

SPATIAL DISTRIBUTION OF DDTs IN WILD MUSSELS (*Mytilus galloprovincialis*) FROM CANTABRIC SEA (N SPAIN)

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INTRODUCTION

DDT is a persistent organic pollutant characterized by its toxicity and tendency to be accumulated in fatty tissues of sea animals. It is very persistent in the environment and its degradation produces DDE and DDD, which have chemical, physical and toxicological properties similar to the original product.

Since 1940, DDT has been used to control plagues in agriculture, for fighting malaria and as a domestic pesticide. Due to the numerous negative physiological effects on the immune system (it is a powerful endocrine disruptor), its use is restricted or forbidden in most of developed countries.

DDT and all its derivatives are included in the list of so-called Persistent Organic Pollutants (POPs), whose use and production must be eliminated worldwide (Stockholm Convention). At present, UN/ECE (United Nations Economic Commission for Europe) restricts DDT use to two situations: a) protection of public health from diseases like malaria b) as intermediate product in the synthesis of Dicolof.

In spite of these restrictions, it still found in different environmental compartments because it can be transported in different ways (mainly atmospheric transport) thousands of kilometres away from its source (Shaw and Connel, 1986).

As there is a clear relationship between concentrations of these compounds in some organisms and the waters they live in (Duinker et al. 1983), such organisms are used as indicators of pollution of their living areas.

Mussels are the organisms most frequently used for this purpose, as they are a good indicator due to the amount of water they filter, their sessile character, wide geographical distribution and, as their enzymatic system have a low metabolic capacity, their high bioaccumulation potential.

RESULTS AND DISCUSSION

Twenty five sample locations were chosen: from Muxia to Fuenterrabía (Fig.1). Locations of easy access, with good availability of individuals, were selected, being representative of areas with different levels of contamination: "clean", moderately contaminated, and situated in industrialised/populated areas, although the last were deliberately chosen not to be in the immediate vicinity of hot spots.

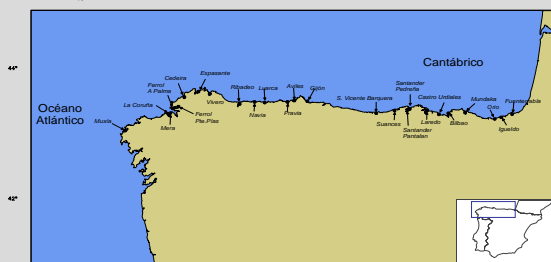


Figure 1. Location of the sampling sites

The analyses were carried out on homogenates of 50 mussel individuals, with size between 40 and 70 mm.

Analyses were performed following the procedure described by De Boer (1988) and González-Quijano and Fumega (1996). Samples were extracted in a Soxhlet apparatus with a mixture pentane-dichloromethane. The extracts were purified in an alumina column eluted with pentane, and fractionated in a silica gel column sequentially eluted with iso-octane and iso-octane/diethylene. The purified extracts were analysed by gas chromatography with electron capture detector using capillary columns and H₂ as carrier gas.

In order to validate the analytical procedure, certified reference materials were used, as well as participation in international intercomparison exercises, such as QUASIMEME, on a regular basis.

Results of DDTs are shown in Figure 2. The two highest values (3.7 y 4.9 µg/kg ww) correspond to the samples located in Ferrol, and the lowest (0.39 µg/kg ww) and (0.47 µg/kg ww) to the samples from Navia and Espasante respectively.

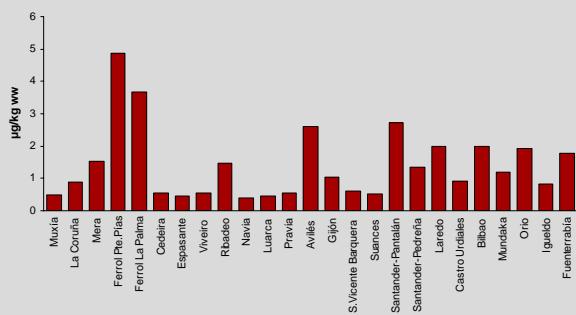


Figure 2. Sum DDTs (pp'DDE+pp'DDD+pp'DDT) concentrations in mussel

CONCLUSIONS

- Both DDT and its metabolite DDE present low concentrations in the whole area, being the DDE levels well below the Ecotoxicological Assessment Criteria established by OSPAR.
- The relationships between DDE/DDT point out to a recent contamination in Gijón and Avilés.

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Higher proportion of pp' DDT compared to pp' DDE found in mussel samples of Avilés and Gijón suggest the presence of current emission sources of DDT. In all the other studied sites, pp' DDE was the main metabolite found, as it is frequently observed in biota from areas not subject to recent contamination (Figure 3).

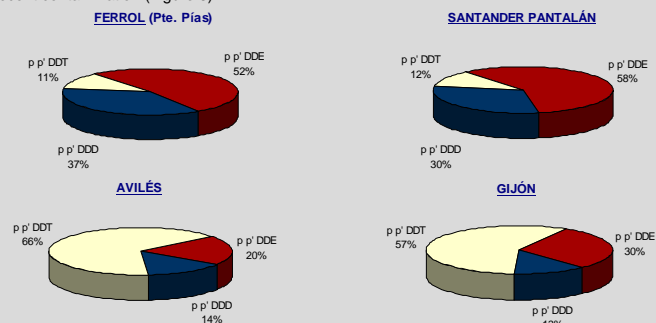


Figure 3. Distribution of SDDTs in four sites with medium-large urban or industrial areas

The Ecotoxicological Assessment Criteria (EACs) concentrations are those that, according to the existing scientific knowledge, are close to the concentrations below which the potential for adverse effects is minimum. OSPAR has adopted EACs for the most common pollutants in water, sediments and biota (OSPAR, 1997b).

A comparison of the pp' DDE results with the EAC concentration established for mussel, which is 10 µg/kg in ww., are made (Figure 4). All the samples analysed in this study present lower concentrations than the mussel EAC.

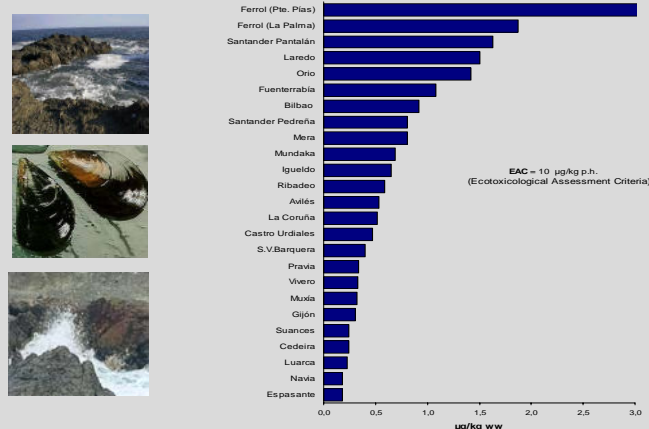


Figure 4. Spatial distribution of pp' DDE in mussels. Comparison with EAC value

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