

## OCCURRENCE OF SOME PHENOXY CARBOXYLIC HERBICIDES IN DIFFERENT SURFACE WATER AND WASTEWATER SOURCES FROM ROMANIA

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**Abstract.** Chlorophenoxy-carboxylic acids, used worldwide in controlling the weeds, are known to have adverse effects on phytoplankton populations. Some of these herbicides, 2,4-dichlorophenoxyacetic acid (2,4-D), 2-methyl-4-chlorophenoxyacetic acid (MCPA), 2-methyl-4-chlorophenoxybutyric acid, 2,4-dichlorophenoxybutyric acid and 4-chlorophenoxyacetic acid (4-CPA) were reported in concentrations of tens ng/L in surface water and municipal wastewater. Limited information is available about their occurrence in Romania's waters. As far as we know, few studies monitored the presence of 2,4-D and MCPA in Danube water, while for wastewaters no further studies have been done.

Through this work the above specified herbicides were quantified in wastewaters and receiving surface waters (Jiu and Danube). Data were collected from one sampling campaign, at the end of October. In order to reach low limits of detection, below 5ng/L, an analytical method based on automated solid phase extraction and gas chromatograph coupled with tandem mass spectrometer, SPE-GC/MS/MS was used.

The results revealed that the dominant herbicide in Danube River was 2,4-D (2.3-112 ng/L), higher than other data reported for Danube and occasionally higher than allowable concentration limit (100 ng/L) specified in Order 161/2006. Levels of other

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compounds were lower comparing with 2,4-D, in the range of 2.4-63ng/L. For wastewater effluents, the values were significantly higher for 2,4-D (5-247 ng/L), MCPA (18-130 ng/L) and 4-CPA (3-142 ng/L).

Computing the daily discharge of selected herbicides from the different wastewater treatment plants we obtained comparable results, in the range of 0.17-8.6 g/day. The overall contribution of wastewater effluents to Danube loads is below 0.3%. These results indicate that the major contribution to Danube herbicides loads comes from diffuse sources, most probable from agriculture.

An index, ERPWI (Environmental Relevance of Pesticides from Wastewater treatment plants Index), was used to assess the risk of the maximum concentrations of analyzed herbicides to sensitive aquatic organisms from water bodies. The impact is moderate.

**Keywords:** chlorophenoxycarboxylic acids, herbicides, surface water, wastewater

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