



Research Paper

SIGNIFICANCE OF POKKALI FIELDS AT KADAMAKKUDY, KERALA

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Abstract

The coastal belt of Kerala has a unique system of paddy cultivation in saline soils known locally as “Pokkali” refers to a saline resistant variety. Pokkali field is a highly nutritive agricultural land with paddy and prawn as alternative crops. The fluctuating physico-chemical parameters of water in these fields make them a sustainable ecosystem with rich biodiversity. The present study was on the various physico-chemical parameters of water fluctuating in these fields during different phases of cultivation. Strict protective measures must be envisaged to prevent degradation of this rich habitat.

Key words: Pokkali field, physico-chemical parameters.

INTRODUCTION

Areas adjoining to the sea, backwaters and estuarine regions lower than the mean sea level are blessed with a rich ecosystem having diverse cropping pattern and production possibilities like salt fish in salt pan areas, rice fish farming in embanked coastal flood plains and rice-shrimp rotational farming systems in low lying pokkali fields in brackish water regions.

Pokkali cultivation is a traditional indigenous method of rice-fish rotational cultivation practiced in the coastal belts. The variety of paddy used for this type is locally known as Pokkali, which is salt-tolerating and usually tall. Cultivation is done in the fields adjoining the backwaters during June- September when the water is of low salinity.

Pokkali fields are tidal wetlands, the tide that occur twice a day play an important role on fertility and productivity of the agro-ecosystem (Sasidharan,2005). Here, the retention of tidal flow during the post rice season causes inundation of brackish water into the fields, and the live feed generated form the basis of perpetual renewable bio-energetic resources for alternate production of rice and prawn in the fields (Purushan, 2002).

The Pokkali fields of Kerala are usually single crop paddy fields, extending upto 10,000 acres and yielding an annual production of 5,000 tonnes. The paddy fields after paddy crop harvest are usually used to trap high tide water through sluices along with

prawns mainly and then the water is let out through the filters during low tide (Raman & Menon, 1969).

2. Study area

The area opted for the study is Pokkali fields at Kadamakkudy, situated in Kadamakkudy panchayath of Ernakulam District. The area lies between 10°11N'W & 70°45E', has an area of 470 ha, surrounded on all sides by the small tributaries of river Periyar. Three sites were selected for the study, of each of having 5 acres, of which the first two sites were cultivating while the third one is non-cultivating, separated by a canal as well as 100m wide asphalted road. The study was carried out from July 2010-June 2011, with observation and sampling fortnightly every month.

3. Objectives

- To envisage the significance of pokkali cultivation system in the ecosystem.
- To study the Physico-chemical parameters of water in the Pokkali fields.

4. Methodology

Direct observation and sampling was used for determining chemical parameters. Dissolved Oxygen was calculated by Winklers method and pH with digital pH meter. Carbon dioxide was determined by the standard method with 0.1 NaOH, Hardness by EDTA, Chlorinity by Mohrs Method, Salinity inferred from chlorinity levels with proposed equation and Alkalinity by Volumetric analysis in the laboratory.

5. Results

Various parameters measured during the study period are given in Figure 1 below.

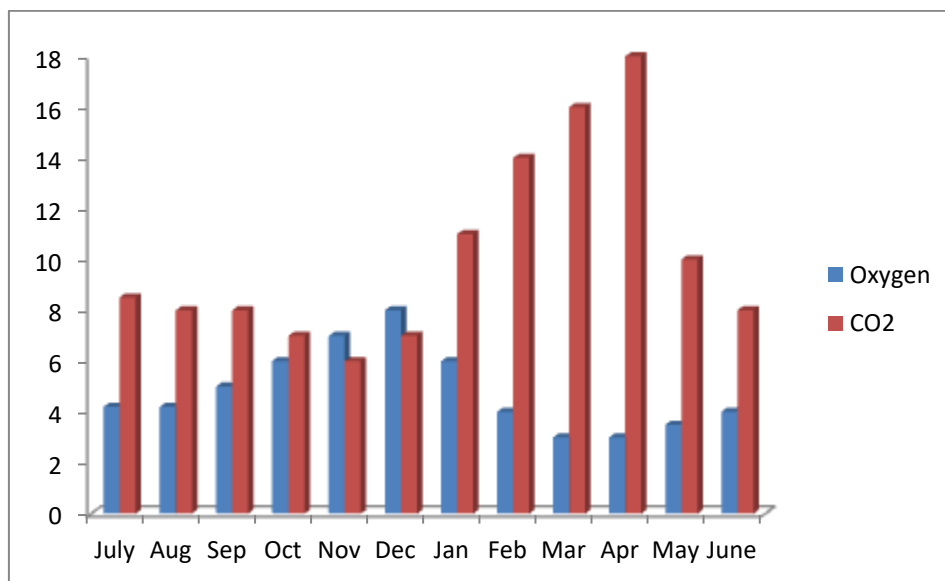
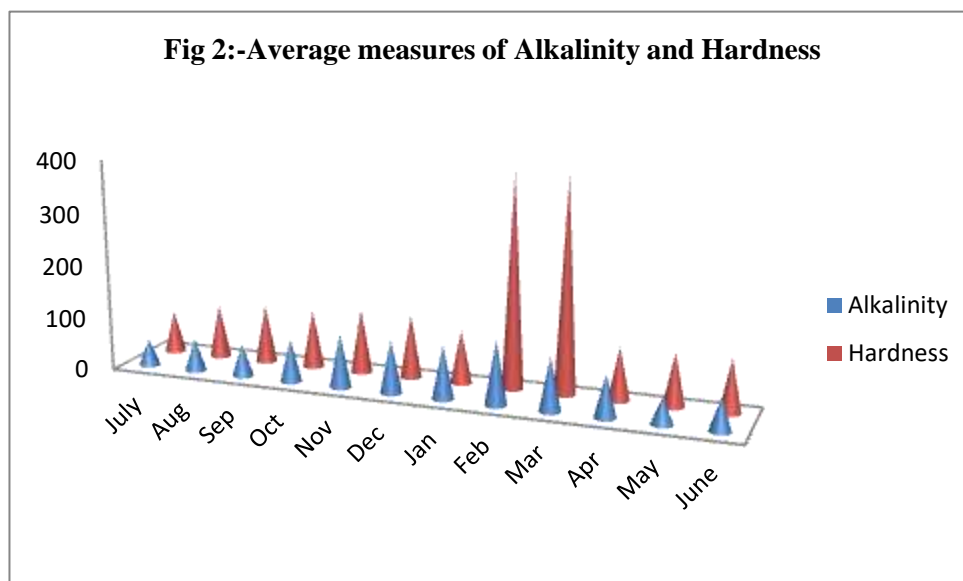


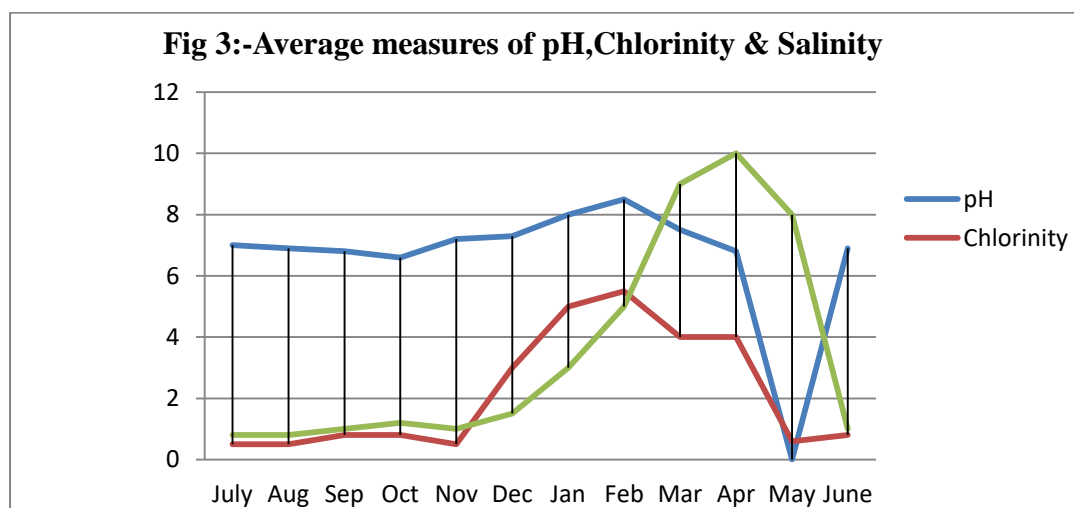
Figure 1:-Average values of Oxygen and Carbondioxide of three sites

It has been found from the above figure that the dissolved oxygen amount is maximum in three sites in the month of November, while least in January. The highest value may be due to the presence of excessive growth of macrophytes and microphytes, releasing excess oxygen through photosynthesis and minimum value is because of less growth of macro and microphytes.

Carbon dioxide level was found to be maximum in the month of February while least in November and there shows an inverse relation between dissolved oxygen and the carbon dioxide level of the water body. Maximum value is because of loss of vegetation while less value is due to the excessive growth of vegetation.



In the above figure, it was clear that Alkalinity level was found to be highest in the month of February, while lowest in the month of July. The rise and fall in the values dependent on the different cultivation periods in the field, further dependent on the varying saline water levels. Hardness of water shows a considerable fluctuation and found to increase gradually from the month of October to April while found to decrease from July to September. The abrupt rise may be associated with the increased halides level in the water body, due to the change in weather, from mild temperature to high temperature during summer months. The gradual decrease in the level can be correlated with the amount of heavy rainfall in the particular rainy season.



The measures of chlorinity as well as resultant salinity level was maximum during March whereas minimum in the month of Jul, in all the three sites. The high value is in correlation with the entry of saline waters from the adjoining sea into the field through sluice gates, because of high tides. Likewise a low level is due to the flow of saline waters back into the sea, of low tides, which is the period suited for paddy cultivation.

The P^H value of the water also showed a gradual variation during the study period, with a gradual rise from the month of September to February, in all the three sites. Lowest values were in the month of September and maximum during February, due to the varying alkaline and saline conditions of the water body.

It can be inferred that there is an inverse relation between the dissolved oxygen and the carbon dioxide values. Dissolved oxygen showed a wavy pattern of variance from, gradually increasing from July(4.5) to a maximum during November(8.13) and after which slowly declines to a minimum in April(3.8). Correspondingly, carbon dioxide decrease gradually from July(8.8) to a minimum in November(6.16), later increase upto a maximum during April (16.8). Thus there is a negative correlation between the two parameters, one increases while the other decreases.

Deepa(2008) studied the physico- chemical parameters at Kadamakkudy pokkali fields, and also noted an inverse relationship between Dissolved oxygen and carbon dioxide values, with oxygen increases during the summer season, with a maximum of 5mg/l in April while carbon dioxide values also showed a gradual decline in summer months.

Saritha suresh(2008) studied the avian fauna at kadamakkudy pokkali fields and found that dissolved oxygen was minimum in February(8.9) while maximum in September(13.4). Whereas Carbon dioxide values also showed positive correlation with that of dissolved oxygen, increasing with increasing oxygen values and vice versa.

Maximum level of oxygen observed in the present study in the month of November was due to the thick vegetation, water flow and entry of fresh water. Minimum of dissolved oxygen in the month of April was due to the decomposition and lack of vegetation and the presence of high saline water.

It can be inferred that there is a positive correlation between the pH and that of Salinity of the water body, observed during the study period. The pH of water decreased from a maximum value in July(7) to a minimum of value (6.78) in September, and further increase slowly to a maximum in January(8.38), after which it declines. Salinity also showed a gradual increase till September, followed by a decrease in October, further an increase in the rest of the study period with a maximum value in March(10.2), followed by a decline in April.

6. Conclusions

The Pokkali cultivation system with alternate rice and prawn/crab cultivation in their respective periods of salinity, hardness, alkalinity, chlorinity and other conditions provide a habitat for rich and dense forms of biota of both invertebrates and vertebrates, differs in their dominance and availability. The gradual and cyclical fluctuations in the various physico-chemical parameters of the pokkali fields during the different facets of cultivation, make it rich with diverse flora and fauna. Because of this, Pokkali fields must be preserved and cultivation practices should be maintained allowing the coming generations to perceive the richness of biodiversity sustained by us in this traditional system of cultivation.

7.Recommendations

Strict protective measures must be envisaged and proper awareness among the farmers must be provided, which will help to prevent the degradation of the habitat. Financial aid and training must be given to farmers , in sustaining this cultivating practise.

8.Declarations

I do hereby declare that this dissertation “Significance of Pokkali fields at Kadamakkudy” is an authentic record of mine carried out by me under the supervision of Dr.John George.M, department of Zoology, Mar thoma college, Tiruvalla.

9.Acknowledgement

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