ON THE DISTRIBUTION OF NUISANCE, POTENTIALLY AND OBLIGATORY TOXIC PHYTOPLANKTON SPECIES DURING THE RED-TIDE (IZMIR BAY, AEGEAN SEA)

Burak Inanan *, Aydin Unluoglu , K.can Bizsel and Nihayet Bizsel
Dokuz Eylul University, Institute of Marine Science and Technology, Baku BulvarıNo:32 35340 İnciraltı-İzmir -
burak.inanan@ogr.deu.edu.tr

Abstract
The bloom-forming phytoplankton species were studied in the heavily eutrophied inner part of Izmir Bay during the red-tide event observed in April 1998. During the period between 21- 24 April 98 when fish mass mortality was observed, the abundance of some nuisance and toxic species increased (*Pseudonitzchia seriata* group, *Alexandrium minutum*, *Gymnodinium* sp ., *Prorocentrum micans, Dinophysis rotundata, Heterosigma cf. akashiwo Gymnodinium cf. mikimotoi (=Karenia mikimotoi),Prorocentrum minimum, Noctiluca scintillans)*. The appearances of some of these species have been reported frequently since the early 1980ies. Particularly *Noctiluca scintillans* could have prominent effects on the water quality.
Keywords : Aegean Sea, Phytoplankton, Blooms, Eutrophication, Toxic Blooms.

Among the 5000 species of extant marine phytoplankton (Sournia et al., 1991), some 300 species can at times occur in such high numbers that they discolor the surface of the sea, resulting in so-called "red-tides", while only about 40 species have the capacity to produce potent toxins that can find their way through fish and shellfish to humans (Hallegraeff et al., 1995). Only about 1 % of 5000 species are toxin producer, though the impact of these few species can be profound. The amount of cell does not define Harmful Algal Blooms (HABs), as some species are so toxic that their presence, even in relatively low numbers, may be harmful, *i.e.*, the recommended concentration limits for species like *Dinophysis acuminata* and *Alexandrium spp.* are only 500 cells/l in Danish waters (Andersen, 1996).

Sampling was carried out in the inner Izmir bay in April 1998 at the start and peak of the bloom. Additional samples were taken from reddish-brown and orange patches on April 21-24 when mass fish mortality was observed. Phytoplankton samples (5 l) were taken from surface waters (0.3-0.5 m), fixed in lugol and counted using the single drop technique (Semina, 1978). Cells were photomicrographicied with an Olympus inverted microscope.

The first red-tide and mass fish mortalities events in Izmir Bay had been reported in the 1950ies (Numann, 1955) and the first record on toxic phtyoplankton species was *Alexandrium minutum* (8 x10^6 cells/l) in 1983 (Koray and Buyukısık, 1988) in the harbor region of the Inner Ba, during a red tide event.

During peak period of the bloom (17 April) the number of species with an abundance higher than 2000 cells/l was 23 in the reddish-brown patch while it was 33 in the orange patch. In both patches, there were 4 toxic and/or potential toxic species and their abundance was >10.000 cells/l in the latter. *Alexandrium minutum* reached a maximum abundance of 410.000 cells/l on 21 April, when the first observation on the mass fish mortality was reported. The main affected fish species were gray mullets (Mugilidae).

As an alternative red-tide causative, ciliates exhibited a significant correlation with nitrate (r=0,45 n=33, p<0,05). There is also a significant correlation between *Noctiluca scintillans* abundance and ammonium (0,61, n=14) as expected. *N. scintillans* had been observed generally in the inner and middle bay during the sampling period. Chl a and ammonium sharply increased whilst nitrate decreased during the sampling period in the inner bay.

On the bases of the data available in the last decade and the most recent observations (including August 2006), it is apparent that discoloration is still frequent, as the conditions causing eutrophication are still prevalent in spite of lower organic loads at present than in the past.

References

1 - Andersen P. 1996. Design and implementation of some harmful algal monitoring systems. IOC Technical Series, 44. UNESCO, Paris. 102 pp.
2 - Hallegraeff G.M., Anderson D.M. and Cembella A.D.1995. Manual on harmful marine microalgea. IOC Manuals and Guides, 33. UNESCO, Paris. 486 pp.
3 - Koray T. and Buyukısık B. 1988. Toxic Dinoflagellate Blooms in the Harbor Region of Izmir Bay (Aegean Sea). Revue Intern. D'Oceanogr. Medic., Tomes, LXXXXI-LXXXXII, pp 25-42.
4 - Semina H. J. 1978. The size of cells. In: Sournia, A., ed. Phytoplankton manual. UNESCO Monographs on Oceanographic Methodology 6, Paris, pp. 233-237.
5 - Sournia A., Chretiennot-Dinet M.J., Richard M. 1991. Marine phytoplankton:how many in the world ocean?. J. Plankton Re. 13:1093-1099.