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TEMPORAL VARIATIONS IN PHYSICOCHEMICAL PROPERTIES OF TRADITIONAL WATER BHERIES

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ABSTRACT

The present communication embodies the result of studies made on the temporal variation in some of the physicochemical properties of improved traditional brackish water Bheris during October 2009 to May 2009. The studies revealed that the Bheries are good profitable brackish water aquaculture resources and fluctuations are in the suitable range of culturing the fresh and brackish water fish species. The period between final harvesting and initial stocking is used for the drying, ploughing and liming of pond besides the repairing of embankment which helps in maintaining the optimum carrying capacity of Bheries year after year.

Key words : Improved traditional, bheries, temporal variation, pokkali.

INTRODUCTION

The Bheries of West Bengal, the prawn culture in paddy fields of Kerala (Pokkali) and culture of fish in lagoons are the three principal types of traditional brackish water farming practiced in India. The shallow impoundments in the tidal marshes of Sundarban locally known as 'Bheri'. form an important area of intensive ecological investigation in view of their extensive pisciculture practices and constitute about 47,700 ha area (Ghosh *et al.,* 1990) in the districts of North and South 24 Parganas of West Bengal. The traditional bheries and pokkali fields, range from 5-20 ha in area. The enormous size of Bheries leads to difficulties in water management, pest and predatory control, and retrieval during harvest.There are five different brackish water aquaculture practices mentioned in the literature, ranging from traditional to super-intensive (Shiva and Karir 1997, Primavera 1998, Rosenberry 1999). Traditional systems are often characterised by polyculture of shrimp and fish or by rotation with rice. In this method, low-lying areas near the banks of saline water rivers and creeks are encircled by peripheral dyke, and tidal water is allowed to enter into the impoundment along with natural seeds of various species of shrimps, crabs and fishes. Water is retained with periodical exchanges during lunar cycles and the animals are allowed to grow utilizing natural food. After 3-4 months, partial harvesting starts using tidal inflow during lunar cycles and continues up to 10-11 months. Productivity in this system ranged between 500-750 kg ha-1year-1 of which about 30 percent is constituted by prawns/ shrimps and 70 per cent by other brackish water fishes.

Quality of water in brackish water bheries depend on several physical, chemical and biological processes (Das *et al.,* 2001) and the interactions occurring in the pond and their effect on biological community of the pond are in a continual state of flux and are all interdependent. Frequent oscillation of dissolved oxygen content of water was observed in bheries due to the varying quantity of flushing of fresh water and tidal flow. It was observed that the pH remained fairly alkaline throughout the culture period and free carbon dioxide nearly absent in saline environment (Garg and Bhatnagar, 1996; Das *et al.,* 2001). Generally the fishes in bheries include major carps (*L. robita, C. catla, C. mrigala*), bhetki (*L. calcarifer*) and prawns (*P. monodon, M. rosenbergii*). The traditional bheri culture practice has undergone a number of modifications with changes in the management practices like external stocking along with auto stocking, application of lime and supplementary feeding etc. during the course of time. The present studies were undertaken to generate data on dynamics of important abiotic factors, to better understanding of improved traditional bheri culture system. Knowledge on pond dynamics of brackish water bheri culture system is necessary to manipulate the management practices for enhancing production.

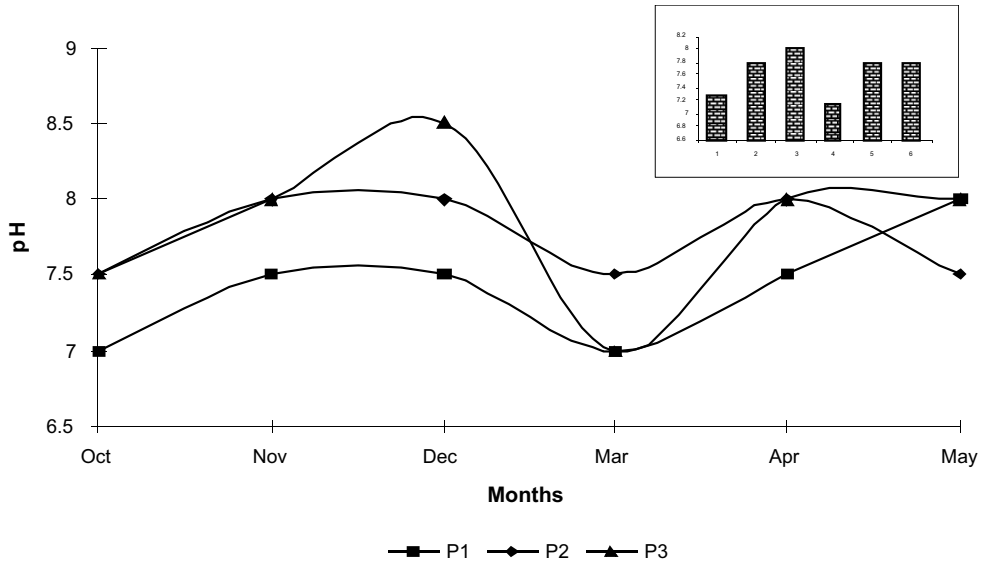

Fig.-1 : Temporal variation in pH.

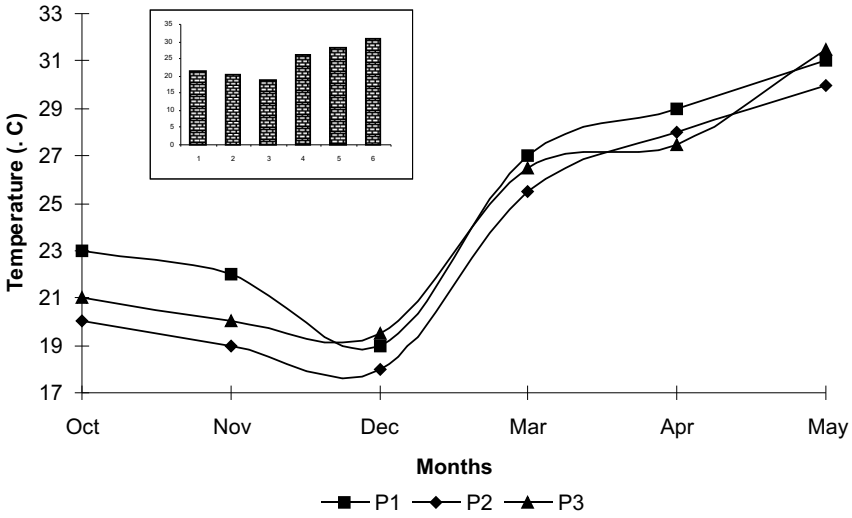

Fig.-2 : Temporal variation in Temperature.

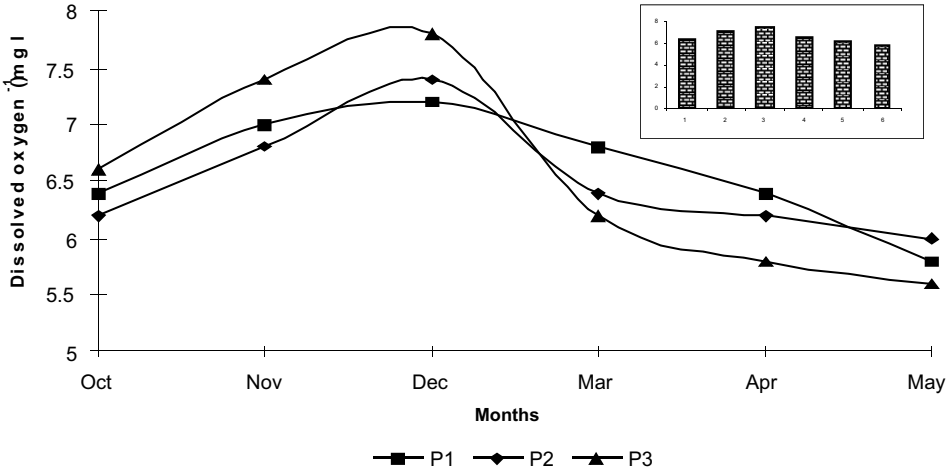

Fig.-3 : Temporal variation in Dissolved oxygen.

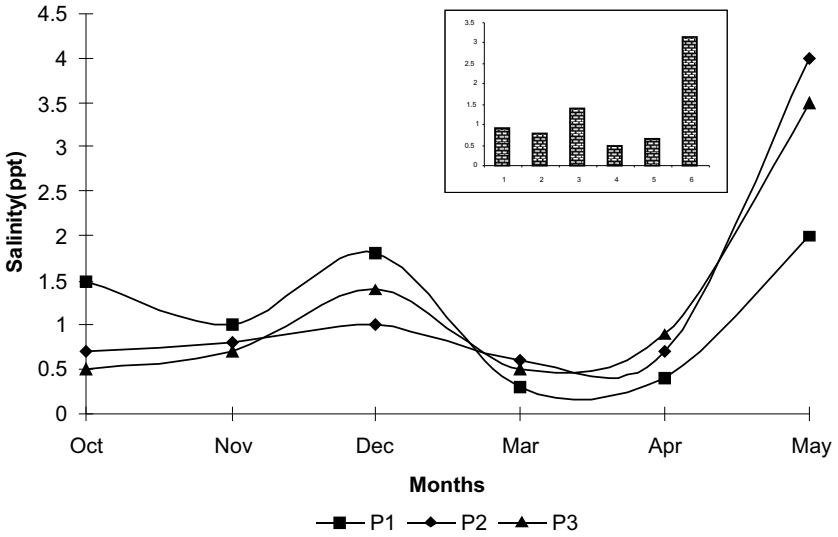

Fig.-4 : Temporal variation in Salinity.

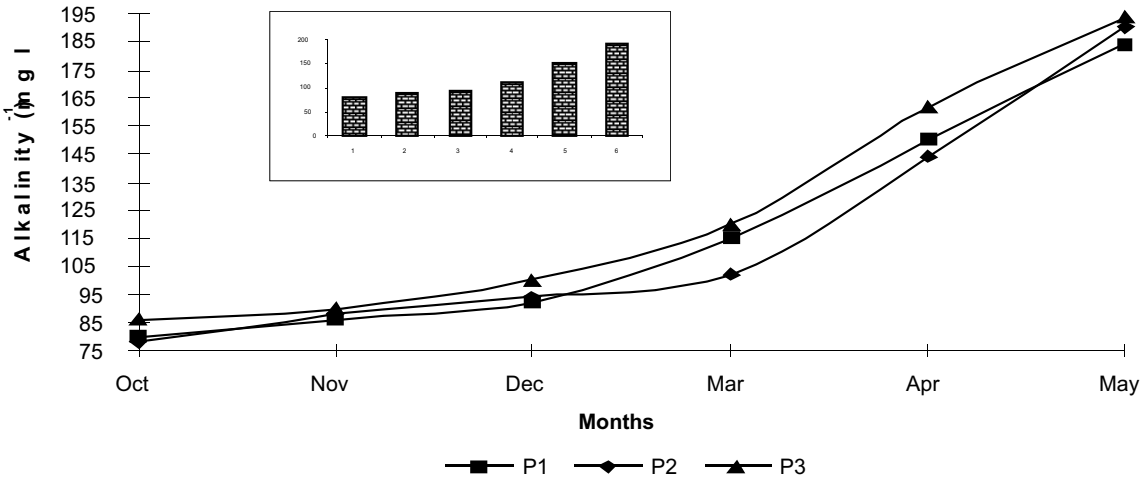

Fig.-5 : Temporal variation in Alkalinity.

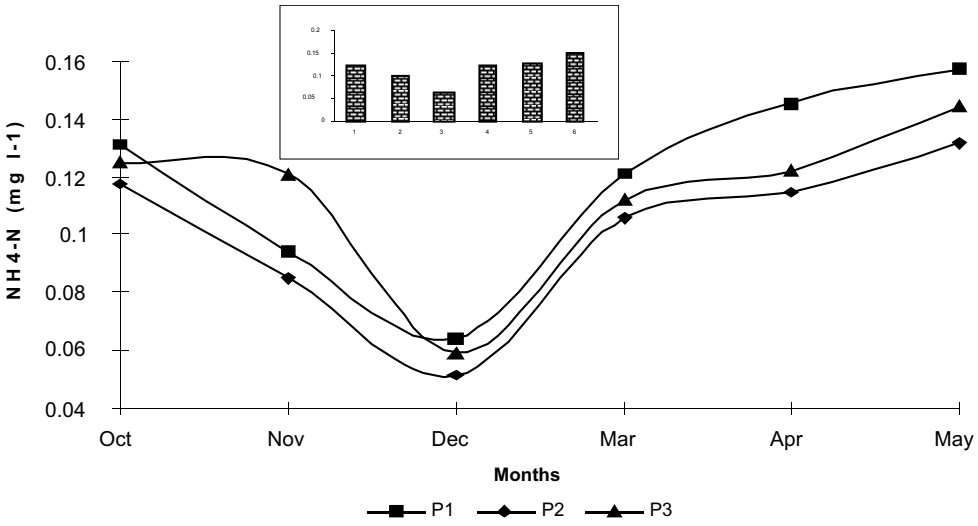

Fig.-6 : Temporal variation in hardness.

MATERIALS AND METHODS

The study was conducted at Kharibari area of 24 Parganas (North) district of West Bengal during October 2004 to May 2005. Water samples were collected every month from three stations of randomly selected three bheries of unequal sizes (80150 ha) of the Kharibari area. The management practices of the bheries as revealed by the owners were found to be more or less identical in terms of different inputs such as fish seed, manuring, feeding and harvesting. The samples were analyzed according to standard methods (APHA, 1995).

RESULTS AND DISCUSSION

The bheri culture in West Bengal starts in the month of February with the inputs of tidal water along with the natural seeds and complete harvesting is done in the month of December. The study thus has been done in two parts first during last phase (Oct., Nov., Dec.) of culture and second during initial phase (Mar., Apr., May.) of culture period. The hydrological observations carried out are as follows.

1. pH : The pH of water remains alkaline during the whole culture period with a maximum value of 7.8 during the first culture phase and 8.0 during the second culture phase. The variations in the pH values were in increasing trend during the second culture phase (October-December) while such trend was not conspicuous during the initial culture phase (March - May) (Fig.-1).

2. Temperature : Surface water temperature during the first phase of investigation (October to December) remained within 18.8 to 21.3°C with little differences among the three units. During the second phase of study (March to May) the average surface water temperature remained much higher and it ranged form 26.3 to 30.8°C (Fig.-2).

3. Dissolved oxygen : An increasing trend was observed in the values of Dissolved Oxygen during winter (From October to December) with a peak of 7.46mg\" in December. The maximum value of Dissolved Oxygen (6.9 mgl-') was observed during May during the first phase of culture. The range of dissolved oxygen varied from5.8 to 6.9 mgl during the first culture period while the values varied from 6.4 to 7.46 mg!! during the second culture phase (Fig.-3).

4. Salinity : Water salinity ranged from 0.9 to 1.4 ppt during the first phase of investigation but it tended to increase from April and the maximum (3.17 ppt) value was observed during May (Fig.-4).

5. Alkalinity : An increasing trend was observed in the values of total alkalinity from October to December but such rate of increase observed during March to May was conspicuous. The average value varied by 48.3% with minimum and maximum values of 91.66 mgland 189.3 mgl·' respectively, from October to May (Fig.-5).

6. Hardness : The values of water hardness behaved in a similar manner to that of total
aikat The minimum (223 mgl) and sam Ki met) Values war dermed during Cocte a la predive Differences ang te ants were regnfcar B005 (Fig.-6).

The fluctuation in water quality parameteris significant in bheries especially in salinity yet both brakishwater as well as fresh water fishes can be cultured. The production could be increased if fishes are stocked with optimum stocking densitywith practice of multiple harvesting. During the first phase of observation ythat is final phase of culture, the alkalinity, salinity, hardness dissolved oxygen and pH increased up to November while the the temperature only decreases. On the contrary, during the second phase of observation (initial phase of culture) all water quality parameter increases except the dissolved oxygen. Therefore, the water quality parameter is apparently not consistent all throughout and is consicuous with influence of seasonality.

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