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Harmful and Toxic Marine Phytoplankton in coastal waters of the Zmiinyi Island in the North-Western part of the Black Sea (2012-2014)

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Abstract

Data on Harmful and Toxic Marine Phytoplankton (HTMP) in the Zmiinyi Island coastal waters are presented and analysed. During spring-autumn 2012-2014 55 HTMP species were observed which made 20,8% contribution to the 265 total number of species. Among HTMP species, there were 28 species of Dinophyta and 14 species of Bacillariophyta. As compared to 2004-2011 period, more extensive blooms caused by harmful species Bacillariophyta (especially *Pseudo-nitzschia*) and Cyanobacteria (*Microcystis*) took place. Significant changes in the structure of phytoplankton species composition were revealed.

Keywords: Zmiinyi Island, phytoplankton, harmful species, Bacillariophyta, Dinophyta

1. Introduction

Negative effects of excessive development of Harmful and Toxic Marine Phytoplankton (HTMP) species include toxicological impact on flora and fauna, disturbance of the marine ecosystem's food webs, especially considering the Black Sea (Krakhmalny *et al.*, 2012, Medinets *et al.*, 2011). The Zmiinyi Island which is located 40 km far from the Danube Delta is one of such reference areas, as anthropogenic influence in its coastal waters is minimal (Smyntyna *et al.*, 2008). The aim of the research was to study the structure of phytoplankton community, especially HTMP and Cyanobacteria, in the coastal waters of the Zmiinyi Island, during 2012 -2014.

2. Materials and methods

Marine phytoplankton has been sampled and processed in the Zmiinyi Island area by the staff of Marine Research Station (MRS) “Zmiinyi Island” of Odessa National I.I. Mechnikov University, using methods described in Smyntyna *et al.* (2008). Taxonomic determination of potentially toxic and toxic species was made in accordance with Moestrup *et al.* (2015) and Ryabushko (2003).

3. Results

During spring-autumn 2012-2014, 55 HTMP species were observed which made 20,8 % contribution to the 265 total number of species. Among HTMP species, there were 28 species of Dinophyta and 14 species of Bacillariophyta and also species of Chlorophyta and Cyanobacteria, Euglenophyceae, Haptophyta, Chrysophyceae, Dictyochophyceae and Ebriophyceae. Such species as *Heterocapsa triquetra* (Ehr.) Stein, *Noctiluca scintillans* (Mac.) Kof. et Sw., *Skeletonema costatum* (Grev.) Cl., *Pseudo-nitzschia delicatissima* (Cl.) Heid. et Kolbe, *Emiliania huxleyi* (Lohm.) Hay et Mohler, etc. should be specially pointed out as those having threatened the ecosystem during massive scale algae bloom. Abundance of HTMP species of Bacillariophyta in most samples which were collected during 2012-2014 comprised 50-100 per cent out of the total phytoplankton abundance and was reaching their bloom levels in spring and early summer.. Moreover, we can point out that the phytoplankton community during last three years exhibited some peculiar characteristics such as the increase in maximal abundance and biomass values for species as *Cerataulina pelagica*, *Chaetoceros curvisetus*, *Pseudosolenia calcar avis*, *Skeletonema costatum*, etc. which exceeded significantly (10-100 times) the maxima of the previous years. The increase in the abundance of HTMP Dinophyta from other parts of the sea is also raising a concern, since adaptation of these

species to the island coastal waters conditions could impair normal development of the ecosystem’s trophic structure (Dereziuk, 2012).

4. Conclusions

Through the analysis of all our observations for 2004-2014, we have established a data set of 412 species of phytoplankton (including cyanobacteria), 64 of which (15.5 %) were HTMP species. More specifically, in the periods 2004-2011 and 2012-2014 the number of HTMP species registered were 59 (17.0% of 348 species) and 55 (20.8 %of the 265 species), respectively. During the past 3 years, 66 species of microalgae and cyanobacteria were observed in the Zmiinyi Island coastal waters, which have never been registered before in the area.

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