PHYTOPLANKTON PIGMENT/CARBOHYDRATE RELATIONSHIPS IN THE NORTHERN ADRIATIC

Marijan AHEL[1], Senka TERZIC[1], Alenka MALEJ[2] & Robert PRECALI[3]

[1]Center for Marine Research Zagreb, Ruder BoskovicInstitute, Zagreb, Croatia
[2] Marine Biological Station Piran, Institute of Biology, Univ. of Ljubljana, Slovenia
[3] Center for Marine Research Rovinj, Ruder Boskovic Institute, Rovinj, Croatia

Wide variety of biochemical compounds, including proteins, lipids, carbohydrates and photosynthetic pigments, have been used to study biological situation in estuarine and coastal environments. Determinations of chlorophyll and carotenoid pigments in the marine environment have proved to be particularly useful for providing additional information about the chemotaxonomic composition of phytoplankton and species specific distribution of phytoplankton biomass (BARLOW *et al.*, 1993). On the other hand, recent investigations have shown that carbohydrates represent a major pool of dissolved organic carbon in the oceans. Moreover, polysaccharides are thought to play an important role in formation of larger organic aggregates. Large-scale gelatinous mucus aggregations observed in the Adriatic Sea consisted mainly of polymeric carbohydrates (POSEDEL and FAGANELI, 1991). In addition, it was suggested that copepod grazing can strongly be inhibited by diatom carbohydrate-like exudates (MALEJ and HARRIS, 1993). The aim of this study was to investigate the relationships between the phyto-plankton biomass and concen-trations of carbohydrates (CHO) in the northern Adriatic.

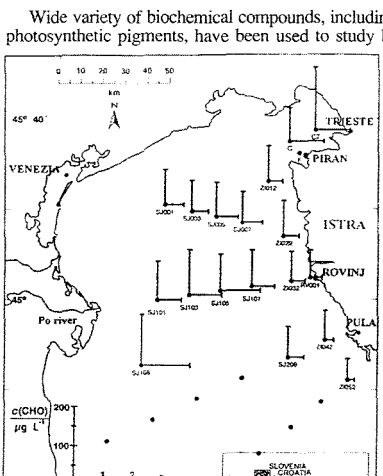

Figure 1. Annual mean Chl a and CHO concentrations in the water column of the N. Adriatic in 1992.

Sea water samples for phytoplankton pigment and carbohydrate determinations were collected on several stations (Fig. 1) in approximately monthly intervals during 1992 at standard oceanographic depths (0, 5, 10 and 20 m). After filtration through a Whatman GF/F filter pigments were determined by reversed-phase HPLC according to a modified method by Mantoura and Llewellyn (BARLOW *et al.*, 1993), whilst total CHO were determined from unfiltered samples using the standard phenol-sulphuric method. Distributions of the annual mean concentrations of both chlorophyll a and total CHO in the top 10 m of the sea water column (Fig. 1) indicate strong influence of the river inputs on the observed concentration levels with maxima recorded close to the freshwater plume of the Po River and in the Gulf of Trieste.

Since hydrographic conditions in 1992 were not particularly favourable for the formation of a high phytoplankton biomass compared with some previous years the concentrations of CHO were rather low (< 0.5 mg/l). Nevertheless, a comparison of seasonal fluctuations of phytoplankton biomass and CHO concentrations in the Gulf of Trieste (Fig. 2) suggested their positive correlation in some seasons. A pronounced CHO spring peak in the surface layer was accompanied by a concomitant peak of fucoxanthin (fuc), a characteristic accessory pigment from diatoms. Similar situation was observed in the bottom layer. By contrast, seasonal peak of 19'-hexanoyloxyfucoxanthin (hex), accessory pigment characteristic of Prymnesiophytes, was not followed by similarly enhanced concentrations of CHO. A linear regression analysis (log-lin) between the diatom counts and total CHO concentrations showed a week but significant correlation between the two parameters (r = 0.43). This suggested that not only phyto-plankton biomass con-centration but also its physiological status played an important role in determining CHO levels in the northern Adriatic.

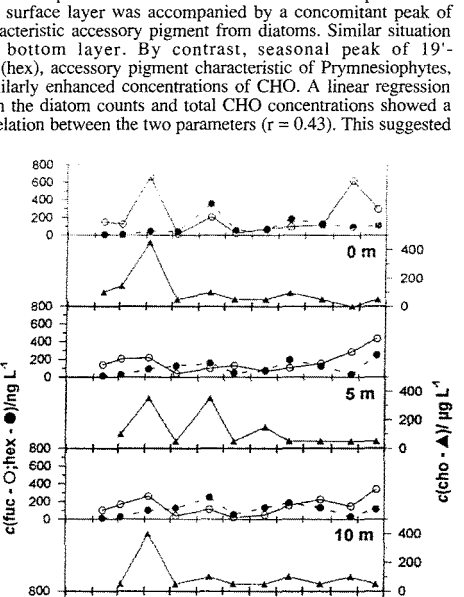

Figure 2. Seasonal fluctuations of CHO and accessory photosynthetic pigment concentrations in 1992 in the Gulf of Trieste.

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