EPIPHYTIC DIATOM COMMUNITY ON MACROPHITE LEAVES IN IZMIT BAY (MARMARA SEA)

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Summary

In marine coastal ecosystems, benthic algae are important contributors to primary production and a limiting resource for sessile plants and animals. The aim of this study, from March 1999 to September 2000, was to characterize the diatom flora among the algal epiphytes in two macrophytes from Izmit Bay, Marmara Sea: *Cymodocea nodosa* (Ucria) Aresch and *Zostera noltii* Horneman. Diatoms were identified by Scanning Electron Microscopy and quantitative analyses were conducted to estimate the diatom abundance. In the study period, 4 centric, 25 pennate diatom taxa were recorded on two macrophytes.

Key words: epiphytic diatom, Izmit Bay, Marmara Sea

Introduction

Algal epiphytes on macro algae play an important role in marine communities, contributing to the primary productivity of ecosystems, supplying a main food source for animals such as molluscs and amphipod crustaceans and comprise a major portion of the biota present in a given area [1, 2]. As for the micro flora, diatoms are always dominant. Despite the importance of benthic algae (particularly diatoms) in marine communities, little information is available about the timing and patterns of epiphyte distribution on marine macrophytes [3].

This study is part of a larger investigation on the ecological distribution of benthic diatom communities along the coast of Izmit Bay. The aims of this study are to characterize the epiphytic diatom flora among the benthic algal composition and at the same time to contribute to the knowledge of benthic diatom diversity of the Marmara Seas.

Izmit Bay is located on the north-eastern part of Marmara Sea and it is one of the most polluted areas in Turkey. The Bay has been receiving more than 300 industries' effluents, together with the untreated domestic waste-waters from the small cities and also from Izmit, the most populated city of the region. The Bay was also affected by a powerful earthquake (on August 1999) and by the subsequent fire in the refinery situated on the north-eastern coast [4].

Materials and Methods

Temperature, dissolved oxygen, salinity and pH were measured in surface water. Nutrient (Nitrate, *o*-phosphate and silicate) analysis were determined bimonthly in TÜBITAK Research Center by a Technicon Autoanalizer II System.

Sampling was carried out monthly by SCUBA-diving and snorkelling. A part of host plants (*Cymodocea nodosa* and *Zostera noltii*) was fixed in 4% formaldehyde and the other parts were desiccated to constitute a herbarium. In the laboratory, epiphytic diatoms on host plants were separated by washing-tearing methods and temporary slides were prepared for counting. In every counting, minimum 100 diatoms frustules were counted and abundances were calculated. Diatoms were identified by light and scanning electron microscopy and photographed.

Results and Discussion

Temperature changed according to sites and seasons related also to turbulence of wind and wave. Salinity values were considerably varied in the littoral zone. Besides marine diatoms, freshwater species were recorded also on epiphytic flora.

Macrophytes were recorded as "rarely present" (6%, n=18) at Yalova and "constantly present" (83%, n=18) at Dereköy, a partly sheltered area. A total of 29 epiphytic diatom taxa were recorded. *Achnanthes* spp., *Cocconeis* spp. ("true" epiphytes, with adnate cells) and *Navicula ramosissima* var. *mucosa* (metaphyton, with motile cells living in mucilage tubes) were dominant in these assemblages.

Table 1. Values of physical and chemical parameters.

	min	max	average
Temperature (^{0}C)	7	28	17.5
pH	7.4	9.5	8.5
Salinity (‰S)	16	28	22
NO^-_3-N (µg l^{-1})	2	40.9	13
PO^-_4-P (µg l^{-1})	2	38	8.2
SiO_2 (µmol l^{-1})	0.12	7.17	5.5
Suspended solids (mg l^{-1})	17.8	32.4	22.6

Cymodocea nodosa and *Zostera noltii* were suitable host plants at selected sites because of wide distribution. Moreover, their leaves constituted a suitable settlement surface for a characteristic micro algal community.

Epiphytic diatoms did not show considerable seasonal variations at Izmit Bay. However, their abundances changed. In spring and autumn, an extensive epiphytic diatom growth was observed on the host plants that, furthermore, besides being affected by a remarkable diatom cover, are also colonised by small filamentous algae (*Ectocarpus, Callithamnion, Polysiphonia, Cladophora* and *Ceramium*).

Acknowledgments. This study was supported by the Research Fund of Istanbul University, Project Number: T-670/190299

Table 2. Epiphytic diatom taxa, h: habitats (B=Brackish; M=Marine; F=Freshwater) and rc: relative abundances (n=18).

Taxa	rc	h
Centrales		
Actinocyclus subtilis (Greg.) Ralfs in Pritch	17	M
Melosira moniliformis (O. F. Müll.) Ag.	28	B M
M. nummuloides Ag.	33	B
Skeletonema costatum Grev. in Cleve	6	M
Pennales		
Achnanthes spp.	78	
A. brevipes Ag.	56	B
Amphora alata (Ehrenb.) Kütz.	6	M
A. exigua Greg.	17	B M
Caloneis sp.	28	
Cocconeis disculus (Schum.) Cléve	6	M
C. pediculus Ehrenb.	28	F
C. scutellum Ehrenb.	50	M
Cylindrotecha closterium (Ehr.) Lew&Rein	50	M
Fragilaria oceanica Cléve	39	M
Grammatophora marina (Lyngb.) Kütz.	6	M
Lichmophora abbreviata Ag.	39	M
Lichmophora paradoxa (Lyngb.) Ag.	28	M
Navicula menisculus Schum.	6	B
N. ramosissima var. *mucosa*(Aleem)Hendey	72	M
N. rostellata Kütz.	17	M
N. tripunctata (O. F. Müller) Bory	39	F
Nitzschia apiculata (Greg.) Grun.	6	M
N. frustulum var. *perpusilla* (Rabh.) Grun.	11	B F
Stauroneis membranacea (Cléve)F.W.Mills	6	M
Striatella unipunctata (Lyngb.) Ag.	22	M
Synedra crystallina (Ag.) Kütz.	11	M
S. tabulata var. *fasciculata* (Kütz.) Grun.	56	B M
S. tabulata var. *parva* (Kütz.) Grun.	28	B M
Toxonidea insignis Donk.	6	M

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