present study it was revealed that the slight change in the physical parameters have lesser effect in the growth of the *Oreochromis mossambiccus*.

Keywords: *Oreochromis mossambiccus*, Post-monsoon, Electrical conductivity, Transparency, Percentage weight gain.

Introduction

Hydrosphere is one of the most important components of an ecosystem on earth. Water is a most vital resource for all kinds of living organisms in this planet. Seasonally water condition is

subjected to fluctuation and adversely got altered both by qualitatively and quantitatively because of climatic changes (Oybonna and Jimoh, 2011). Quality of water is much of importance and concerned with human health (Jimoh, 2011). Life depends upon pure water and it is a demanding solvent for human sustainability in due course of the civilization (Sayyed Hussain, 2012). Increasing human population and rapid industrial growth in the present era is contributing to a maximum effect influencing the physical properties of the fresh water bodies (Miller, 1973; Goldman and Horna, 1983). Water quality analysis is a major test to check the condition of water. Physical parameters such as atmospheric temperature, surface water temperature, transparency of water and Electrical conductivity has to be continuously monitored to maintain a freshwater medium for the life conducible level (Tepe *et al*., 2006). Physical parameter analysis is essential in the reservoir water and interactions of both physical parameters of water and the growth of the fish play a significant role in the composition, distribution and abundance of aquatic organisms (Mustapha and Omotosho, 2005; Nagarajan and Kannan, 2013).

Main objective of Physical parameter study of the Kullursandhai reservoir a fresh water ecosystem, the only water resource of Virudhunagar town of Tamilnadu was to know the distribution of solute in the reservoir water and sustainability of the ground water for fish culture practice. To understand the complete biological phenomenon, the physical prospect of water reveals the growth of the fish, energy scenario of the fish, and dynamics of ecosystem and explains the general hydro biological relationship (Pandey *et al*., 1973). Basic information such as knowledge on climatic and physical parameters of the water with relation to that of the length and weight of the fish is scanty. Therefore Kullursandhai reservoir was selected as the freshwater resource to study the growth of the *Oreocromis mossambiccus* with relation to the physical parameters such as atmospheric temperature, surface water temperature, transparency of water and Electrical conductivity of water was done during the Post-monsoon season (December to February) a season immediately after the rainy monsoon season. Reservoir a freshwater medium will be in full capacity and well settled water medium.

Material and Methods

In the present study, investigation was done during the Post-monsoon season from the month of December to February. Measurements were done once in every fortnight interval. On every 14th

day on every month atmospheric temperature was noted using thermometer and surface water temperature was measured by dipping the digital thermometer into the water medium in different places of the Kullursandhai reservoir. With the help of Secchi disc the transparency of the fresh water in the reservoir was recorded. Electrical conductivity of the water was measured by using the Electrical conductivity meter. A value of three replicates in different places at random was recorded. Investigation of the growth of the Tilapia fish *Oreochromis mossambiccus* in the natural conditions of Kullursandhai freshwater to the various physical parameters was done. 50 fishes at random were selected from the heap of fish catch nearby to the dam (Fig.1). Lengths of the 50 fishes were measured with the meter tape and the weights of the 50 fishes were weighed by using the digital weighing machine in the fishing catch area itself once in every fortnight interval.

Fig.1. Sorted Fish *Oreochromis mossambiccus* from the fish catch in Kullursandhai freshwater reservoir.

Results

In the present study it was observed that from the December month onwards up to 90th day in the month of February the atmospheric temperature was found to be slightly increased from 26.15 ^{0}C to 26.75 ^{0}C. Surface water temperature was found to be increased by 2.56 ^{0}C, that is from 24 ^{0}C to 26.56 ^{0}C. Electrical conductivity value was drastically raised from 312.6 µS/cm to 356.0 µS/cm. Transparency of the water recorded to be from 25 cm to 26.16 cm for 90 days (Table.1). Specific growth rate of *Oreochromis mossambiccus* in the freshwater was calculated. From the Table.II it was clearly evident that, there is double the value increase in the specific growth rate from December 1st to February 28th. Percentage of weight gain was raised by 5.42%. Weight gain was improved from 1.32 to 7.96 values. In Fig .2 the specific growth rate of the fish is very gradual and steady rise was noticed, but in the Fig .3 and Fig .4 the percentage weight gain and weight gain of the fish is very rapid and productive during the experimental period from 1st day to 90th day.

Discussion

Comparative study of the physical parameters of the freshwater medium of Kullursandhai and the growth of the *Oreochromis mossambiccus* was clearly discussed by the relationship of the fish with the physical parameters of the water medium. Length and weight of the fish increase will always leads to the growth of the fish, therefore length as well as weight of the fish is directly proportional to the growth of the fishes in any aquatic environment (Gopinathan nair, 1988). Physical parameters of the reservoir such as atmospheric temperature, surface water temperature, transparency of the water and Electrical conductivity of the water showed only slight increase in the level during the Post-monsoon season. These slight changes in the water have no predominant increase in the growth of the fish. Same trend was noticed by several reporters in the freshwater habitat in the post-monsoon season (Umaru, 2015; Tsegag Teame, 2016). During the Post-monsoon season, the water quality is highly in unsettled condition and irregular in nature may be the causative factor for the retrogressive growth of the *Oreochromis mossambiccus* (Nagarajan and Kannan, 2017).

Characteristic change in the organisms, gaseous solubility in the water and dissolved slats in the water was determined by the temperature (Cogan, 1998). Higher electrical conductivity of water

from 312.66 µS/cm to 356.0 µS/cm in the Kullursandhai reservoir may be the causative factor for lesser rise in the fish weight gain from 1.392 to 7.9 values. Same result was obtained by the reporters in the Amaravathy water habitat in Tamilnadu (Chaudhri, 2014; Sivakumar, 2011). Therefore during the Post-monsoon season from the month of December to February it was concluded that the growth of fish *Oreochromis mossambiccus* was not raised economically because of the lesser changes in the Physical parameters of the water.

Conclusion

In the freshwater medium, Kullursandhai reservoir water the Physical parameters of the water is not suitable for the economical growth of the *Oreochromis mossambiccus* during the Post-monsoon season. Fish catch is not advisable during this season.

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Table 1. Physical parameters of freshwater habitat Kullursandhai reservoir during the Post-monsoon season

S.No	Post-Monsoon sampling (Day)	Atmospheric Temperature (^{0}C)	Surface Water Temperature (^{0}C)	Electrical conductivity µS/cm	Transparency (cm)
1	1st	24.00±0.72	26.16±0.44	312.66± 20.44	25.06±0.34
2	15th	25.00±0.52	26.02±0.22	316.66±31.22	26.00±0.82
3	30th	26.00±0.82	26.94±0.88	330.94±24.98	26.76±1.38
4	45th	26.73±0.12	27.10±0.33	373.10±30.39	26.73±0.43
5	60th	26.76±0.43	27.43±0.83	330.13±40.49	27.00±0.93
6	75th	26.16±0.73	27.46±0.13	370.26±40.43	28.00±0.93
7	90th	26.56±0.32	26.73±0.12	356.23±30.72	26.16± 0.62

SD ± Mean of 3 replicates

Table .II. Growth parameters of *Oreochromis mossambiccus* in freshwater habitat Kullursandhai reservoir during the Post-monsoon season

Categories	Study Period					
	1-15th Day	**1-30th Day**	**1-45th Day**	**1-60th Day**	**1-75th Day**	**1-90th Day**
Specific Growth Rate	5.16	7.22	1.23	1.29	2.96	3.0
% Weight Gain	1.07	1.50	2.58	2.72	6.32	6.49
Weight Gain	1.32	1.85	3.17	3.34	7.76	7.96

Fig.2. Specific Growth Rate of *Oreochromis mossambiccus* in freshwater habitat during the Post-monsoon season

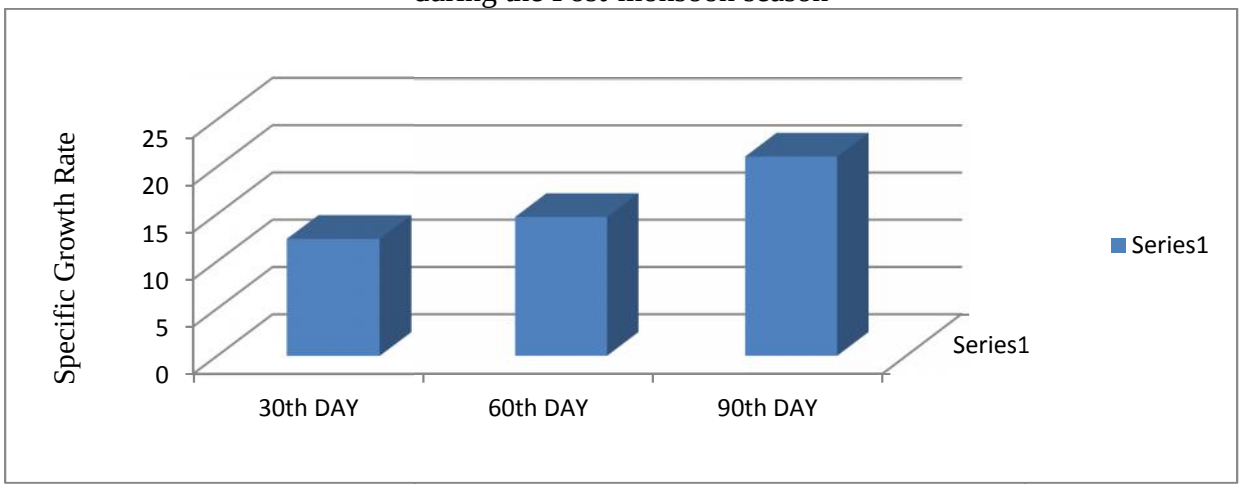

Fig.3. Specific Growth Rate of *Oreochromis mossambiccus* in freshwater habitat during the Post-monsoon season

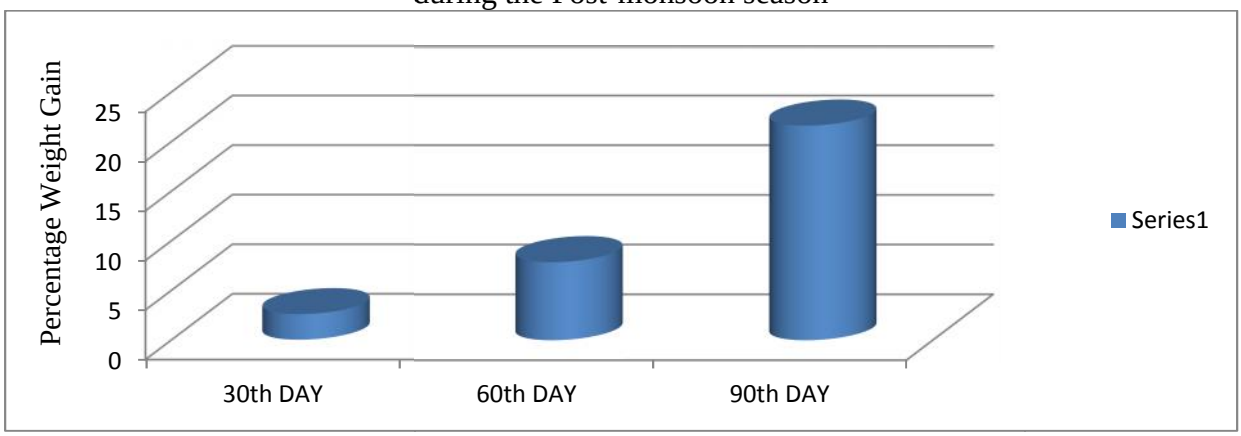

Fig.4. Specific Growth Rate of *Oreochromis mossambiccus* in freshwater habitat during the Post-monsoon season