ESTIMATION OF PHYTOPLANKTON CARBON (PHYTO C) BY USING VARIABILITY OF CHL A VERSUS PARTICULATE ORGANIC CARBON (POC) AND THEIR RELATIONSHIPS WITH NITROGEN (PON) ALONG THE SALINITY GRADIENT IN THE MOUTH OF THE GEDIZ RIVER, IZMIR BAY, AEGEAN SEA

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Abstract

In order to determine accurate estimates of phytoplankton biomass, Phytoplankton Carbon (Phyto C) values were computed by using Chl-a and Particulate Organic Carbon (POC) data. Particulate Organic Nitrogen (PON), POC and Chl a distributions in the mouth of the heavily polluted Gediz River through the salinity gradient showed that the river acts as a source for the plume area but as a sink for the Outer Izmir Bay regardless the alterations in its flux. The linear regressions of POC vs. Chl a and POC vs. PON showed that the spatial variations in POC:Chl and POC:PON were within the ranges of 3000-300 and 4-0.3, respectively. The former seems to be related with the variatons in detrital carbon (about 1500 mg/l-100 mg/l) along the salinity gradient.

Keywords : Aegean Sea, Brackish Water, Coastal Processes, River Input, Phytoplankton.

Berger et al. [1], Falkowski, [2] and Antoine et al. [3] have drawn attention to the fact that phytoplankton may fix between 35-45 Pg (peta-grammes=1015 g=gigatonnes) of carbon per year, i.e. no less than 30-60 % of the global annual fixation of carbon on Earth, despite these organisms account for only 1-2% of the global biomass [1]. The amount of Chl a is generally used as an index of the living photosynthetically active phytoplankton biomass. But it has an inherent error because of cell size and photoacclimation. Therefore, the reach of phytoplankton carbon (Phyto C) is essential for obtaining more accurate and precise information on their biomass. Direct measurement of Phyto C in nature is impossible because it is inseperable from non-phyto C by any convenient and reliable approach [4]. Therefore, in the present study Phyto C values were estimated by using POC and Chl a data.

The study area, Gediz river is heavily polluted due to agricultural drainage water, industrial waste water and virtually all domestic waste water from the entire provincial area. It is the second largest river flowing into the Aegean Sea from Anatolia through Izmir Bay. During the study period (August 2004- August 2005) samples were taken 7-8 stations in the mouth of Gediz river through the salinity gradient. POC, PON and Chl a together with the physical parameters of seawater.In order to estimate Phyto C, POC and Chl a data collected through the salinity gradient which could be classifed into five different salinity ranges as: 0-5, 8-20, 20-30, 30-38, 38-40 psu's, were used as described by Wienke and Cloern (1987) [5].
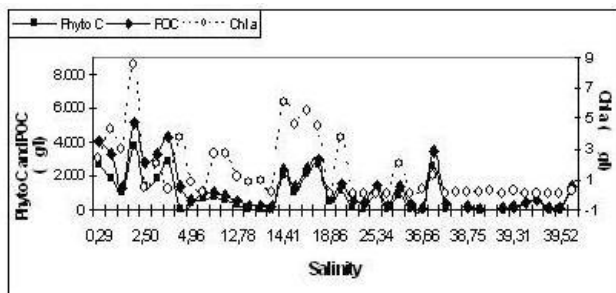

Fig. 1. Distribution of POC, Chl a and Phyto C through the salinity gradient.

Significant correlations were found among the particulate materials (POC, PON, TSS, Chla, Phyto C and salinty). POC, Chl a and PhytoC distribution through the salinity changes from the Gediz River to the Outer Izmir Bay were shown in the Figure 1. Phyto C ranged from 70 mg/l (43% in POC) in November'04 in the outer bay to 3700 mg/l (73% in POC) in April'05 in the mouth of Gediz river. As the salinity increases, Phyto C decrese as well as other particulate materials i.e. POC, PON, Chl a. This indicates that POC is mainly determined by phytoplankton.

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