

ANNUAL VARIATIONS OF ZOOPLANKTON BIOMASS AND ABUNDANCE IN MERSIN BAY (NE MEDITERRANEAN SEA)

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Abstract

Annual changes in zooplankton abundance, biomass and group composition were studied monthly at a coastal (20m) and an open (200m) stations between December 2004 and January 2006 in Mersin Bay, NE Mediterranean Sea. Zooplankton biomass and abundance were determined for four size fractions: 112-200, 200-500, 500-1000 and >1000 μm . Surface seston chlorophyll-a, lipid, protein and carbohydrate concentrations were also measured. Zooplankton abundance was correlated with chlorophyll in the coastal station ($p < 0.05$). Significant correlation was observed between total zooplankton biomass and total particulate organic matter ($p < 0.01$) in coastal station.

Keywords : Biomass, Zooplankton, Eastern Mediterranean.

Introduction

The Eastern Mediterranean Sea is an oligotrophic sea with poor nutrient concentration leading to low plankton biomass and production ([1]). Zooplanktonic organisms play a key role in the pelagic food web by controlling phytoplankton production and shaping pelagic ecosystems ([2]). Studying zooplankton communities are especially important for understanding the functioning of coastal ecosystems because of both land and ocean based environmental factors ([3]). The aim of the study is to provide information on the zooplankton annual cycle in relation to the influence of environmental parameters on them.

Material and Methods

Zooplankton sampling were carried out monthly at two stations; one representing coastal ($36^{\circ}33'58\text{N}$, $34^{\circ}15'68\text{E}$; 20m depth) and the other representing open waters ($36^{\circ}26'\text{N}$, $34^{\circ}21'\text{E}$; 200m depth) characteristics, from December 2004 to January 2006 in Mersin Bay, NE Mediterranean Sea. Samples were collected with Nansen net (70 cm mouth diameter with 112 μm mesh) and fractionated into 112-200, 200-500, 500-1000 and >1000 μm size groups for biomass (dry weight) estimation and major taxonomic group identification. Zooplankton samples were preserved in 5% borax-buffered formaldehyde for quantitative taxonomic analyses. Temperature and salinity profiles were obtained with a CTD-probe. Surface seawater samples were collected with niskin bottles for chlorophyll-a, lipid, protein and carbohydrate measurements. Correlation and regression analysis were used to identify environmental correlates with zooplankton parameters.

Results and Discussion

Very low chlorophyll concentrations in the open station ($0.02\text{-}0.35 \mu\text{g L}^{-1}$) can be compared with those observed in the NW Levantine Sea ($0.10\text{-}0.47 \mu\text{g L}^{-1}$, [4]). Chlorophyll maximum occurred in spring and autumn for both stations. Highest chlorophyll-a concentration ($2.5 \mu\text{g L}^{-1}$) were observed in March at coastal station due to the input of Lamas River nearby. Total particulate organic matter (POM) (sum of total lipid, protein and carbohydrate) varied from $42.1 \mu\text{g L}^{-1}$ (in January) to $1082 \mu\text{g L}^{-1}$ (in March) and $53.7 \mu\text{g L}^{-1}$ (in January) to $246 \mu\text{g L}^{-1}$ (in May) in coastal and open station, respectively. Total POM decreases with increasing distance from the coast which then reflects the spatial pattern of phytoplankton biomass and zooplankton biomass ([5]). Mediterranean zooplankton is characterized by two abundance maxima: one in late winter or early spring and a second peak in autumn ([6], [7]) as shown in the figure 1. Average zooplankton abundance in coastal station was about ten times more abundant than the open station throughout the year. 112-200 and 200-500 μm size groups were the dominant groups in the coastal station and only the 112-200 μm size group in the open station. Copepods were the main group in total zooplankton abundance; 65% of the coastal zooplanktonic groups and 76% of the open station within the year, thus this group plays an important role in the annual changes of zooplankton. After copepods, crustacea nauplii and appendicularia were the dominant groups both in the coastal and open stations. Throughout the year, average zooplankton biomass in coastal station was about nine times higher than the open station. Highest biomass was observed in June at coastal station, and in November at open station. 200-500 μm size group constituted the majority of the average zooplankton biomass in coastal station within the year, on the other hand open station is constituted by >1000 μm size group. Zooplankton abundance was correlated with chlorophyll in the coastal station ($p < 0.05$) and significant correlation was observed between

total zooplankton biomass and total particulate organic matter ($p < 0.01$) in coastal station. Acknowledgement The present study was supported by METU-BAP-2005-07-01-01 project. We would like to thank to Doruk Yilmaz for his assistance in biochemical composition of particulate organic matter measurements and to Dr. Dilek Ediger for helping in chlorophyll-a measurements.

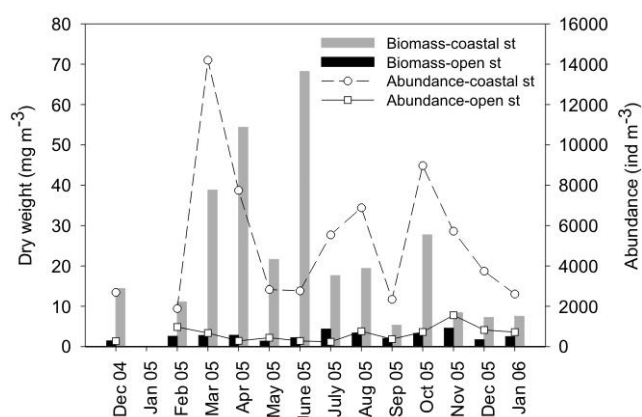


Fig. 1. Annual changes in zooplankton biomass (mg m^{-3}) and abundance (ind. m^{-3}) at coastal and open stations.

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