Annual Pattern of heterotrophic bacteria and phytoplankton in a nitrogen rich coastal system

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The role of inorganic nitrogen in coastal environments has been studied extensively over the last decades (VALIELA, 1984). However, there is limited information concerning the ecological significance of organic nitrogen (FLYNN, 1990) and its role to the dynamics of the heterotrophic microbial flora (VAN WAMBEKE and BIANCHI, 1985) especially when eutrophic conditions are encountered. In the present work the annual pattern of nitrogen, phytoplankton, zooplankton and heterotrophic bacterial populations was studied in a near-shore environment affected by sewage pollution and the modelling of the bacterial subsystem was proposed.

Sampling was carried out bimonthly during 1991, along the coastal area of the city of Mytilini, Greece. Two stations M1 eutrophic and M2 oligotrophic were used to monitor inorganic nutrients and organic nitrogen (PARSONS *et al.*, 1989), phytoplankton, zooplankton and heterotrophic bacteria (APHA, 1985). Temperature, salinity, light extinction and dissolved oxygen were also recorded.

A summary of the data is given in Table 1. It is observed that station M1 showed values twice as high as the values in station M2. The load of heterotrophic bacteria and phytoplankton during the summer was found particularly high. A simulation model developed with special emphasis on organic matter and heterotrophic bacteria, was run on SENECA (1991) software. The seasonal variation of the variables involved is given in Figure 1. The inorganic nitrogen pool reaches a minimum during the summer whereas, phytoplankton and organic nitrogen showed maximum yield. Heterotrophic bacterial population showed an increase during August-October. The maximum bacterial activity was observed during the summer may be explained as the typical behaviour of nutrient non-limited system favoured by high temperature and light intensities.

Table 1 Minimum-maximum and mean values of five variables related to heterotrophic activity of bacterioplankton M1: Nitrogen rich station M2: Control site

Station	Nitrate ug-at/l	Org. N ug-at/l	Phytoplankton cells/l	Het. Bact. cells/ml	Zoopl. gr/m3
M1	0.14-4.94	6.5-25.8	17000-252000	30-15525	0.10-4.27
	0.82	17.82	82500	2399	1.09
M2	0.01-0.37	0.4-27.4	10200-109000	8-6563	0.17-1.54
	0.17	14.32	48900	1222	0.65

Further investigations are being carried out concerning microbial identification. succession and the use of validation data in further evaluation of the model and the understanding of heterotrophic microbial processes.

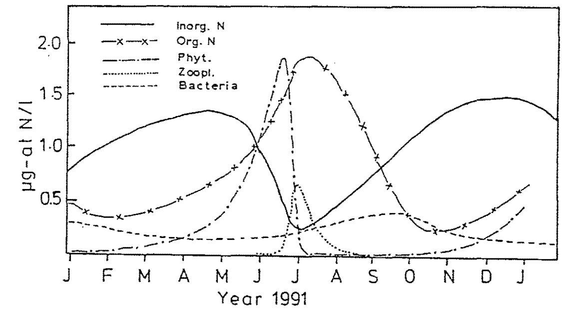

Figure 1. Annual fluctuations of five environmental variables related to heterotrophic microbial activities

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