

# COMPARISON OF ORGANIC CONTAMINANT LEVELS IN MUSSELS *MYTILUS GALLOPROVINCIALIS* FROM THE MEDITERRANEAN COAST OF SPAIN COLLECTED IN 1993 AND 2001.

Juan A. Campillo <sup>1\*</sup>, Maria Franco <sup>2</sup>, Fulgencio Martinez <sup>1</sup> And José Benedicto <sup>1</sup>

<sup>1</sup> Instituto Español de Oceanografía, Centro Oceanográfico de Murcia, Varadero 1, 30740 San Pedro del Pinatar, Murcia, Spain.

<sup>2</sup> Centro Oceanográfico de Vigo. Cabo Estay. Canido. 36390 Vigo, Spain.

## Abstract

Organic contaminant concentrations in mussels collected from 15 sites along the Iberian Mediterranean coast, in 1993 and 2001, are compared applying the Sign test. Polychlorinated biphenyls (PCBs) concentrations showed a significant decrease between 1993 and 2001, since 14 of the 15 concentrations determined in year 1993 exceed the obtained ones in 2001. DDT and its metabolites showed a comparable decrease for ppDDD and as well as for the sum of ppDDT, ppDDE and ppDDD.

**Keywords:** PCB, DDT, *Mytilus galloprovincialis*

## Introduction

Mussels have the ability to accumulate trace levels of certain organic pollutants. Owing to their sedentary characteristics, bivalves are considered ideal bioindicators for marine pollution monitoring. Among a large number of man-made chemicals, organochlorines, such as DDTs and PCBs, are of great concern due to their ubiquitous, persistent and highly bioaccumulative nature as well as toxic effects. Even though most of the countries have banned or restricted the production and usage of many of these organochlorines, they are still widely distributed in the marine environment (1). The objective of this study was to assess the trends of the levels of contamination of PCBs and DDTs in the Mediterranean coastal waters of Spain, through comparison of organic contaminants levels in mussels collected in 1993 and 2001.

## Materials and Methods

In order to minimise natural variability, sampling was made under standardized conditions, collecting native mussels from the same site and at the same time of the year (May-June, post-spawning period). At each site (Fig. 1), three subsamples of 50 individuals, size 3 to 4 cm, were collected by hand. Preparation of samples has been described elsewhere in detail (2). The mussel homogenates were freeze-dried and Soxhlet extracted. Lipids were removed by chromatography over alumina. The PCBs and DDTs purified fractions were obtained by chromatography on silica. Final extracts were analysed by capillary gas chromatography with a <sup>63</sup>Ni electron capture detector. Total PCB concentrations in samples was quantified as the sum of 7 congeners (n° 28, 52, 101, 118, 138, 153 and 180). Intercalibration mussel homogenate samples, from QUASIMEME, were used as a control for the analytical methods. The Sign test was used for comparing results obtained from 1993 and 2001.

## Results and discussion.

ΣPCBs and DDTs concentrations in mussels are summarized in the Table 1. Of the 15 pairs of data per chemical, the 1993 concentrations were higher 14, 12, 12 times for ΣPCBs, ΣDDTs and ppDDD, respectively. Statistically, ΣPCBs results have less than a 0.1 % chance of being random, and for ΣDDT and ppDDD there are less than a 3 % chance that any of those tendencies toward higher values in 1993 are random. For ppDDE and ppDDT, the Sign test does not show any significant differences between 1993 and 2001 levels.

In 1993 and 2001, ΣPCBs mean concentration values were 68.9 and 59.8 ng/g dry wt., respectively. ΣPCBs concentration decreased a 13.2 % in 2001 with respect to 1993. In general, ΣPCBs concentrations decreased at all the locations studied, excepted at Delta del Ebro, where ΣPCBs concentration was 2.6 times higher in 2001 than in 1993. However, mussels collected in 2000 from this sampling point showed a similar result obtained in 1993. Although European countries have banned PCBs uses, releases of this compounds occur as leaks from sealed systems, accidental losses and spills, and emissions from PCB-containing materials and soils.

ΣDDTs mean values in 1993 and 2001 were 54.6 and 39.7 ng/g dry wt., respectively. ΣDDTs concentration decreased approximately a 27.3 %. ppDDE was the major compound founded in mussel. There is evidence, that DDT concentration in biota have generally decreased, whereas for related compounds no such conclusions can be drawn (3).

## Conclusion

Comparison of organochlorine concentrations founded in mussel collected in 1993 and 2001, shows a general decreases of PCBs concentrations along the Spanish Mediterranean coast. The declining use and progressive elimination of PCBs have been reflected in these

results. For DDT and its metabolites, banned in many countries including those in Western Europe, a similar decline has been observed.

**Table 1. Concentrations of PCBs and DDTs (ng/g dry wt) in mussel from the Spanish Mediterranean Coast.**

	2001				1993			
	ppDDT	ppDDE	ppDDD	ΣPCBs	ppDDT	ppDDE	ppDDD	ΣPCBs
Islas Medas	2.9	6.5	5.4	18.1	0.7	2.4	0.6	23.8
Barcelona	19.0	52.4	13.5	203.5	2.0	167.9	17.7	260.9
Vallcarca	12.4	61.7	8.1	214.3	21.0	232.5	15.8	232.0
Tarragona	3.4	11.5	3.6	53.8	4.6	55.1	4.6	78.9
D. del Ebro	96.8	125.9	66.0	196.2	20.9	44.3	25.8	74.0
Valencia	6.7	17.4	4.0	106.4	10.1	40.6	12.8	151.2
Cullera	2.7	18.4	6.4	35.9	4.9	30.1	8.6	46.6
Portman	1.9	7.1	2.2	10.9	5.4	5.2	2.9	20.6
Cartagena	1.8	2.6	1.7	33.4	2.3	5.0	2.8	45.3
Calahonda	0.6	4.6	1.1	2.4	2.6	31.6	2.2	16.0
Almuñecar	1.0	5.8	0.2	5.0	nd	5.0	nd	10.4
Herradura	1.3	5.3	0.2	2.8	2.3	2.8	4.1	9.6
Fuengirola	0.2	3.0	nd	4.9	nd	3.9	1.5	21.9
San Diego	0.7	3.9	0.1	3.4	1.8	4.0	2.2	11.2
Algeciras	1.4	3.7	0.8	6.2	1.6	6.5	1.4	31.7



**Fig. 1. Map with sampling points.**

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