

# MUCILAGE EVENTS (2000-2002) IN THE NORTHERN ADRIATIC AND THE N/P RATIO

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## Abstract

DIN/PO<sub>4</sub> ratio changes were investigated (1999-2002) in the northern Adriatic waters, influenced by riverine inputs, were mucilaginous aggregates preferably form. It was not evidenced that much higher DIN/PO<sub>4</sub> ratio than the Redfield value (16:1) contributed to the mucilage events.

*Keywords: Mucilage events, N/P ratio, Po River influence, Northern Adriatic*

## Introduction

In the last 15 years mucilage events occurred with a much higher frequency (1988, 1989, 1991, 1997, 2000-2002) than in the previous several decades (1). These events coincided with a considerable reduction of the phosphorus load in the Po River waters, with a significant increase in the DIN/PO<sub>4</sub> ratio. Laboratory experiments proved that high values of this ratio can increase the phytoplankton extracellular release of compounds that are assumed to represent the matrix of mucilaginous aggregates (1).

The aim of the research was to investigate a possible role of changes in the DIN/PO<sub>4</sub> ratio in the northern Adriatic surface layer during the period 1999-2002, when mucilage events occurred with varying intensity and duration.

## Materials and methods

Data were collected approximately monthly from June 1999-July 2002 at 20 stations along three transects, northerly of the line Senigallia-Susak Island. The water samples were collected with 5 L Niskin samplers. Nutrient analyses were performed aboard immediately after sample collection with spectrophotometric methods widely used in oceanography (2).

Waters (type 1) with salinity range 32≤S≤37, oxygen saturation ratio O<sub>2sat</sub> ≥105%, and depths <10 m were analysed. Visual observations suggested that the most part of mucilaginous material forms in these waters. Nutrients concentration and DIN/PO<sub>4</sub> ratio in type 1 water were grouped in two categories: before (March-June) and during or after (June-August) the mucilage event. The data were presented as Box and Whisker graphs for every year.

## Results and discussion

Riverine nutrients can substantially modify the nutrient ratios of the upper water column of the northern Adriatic during the spring freshets. During the investigated period the DIN/PO<sub>4</sub> ratio in the Po River water were much higher than the optimal Redfield ratio (16:1) and ranged from 50:1-150:1, depending on the flow dynamic (Fig. 1). The values of this ratio were even higher before the mucilage events (Fig. 2) in 2000, but particularly in 2001, when the freshwater influence was more marked (lower surface salinities, higher DIN concentrations; Fig. 2). Interestingly, in those years the mucilage events were time limited (1-2 weeks). In contrast, in 2002, when the DIN/PO<sub>4</sub> ratios were much lower (Fig. 2), the event lasted for more than two months.

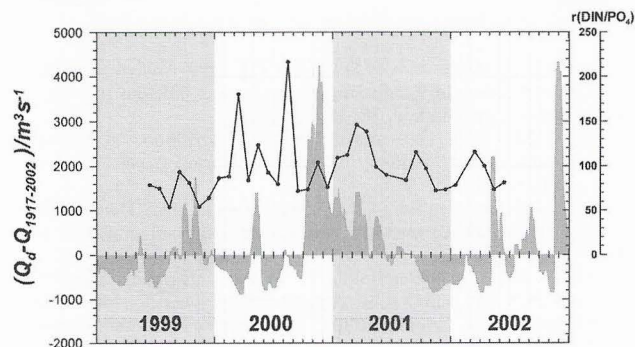


Fig. 1. Differences of the Po River daily flows from model values (1917-2002), and DIN/PO<sub>4</sub> ratio (*r*) in its waters in the period 1999-2002.

In summer the DIN/PO<sub>4</sub> ratios were markedly decreased, approaching the Redfield ratio. But, this decrease was observed in all the investigated years, independently on the intensity of the mucilage events, or even if the event did not occur (in 1999).

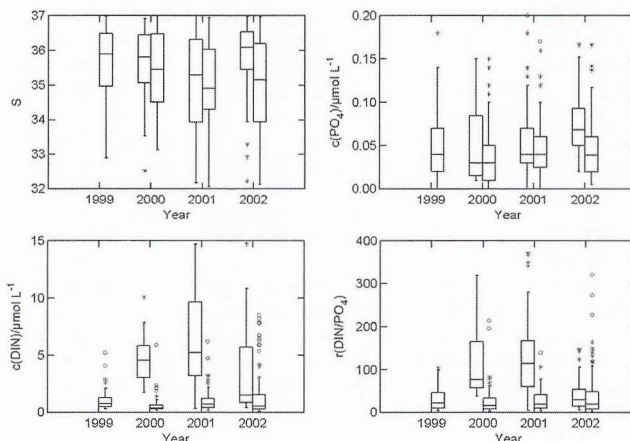


Fig. 2. Box and Whisker graphs of salinity, dissolved inorganic nitrogen (DIN) and orthophosphate (PO<sub>4</sub>) concentrations (*c*), and DIN/PO<sub>4</sub> ratio (*r*) in waters of type 1 before (March-June, left) and during (July-August, right) appearance of mucilage in the period 1999-2002.

The DIN/PO<sub>4</sub> ratio changes obviously do not trigger mucilage events, but they probably have an important role, influencing chronically the excretion mechanisms of the northern Adriatic phytoplankton, and, thus, synergically contributing with several other factors (biological, physical).

## References

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