SEASONAL VARIABILITY OF NANO- AND MICROPLANKTON IN HERAKLION BAY (SOUTH AEGEAN)

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Plankton community dynamics, in the Eastern Mediterranean, and especially as far as microzooplankton is concerned, has hardly been studied. A regular sampling programme was undertaken in order to study the structure of the nano- and microplankton communities in the Gulf of Heraklion over four distinct periods as well as the intra-annual differences in species composition. To this end, samples were collected between 15/1 and 26/2/1992 (winter), 17/4 and 19/5/1993 (spring), 1/6 and 3/7/1993 (summer), 4/11 and 6/12/1993 (autumn). Sampling was conducted on the surface layer of the coastal sea area every fourth day, using a 10 l recipient. The samples were preserved with acidic Lugol's iodine and stored at 4°C until examination under an inverted microscope. Counts and identification of planktonic organisms (diatoms, flagellates, dinoflagellates, ciliates and rotifers) were carried out with the Utermöhl method, to the species level. These data were analysed using Multi-dimensional scaling (MDS) (FIELD *et al.*, 1982) with a log(x+1) transformation and Canberra similarity index. The two dimensional MDS plot (Fig.1) reveals a pattern corresponding to seasonal differences in the structure of plankton communities. It can clearly be seen that winter and autumn samples form two separate clusters while spring and summer communities are grouped together in a third cluster. The high community similarity between spring and summer can be attributed to the similar environmental conditions (light intensity, temperature, nutrients concentration) during this period.

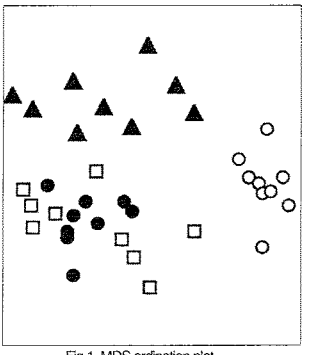

Fig.1. MDS ordination plot
○ winter spring ●
□ summer autumn ▲

Figure 2 shows the quantitative data at the group level, i.e. the average abundance as well as the total species number of diatoms, dinoflagellates, ciliates and rotifers. Flagellates are not included in this histogram because their enumeration was based on size classes. It is apparent that at this group level three combinations are distinguished: high diatom-low dinoflagellate (winter), low diatom-high dinoflagellate (spring-summer) and low diatom-moderate dinoflagellate (autumn). In comparison to the above mentioned groups, ciliates are of minor quantitative importance although they present a noticeable species richness. Diatoms presented maximal abundance in winter samples (highest value 13 480 cells/l) with dominant species *Nitzschia delicatissima, N. seriata* and *Leptocylindrus danicus*. Dinoflagellates were particularly abundant in spring and summer (maximal abundance 10 340 cells/l and 7 640 cells/l respectively) and less abundant in autumn (4 280 cells/l max. value). The highest density (592 000 cells/l), recorded in a summer sample, was monopolized by a *Peridinium trochoideum* bloom. Two rotifer species (*Synchaeta triophthalma* and *Trichocerca sp.*) were found. Rotifers' abundance was detectable only during spring and summer. The highest density counted was 780 *S. triophthalma*/l in a summer sample while the usual abundance, during spring and summer was 20 ind./l. Overall, 30 plankton ciliate species were identified: 10 Tintinnina and 20 Oligotrichina species. Ciliates presented a higher number of species in spring and summer while their maximal abundance was recorded during summer. The dominant ciliate species were *Strombidium conicum, S. parvum, S. vestitum, Favella azorica* and a tiny *Strombidium sp.* In comparison to seasonal phytoplankton data from Saronikos Gulf (IGNATIADES, 1969) our data presen-ted higher abundance of dinoflagellates and less pronounced seasonal differences in diatoms abundance as well as qualitative differences in phytoplankton community composition. These differences might be related to the proximity of Crete to the subtropical zone as well as to the fact that in the near shore zone, the fluctuation of nutrients throughout the year is less dramatic than in more offshore systems.

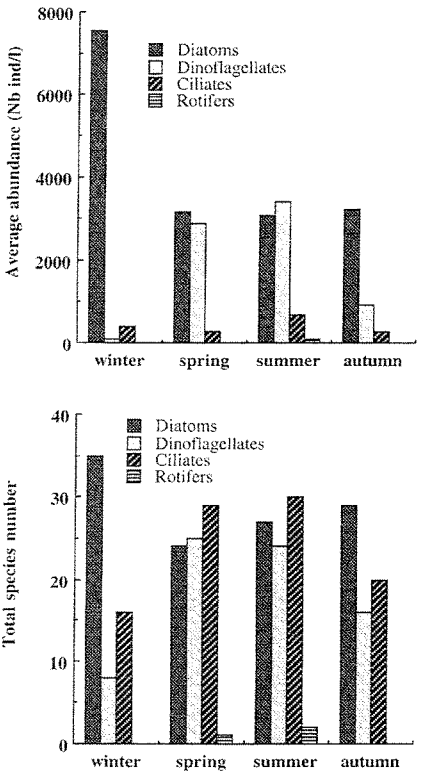

Fig. 2. Average abundance (in all 9 samples) and total species number (over 9 samples) of plankton groups over the four seasons.

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REFERENCES

FIELD J.G., CLARKE K.R. and WARWICK R.M., 1982. A practical strategy for analysing multispecies distribution patterns. *Mar. Ecol. Prog. Ser.*, 8: 37-52.

IGNATIADES L., 1969. Annual cycle, species diversity and succession of phytoplankton in lower Saronicos Bay, Aegean Sea. *Mar. Biol.*, 3(3): 196-200.