

Persistent organic pollutants in the environment and food products in Latvia

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In recent years, halogenated persistent organic pollutants (POPs) have been of great concern due to their release into the environment, bioaccumulation, migration through food chains and potential risks to the environment and human health. Particular attention is paid to the Baltic Sea region due to the increased background levels of POPs. As a result of technological processes and improper utilization of consumer goods, significant amounts of POPs were emitted into the environment. Though concentrations of these compounds in the environment are generally low (*ppb* or even *ppt* levels), this may cause adverse effects in all ecosystems. Due to the high-end position in the food chain, biomagnification of POPs poses significant health risks to humans. In recent years extensive studies in the field of contamination of the environment and food products have been conducted at the Institute for Food Safety, Animal Health and the Environment (BIOR). A number of new analytical methods as well as effective monitoring strategies have been developed for these compounds. The research significantly deepens the understanding of the overall status of environmental pollution in Latvia, occurrence of POPs in food products and possible risks to the Latvian population, as well as supports the European Commission's Green Course strategy, the main goal of which is to protect human health and the environment from toxic contaminants. In the frame of the research the following results were achieved:

- New selective and ultra-sensitive methods for the analysis of halogenated flame retardants and perfluorinated compounds in food, water, and environmental samples using Orbitrap high-resolution mass spectrometry and ultra-high-resolution Fourier transform ion cyclotron resonance (ICR) mass spectrometry (MS) were developed;
- Several methods have been developed for the ultra-sensitive analysis of regulated and little-studied halogenated dioxin-like compounds in food and environmental samples using high-resolution magnetic sector spectrometry;
- The developed methods were applied to the analysis of food products from the Latvian market. Almost all selected POP groups were represented in food.
- The developed methods were applied to the analysis of environmental samples of the Baltic region. The contamination status of the samples with regulated contaminants and with little-studied compounds was assessed. It has been found that fish samples from the Baltic Sea showed higher contamination in comparison with freshwater species, while pollution in samples from inland waters was also highly dependent on the fish species (for example, eels bioaccumulate at significantly higher concentrations due to their feeding characteristics);
- The content of halogenated pollutants and toxic elements in Latvian wild animals (wild boar, deer and elk) was evaluated. Halogenated contaminants and toxic elements were detected in all species, confirming the ubiquity of ecotoxicants;
- Information on the presence of perfluorinated compounds in food is collected at the European level and the potential risks to consumers are assessed, taking into account the toxicological properties of these contaminants.

Considering that the problem of POPs in the environment and food products is of great concern to all regions of the world, the analytical methods and strategies developed by BIOR as well as generated occurrence data will support research in this area in a new quality on a global scale.