

Determination of organochlorine pesticides and total PCB in aquatic ecosystems of Cluj county

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Abstract. In the present study, fat tissues of small cyprinid fish was sampled from Cluj-Napoca and Cluj surrounding areas (N-W of Romania), urban and peri-urban waters, and used to determine the organochlorine and total polychlorinated biphenyls (PCB) concentrations of aquatic environments. Results indicated a very low concentration or even the absence of some organochlorine pesticides and PCB, as follows: DDT and metabolites 0.005, Aldrin 0.001, Dieldrin 0.000, Endrin 0.000, Hexachlorbenzen 0.002, Heptachlor 0.001, α -HCH=0.000, β -HCH=0.000, γ -HCH=0.007, δ -HCH=0.000, total PCB=0.000. Such low concentrations of pollutants found in fish fat are explained by decreased agricultural and industrial exploitation in Romania, banning the use of some dangerous chemicals in agriculture, short generation time of fish and its low position in the trophic chain.

Key Words: agricultural exploitation, industrial, pesticides, concentration, aquatic ecosystems.

Summary. Endocrine disruptors (ED) are exogenous substances that interfere with the synthesis, secretion, transport, binding, action, or elimination of natural hormones in the body that are responsible for the maintenance of homeostasis, reproduction, development, and/or behavior (Georgescu et al 2005; Petrescu-Mag et al 2010; Păunescu et al 2011; Sandor et al 2012). They are sometimes also referred to as hormonally active agents, endocrine disrupting chemicals, or endocrine disrupting compounds. Organochlorine pesticides and total polychlorinated biphenyls are among the most important ED (Fleșeriu 2010).

In the present study, fat tissues of small cyprinid fish was sampled from Cluj county (N-W Romania), urban and peri-urban waters, and used to determine the organochlorine and PCB concentrations of aquatic environments. Twenty different sampling places were selected, including both rivers and lakes; ten sampling places were situated in Cluj-Napoca (mostly industrial) and ten from Cluj-Napoca surrounding areas (mainly agricultural), as follows: Someș (from entering the river in the city), one sample; Someș (central zone of the city), two samples; Someș (on leaving the river in the city) one sample; Cartier Intre Lacuri – irrigation canals, three samples; Cartier Intre Lacuri – Lake II, one sample; Lake Gheorgheni I – one sample; Lake Chios, one sample; Gilău, one sample; Luna de Sus, one sample; Florești, one sample; Apahida, one sample; Jucu de Mijloc, one sample; Jucu, one sample; Lakes from Câmpenești, three samples; Mărtinești (nearby Aiton), one sample.

The organochlorine pollutants were determined by GC-ECD, using a Perkin Elmer GC-MS. Results indicated a very low concentration or even the absence of some organochlorine pesticides and PCB (see Table 1). Their level proven to be much lower than maximum admissible levels according to EU legislation. The pollutants were identified in fat tissues of fish in 0-35% of samples analyzed.

Such low concentrations of pollutants in fish fat compared to results observed in other animals, in mammals for instance (Georgescu et al 2011), and compared to other countries, are explained by decreased agricultural exploitation in Romania, banning the

use of some dangerous chemicals in agriculture wide world, short generation time of fish and its low position in the trophic pyramid.

Table 1

Level of organochlorine pollutants and total PCB
in fish fat sampled from Cluj county and surrounding areas, Romania

<i>Compounds</i>	<i>Sample size</i>	<i>Mean level mg/kg (ppm)</i>
DDT and metabolites	20	0.005
Aldrin	20	0.001
Dieldrin	20	0.000
Endrin	20	0.000
Hexachlorbenzene	20	0.002
Heptachlor	20	0.001
α -HCH	20	0.000
β -HCH	20	0.000
γ -HCH (lindan)	20	0.007
δ -HCH	20	0.000
Total PCB (mixture)	20	0.000

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