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Total humic acids in the inshore waters of Cochin

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Abstract

Total humic acids (THA) determined from surface as well as from subsurface water and sediment of Cochin inshore area for a period of one year from Oct. 1997 to Oct. '98 formed the material for this study. THA levels in water ranged from nil to 9.56 ppm at surface and nil to 9.71 ppm at the bottom. In the sediment THA levels registered a minimum of 0.09 ppm and a maximum of 7.56ppm. Mean values for THA indicated that the distribution of THA in water was maximum in Station – 1 for surface (4.09 ppm) and in Station – 2 (2.59ppm) for bottom. THA levels for sediment (2.45 ppm) was also maximum in Station – 2. Significant correlation could not be established between THA, temperature and salinity except for a weak negative relation of THA with salinity in the inshore region. The results were discussed in the context of their role in pollution abatement in aquatic systems.

Keywords : Total humic acids, Cochin waters, pollution abatement.

Introduction

The humic substances found in coastal waters is of terrestrial origin and is present in bo solved and particulate states imparting a yellowish brown colour to seawater[1]. Pla decomposition products referred to as 'gelbstoff' by Kalle[2] and as 'water humus' by Skop are also similar to humic compounds. Humic acids are considered natural chelators[4], st of phytoplankton growth[1,5] as well as inhibitor of toxic effects of certain pollutants[6,7]. hand report on THA levels in the inshore waters of Cochin was mainly taken up while r monitoring the state of health of inshore waters with a view to understand the status levels present in these waters and their possible relationship with certain pollutants as th industrially as well as commercially active.

Material and method

Water and sediment samples were collected from three stations (Fig. 1) on board Rv Cadalmin. Station-1 was a shallow backwater area close to the Cochin Shipyard Lt. The depth varied from 5 – 6 m. Station-2 was close to the bar mouth and depth ranged from 9 – 10m. Station-3 was at the fair way buoy in the Port Channel at a depth of 10 – 12m. Water samples were collected from surface and bottom with Nansen reversing bottles and sediment using a VanVeen grab. Water samples were stored frozen prior to analyses. THA in water was estimated from 500 ml. samples according to the method of Martin and Pierce[8].

Sediment samples brought to the laboratory were weighed 5 g each with three replicates per station in separate vials. 15 ml. of 0.5N NaOH was added and kept overnight, constantly agitated in a laboratory shaker. The slurry was centrifuged at 6000 rpm for 8 min. The supernatant was saved and to the residue fresh volume of 0.5 N NaOH was added, mixed and centrifuged. Supernatants were saved and conc. HCl was added drop by drop until precipitation. The ppt was separated by centrifuging at 5000 rpm for 10 min. The ppt. Containing THA was dissolved in known volume of 0.5 N NaOH were read at 520 nm on a UV-Vis Spectrophotometer (GBM, 911 A) against suitable standards (8).

Results and discussion

THA in water : THA levels in water ranged from BDL to 9.56 ppm at the surface and BDL to 9.71 ppm at bottom (Figs. 2-4). Annual average of THA in station-1 recorded a maximum of 4.085 ppm at surface and a maximum of 2.59 ppm at the bottom in station-2 (Fig. 5). Monthly mean of THA levels in Station-1 showed highest values in September '97 at surface (9.56ppm) and in April '98 at the bottom (4.85 ppm; Fig. 2). In station-2 highest levels of THA occurred in Oct. '97 at surface (6.03 ppm) and in Feb.'98 at bottom (5.29 ppm; Fig. 3). In station-3 highest levels of THA occurred in Oct.'98 both at surface as well as tat the bottom. On the whole, it was observed that the levels of THA was maximum at the surface of Station-1 compared to the same at the bottom, coinciding with the terrestrial run off.

THA in sediment: THA levels in sediment samples ranged from 0.89 ppm to 7.56 ppm. Highest levels of THA was observed in September '97 from Station-1 (3.86 ppm) and in Oct. '98 in Station-2 (7.56 ppm), while Station-3 recorded a peak level of THA in Dec. '97.

It was observed that both monthly and annual average of THA values were the highest in water

especially at surface. Hence it is presumable that the THA levels may predominantly of dissolved fraction. Whereas, according to Hair and Bassett[9] 85% of the sum of dissolved and particulate fraction of humic acids reported from the Connetquot River, New York is from particulate humic acid fraction. According to them salinity appears to influence the solubility of THA in natural waters. The present study also indicated negative correlation ($r = -0.5$) of THA with salinity in Station-e both at surface as well as at the bottom.

It is established that humic acid substances reduced the toxicity of tin (Sn II & Sn IV) towards cyanobacterium *Synethocysiis aquatilis* in cultures (6). It is demonstrated that both the bioavailability and acute toxicity of Meothrin are decreased significantly by the presence of aquatic humic acid at the concentration of 5 and 10 ppm (7). THA in sediments also play active role in the bottom characteristics as it is established (10) that with increasing age of sediments, molecular weight of extracted humic acids increases, carbon to hydrogen ratios decreases and such changes are accompanied by decreasing organic matter content and increasing humification of organic matter. The present study forms a basis for understanding the nature of THA occurring in these area and their possible binding or adsorption of certain trace or heavy metals present in these waters opening up their role in the field of primary productivity and marine pollution.

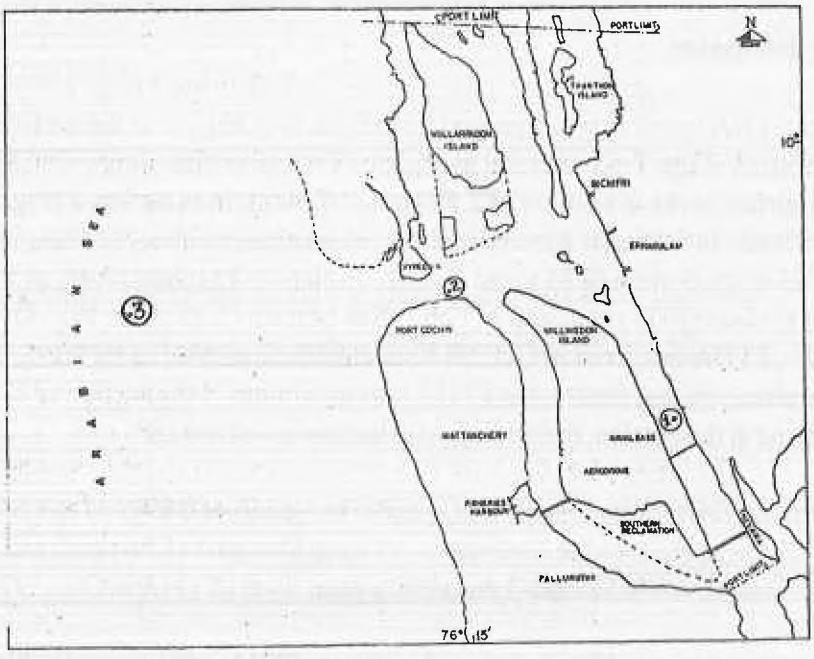
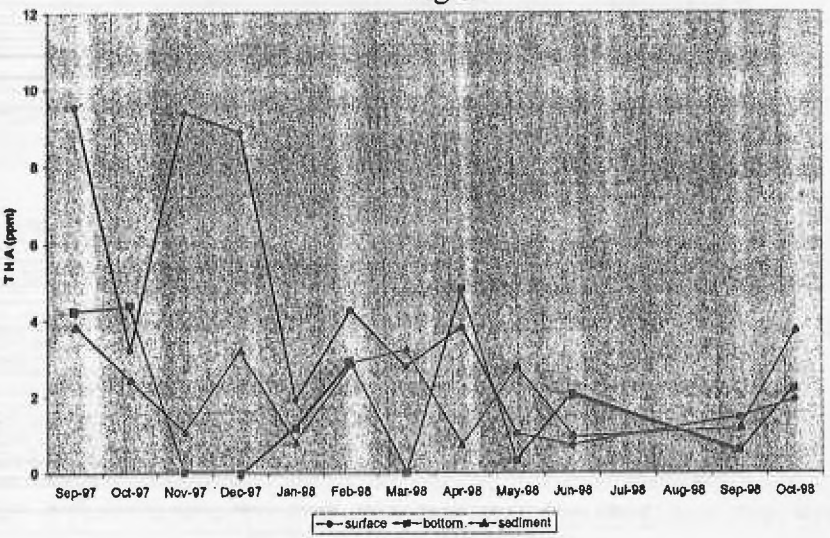


Fig.1 Sampling Stations

TOTAL HUMIC ACIDS IN STN. 1

Fig. 2



TOTAL HUMIC ACIDS IN STN. 2

Fig. 3

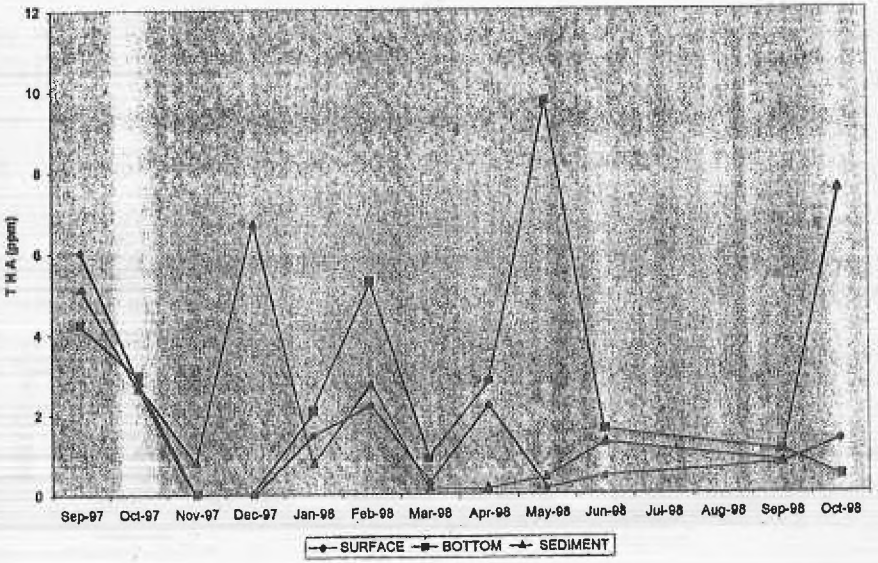


Fig. 4. TOTAL HUMIC ACIDS IN STN. 3

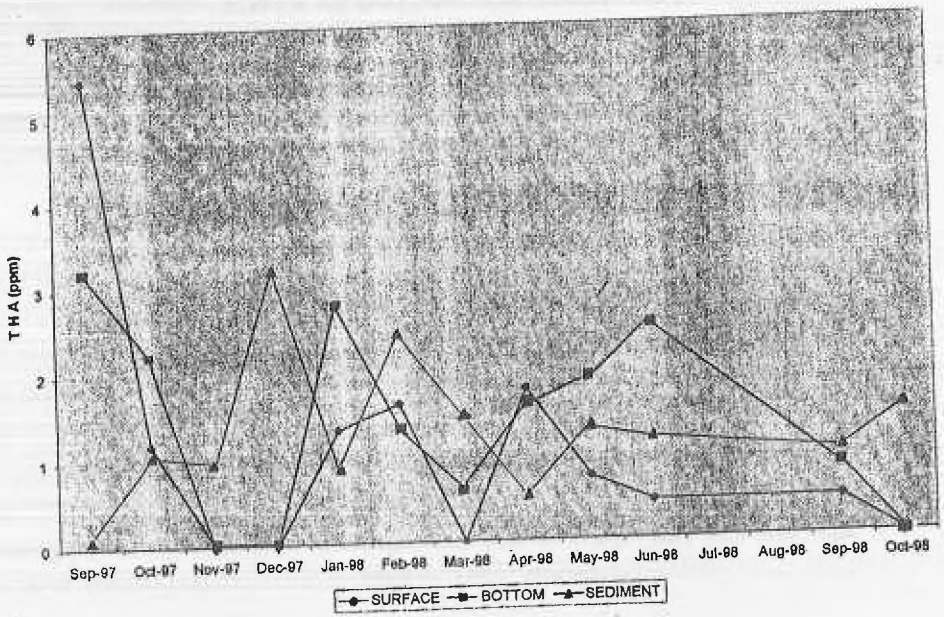
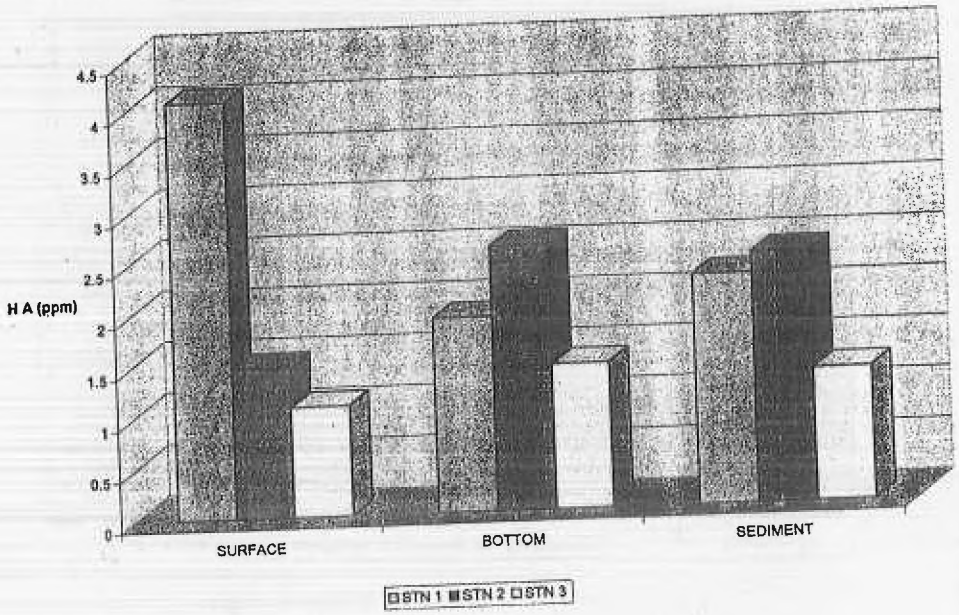


Fig. 5. AVERAGE VALUES FOR THA AT THREE SAMPLING STATIONS



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