



ENVIRONMENTAL MONITORING BY USING CHEMICAL AND BIOMARKERS MEASUREMENTS IN RED MULLET (MULLUS BARBATUS) ALONG THE MEDITERRANEAN COAST OF SPAIN

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INTRODUCTION

•The approach to make an integrated assessment of the environmental quality status of the marine areas is being stressed and expert organization (ICES, MEDPOL) agree that is necessary a joint assessment of the water, sediment and biota performing chemical and biological measurements.

•In 2006, an environmental monitoring by using a suite of biomarker measurements in red mullet was performed in a coordinated way with chemical measurements in fish by the Spanish Institute of Oceanography (IEO), which is promoting this biomonitoring to be extended for coming years.

MATERIAL & METHODS

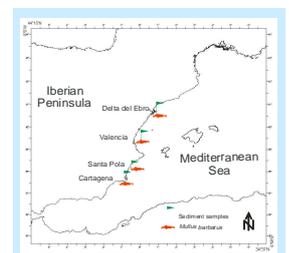


Survey: 15-30th April (pre-spawning period for *M. barbatus*). According MEDPOL guidelines for chemical monitoring

•Biomarkers were analysed in liver and chemical contaminants (PAHs, PCBs, o,p' DDT, p,p' DDT and their metabolites, lindane, α -HCH, HCB, aldrin, isodrin, dieldrin, endrin, Cd, Cu, Zn, Hg, Pb, As) in muscle tissue of the target specie *Mullus barbatus*, according MEDPOL guidelines.



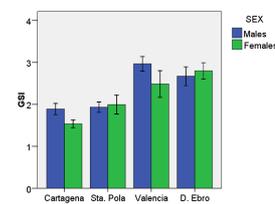
BIOMARKER	TECHNIQUE	PURPOSE
EROD activity	Eggens and Galgani, 1992 UNEP/RAMOGE, 1999	Induction of detoxification mechanisms of organic compounds
Metallothionein content (MT)	Benedicto et al., 2005 UNEP/RAMOGE, 1999	Biomarker of general stress
DNA damage	Kohn et al., 1981 UNEP/RAMOGE, 1999	Genotoxic effects of chemical compounds



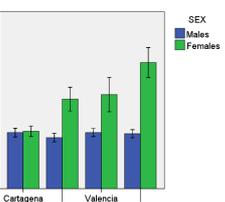
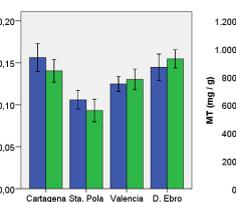
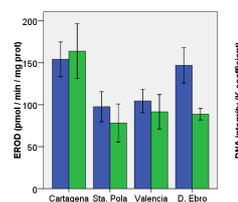
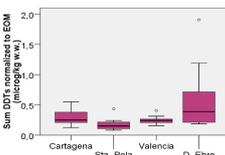
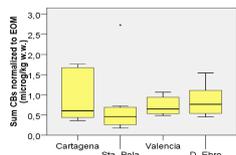
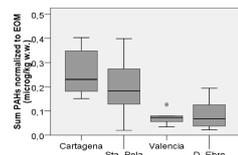
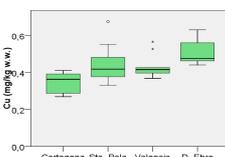
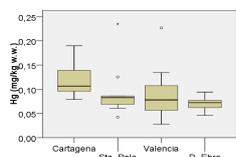
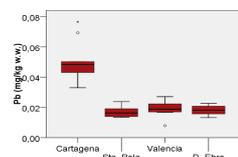
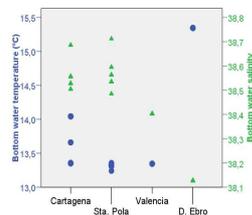
Supporting parameters:
 •Bottom water temperature
 •Gonad somatic Index (GSI)

- 12 males and 12 females by area for biomarker analysis
- 10 specimens by area for chemical analysis
- Fish length ranged from 12-18 cm

RESULTS



Specimens were not in same gonadic development state. Only specimens with GSI < 5 were used for biomarker analysis.



DISCUSSION AND CONCLUSIONS

• Preliminary results obtained so far show that Cartagena and Delta del Ebro are areas of serious concern, showing the highest values of certain contaminants and biological responses as EROD activity and DNA damage (male data; $p < 0.05$; 1-way ANOVA). Therefore, these areas will be selected in next surveys along the inner continental shelf of the Iberian Mediterranean Sea to perform the biomonitoring programme over time.

• Despite the sampling strategy, it was not possible to get specimens in same gonadic stage of development. To get a minimum sampling size of 12 specimens of each sex, ranging from 12 to 18 cm, was difficult because the sampling period (predominance of bigger mature specimens).

• Biological responses in females were affected by environmental and biological factors during sampling period.

• It is concluded that future biomonitoring programme will be conducted by IEO during the post-spawning period (October) in order to avoid the influence of the reproductive status on the response of the selected biomarkers.

• MEDPOL guidelines concerning the time-sampling strategy for chemistry monitoring in fish should be revised to post-spawning period for red mullet. This would allow to perform an integrated monitoring programme (chemical and biomarker measurements) in a cost-effective manner.

• Biomonitoring should be expanded by sampling in different fishing grounds (Andalusian region, Balearic Islands, etc.) to establish baseline biomarker responses in red mullet populations from the whole Iberian Mediterranean inner shelf.

ACKNOWLEDGMENTS:

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