

# SEASONALITY OF DINOFLAGELLATES IN OLIGOTROPHIC ECOSYSTEM OF MIDDLE ADRIATIC

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## Abstract

This study presents the first data on dinoflagellates composition in oligotrophic Telašćica Bay, and it is a part of complex hydrographical and biological investigation in the Middle Adriatic during 1999-2000. The relative contribution of dinoflagellates to microphytoplankton varied from 0 to 99.18%. Dinoflagellates dominated phytoplankton from late spring to beginning of autumn when water temperatures over 20 °C prevailed.

**Keywords:** *Adriatic Sea, Dinoflagellates, Salinity, Temperature*

## Introduction

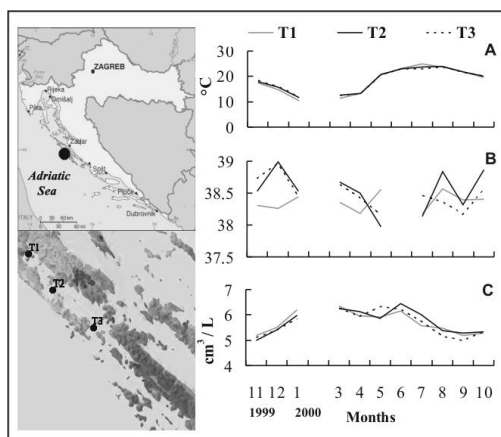
Telašćica Bay is situated in the central part of the eastern Adriatic coast, in the SE part of the island of Dugi Otok. It is 8200 m long and 150-1500 m wide, with the total coast length of 68.78 km. Owing to well-indented coastline and specific and diverse plant and animal life, this area was proclaimed the Nature Park in 1988. Based on the annual microphytoplankton abundance, Telašćica Bay may be classified as oligotrophic ecosystem [1].

## Materials and methods

Phytoplankton samples were collected and hydrographic parameters were measured monthly between November 1999 and October 2000 in Telašćica Bay (except in February 2000). Surface samples were collected at three stations: inland (T1), middle (T2), and outer (T3). Temperature, salinity and oxygen saturation were calculated using standard oceanographic methods [2]. Phytoplankton counts were obtained at 200x and 400x magnification, using the inverted microscope method [3]. PRIMER v5 software was used to calculate the Margalef's species richness index [4].

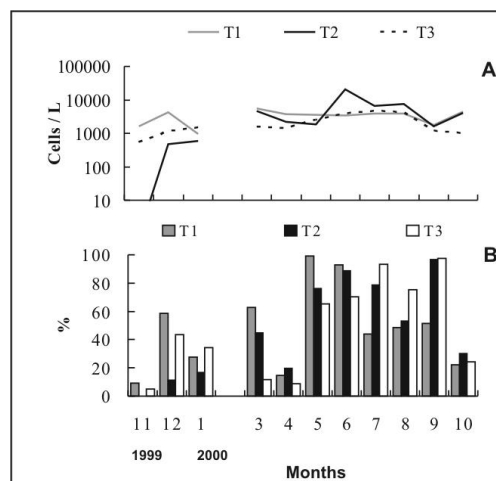
## Results

Water temperature in Telašćica Bay ranged from 10.3 °C (January) to 24.9 °C (July), with both the maximum and minimum at T1 (Fig. 1). Temperature rose from April to July and began to fall down in September at all three stations. Salinity ranged from 37.9 in May to 38.9 in December, both at T2 (Fig. 1). Dissolved oxygen concentrations ranged from 4.9 cm<sup>3</sup> L<sup>-1</sup> in September at T3 to 6.4 cm<sup>3</sup> L<sup>-1</sup> in June at T2 (Fig. 1).



**Fig. 1.** Map of Telašćica Bay (left) and annual distribution (right) of surface temperature (A), salinity (B) and dissolved oxygen (C)

Microphytoplankton (MICRO, cells size > 20 µm) abundances, varied from 1.2 x 10<sup>3</sup> cells L<sup>-1</sup> in September at T3 to 2.5 x 10<sup>4</sup> cells L<sup>-1</sup> in April at T1. Dinoflagellates were present in the Telašćica Bay throughout the whole investigating period, except in November at T2 (Fig. 2). The relative contribution of dinoflagellates to MICRO varied from 0 to 99.18% and from May to September they were the dominant group in MICRO at all investigated stations. Abundance of dinoflagellates ranged from 0 to 2.08 x 10<sup>4</sup> cells L<sup>-1</sup> (Fig. 2), with the highest abundance encountered at station T2 (June 2000).



**Fig. 2.** Annual distribution of dinoflagellates abundances (A) and their relative contribution to microphytoplankton (B)

Altogether, 59 taxa of dinoflagellates were identified in Telašćica Bay. The most abundant taxa (> 10<sup>3</sup> cells L<sup>-1</sup>) were: *Gymnodinium* spp., *Gyrodinium* sp., *Oxytoxum variabile*, *Prorocentrum compressum*, *Prorocentrum micans*, *Prorocentrum minimum*, *Prorocentrum triestinum*, *Scrippsiella* sp. and unidentified dinoflagellates. *Prorocentrum compressum* was the most dominant species during the peak in June (1.7 x 10<sup>4</sup> cells L<sup>-1</sup>). Margalef's species richness index varied from 0 to 3.6 at all stations, with the highest value found at the station T2 in August.

## Conclusion

Dinoflagellates dominated the surface phytoplankton from late spring until beginning of autumn, when temperatures higher than 20 °C prevailed in the Telašćica Bay. In these months the contribution of dinoflagellates to total MICRO was 48-99% at all stations, with smaller dinoflagellate (cell size < 40 µm), such as *P. compressum*, being the dominant taxa.

## References

- 1 - Vilicic, D., 1989. Phytoplankton population density and volume as indicators of eutrophication in the eastern part of the Adriatic Sea. *Hydrobiologia*, 174:117-132.
- 2 - Strickland, J. D. H. and Parsons, T. R., 1972. A practical handbook of seawater analysis. *Fish. Res. Board Can. Bull.*, 167: pp 310.
- 3 - Utermöhl, H., 1958. Zur Vervollkommnung der quantitativen Phytoplankton-Metodik. *Mitt. Int. Ver. Theor. Angew. Limnol.*, 9: 1-38.
- 4 - Margalef, R., 1965. Composición y distribución del fitoplancton. *Mem. Soc. Cienc. Natur. La Salle*, 25: 141-205.