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Response of phytoplankton resting stage communities to chemical contamination in two Mediterranean port areas: Trieste (Italy) and Haifa (Israel)

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Abstract

The encysted phytoplankton communities in surface sediments of two Mediterranean port areas were investigated to highlight how anthropogenic activities could shape the structure of the phytoplankton both in the sediments and in the water column in those areas. In fact, cyst assemblages are able to respond to changes of environmental conditions, including variations in nutrient levels or pollution. This response could be a direct consequence of the exposure of cysts in contaminated sediments but also the indirect effect of variations in the water of active stages of species with different biological and/or ecological properties.

The ports of Trieste in Italy and Haifa in Israel are two of the largest in the Mediterranean. Both have different terminals, including general cargo, chemical and oil piers and cruise terminals.

Besides this, the two areas are characterised by high concentrations of contaminants derived from the proximity of the industrial area at Trieste site and the enclosing of the Kishon estuary, the most polluted river of Israel, in the port of Haifa. The cyst assemblages were analysed in surface sediments collected at sampling sites chosen to represent different environmental features of the two ports.

The analyses revealed a clear signal of chemical pollution and change in the trophic status of the system was observed in both areas, in terms of increase of heterotrophs and species linked to high levels of heavy metals contamination. Conversely, different patterns were found among the sites inside each port and in the indices of ecological diversity between ports.

These results confirm the influence of anthropogenic activities on the structure of plankton communities. Yet, they concomitantly underscore the need to improve the knowledge of local communities, in order to correctly estimate the effects of pollution on plankton and identify species as biological indicators of these effects.

Keywords

phytoplankton, resting stages, port, Mediterranean