MUSSELS *(MYTILUS GALLOPROVINCIALIS)* AS BIOINDICATOR OF CHLORINATED HYDROCARBONS POLLUTION IN THE KASTELA BAY (ADRIATIC SEA)

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Abstract

Significantly increased values of chlorinated hydrocarbons in mussels (*Mytilus galloprovincialis*) transplanted to the Kastela Bay show a certain level of the pollution of the Kastela bay with organochlorines. The PCBs higher values undoubtedly indicate the presence of industrial wastewaters in the investigated area. An inverse relationship between chlorinated hydrocarbons concentrations in mussels and the specimen length was found. The comparison of the concentration of extractable organic matter to chlorinated hydrocarbons concentrations show a limited corellation. However, the detailed interpretation of the obtained results in terms of physiological effects is not yet possible because of the small number of analysis.

Key words: Adriatic Sea, mussel, chlorinated hydrocarbons, PCBs, pesticides

Introduction

Chlorinated hydrocarbons are ubiquitous contaminants in the coastal areas. To provide reable information on the contaminant presence in the environment, mussels have traditionally been used as good biological indicators of the sea pollution. However, the degree to which the organochlorines are accumulated by mussels depends not only on their concentrations in the external environment, but also on internal biological factors (e.g. age, size, reproductive cycle). The present study was designed to monitor patterns of bimonthly accumulation of chlorinated hydrocarbons in mussels over a one-year period in the area of Kastela Bay. In this paper, we report the results of only one sampling done in January 2002.

Materials and methods

Two size classes of mussel *Mytilus galloprovincialis* (class A: ~5 cm shell length and class B: ~6 cm shell length) were transferred from the clean area of the Mali Ston Bay to four experimental stations in a relatively polluted area of the Kastela Bay in November 2001. After two months of the exposure to the ambient conditions, mussel samples were taken for an analysis. Chlorinated pesticides (DDE, DDD, DDT) and polychlorinated biphenyls (Arochlor 1254, Arochlor 1260) (PCBs) were determined by the capillary gas chromatography with an electron capture detector (1).

Results and discussion

The obtained results show a significant increase of the concentration of chlorinated hydrocarbons in the mussels. The mean concentration of chlorinated pesticides increased from 3.5 to 7.3 ng/g d.w. (class A) and 3.2 to 6.0 ng/g d.w. (class B), respectively (Fig. 1). PCBs show even higher tendency of increase at all investigated stations. The mean concentration of total PCBs increased from 9.6 to 73.6 ng/g d.w. (class A) and 12.4 to 66.3 ng/g d.w. (class B), respectively (Fig. 2). The overall data on chlorinated hydrocarbons show that PCBs predominate in all mussels at all investigated stations over DDT compounds. Moreover, the change of total DDT concentrations between sampling stations is less pronounced than that shown for total PCBs. Regarding the investigated area, the spatial distribution of both groups of compounds is basically similar. The highest amount of chlorinated pesticides and PCBs was found at the Inavinil station located in the eastern part of the Kastela Bay, which is under the strong impact of industrial wastewater and urban runoff.

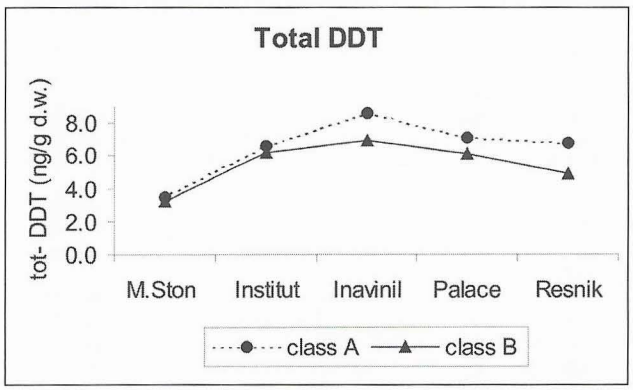

Fig. 1. Concentration of total DDT compounds in two size classes of mussels at sampling stations.

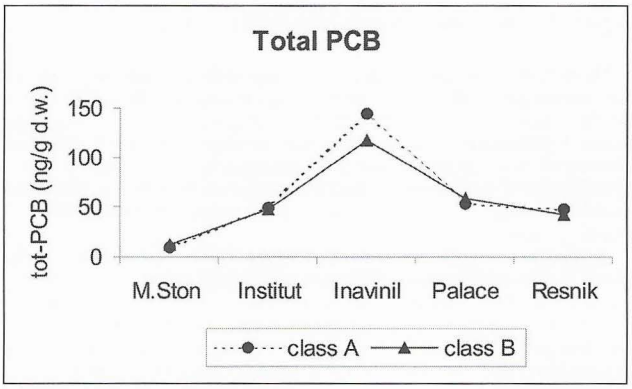

Fig. 2. Concentration of total PCBs in two size classes of mussels at sampling stations.

Regarding the length of collected mussels, we have found generally higher concentrations of chlorinated hydrocarbons in smaller mussels (class A), which is in accordance with the previously published results indicating the tissue concentrations decrease with increasing body size (2).

The extractable organic matter (EOM) content expressed on a dry weight basis, is not significantly different between the mussel classes and investigated stations. The highest value of EOM and chlorinated hydrocarbons we have found is at the Inavinil station. Limited correlation between PCBs concentration and EOM was found, which suggests that variation in the mussels' lipid cycle might be responsible for some of the variations of the organochlorines concentrations (3).

In conclusion, the analysis of mussels *Mytilus galloprovincialis* from the Kastela Bay clearly demonstrate a quite low level of pollution by DDT and PCBs compounds in the Bay. Moreover, the obtained results are lower than those previously reported in literature (4).

References

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