



THE IMPACT OF ENVIRONMENTAL CHARACTERISTICS ON THE GROWTH OF INDIAN MAJOR FRESHWATER CARPS-KENDAI

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ABSTRACT

Our country has enormous scope for developing both marine and inland fisheries as a major industry. India has a long coastal line of 6,100 km with a vast area of continental shelf, spread on both the west and east coast were the fishing operations are carried out. The natural catching of fish and fishery production could not meet the exponential growth of world population. Existing ponds and swamp lands as well as agricultural system can profitably used for aqua food production. The maintenance of water quality is essential for both survival and optimum growth. The water quality parameter like temperature, transparency, dissolved oxygen, pH, carbon-di-oxide, salinity, calcium. The biological variables such as qualitative and quantitative study of phytoplankton, zooplankton and fish growth were analyzed, the readings were recorded on the twice a month. Surface temperature of culture pond of varies between 25.3°C to 33.2°C. The temperature is responsible for regulative some physiological process both under nature and artificial conduction. The hydrogen ion concentration of the pond has a little variation. The highest pH is (8.1 pH) of was recorded on first week of March, the CO₂ is a limiting factor for the pH. The turbidity of water ranging from 35-41cm, normally turbidity of water affected by the growth of phytoplankton and rainwater inflow from the river. The oxygen content in a water body is the function of temperature as well as photosynthesis and community respiration. The phytoplankton population gradually increased from December to March during the study period. The phytoplankton increase may be due to high light intensity. Among the three fishes in the order of cypriniforms like *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* maximum weight was recorded for the fish *Catla* than the other groups. An organisms which have direct influence on the activities of the organisms.

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INTRODUCTION

India has a long coast line of 6,100 km with a vast area of continental shelf, spread on both the west and east coasts were the fishing operations are carried out. For natural fishing normally requires large number crafts and gears. Varies kinds of traditional crafts and gears, locally made are in use since centuries for capturing different kinds of fishes including crustaceans such as lobsters, crabs and shrimps. Aquaculture can be an excellent complement to human being to meet the protein rich food requirement of growing population. (Anand *et al.*, 1986; Ayyappan *et al.*, 1991). The maintenance of good water quality is essential for both survival and optimum growth of fish. The levels of metabolites in pond water that can have an adverse effect on growth. Good water quality is characterized by adequate oxygen and limited levels of metabolites (Sekar *et al.*, 2011). The scientific utilization of inland water lies in acquiring an intimate knowledge of the ecology of the freshwater bodies, their physico-chemical characteristics and the biology of the organisms inhabiting them. Aquaculture is carried out in a variety of enclosures, yet the rural ponds are the most popular ones. Empirical knowledge and experience gained over decades from these ponds have helped us to understand the scientific basis of fish culture (Sinha, 1975). Hence the present study was carried out the physico-chemical parameter of pond water, plankton population and length (cm) and weight (mg) of fishes.

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MATERIALS AND METHODS

For the present study the physico-chemical parameters, plankton population and fish growth were analysed in artificial freshwater fish culture pond namely Ponnusamy Aqua Farm, Mananchery. The pond having an area of 0.50 acres (180m length, 122m breath and 3m depth), it is situated in Thanjavur District, Tamil Nadu. The analysed water quality parameters like temperature, transparency, dissolved oxygen, pH, carbon-di-oxide, salinity and calcium. The biological variables such as qualitative and quantitative study of phytoplankton and zooplankton and growth rate fish *Catla catla*, *Labeo rohita* and *Cirrhinus mrigala* were analyzed, the readings were recorded on the twice a month (APHA, 1976).

RESULT AND DISCUSSION

The physico-chemical and biochemical characteristics of the fish culture pond were summarized in the Tables 1. Surface temperature of culture pond of varies between 25.3°C to 33.2°C. The temperature is responsible for not only important role in regulative some physiological process both under nature and artificial conduction. The present result is in agreement with the observation of Somalingam (1990). The hydrogen ion concentration of the pond has a little variation. The highest pH is (8.1 pH) of was recorded on first week of March 2009. The CO₂ is a limiting factor for the pH. The amount of dissolved free CO₂ present in the water can increased the alkalinity Shreeram Sinch (1983) the pH value below 4.8 and above 10.8 have harmful (affect) to fish life. Temperature and pH are the

Table 1. Water quality characters (physico-chemical parameters) of culture-pond

S. No	Month	Temperature (°C)	pH	Turbidity (cm)	O ₂ (mg/l)	CO ₂ (mg/l)	Salinity (mg/l)	Ca (mg/l)
1.	December	26.4	7.0	35	1.68	0.0071	0.129	1.75
2.	December	25.3	7.5	37	2.24	0.0066	0.135	1.61
3.	January	26.2	8.0	38	2.42	0.0074	0.154	1.85
4.	January	27.4	6.5	40	2.42	0.0079	0.158	1.45
5.	February	28.2	7.2	38	2.81	0.0062	0.173	1.65
6.	February	28.5	7.5	36	2.24	0.0068	0.194	1.72
7.	March	30.2	8.1	41	3.36	0.0062	0.265	2.84
8.	March	33.2	7.9	38	3.37	0.0066	0.254	2.71

Table 2. Growth characters of Length (cm) and Weight (gm) of the fishes of culture-pond

S.No	Month	Catla		Rohu		Mrigal	
		Length (cm)	Weight (mg)	Length (cm)	Weight (mg)	Length (cm)	Weight (mg)
1.	December	6.5	25	4.5	20	4.0	17
2.	December	7.3	41	5.2	26	6.1	25
3.	January	8.9	57	6.7	34	7.3	40
4.	January	10.2	72	8.3	50	8.9	55
5.	February	11.4	95	10.2	69	10.2	75
6.	February	12.8	121	11.4	92	11.1	98
7.	March	14.0	148	12.5	124	12.2	117
8.	March	15.5	197	13.7	155	13.2	130

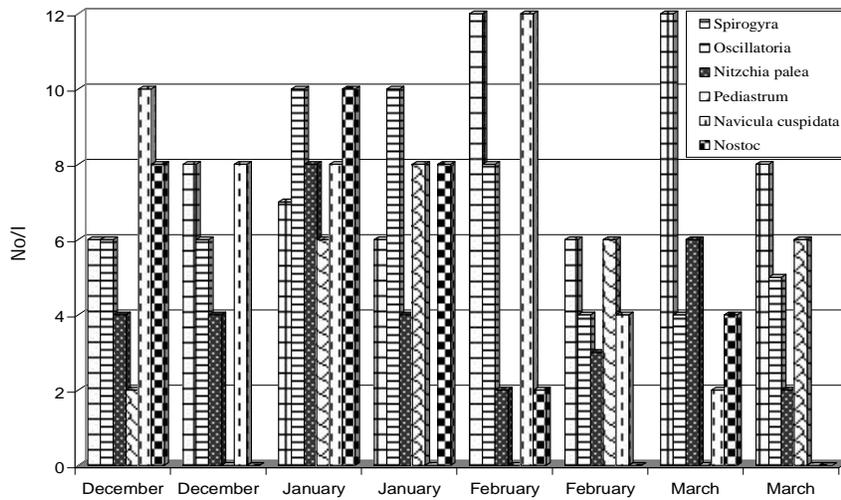


Fig.1. Phytoplankton density of culture pond (No/l)

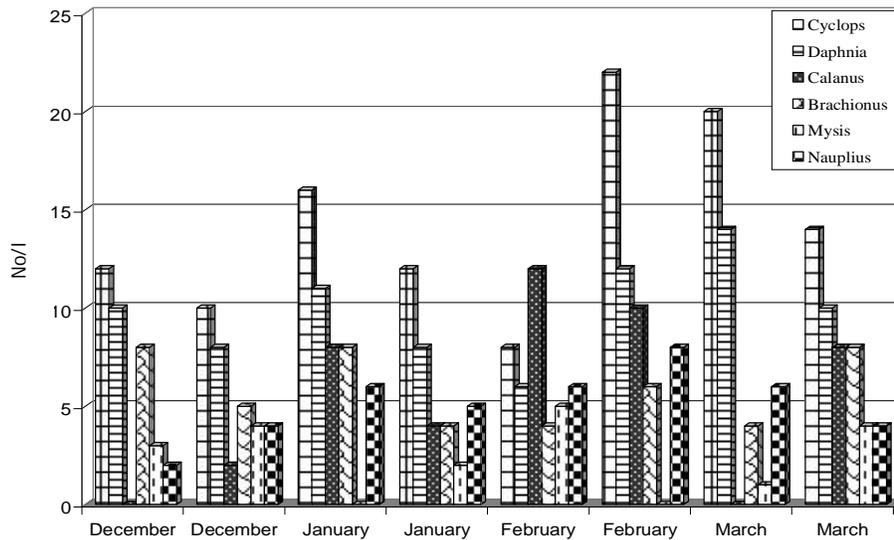


Fig. 2. Zooplankton density of culture pond (No/l)

sum of the important physical variables of water which responsible for the production of environment and in which the phytoplankton the primary producer or designing the food-web process. The turbidity of water ranging from 35-41cm. The maximum turbidity was recorded in first week of March 2009. Normally turbidity affect the growth of phytoplankton the turbidity of water normally increased at the time of rainwater inflow of water from the river or by the growth of the planktons. This may change the primary productivity of organisms (Khan and Zutshi., 1980). The dissolved oxygen content of the water ranging from the 1.68 mg/l – 3.37 ml/l. The oxygen content in a water body is the function of temperature as well as photosynthesis and community respiration. When the water is moving the dissolved oxygen content is higher and when the water is stagnant the dissolve oxygen is found to below (Singh, 1981). The dissolved carbon-dioxide content of the pond varies from 0.0062 mg/l - 0.0071 mg/l. The pH and free carbon-di-oxide directly proportional to each other. If the alkalinity increases the carbon-di-oxide value also gradually increases. The buffer system, of most of the water is responsible for the transformation of carbon-di-oxide to carbonic acid and bicarbonate, this bicarbonate produce carbonates. The carbon-di-oxide and the bicarbonate are not co-exist since this would neutralize each other to form carbonate. As a result the pH is increased to a higher value. Increase in dissolved carbon-di-oxide concentration promotes the green algal population and results in a good yield than the blue green algal productivity (Fisher *et al.*, 1998). The salinity of the pond have only a small variation (0.129 mg/l - 0.265 mg/l). According to Welz (1952) the salinity of freshwater body should be below 0.5 ppt. The present data of pond also reveals more or less the same results. Based upon the results of the study, inference can be drawn that the water quality parameters are suitable for fish culture (Somalingam, 1990).

In the present Study plankton population were maintained by applying manures and fertilizers. The phytoplankton population gradually increased from December to March during the study period. The phytoplankton increase may be due to high light intensity, during March then December. There is a indirect relationship noticed between phytoplankton and zooplankton population (Fig.1 and 2). The present study agrees with earlier observations (Ayyappan *et al.*, 1991; Bentzen *et al.*, 1992; Jack *et al.*, 1993). In the present study the freshwater major carps, *Catla catla*, *Labeo rohita* and *Cirrhinas mrigala* was recorded every month in the pond. Among the three fishes maximum of weight was recorded for the fish *Catla* than the other groups (Table 2). The aquatic organisms are totally depending upon their environment for their requirements and are inseparably related with it. The environment refers to the surroundings of organisms which have direct influence on the activities of the organisms. Thus, the relationship existing between the organisms and the environment is of reciprocal nature.

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