

Phytoplankton composition of the western Black Sea during the R/V Knorr cruise in May-June 2001

Nuray Soydemir¹, Ahmet E. Kideys² & Gürkan Ekingen¹

nsoydemir@mersin.edu.tr; kideys@ims.metu.edu.tr

¹Faculty of Aquatic Products, Mersin University, 33280 Mersin, Turkey,

²Institute of Marine Sciences, Middle East Technical University, Erdemli 33731 Mersin, Turkey

Abstract- Species composition, abundance and biomass of phytoplankton sampled on board R/V Knorr from the western Black Sea during May-June 2001 of the Black Sea were studied to assess phytoplankton condition. A total of 41 dinoflagellates, 7 diatoms and 5 other species were present in the samples. Among these, the dinoflagellate *Gymnodinium sanguineum* (Hirasaka), the diatom *Nitzschia delicatissima* (Cleve) and the coccolithophore *Emiliania huxleyi* (Lochman) Hay & Mohler were dominant species either in terms of abundance and biomass. Whilst, the bulk (91%) of all phytoplankton biomass was made up by dinoflagellates, coccolithophores (i.e. *E. huxleyi*) were the most abundant phytoplankton group comprising 53% of total abundance. The average abundance and biomass values from the surface of a total of 13 stations were found as about 119×10^3 cells l^{-1} and $1,776 \mu g l^{-1}$ respectively. The average size of phytoplankton cells is higher than the previous a few studies, denoting a shorter food chain, which could be a sign of a healthier Black Sea ecosystem.

Key words- Black Sea, phytoplankton, biomass, abundance

Introduction

The pelagic ecosystem of the Black Sea, an almost enclosed basin, is continuously changing at surprising rates. It was reported (Mee, 1992) to be in a near-hopeless condition in the 1980s mainly due to increasing eutrophication (i.e. over-increase in limiting nutrient transported by rivers and hence in primary production). The mass development of an invasive voracious zooplanktivorous predator (i.e. ctenophore *Mnemiopsis leidyi*) has exacerbated the eutrophication by removing a substantial part of herbivorous zooplankton from the ecosystem. Thus, very high biomass values for phytoplankton were repeatedly reported during the 1980s and early 1990s particularly from the western Black Sea which is under the direct effect of the Danube River, the major nutrient source of the basin. With the decrease of nutrients and *M. leidyi* levels, eutrophication levels were reported to be lowered (Yuneev et al., 2002). There has been fast recovery of the entire ecosystem since the mid-1990s (Kideys, 2002). The main aim of the study is to analyse phytoplankton composition and biomass with respect to improvements in the ecosystem. A more detailed analyses will be made later after

comparing our data with a large number of other parameters (including on nutrients, bacteria, zooplankton etc.) measured during the R/V Knorr cruise.

Material and Methods

Phytoplankton samples collected during 25 May-9 June 2001 on board R/V Knorr. Sampling was from different layers of the water column from a total of 14 stations (Fig.1). A Rosette Sampler was used for the sampling. Samples were fixed with buffered formaldehyde to obtain a final concentration of 2.5%. Sedimentation method was used enabling us to evaluate contribution of small phytoplankton (as small as 6 micron). Each cell were identified and individually measured for calculating the biomass.

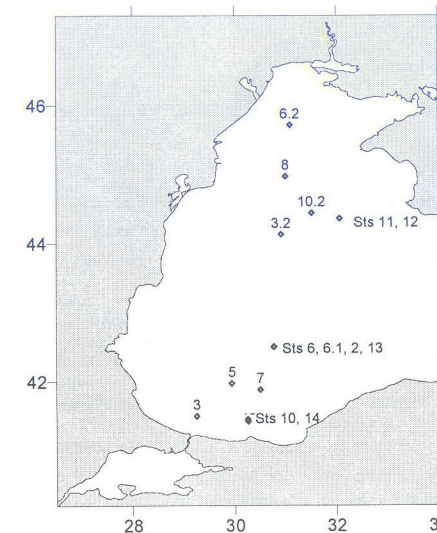


Fig. 1. Sampling stations in the western Black Sea in May-June 2001. ".2" denotes the second leg of the R/V Knorr cruise

Results and Discussion

A total of 53 species were identified 77% of which were dinoflagellates, 13% were diatoms, 10% of the other phytoplankton groups (Fig. 2). This is lower than the 121 spp. found by Eker et al (1999) in the western Black Sea for 1995 spring. Whilst, the average biomass ($1,776 \mu g l^{-1}$) of the total phytoplankton found here is higher than previous studies, the average abundance values (119×10^3 cells l^{-1}) is lower (see Eker et al., 1999 for comparison). This denotes that average size of phytoplankton (and

particularly of dinoflagellates) is larger which could be indication for healthier ecosystem supporting high pelagic fishery yield due to shortened food chain. Dinoflagellates and coccolithophores (entirely made up of *E. huxleyi*) dominated the plankton in terms of biomass and abundance, respectively. However, no reflection (known to be caused by the coccolithophores) was noticed from the remote sensing caused by the coccolithophores during the cruise period.

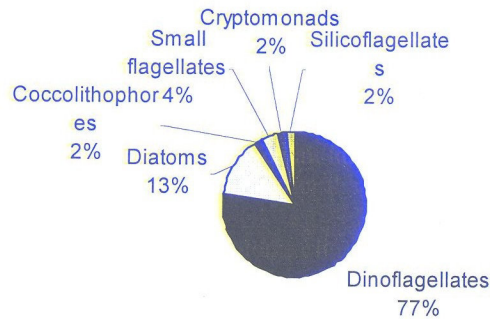


Fig. 2. Species percentage of main phytoplankton groups (all depths included). Total species number is 53.

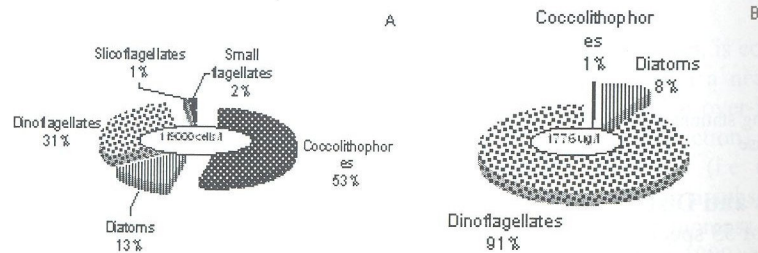


Fig. 3. Average quantity percentages of main phytoplankton groups: (A) Abundance (B) Biomass

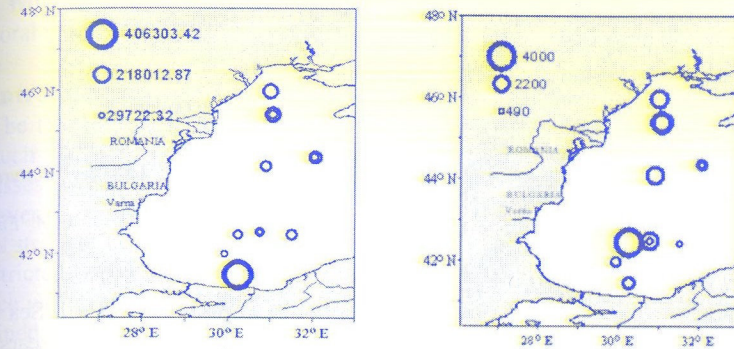


Fig. 4. Distribution of total phytoplankton abundance (left) and biomass (right figure) in the study area

Conclusion

The high average biomass-abundance ratio found here may denote either a healthier ecosystem or a new factor acting in the Black Sea (e.g. global warming). A more detailed analyses will be carried out for a better understanding the ecosystem with respect to our finding here.

References

- Eker E., L. Georgieva, L. Senichkina, A. E. Kideys. "Phytoplankton distribution in the western and eastern Black Sea in spring and autumn 1995", *ICES Journal of Marine Science*, **56**: 15-22. (1999).
- Kideys A. E. "Decline and recovery of a large marine ecosystem, the Black Sea", *Science*, **297**: 1482-1484. (2002).
- Yunev O. A., V. I. Vedernikov, O. Basturk, A. Yilmaz, A. E. Kideys, S. Moncheva, S. K. Kononov. "Long-term variations of surface chlorophyll-a and primary production levels in the open Black Sea", *Marine Ecology Progress Series*, **230**: 11-28. (2002).