Spatiotemporal variability of microphytobenthos in the coastal lagoon of Cabras (Sardinia, Italy)

Francesca Di Pippo[1], Neil T.W. Ellwood[2], Paolo Magni[3,4], Roberta Congestri[1], Angelo Perilli[3], Giovanni Fenzi[3] and Patrizia Albertano[1]

[1]Laboratory for Biology of Algae, Department of Biology,
University of Rome "Tor Vergata", via della Ricerca scientifica 1, 00133 Rome, Italy;
[2]Department of Geological Sciences, University of Rome 'Roma Tre',
Largo San Leonardo Murialdo, 1, 00146 Rome, Italy;
[3]Institute for Coastal Marine Environment (CNR-IAMC),
Loc. Sa Mardini, Torregrande, 09072 Oristano, Italy;
[4]Institute for Marine Science (CNR-ISMAR), Arsenale di Venezia, 30122 Venezia, Italy.

Phone: +00-(39)-06 72594332
E-mail:
francesca.di.pippo@uniroma2.it

Introduction: The Cabras lagoon is a shallow transitional system connected to the Gulf of Oristano (Sardinia, Italy). This Ramsar listed lagoon is of local economic importance (e.g. artisanal fisheries), but is increasingly suffering from excessive nutrient, organic matter loading and the tendency to anoxic events. The degradation of the lagoon has resulted in many studies which have shown a close link between the distribution of organically enriched sediments, benthic macroinvertebrates and the water residence times [1]. The primary producers of the lagoon were considered an important organic matter source [2]. Yet the contribution of microphytobenthos (MPB) in the Cabras lagoon has still not been considered in spite of its importance in ecosystem functioning [3-7]. The structure and function of MPB biofilms on the sediment surface are normally maintained by the production of a common exopolymeric matrix (EPS) in which the microorganisms are embedded [8] and also results in cohesion of fine sediments [9]. In this on-going study, we aim to determine the spatial and temporal variability of microphytobenthic biomass and composition and to evaluate the EPS production in the surface sediments of the Cabras lagoon.

Methods: Four sampling campaigns were conducted at sandy and muddy sites in September 2009, March, July and September 2010. Sediment samples were collected using a manual corer and the uppermost 2-3 mm were taken for further analysis. Six replicates were collected randomly at each site. Water samples were also collected. Analyses included chlorophyll *a*, taxonomic identification, EPS production, and water and sediment nutrient concentrations.

Results and Discussion: Our results show that MPB assemblages develop at the sediment surface in the form of biofilms with a high degree of species diversity, comprising both eukaryotic and prokaryotic microorganisms embedded in an EPS matrix. The MPB community is dominated by diatoms (Fig.1), with cyanobacteria and green algae present in most samples. A marked spatial and temporal variability in species composition and biomass is found. In the muddy sites, sediments are rich in organic matter, and total nitrogen concentrations in the overlying water are up to two times higher those of the sandy sites. This indicates significant loading potential to the sediments. Higher Chl *a* and EPS values at the muddy sites indicate that the MPB community prefer organic enriched sediments. Given the relatively high N:P values of the water (low aqueous TP) at muddy sites the MPB are most probably obtaining phosphorus from the organic material present in the sediments.

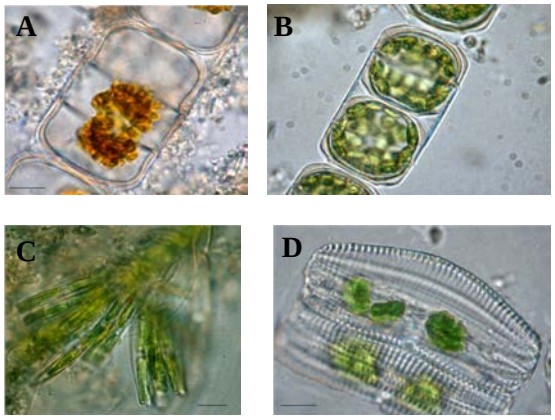

Fig. 1: CA4 samples showed the highest diatom taxon richness..The main representative diatoms belong to the centric *Melosira* genus, with the two morphotypes (Figs A and B). C and D show one nitzschioid morphotype. and the monoraphid colonial species *Achnanthes* sp. Bars: 10 µm

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