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Hydrological Parameters in the Pokkali Fields at Kadamakkudy, Kerala

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Abstract

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. Strict protective measures must be envisaged to prevent degradation of this rich habitat.

Keywords: Pokkali field, Physico-chemical parameters

Introduction

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).

Inundation of brackish water into the fields results in retention of tidal flow during the post rice season. The live feed thus 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 single crop paddy fields of 10,000 acres with an annual yield of 5,000 tonnes. After the paddy harvest, live feed and prawns are trapped inside through sluices in high tide and only water is drained out in low tide (Raman & Menon, 1969).

Study Area

The study area was Pokkali fields of Kadamakkudy, situated in Kadamakkudy Panchayath of Ernakulam District. The area lies between 10 <" 11 N[1] W & 70 <" 45 E, has an area of 470 ha, surrounded by the small tributaries of river Periyar. Three sites were selected for the study, 5 acres each, of which the first two sites were cultivating while the third one non-cultivating, separated by a canal as well as 100 m wide asphalted road.

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Methods

Study was carried out for a year from July 2010 - June 2011. The observation and sampling was carried out in the morning between 8 am & 10 am, twice every month.

Results and Discussion

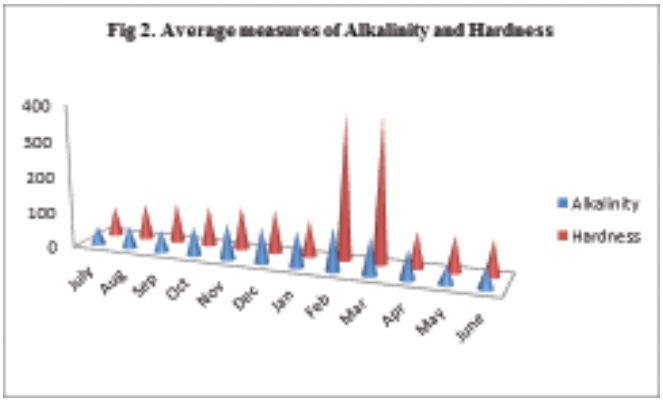
Various parameters measured during the study period are given below

Figure 1. Average values of Oxygen and Carbon dioxide of three sites

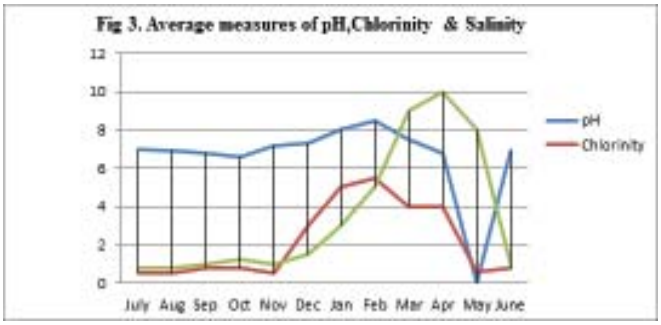
It has been found from the above figure that the dissolved oxygen amount is maximum in three sites in the month of December, while least in March. The highest value may be due to the presence of excessive growth of macrophytes and microphytes, which releasing excess oxygen through photosynthesis and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

Carbon dioxide level was found to be maximum in the month of April 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. The rise and fall in the values dependent on the different cultivation periods in the field and varying salinity. Hardness of water shows a considerable fluctuation and found to increase gradually from the month of July to March except January. The abrupt rise may be due to increased halide level in the water body, change in weather or wide fluctuation of temperature. The gradual decrease in the level can be due to heavy rainfall in the season.



The chlorinity and salinity levels were maximum during February, whereas minimum in July in all the three sites. The high value is in relation with the entry of saline waters from the adjoining sea into the field through sluice gates on high tides. Likewise a low level is due to the flow of saline waters back into the sea, during low tides, making it suitable for paddy cultivation. The P^H value of the water, in all the three sites also showed a gradual variation during the study period, with a gradual rise from the month of October to Febraury. Lowest values were in the month of October and maximum during February, due to the varying alkaline and saline conditions of the water body.

The dissolved oxygen and carbon dioxide values were found to be inversely proportional to each other and the result is supported the view of Deepa (2008). In this study, the level of dissolved oxygen elevated from a minimum value of 4.5 mg/L in July to maximum of 8.13 mg/L in December and then declines to a minimum of 3.8 mg/L in March. Likewise, the level of carbon dioxide declined from 8.8 mg/L in July to a minimum of 6.16 mg/L in November then elevated to a maximum of 16.8 mg/L in April. This result showed that there is a negative correlation between these two parameters. The high level of dissolved oxygen in the month of December was may be due to the thick vegetation and entry of fresh water. The low level was may be on account of decomposition, lack of vegetation and high saline inflow.

This study shows that there is a positive correlation between pH and salinity of the water body. pH changed from 7 in July to 6.78 in October and then to 8.38 in February. The Salinity showed a wide fluctuation during the study period. Pokkali fields are unique cultivation area noted with cyclical fluctuations in the various physico-chemical parameters highly favouring alternate cultivation of paddy and prawn and to be maintained for our future generations.

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