Detection of Phytoplankton seasonality trends based on k-dominance curves

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Phytoplankton studies at community level have been widely used to describe temporal and spatial distributions. However, the analysis of data using estimators such as cell numbers, biomass or diversity indexes may not be adequate to extract all information regarding the seasonal trends.

In the present investigation a graphical representation of the k-dominance curves based on samples of ranked species abundance (in decreasing order) was examined as a possible procedure to describe temporal patterns of phytoplankton distribution. The advantage of distribution plots as k-dominance curves is that the detection of differences among assemblages is based on the distribution of species abundances among individuals.

Data from five stations (1) of Saronicos Gulf collected at four seasons were analysed by the univariate analysis including the estimation of the Shannon-Weaver diversity index and the plotting of the k-dominance curves (2).

The results are shown in Figure 2. It is seen that the k-dominance curves detected high species richness in the January samples at all stations. In April all curves had similar horizontal pattern indicating species homogeneity in the area. Phytoplankton heterogeneity was established again in July and continued in October showing also differences among the stations. The seasonal changes in species richness and heterogeneity among stations might be associated with the hydrography of the area and the eutrophication conditions prevailing at cetain stations (1).

The results of species diversity (Table 1) approaching those of k-dominance curves can describe temporal changes in phytoplankton assemblages by presenting the relative importance of each species in a sample and without reducing a serie of data to a single number as a diversity index. Also, they can possibly characterise the eutrophication status of an area.

However, questions of statistical significance of the differences between k-dominance curves inevitably arise and so, the application of univariate tests as well as the statistical evaluation of similarities (3) are under investigation.

Table 1 The Shannon-Weaver diversity Index calculated for five stations

St.	Jan.	Apr.	Jul.	Oct.
S1	2.325	0.473	0.240	0.629
S2	2.659	0.445	1.726	1.825
S3	2.557	0.305	1.546	1.984
S5	1.956	0.177	0.837	1.795
S9	1.891	0.477	0.533	1.952

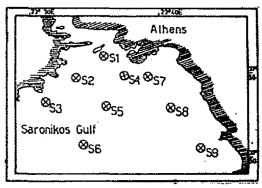

Figure 1 Stations location

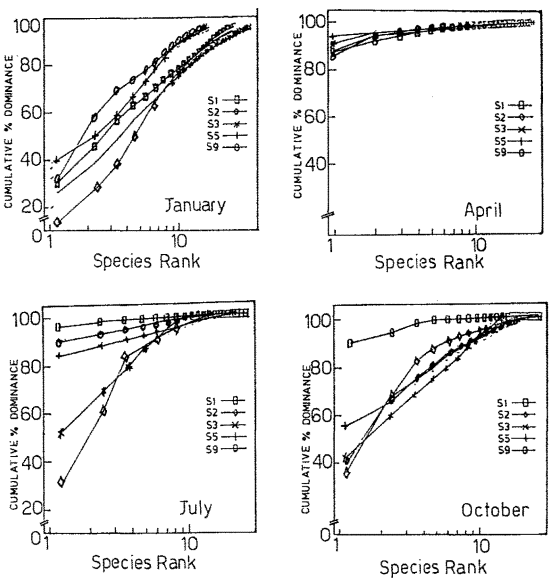

Figure 2 Series of k-dominance curves of phytoplankton assemblages showing the seasonal trends.

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