ABUNDANCE AND BIOMASS OF NONLORICATE CILIATE POPULATIONS IN KASTELA BAY (ADRIATIC SEA)

Natalia Bojanić

Institute of Oceanography and Fisheries, Split, Croatia - bojanic@izor.hr

Abstract

Seasonal distributions of nonloricate ciliates (NLC) density and biomass were investigated in the north-eastern part of the Kaštela Bay, Croatia. The highest NLC abundance (2040 ind.l^{-1}) and biomass (6.844 µgC l^{-1}) were recorded in June 1999 at the surface, and in October 1999 at 10 m depth, respectively.

Keywords: zooplankton, biomass, Adriatic Sea

Introduction

Ciliated protozoa are undoubtedly an important component in marine ecosystems, because they participate in the flow of energy and carbon from bacterioplankton and phytoplankton to large zooplankton organisms [1, 2]. On the other hand, phytoplankton releases the dissolved organic matter, which is returned to the main food chain via the "microbial loop" [3]. In such circumstances ciliated protozoa could act as a link between classic herbivorous food chains and microbial food web [4]. Due to those reasons, the study of temporal fluctuations of nonloricate ciliate (NLC) abundance and biomass in the north-eastern part of Kaštela Bay has been carried out. These are the first results for this part of the Bay as well as the biomass data, that are one of very few available for the whole Adriatic Sea.

Material and methods

Samples were collected at one station (43°32.5' N; 16°24.4 E), on a monthly basis from July 1998 until November 1999, at 0, 5, 10 and 28 m depth, using 1.7 l Nansen bottles (Fig. 1). Organisms were preserved in buffered formaldehyde, final concentration 2.5%. The material was sedimented, decanted down to 20 ml [5] and counted using microscope at magnifications of x200 and x400. The biovolume of nonloricates (NLC) was calculated applying the geometrical method. After measurement of organism dimensions, NLC populations were divided into four size categories: NLC I <10^3 µm^3, II – 10^3-10^4 µm^3, III – 10^4-10^5 µm^3, IV >10^5 µm^3. Conversion factor used to transform these volumes into carbon biomass values was 0.14 pgC µm^{-3} [6].

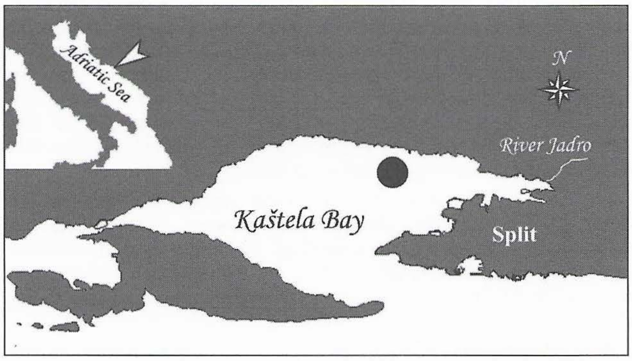

Fig. 1. Study area (Kastela Bay) with the sampling station.

Results and discussion

Seasonal distribution of nonloricate (NLC) abundance showed the highest density during the summer, with the maximum of 670±928 ind.l^{-1} in June 1999. In the remaining period of the year average density values were less then 290 ind.l^{-1} (Fig. 2). The majority of NLC populations (72%) remained in the layer above 5 m depth and the highest abundance of 2040 ind.l^{-1} was noticed at the surface in June 1999, when was recorded the intensive inflow of fresh water. Such fluctuations corresponded with variability of NLC II (10^3-10^4 µm^3) that contributed to the total NLC number with 50%. High summer NLC abundance is characteristic of eutrophicated ecosystems [7].

Biomass of NLC varied from 0.233±0.267 to 2.544±3.013 µgC l^{-1} in November 1998 and October 1999, respectively (Fig. 2). The values were rather uniformly distributed (<1,623 µgC l^{-1}) from July to November 1998. The period from February to July 1999 was characterised by increase of biomass in the upper 5 m, where ~60% of NLC biomass were concentrated. In October 1999 was recorded the highest biomass of 6.844 µgC l^{-1} at 10 m depth. This variability was particularly affected by NLC >10^4 µm^3, which participate in total NLC biomass with 87%. Similar biomass data are found in the Gulf of Trieste [8].

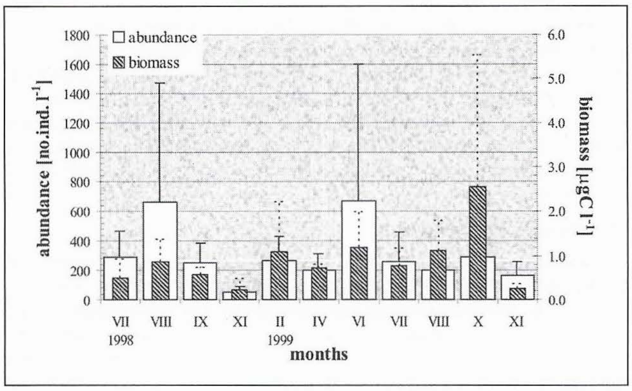

Fig. 2. Temporal variability in abundance and biomass of nonloricates in the Kastela Bay.

High abundance and biomass values of NLC populations point the importance of these organisms in the secondary production of the Kaštela Bay.

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