

ORGANOCHLORINATED (PCBS) AND ORGANOBROMINATED (PBDES) CONTAMINANTS IN EUROPEAN ANCHOVY (*ENGRAULIS ENCRASICOLUS*) FROM THE NORTH-WESTERN MEDITERRANEAN SEA

C. Munsch¹, V. Loizeau², H. Pethybridge², C. Tixier¹, J. Tronczynski^{1*}, N. Bodin³, F. Le Loch⁴ and M. Harmelin-Vivien⁵

¹ IFREMER - Biogeochemistry and Ecotoxicology Unit, Laboratory of Biogeochemistry of Organic Contaminants (BE/LBCO), Nantes, France - jtronczy@ifremer.fr

² IFREMER - BE/LBCO, Brest, France

³ IRD - UMR 212 EME, Victoria, Seychelles

⁴ IRD - UMR 212 EME, Sète, France

⁵ Institut Méditerranéen d'Océanologie, Aix-Marseille Université, UM 110, Station Marine d'Endoume, Marseille, France

Abstract

Polychlorinated biphenyls (PCBs) and polybrominated diphenyl ethers (PBDEs) were investigated in European anchovy (*Engraulis encrasicolus*) collected in the Gulf of Lions. The contaminants were determined in different organs and tissues of male and female adult fish sampled during the spawning and resting seasons. The influence of sex, age and reproduction on contaminant concentrations was evaluated.

Keywords: Bio-accumulation, Gulf of Lyon, Fishes, Pcb

Small pelagic fish, such as European anchovy (*Engraulis encrasicolus*), stand at intermediate levels in food webs and play an essential role in North-Western Mediterranean ecosystems [1]. Understanding their contamination by persistent toxic contaminants is therefore of importance. The contamination of selected organochlorinated (polychlorinated biphenyls - PCBs) and organobrominated (polybrominated diphenyl ethers -PBDEs) contaminants was investigated in European anchovy collected in the Gulf of Lions (North-Western Mediterranean Sea). The spatial distribution of contamination was assessed at different locations throughout the Gulf of Lions, from the mouth of the Rhône River in the Eastern part of the Gulf, to Port Vendres in the South-Western part. Male and female adult fish of homogeneous size were sampled during the spawning and resting seasons (i.e., July 2010 and March 2011, respectively). Contaminant determination was done on pooled individuals of similar size and sex, and replicate pools were analysed when available. Extensive determination of contaminants in different organs and tissues (muscle, liver, gonad, viscera and carcass) allowed to calculate the whole body's contamination levels and to assess the effects of anchovy's reproductive activity on the distribution and levels of organic chemicals. Fish contamination was examined together with total lipid content. Lipid classes (triacylglycerols, sterols and phospholipids) as well as carbon and nitrogen stable isotopes were also determined in selected tissues in individual anchovies. Finally, contaminants, lipids and stable isotopes were assessed in anchovy main diet (small zooplankton), and BMF and TMF were evaluated. No significant differences in anchovies' contamination levels were observed throughout the Gulf of Lions, revealing a fairly homogeneous population within the study area and no local influence of contaminant inputs on fish contamination. During the spawning season, females exhibited lower contamination levels than males, while no statistically significant difference was found during the resting season. CB-153 (predominant PCB congener) concentrations ranged from 4.1 ng g⁻¹ wet weight (ww) to 9.3 ng g⁻¹ ww in females and males respectively during the reproductive season; they ranged from 9.6 ng g⁻¹ ww to 12.2 ng g⁻¹ ww during the resting season. BDE-47 (predominant PBDE congener) concentrations were 40- to 60-fold lower than those of CB-153. The lower PCB and PBDE levels measured in females during the spawning season could result from a decontamination process that occurred during spawning [2]. Moreover, a modelling approach based on the Dynamic Energy Budget (DEB) theory revealed age differences between fish of given sex and length between the two seasons [3]; this could also explain the differences observed in anchovies' contamination.

and p,p'DDE concentrations and repartitions in the European hake (*Merluccius merluccius*, L.) from the Gulf of Lions (N.W. Mediterranean). *Sci. Total Environ.*, 408:304-311.

3 - Pethybridge H., Loizeau V., Munsch C., Roos D., Chiffolleau J.F., Cossa D., Bacher C., 2013. Modelling growth and bioaccumulation of PCBs and Me-Hg in anchovy (*Engraulis encrasicolus*) from the Gulf of Lions. Submitted to *CIESM* 2013.

References

- 1 - Palomera I., Olivar M.P., Salat J., Sabatés A., Coll M., Garcia A., Morales-Nin B., 2007. Small pelagic fish in the NW Mediterranean Sea: An ecological review. *Prog. Oceanog.*, 74: 377-396.
- 2 - Bodiguel X., Loizeau V., Le Guellec A.M., Roupsard F., Philippon X., Mellon-Duval C., 2009. Influence of sex, maturity and reproduction on PCB

Ce volume présente sous la forme d'articles synthétiques toutes les communications scientifiques présentées lors du 40ème Congrès de la CIESM. Les articles incluent chacun un résumé et des références bibliographiques. Comme ce sont plus de 900 chercheurs originaires de 40 pays qui se sont rassemblés en octobre 2013 à Marseille, l'ensemble offre un vaste panorama, très représentatif des recherches marines menées actuellement en Méditerranée et en mer Noire.

Les articles présentés dans le cadre des six comités scientifiques sont édités sous la responsabilité du Président de comité concerné. Seules les communications physiquement présentées par leur auteur lors du Congrès ont été retenues pour cette publication. Pour leur part, les rapports des modérateurs des sessions ont été édités par mes soins.

*Frédéric Briand
Directeur Général, CIESM*

Editeurs scientifiques

Les Présidents des comités scientifiques de la CIESM, 2010-2013

Gert J. de Lange (Géosciences marines),

Miroslav Gačić (Physique et climat de l'océan),

Axel Romaña (Biogéochimie marine),

Milton da Costa (Microbiologie et biotechnologie marines),

Ferdinando Boero et Cemal Turan (Ecosystèmes marins et ressources vivantes),

Enric Sala (Systèmes côtiers)

Réalisation

Michèle Barbier, Annelise Gastaldi, Valérie Gollino, Paula Moschella, Kaveh Rassoulzadegan

Références bibliographiques

Rapp. Comm. int. Mer Médit., 40

Ex :

de Lange G., Slomp C., Erba E., Corselli C., Thomson J., Anastasakis G., Michard A. and C. Vale 2013. Sapropel S1 : basin-wide isochronous formation and preservation in the Eastern Mediterranean. *Rapp. Comm. int. Mer Médit.*, 40 : 12.



CIESM

16, bd de Suisse MC 98000 – Monaco

Tèl. : +377 9330 3879 Fax : +377 9216 1195

www.ciesm.org