

BIOACCUMULATION OF HEAVY METALS BY THE BROWN ALGA *CYSTOSEIRA* SP. ALONG THE TURKISH COAST OF THE AEGEAN SEA

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Abstract

Brown algae *Cystoseira* sp. and to gain additional information on the environmental conditions of the area seawater samples were collected from six sampling stations along the Turkish coast of the Aegean Sea. Concentrations of Cd, Pb, Cu, Zn, Mn and Fe were measured for both algae and seawater samples. The heavy metal concentrations detected in algae showed significant differences among all stations. The data obtained from this study were also compared with those obtained from previous studies. Metal concentrations recorded at the stations may be used for background levels for interspecific comparison within the Aegean area.

Keywords: *Bio-Accumulation, Metals, Aegean Sea*

Introduction

Heavy metals, reaching the marine environment directly or indirectly, are dangerous pollutants which can effect human health. Determination of metal concentration in an area is important to provide information about the levels of metal contamination and environmental quality. On that basis macroalgae have been used as biomonitors of heavy metal pollution in marine environment because they have high accumulation capacity, bind only free metal ions, represent the metal concentration of their locality quite well and they are widely distributed [1,2]. Brown algae have high metal accumulation capacity from surrounding water and they are good indicators of their environment because they are physiologically unable to regulate the uptake of trace elements [3,4]. *Cystoseira* species were used in this study because of these characteristics of the phylum and because they widespread along the coast of the Aegean Sea.

Materials and Methods

The *Cystoseira* sp. and water samples were collected in six stations in April, 2006 from the Northern (Çanakkale), Middle (Izmir) and the Southern (Marmaris – Muğla) parts of the Aegean coast. Three subsamples of each macroalgae sample (approximately 1 g dry weight) were digested in microwave digestion system with acid mixture solution. The water samples were collected in preconditioned polyethylene bottles. Ion exchange technique, using Chelex-100 resin was applied for heavy metals in water samples [5]. All the analyses were performed by Varian atomic absorption spectrophotometer [6].

Results and Discussion

Metal concentrations in *Cystoseira* decreased in the order Pb<Cd<Cu<Zn<Mn<Fe; in seawater the sequence was Pb<Cd<Cu<Mn<Zn<Fe. The highest levels for all metals in *Cystoseira* were measured in Marmaris region except Cd and Pb. There were positive correlations in *Cystoseira* sp. between Cd-Zn, Cd-Fe, Cu-Zn, Cu-Mn, Cu-Fe, Zn-Mn, Zn-Fe and Mn-Fe (Spearman correlation coefficient, p<0.05). Pb and Cu concentrations in the alga were positively correlated with the respective concentrations in the seawater. Cd, Pb, Cu, Zn and Mn concentrations in *Cystoseira* sp. were lower than those from other areas [7,8,9].

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