MONTHLY CHANGES IN THE ABUNDANCE AND BIOMASS OF CYANOBACTERIA *SYNECHOCOCCUS* IN THE CILICIAN BASIN

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Abstract

The aim of the present study is to understand the changes in the abundance and biomass of marine cyanobacteria *Synechococcus* with respect to multitude of ambient physical, chemical and biological factors. Monthly samples over a period of one year at a shelf station in the Cilician Basin (Eastern Mediterranean) were collected and analyzed. Due to winter mixing water column was nearly homogeneous. High temperature, salinity and low nutrient values together with maximum abundance and biomass of *Synechococcus* were recorded during late summer - autumn period at surface waters.

Keywords : Biomass, Eastern Mediterranean, Primary Production, Cyanobacteria.

Synechococcus were the first picoplankton discovered in world oceans [1]. Belonging to division cyanophyta, they are important as a primary producer especially in oligotrophic waters and the open ocean [2]. This group of organisms are also one of the main components of the microbial loop [3].It is also regarded as one of the important phytoplankton in ultra-oligotrophic Mediterranean Sea [4]. Having high sea surface temperatures and high salinity, Levantine Surface Water (LSW) is the dominant water mass in Cilician Basin during warm season [5]. Basin is also under the effect of river run offs influencing the nutrient budget as well as the salinity fluctuations [6]. The aim of the present study is to understand the changes in the biomass and abundance of *Synechococcus* with respect to multitude of ambient physical, chemical and biological factors. Monthly samples were collected from standard depths over a period of twelve months (February 2005-January 2006) at a single station (total depth is 200m) in the Cilician basin. Physical parameters, namely temperature,salinity, and density were measured via SeaBird-SBE 9 Oceanographics CTD profiler. Secchi disk depths were recorded. For the nutrient analysis (phosphate, nitrate, nitrite) water samples were collected from the standard depths by Nansen bottles [7]. *Synechococcus* abundances were found from the direct counts of the filtered samples [6]. Direct counts were made under a Nikon epifluorescent microscope at 1500X with a filter combination of B-2A (blue excitation-DM 505, EX 450-490, BA 520) and G-1A(green excitation-DM 575, EX 546/10, BA 580). For cell size measurements and further biomass estimations an image analysis system consisted of a digital camera, computer and a software were utilized. Cell volumes were determined using the volume formula for an ellipsoid [8]. To calculate carbon content of *Synechococcus* 123 fg carbon per cubic micron was used [9]. In order to find out the correlation between ambient parameters and *Synechococcus* abundance and biomass, Spearman rank-order correlation test was applied. The maximum, minimum, and average values found for all parameters during this study are summarized in Table 1.

Tab. 1. Maximum and minimum values of the biological,physical, and chemical parameters at surface and 200m depths of the station observed during year.

Station (3626N 3421E)

Depth	0m		200m		
	maximum	minimum	maximum	minimum	Annual avarege
Synechochoccus Abundance (#/ml)	340087	118663	247113	2746	151737.9
Synechochoccus Biomass (µgC/l)	25.16	4.88	10.77	0.03	8.45
Temperature (°C)	26.67	17.18	16.94	15.32	18.06
Saliniy (psu)	39.47	38.37	38.96	38.75	39.03
Density	28.51	24.89	28.97	28.62	28.33
PO_4 (µM)	0.04	0.02	0.07	0.02	0.03
NO_3+NO_2 (µM)	0.2	0.05	3.4	0.18	0.57

Throughout the study, surface water was coldest in February and warmest in August. The lowest and highest salinities were observed on January and October at surface, respectively. The Secchi disk depths varied between 19m (in June) and 32m (in September). Over the year, mean PO_4 concentration for the water column was 0,03 μM whereas the maximal levels were achieved during winter. Despite the low levels of NO_3+NO_2 observed at surface significant fluctuations were observed in the water column. Concentration of total oxidized nitrogen showed a minimum during winter (0,05 μM) and a maximum at 200m in November (3,40 μM). To a minimum and maximum abundance of *Synechococcus* were reached in November at 80m as 865 cells ml^{-1} and as 340087 cells ml^{-1} during November at surface. In addition, to a maximum biomass (30,79 μgC l^{-1}) was reached in March at 40m depth and to a minimum value of 0,03 μgC l^{-1} in November at 200m depth. Both *Synechococcus* abundance and biomass showed highly significant positive correlations (P<0,01) with temperature, salinity, and negative correlation (P<0,01)with density, NO_3 + NO_2, and depth. No correlation was observed with PO_4.

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