

## B.4. Water

# Pesticide residues in surface water in Bosnia-Herzegovina

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## Abstract

The investigation of samples collected from the water of the river Moscanica, Miljacka, Bosna and Zeljeznica has been performed during autumn 1998 and spring 1999 in order to monitor the levels of the pesticides residues from the carbohydrates group (lindane and DDT) and organochlorine phosphorus parathion, malathion and diazinon. The methods that have been used during this research were TCL and GC. Only lindane and DDT have been detected in the rivers Moscanica and Miljacka.

## Keywords

Pesticides, surface water, contamination, residue, insecticides, rivers, carbohydrates and chlorine-phosphorus compounds.

## Introduction

Surface waters have been almost contaminated with pesticides residues regardless of the economical development in certain countries. Special problem is the presence of the persistent pesticides although their usage is prohibited in many countries.

Residues of pesticides are very often present in potable water which decreased its hygienically validity for man as well as domestic animals. However residues of pesticides in waters jeopardise the living matter.

The intensive application of the monitoring system for pesticides residues in surface waters and soil has been started in the last decade, especially in developed countries.

The very first researches of pesticides residues in Bosnia and Herzegovina were performed by Zarkovic *et al.* (1973) in the fatty tissue of men and Numic *et al.* (1976) in the fruit trees and vegetable plants from the group of carbamate. In the region of Sarajevo, Numic (1985) studied soil contamination by pesticide residues.

## Aim

The aim of this project was to study the presence of pesticide residues (active ingredients of chlorine - carbohydrate including:

- Lindane (gamma - isomer HCH)
- DDT (Dichlor diphenyl trichlor ethane) and
- Organic - phosphorus insecticides:
- Diazion (diethyl -/isopropil-methyl-primidyl/-thiophosphate);
- Malathion (dimethyl - dicarboxy - ditiophosphate);
- Parathion (diethyl - nytrophenyl - thiophosphate) in surface waters of the rivers Moscanica, Miljacka Bosna and Zeljeznica.

## Materials

Water samples were collected in the middle and lower part of the river course during autumn (beginning of November) and spring (beginning of May). Each sample contained five litres of water and was collected at the average depth of the stream according to the standard procedure of Soldatovic *et al.* 1980.

## Methods

Samples were boiled in order to decrease the volume and the content of active ingredients of insecticides was determined by TCL (Thin Layer Chromatography). Active ingredients of each insecticide were used as standard.

## Results

The results of the water sample analyses on the concentration of pesticides (insecticides) residues are shown in Tables 1 and 2.

**Table 1. Pesticides residues during autumn 1998**

Pesticide	River	No of samples	Maximum concentration ug/l	No. of + samples
gamma-HCH	Moscanica	5	10	4
	Miljacka	5	4	2
	Bosna	5	0	0
	Zeljeznica	5	18	5
DDT	Moscanica	5	Trace	2
	Miljacka	5	Trace	1
	Bosna	5	0	0
	Zeljeznica	5	2	4
Parathion	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0
Malathion	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0
Diazinon	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0

**Table 2. Pesticides residues during spring 1999**

Pesticide	River	No of samples	Maximum concentration ug/l	No. of + samples
gamma-HCH	Moscanica	5	4	1
	Miljacka	5	3	2
	Bosna	5	0	0
	Zeljeznica	5	7	1
DDT	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0
Parathion	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0
Malathion	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0
Diazinon	Moscanica	5	0	0
	Miljacka	5	0	0
	Bosna	5	0	0
	Zeljeznica	5	0	0

## Discussion

Generally the results showed a low content of pesticides residues in water samples of the rivers Moscanica, Miljacka, Bosna and Zeljeznica.

Lindane was detected in three rivers except river Bosna. This insecticide has been still used for the soil treatment for the pest control but only once per year. It is very likely that this insecticide has been often used in the upper course of the rivers. As extremely persistent pesticide, the lindane is spread on the earth and by atmospheric rain, which comes into rivers, lakes and seas (Juha Pekka Hirvi and Seppo Rekolainen, 1995). Usage of lindane has been prohibited in many countries and this should also be done in Bosnia and Herzegovina.

DDT, although prohibited for a long time, due to extreme persistence, can be detected in the soil and water. However, its presence was found only in traces in the rivers Moscanica and Miljacka. According to water analysis from these rivers, the presence DDT was to some extent higher especially during the 1994 (war actions, unpublished data).

The residues from the group of organo-phosphorus pesticides have not been detected in those four rivers, which showed that its usage was limited in the post-war period. Besides, the parathion was taken off the list of allowed pesticides for usage in the agricultural practice.

According to the various studies on pesticides residues in precipitation and surface waters in Nordic countries and Germany, it is obvious that these chemicals are still present in higher quantities during vegetation season (Kreuger, 1994, Siela *et al.* 1994).

On the basis of the performed investigations of pesticides residues in the four rivers Moscanica, Miljacka, Bosna and Zeljeznica, the following conclusion can be drawn:

- Presence of lindane and DDT residues was determined in the rivers Moscanica and Miljacka.
- The organo-chlorine pesticides were not detected in samples of those waters.
- According to the fact that there are 605 formulated pesticides on the basis of 258 active ingredients the monitoring system for residues would be extremely important for the protection of biosphere and environment.

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