

CHEMICAL AND ECOTOXICOLOGICAL QUALITY ASSESSMENT OF THE ROVINJ COSTAL AREA, NORTHERN ADRIATIC, CROATIA

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Abstract

PAHs content in sediment showed clear differences between pristine, urban industrial and harbor areas. Sites ranged according total HSP70 protein contents in mussel gills and total PAHs content in sediment show the same increased order. On the basis of the present results, we suggest that both sediment chemical (PAHs) and biomarker (HSP70) analyses can serve as a useful index of the contamination level and as an early-warning indicator of environmental alterations.

Keywords : *Pah, Mollusca, Bio-indicators, Adriatic Sea, Pollution.*

Pollution of the Rovinj costal area was determined by PAHs content analysis in sediment and stress-70 proteins as biomarkers of environmental contamination exposure/effect in natural mussel populations, collected seasonally at differently polluted sites (Fig. 1.). Site out of Limski kanal (S-1), was used as a reference point, while other locations are under the influence of mariculture, industrial and urban runoff waste: mariculture (S-2), fish cannery (S-3), gasoline station (S-4), local harbour (S-5) and tobacco factory (S-6).

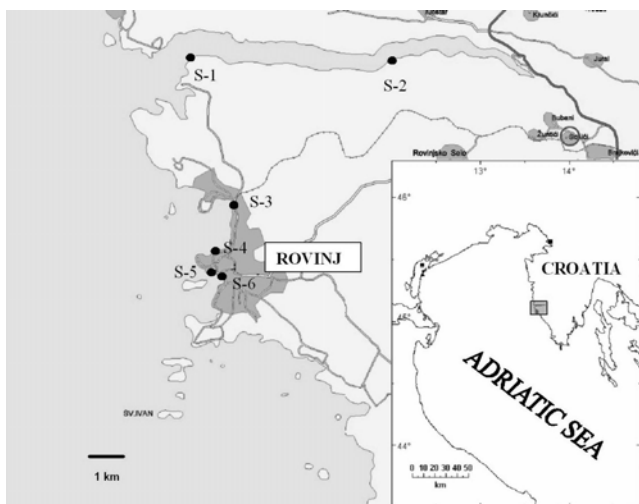


Fig. 1. Location of the sampling sites in the Rovinj costal area, northern Adriatic, Croatia.

PAH analysis

Contents of PAHs determined in sediment from sites S-1 to S-6 are divided into four groups according to their number of aromatic rings as a sum of all PAHs in each sediment and percent of each group, respectively (Fig. 2.A). Twelve of sixteen analyzed PAH were found at low to moderate concentrations, ranging from 32 to 13681 ng/g of the total PAHs per sediment dry weight. They showed clear differences between pristine, urban industrial and harbor areas. According to the total concentration of 12 PAHs detected in the sediment, sampling sites can be ranged in an increasing order: S-1, S-2, S-3, S-4, S-6 and S-5. Molecular indices revealed that PAHs in the sediment originate mainly from pyrolytic sources, but some petroleum influence was also evident (harbor) [1].

Stress-70 protein analysis

The mediterranean mussel *M. galloprovincialis* Lamarck 1819 was used for ecotoxicological investigation and gills as a target tissue. Stress-70 protein content after exposition of organisms to contaminants for long periods in their environment provide a method for quantifying adverse biological impacts when examined in wild populations from contaminated sites.

Using SDS-PAGE and Western blot analysis two stress-70 proteins (HSP70 and HSP72) were detected [2]. Investigations of natural mussel populations collected at different polluted sites of the Rovinj area in four seasons indicated that there is a significant difference in stress-70

contents in mussels from control sites Limski kanal (S-1) and those from other sampling sites with urban and industrial pollution (Fig. 2.B).

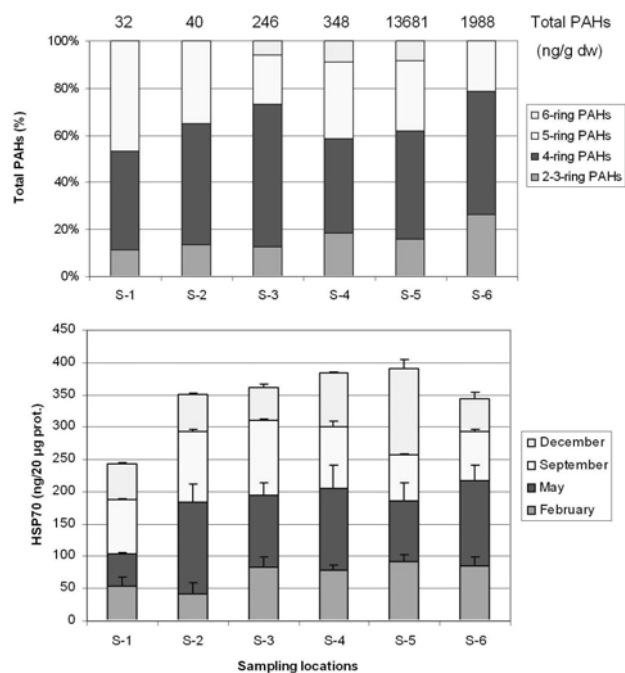


Fig. 2. A) Total PAHs (ng/g dw) and group profile of PAHs (%) from marine sediments. B) Total HSP70 content in gill tissues of *M. galloprovincialis* collected seasonally at 6 locations, control (S-1) and under the influence of mariculture, industrial and urban runoff.

Chemical analyses of PAHs in sediment help to determine the magnitude of anthropogenic contamination by identifying the pollutants but do not provide any information about the contaminant effect on the biota [1]. Stress-70 protein induction as biomarker of exposure/effect of pollution is positively related to total PAHs content at sampling sites. The highest cumulative annual HSP70 content was observed at the site with the highest total sediment PAH content. There is no proof that stress-70 protein induction is in direct connection to PAHs levels found in the sediment of the investigated sites, although a variety of industries indicate the presence of other pollutants and stressors too.

References

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