SPATIAL AND TEMPORAL DISTRIBUTION OF DIATOMS IN SHELLFISH FARMS IN BOKA KOTORSKA BAY (SOUTH-EASTERN ADRIATIC SEA)

D. Drakulovic ¹ *, B. Pestoric ¹, M. Mandic ¹, S. Gvozdenovic ² and D. Joksimovic ¹
¹ Institute of Marine Biology - ddraganas@t-com.me
² BIO ICT-Center of Excellence in Bioinformatics

Abstract
The spatial and temporal distribution of planktonic diatoms was analyzed in Boka Kotorska Bay. Results of water samplings conducted from November 2014 to April 2015 at three positions are presented. Maximum abundance of diatoms was 2.78 x 10⁵ cells L⁻¹. Potentially toxic diatom genus, Pseudo-nitzschia spp. was one of the most frequent. Species indicators of nutrients enriched waters were dominant.

Keywords: Aquaculture, Diatoms, South Adriatic Sea

Introduction
Boka Kotorska Bay is an area located in the southeastern Adriatic Sea. There are 18 marine aquaculture farms located in the Boka Kotorska Bay area [1]. Shells, especially mussels are efficient filter feeders which feed on phytoplankton, among other groups, and because of such method of feeding, can accumulate toxins from toxic phytoplankton. Some species from genus Pseudo-nitzschia can produce the neurotoxin domoic acid that belongs to Amnesic Shellfish Poisoning (ASP). Growing of these species can cause problems in the ecosystem functioning and public health. The aim of this paper was to assess spatial and temporal distribution of diatoms on shellfish farms in the Boka Kotorska Bay.

Materials and methods
Sampling was performed from November 2014 to April 2015, on monthly basis, at 2 positions in the inner part (Kotor Bay) of Boka Kotorska Bay and at one reference position in the open sea – Zanje (Fig.1). Samples were taken using 5 l Niskin bottles at four depths (0m, 2m, 4m and bottom). Phytoplankton cells were enumerated using Leica inverted microscope following Utermöhl [2].

Results
Abundance of diatoms reached values on the order of 10⁵ cells L⁻¹ and highest abundance was in November on 2 m depth (2.78 x 10⁵ cells L⁻¹) at the IMB position. Most of these dominant and frequent diatom species (Chaetoceros affinis, Leptocylindrus mediterraneus, Proboscia alata, Pseudo-nitzschia spp., Thalassiosinema nitzschioides) preferred nutrients enriched conditions [3]. In the current study, the frequently (with frequency of 89.85%) registered diatom genus, Pseudo-nitzschia spp., is considered potentially toxic (highest abundance was 1.85 x 10⁵ cells L⁻¹). This potentially toxic diatom presented most of the microplankton. Diatoms belonging to the genus Pseudo-nitzschia are generally considered to be dominant in the phytoplankton of the Adriatic Sea [4]. The total list of planktonic diatoms found during investigated period in the Boka Kotorska Bay comprises 40 entries (Tab. 1).

Table 1. List of diatoms species found in the Boka Kotorska Bay during investigated period (max-maximum abundance; Fr(%) - frequency of appearance )

Conclusion
Pseudo-nitzschia spp. is only diatom genus known to produce a potent toxin which bioaccumulates in shellfish, impacting mussel aquaculture and contaminating farmed species with amnesic shellfish poisoning (ASP) toxin and which in the case of species that are highly toxic my result in significant consequences to the human health. However, several species of this genus are nontoxic or produce extremely low concentrations of toxin per cell [5]. Records of higher values of potentially toxic diatom genus Pseudo-nitzschia spp. indicates the necessity of continuous monitoring of this area, especially due to the fact that all Montenegrin mussel production is concentrated in the investigated area.

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References