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Determination of Pesticides Residues in Tissue of Two Freshwater Fish Species by Modified QuEChERS Method

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Abstract : The consumption of fish is recommended as a means of preventing serious diseases, especially cardiovascular problems. Fish is known to be a valuable source of protein (rich in essential amino acids), unsaturated fatty acids, fat-soluble vitamins, macro- and microelements. However, it can also contain several contaminants (e.g. pesticides, heavy metals) that may pose considerable risks for humans. Among others, pesticide are of special concern. Their widespread use has resulted in the contamination of environmental compartments, including water. The occurrence of pesticides in the environment is a serious problem, due to their potential toxicity. Therefore, a systematic monitoring is needed. The aim of the study was to determine the organochlorine and organophosphate pesticide residues in fish muscle tissues of the pike (Esox lucius, L.) and the rainbow trout (Oncorhynchus mykkis, Walbaum) by a modified QuEChERS (Quick, Easy, Cheap, Effective, Rugged and Safe) method, using Gas Chromatography Quadrupole Mass Spectrometry (GC/Q-MS), working in selected-ion monitoring (SIM) mode. The analysis of α-HCH, β-HCH, lindane, diazinon, disulfoton, δ-HCH, methyl parathion, heptachlor, malathion, aldrin, parathion, heptachlor epoxide, γ-chlordane, endosulfan, α-chlordane, o,p'-DDE, dieldrin, endrin, 4,4'-DDD, ethion, endrin aldehyde, endosulfan sulfate, 4,4'-DDT, and metoxychlor was performed in the samples collected in the Carp Valley (Malopolska region, Poland). The age of the pike (n=6) was 3 years and its weight was 2-3 kg, while the age of the rainbow trout (n=6) was 0.5 year and its weight was 0.5-1.0 kg. Detectable pesticide (HCH isomers, endosulfan isomers, DDT and its metabolites as well as metoxychlor) residues were present in fish samples. However, all these compounds were below the limit of quantification (LOQ). The other examined pesticide residues were below the limit of detection (LOD). Therefore, the levels of contamination were - in all cases - below the default Maximum Residue Levels (MRLs), established by Regulation (EC) No 396/2005 of the European Parliament and of the Council. The monitoring of pesticide residues content in fish is required to minimize potential adverse effects on the environment and human exposure to these contaminants.

Keywords : contaminants, fish, pesticides residues, QuEChERS method
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