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HERBICIDE MICROPOLLUTANTS IN SURFACE, GROUND AND DRINKING WATER WITHIN AND NEAR THE AREA OF ZAGREB, CROATIA

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AIM

- To investigate the frequency and mass concentration of 13 herbicides in surface, ground and drinking waters in the area of the city of Zagreb and its suburbs
- To extend knowledge regarding water contamination by herbicides not included on the list of Priority Substances in the Field of Water Policy (DIRECTIVE 2013)

EXPERIMENTAL

- Compounds analysed:

Triazines: atrazine, terbuthylazine, deethylatrazine (DEA), deisopropylatrazine (DIA), deethylterbutylazine (DET); *phenylureas*: diuron, linuron, chlortoluron, isoproturon; *chloroacetanilides*: alachlor, acetochlor, metolachlor and *dinitroaniline* trifluralin

- Analysis:

Sample
- 500 mL of water
- 1000 mL of water

SPE
- Octadecylsilica, C_{18}
- Styrene-divinylbenzene, SDB

Quantitative analysis
- GC-MS
- HPLC-UV DAD

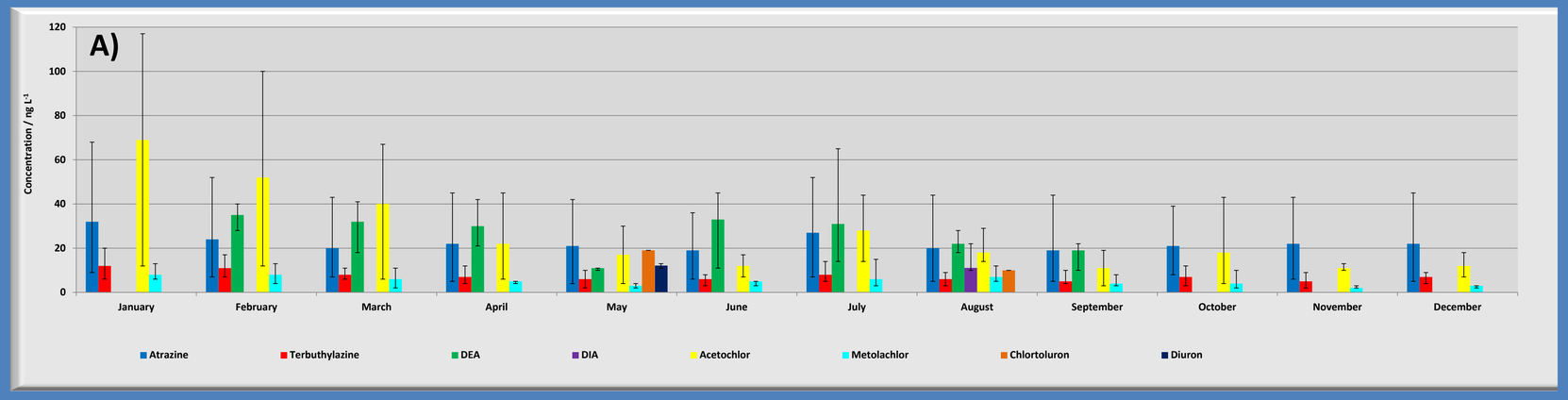
- Sampling:

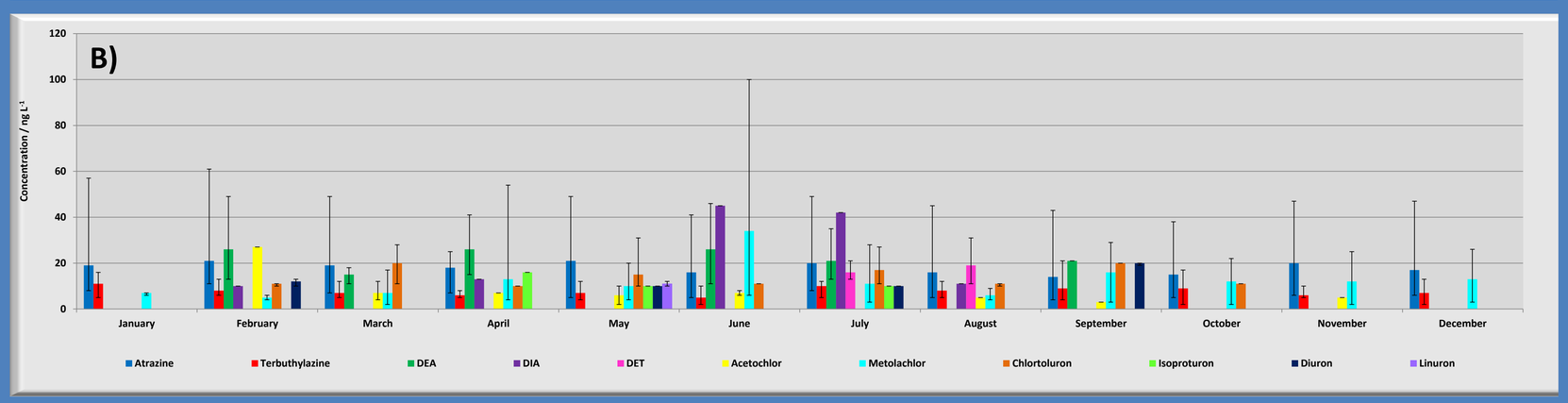
Monthly from January to December 2014:
84 surface water samples (7 locations)
180 ground water samples (15 locations)
252 drinking water samples (21 locations)

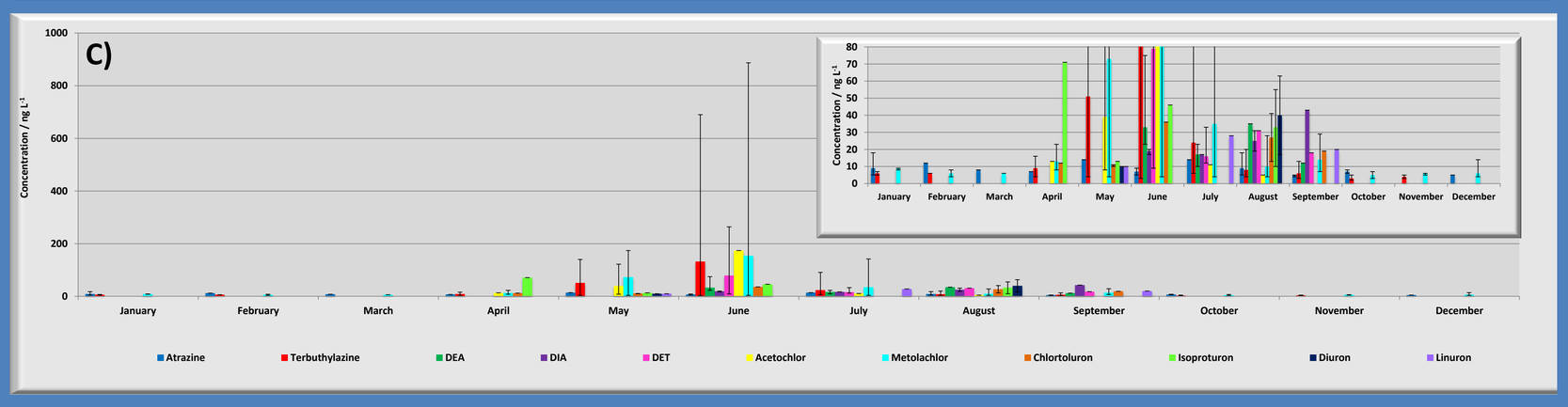
RESULTS

Water samples

Average concentrations and concentration ranges (ng L^{-1}) of analysed compounds in positive samples: A) drinking water, B) ground water and C) surface water

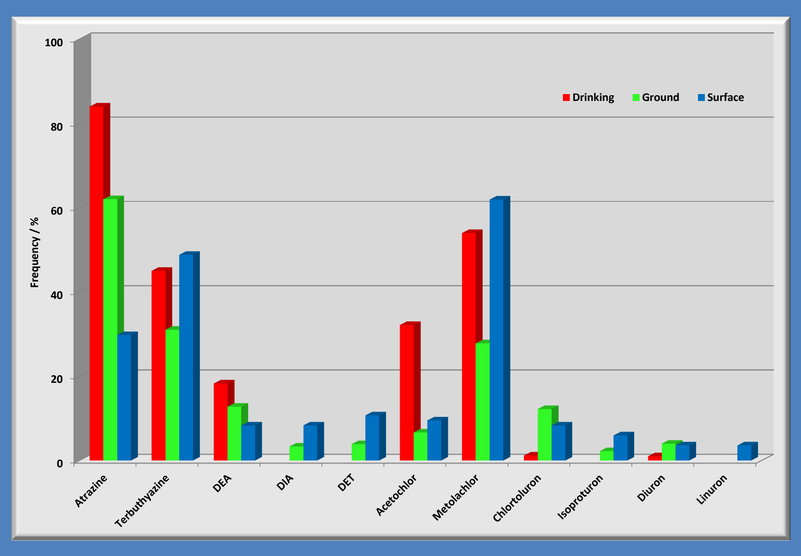






Occurrence

Frequency of occurrence of pollutants in analysed drinking, ground and surface water samples



Atrazine: before and after

Comparison of atrazine concentrations and frequency of occurrence in different waters before (1992-2001) and after (2014) ban

SAMPLE		Frequency	Concentration range / ng L^{-1}	Median / ng L^{-1}
Drinking water	2001	85 %	10-220	70
	2014	85 %	5-70	16
Ground water	2001	95%	10-690	60
	2014	61 %	5-56	7
Surface water	2001	90 %	20-730	40
	2014	29 %	5-18	ND

The extraction recoveries of the analysed compounds from spiked water samples were 82-106 % with RSD < 4.

The detection limit of analysed compounds in water was 5 ng L^{-1}, regardless of the detector used.

Atrazine was the most frequently detected herbicide in drinking (84 %) and ground waters (62 %).

Acetochlor mass concentrations of 107 to 117 ng L^{-1} in three tap water samples were the highest measured.

The most frequently (59 %) and highely measured (887 ng L^{-1}) in surface waters was metolachlor.

Terbuthylazine was detected in 49 % of surface water samples, at concentrations up to 690 ng L^{-1}.

Atrazine mass concentration and frequency of occurrence in surface waters was lower in 2014 than in 1992-2001.

Agricultural activities in the surrounding areas influenced the purity of surface, ground and drinking waters.

ACKNOWLEDGMENT

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