

SPATIAL DISTRIBUTION OF POLYCYCLIC AROMATIC HYDROCARBONS IN MUSSELS (*MYTILUS GALLOPROVINCIALIS*) FROM THE IBERIAN MEDITERRANEAN COAST

C. Martínez-Gómez *, M. Roca , I García-Agüera and J Benedicto

Spanish Institute of Oceanography (IEO), Oceanographic Centre of Murcia, Varadero 1, 30740, San Pedro del Pinatar, Murcia (Spain). - cmartinez@mu.ieo.es

Abstract

Polycyclic aromatic hydrocarbons (PAHs) concentrations were measured in tissues of wild mussels (n=50) (*Mytilus galloprovincialis*) along the Iberian Mediterranean coast in May-June 2004. The total sum of the 13PAHs analysed ranged from 46.85 - 3.83 microg kg⁻¹ wet weight. Highest concentrations were observed near Barcelona, Tarragona, Tabarca island (declared Marine Reserve) and Guadarranque (Algeciras). An indistinct profile of molecular indices were found in the majority of the sampling areas, which is indicative of a diffuse origin of the PAH contamination.

Keywords : *Bivalves, Monitoring, Pah, Western Mediterranean.*

Introduction

Polycyclic aromatic hydrocarbons (PAHs) should be paid particular attention because of their known associated toxicity. Mussels are of great value in terms of biomonitoring due to their sedimentary life, time-integrator capacity and nutritional status (filter feeder). The data obtained represent baseline concentrations along the Iberian Mediterranean coast for future comparisons.

Material and Methods

Sampling was made under standardized conditions, collecting native mussels during May-June 2004 (outside spawning period). At each site (Fig 1.), three replicates (n= 50), size ranging from 30 to 40 mm, were collected. Preparations of samples and procedure to extract PAHs have been described elsewhere in detail [1].

Tab. 1. Concentrations of total polycyclic aromatic hydrocarbons (mean ± standard error of the mean), selected ratios and potential origin of the PAH contamination.

Areas	Mean	± SE	Phe / Ant	Fla / Pyr	Origin
Guadarranque	28.19	3.32	17.18	0.77	petrogenic
Algeciras1	3.83	0.9	14.61	3.48	diffuse
Manilva	3.83	0.27	18.24	3.29	diffuse
Marbella	4.64	0.17	14.6	2.37	diffuse
Fuengirola	4.82	1.03	17.09	3.27	diffuse
Málaga1	7.38	0.46	13.1	1.9	diffuse
Torrox	7.29	0.97	19.65	2.24	diffuse
La Herradura	4.03	1.14	17.37	4.28	diffuse
Almuñécar	5.37	0.33	18.08	2.84	diffuse
Calahonda	5.73	0.17	17.11	4.83	diffuse
Cartagena1	13.01		15.09	2.34	diffuse
Tabarca I.	36.29	6.8	8.72	1.37	pyrogenic
Valencia	16.37	1.06	9.2	2.26	pyrogenic
Peñíscola	8.59	0.46	12.81	2.16	diffuse
D. Ebro	6.36	1	14.86	3.07	diffuse
Tarragona	46.85	4.64	7.55	1.32	pyrogenic
Vallcarca	15.24	1.04	10.66	1.51	diffuse
Barcelona	39.87	1.72	8.66	1.23	pyrogenic
Blanes	8.83	0.9	13.66	3.26	diffuse
Medas I.	5.81	0.34	13.82	3.64	diffuse
Cadaqués	9.33	0.88	14.87	3.93	diffuse

The 13 analysed PAHs (phenanthrene, anthracene, fluoranthene, pyrene, chrysene, benzo(a)anthracene, benzo (b)fluoranthene,

benzo(k)fluoranthene, benzo(a)pyrene, benzo(e)pyrene, indeno(1,2,3-c,d)pyrene, dibenzo(a,h)anthracene and benzo(g,h,i)perylene) were separated and quantified by means of High Performance Liquid Chromatography (HPLC) using a fluorescence detector with programmable wavelength. Results and discussion

The total sum of the 13 individual PAHs analysed ranged from 46.85-3.83 microg kg⁻¹ w.w. (Tab. 1). Higher PAHs concentrations were mainly found near of well-known hotspots along the Iberian Mediterranean coast such as Tarragona, Barcelona and Guadarranque (Algeciras). Tabarca island is a Marine Reserve not directly influenced by any industrial or urban activities, and the high PAH levels observed in this area, could therefore be explained by the dispersion of the inputs provided from inland or pin-point source inputs of petrogenic origin due to the marine traffic around the Marine Reserve. Origin (pyrolytic or petrogenic) of the main source of contamination in the areas was established by using molecular indices (Tab. 1). Values lower than 10 in phenanthrene/ anthracene (Phe/Ant) ratio but higher than 1 in fluoranthene/pyrene (Fla/Pyr) indicate pyrogenic origin. As the same way, values higher than 15 in Phe/Ant ratio but lower than 1 in Fla/Pyr ratio indicate petrogenic origin. Our finding that PAH contamination near Tabarca island had a possible pyrolytic origin indicates that the high PAH concentrations observed in this area are originating from inland sources.

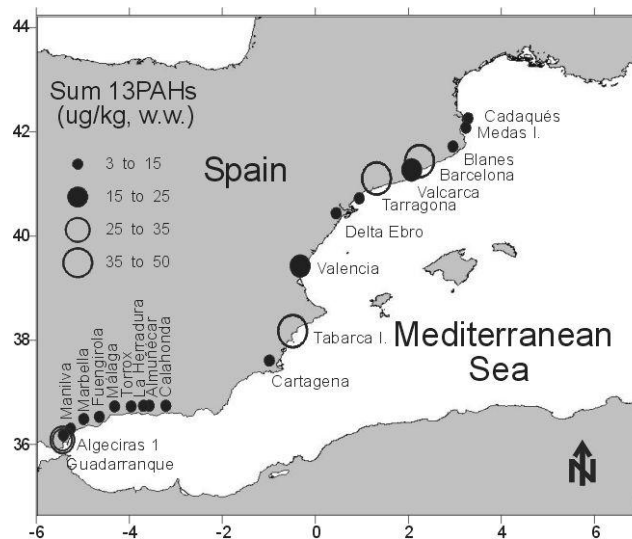


Fig. 1. Map of the study areas with sampling stations. Circles represent range of total PAH concentrations measured (microg/kg w.w.).

Reference

Viñas Diéguez, L. 2002. Tesis doctoral: Evaluación de Hidrocarburos Aromáticos Policíclicos (HAPs) por Cromatografía Líquida de Alta Eficacia (CLAE) en el entorno marino Gallego. Química Analítica y Alimentaria. Vigo, Vigo University: 267.