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## STUDIES ON THE CHARACTERIZATION OF POND WATER FOR AQUACULTURE

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### ABSTRACT

A local perennial pond near Erode city was selected in the present study. The water sample collected from the pond was analyzed and various parameters showed little variations. The pond water was used as a medium to rear the fingerlings of *Oreochromis mossambicus* to find the suitability of water for aquaculture. As the fingerlings died in the raw pond water, they were reared in various concentrations of pond water to study the growth pattern through length weight relationship. As the pond water exerted very little deviations in growth, it is recommended to monitor, the pond water properly to be utilized for future aquaculture practices.

**KEY WORDS:** *Oreochromis mossambicus*, pond water, fingerlings and aquaculture.



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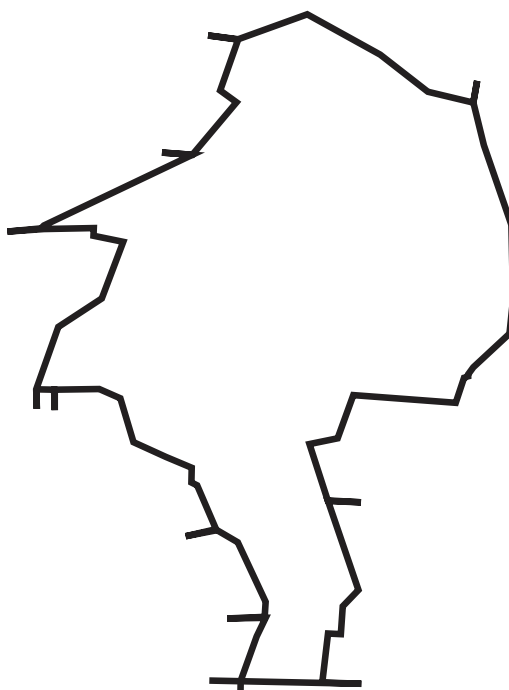
## INTRODUCTION

The problem of pollution is mainly linked with human activities and is met with by both the developed as well as the developing countries<sup>1</sup>. Pollution results in the upset of dynamic balance in the aquatic ecosystem. Good quality water is essential for all living organisms and the characteristics of water that affect the survival, growth, reproduction etc. is important from the view point of culture of aquatic organisms<sup>2</sup>. Limnology plays a very important role in the decision making process in aquaculture practices. A change in water quality affects the biotic community of an aquatic ecosystem ultimately reducing the primary productivity<sup>3</sup> and several deviated physico- chemical factors could cause stress and adversely affect fish population. In this respect a regular monitoring of water quality is essential to determine the status of water bodies with reference to fish culture. Fishes are sensitive to the contaminations of water. So they are adversely affected by the polluted water in aquaculture ponds<sup>4</sup>. This is because they are poikilothermic in nature and live

permanently in water so that they are directly affected by the changes in the ambient medium. In this context the present study has been planned to evaluate the physico-chemical characteristics of water of a local pond and to study the possibility of the utilization of the pond water for fish culture by using the fingerlings of the fresh water teleost fish *Oreochromis mossambicus*.

## STUDY AREA

The pond under the investigation is a perennial one (Ellapalayam pond) situated about 8kms away from Erode city, Tamil Nadu. It is roughly rectangular in shape (Fig.1) covering an area of about 33 acres with a maximum depth of 9 $\frac{1}{2}$  meter, length 510 meters and width 252 meters. It has raised bounds all around with the distribution of marginal rooted vegetation in the surrounding area.



**Figure-1**  
**Map of Ellapalayam Pond**

## MATERIALS AND METHODS

Water sample was collected from the pond at a depth of 100cm in plastic containers. Physico-chemical parameters of the pond water were estimated by following the standard methods<sup>5</sup>. Healthy fingerlings of *O.mossambicus* collected from a local reservoir were acclimatized to the laboratory conditions for a week in dechlorinated tap water. Then the acclimatized fishes were introduced into the raw pond water. As the fingerlings died altogether within 5 days the growth studies were carried out by exposing the in fingerlings different concentrations of pond water (10%, 20%, 30%, 40%, 50% and 60%) with dechlorinated tap water as a diluting medium. The fingerlings were kept in experimental media for about 8 weeks and length, weight relationship were studied through growth parameters such as length weight growth rate and specific growth rate. The results were subjected to statistical analyses.

## RESULTS AND DISCUSSION

Various physicochemical characteristics of the pond water are presented table 1. The pond water is slightly turbid and the total solids are within the tolerable limit<sup>6</sup>. However a high quantity of solids indicates the contamination of water by pollutants because the immediate effect of organic pollution is a rise in the concentration of various solids. The higher values of total dissolved solids are associated with increased turbidity due to silt and organic matter<sup>7</sup>, the dissolved solids reduces the water clarity decreases photosynthesis and increases water temperature<sup>7</sup>. The increased electrical conductivity of the pond water could be due to the enhanced amount of dissolved solids<sup>8, 9</sup>. In agreement with<sup>10</sup>, the pond water is found to have a pH of 7.4 which is safe to maintain productivity and to rear fish fauna. The pond water exhibits an increased alkalinity which could be due to the mixing of toxic substances, high evaporation rate and change in alkalinity with increased decomposition<sup>11</sup>. In the present study the pond water is found to have increased hardness which could be due to mixing of domestic sewage and industrial effluents<sup>12</sup>.

The low dissolved oxygen content of the water in the present study indicates the poor productivity of pond which could be due to mixing of wastes<sup>2</sup>, due to increased decomposition of organic materials, higher organic load and increased population of microorganisms determined the BOD level in water bodies<sup>13, 14</sup>. But in the present pond study the BOD of water is not too much and is within tolerable limits. However, continuous monitoring is necessary as the pond water contains a little quantity of oxygen and a high CO<sub>2</sub> content. In addition the pond water also contains a higher calcium hardness as well as chlorides. This could be due to a high salinity resulted by sewage pollution<sup>15</sup>. A higher concentration of sulphates in the present pond water could be due to the production of hydrogen sulphate by anaerobiosis<sup>16</sup>. A high quantity of phosphate, the water sample of the pond under study is an indication of possible pollution load. This corroborates with the findings<sup>10</sup>. In order to identify the possibility of utilizing the pond water for fish culture the fingerlings of the fish were tested in the laboratory by rearing them in the pond water of various concentrations. The results of length, weight, relationship of the fingerlings reared in various concentrations of pond water are given in Table 2. The perusal of the results indicates that the growth pattern of the fingerlings was slightly deteriorated when they were reared in pond water. The percent change in length and weight as well as growth rate and specific growth rate pertaining to the length and weight of the fingerlings slightly vary significantly in growth pattern. These findings are similar to the observations<sup>17, 18,19,20,21</sup>. From the foregoing account it is clear that the physico-chemical parameters of the pond water are not significantly contaminated. But few variations have been observed in the quality of water with reference to alkalinity, hardness, O<sub>2</sub> content CO<sub>2</sub> and so on. This could be due to mixing of domestic and industrial wastes. The aquatic organisms are generally affected by heavy metals<sup>22, 23</sup>, the pesticide<sup>24, 25</sup> and by soaps and detergents from the sewage<sup>26,27</sup>. In conclusion, it is pointed out that the quality of the pond water seems to exert some changes of one kind or another resulting in the reduction of growth in the fingerlings. The pond under study, as a

greater part of natural environment could be facing great threat due to indiscriminate discharge of toxicants. Therefore, there is a need to monitor parameters of pond water to be utilized for aquaculture. In addition, it is

recommended that the discharge of toxic substances might be properly and strictly controlled and regulated by appropriate measure in order to utilize the pond for the aquaculture practices.

**Table - 1**  
**PHYSICO-CHEMICAL ANALYSES OF POND WATER**

S.No	Parameters	Results
01	Colour	Slightly turbid
02	Total suspended solids	21.00 mg/l
03	Electrical conductivity	2090.00 mmho/cm
04	Total dissolved solids	1230.00 mg/l
05	pH	7.40
06	Alkalinity	410.00 mg/l
07	Total hardness	1250.00 mg/l
08	Dissolved oxygen	1.10 mg/l
09	Biochemical oxygen Demand	14.30 mg/l
10	Chemical oxygen Demand	76.00 mg/l
11	Dissolved Carbon di oxide	30.75 mg/l
12	Dissolved Chlorides	912.97 mg/l
13	Dissolved Sulphate	262.30 mg/l
14	Dissolved Phosphate	-0.81 mg/l
15	Calcium hardness	700.00 mg/l

**Table-2**  
**Length weight relationship of *Oreochromis mossambicus* reared in different concentrations of the pond water**

CONCEN TRATION (%)	CHANGE IN NET LOSS		CHANGE IN GROWTH RATE		CHANGE IN SGR	
	LENGTH	WEIGHT	LENGTH	WEIGHT	LENGTH	WEIGHT
60	1.57	3.04	0.0025	0.0037	0.0123	0.0239
50	1.36	2.85	0.0021	0.0034	0.0106	0.0224
40	1.48	2.73	0.0023	0.0034	0.0116	0.0215
30	1.49	2.86	0.0023	0.0036	0.0117	0.0225
20	1.50	2.45	0.0023	0.0030	0.0117	0.0192
10	1.46	1.61	0.0023	0.0020	0.0114	0.0126

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