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Results of national pesticide screening in the Czech Republic

Vit Kodes, Jitka Vejvodova, and Marketa Ackermanova
Czech Hydrometeorological Institute, Prague, Czech Republic (kodes@chmi.cz, +420 24403 2357)

Screening of pesticides was conducted within a project "Occurrence and transport of pesticides in hydrosphere of the Czech Republic" in 2009. Surface water including drinking water reservoirs, ground water including selected drinking water supply wells, suspended particulate matter (SPM) and river bed sediments were sampled. Additionally rivers and groundwaters were sampled by POCIS (Polar Organic Chemical Integrative Sampler) samplers. Relevancy of pesticides for these matrixes was determined using environmental properties such as half-life, water solubility, adsorption properties; usage of active substances was also considered. 110 active substances and metabolites at 146 sites in surface water, 138 substances and metabolites at 653 sites in groundwater, 58 substances and metabolites at 100 rivers sites in POCIS samplers, 78 substances and metabolites at 64 groundwater sites in POCIS samplers and 47 substances at 72 sites in SPM and 47 substances at 93 sites in sediments were analyzed. In total 584 surface water samples, 1263 groundwater samples, 165 SPM and sediment samples, 164 POCIS samples were taken.

Terbuthylazine, Desethylterbuthylazine, Atrazine, Desethylatrazine, Metolachlor, Acetochlor OA, Glyphosate and AMPA were the most frequently occurring substances in rivers. Substances found in highest concentrations were MCPA, Acetochlor OA, Terbuthylazine, Desethylterbuthylazine, Metazachlor, Metolachlor OA, Glyphosate and AMPA. 47 pesticides were found in rivers, at least one substance was detected at each sampling site. 19 substances occured in drinking water reservoirs, at least 1 pesticide was detected at 45 from 46 sampled reservoirs.

Atrazine, Desethylatrazine, Hexazinone, Terbuthylazine, Metolachlor, Simazine, Terbutryne and Tebuconazole were the most frequently occurring substances in POCIS samplers exposed in rivers. Substances found in highest concentrations were Acetochlor, Terbuthylazine, Linuron, Chlorotoluron, 2,4-D and Metolachlor. 51 substances were detected in samplers, at least 5 substances were found at each sampling site.

p,p'-DDE, p,p'-DDT, AMPA, Glyphosate, p,p'-DDD, Linuron, Terbuthylazine, Terbutryne and Chlorpyrifos were the most frequently occuring susbstances in SPM. Substances found in highest concentrations were Glyphosate, AMPA, Alachlor, p,p'-DDT, Paraquat and Diquat. 20 substances were found, in SPM at least 1 substance occured at 84 from 93 sampling sites

p,p'-DDE, AMPA, p,p'-DDT, Glyphosate and p,p'-DDD were the most frequently occuring substances in river sediments. Substances found in highest concentrations were Hexachlorobenzene, AMPA, p,p'-DDT, Glyphosate, p,p'-DDD and Diquat. 28 substances occured in sediment samples, at least 2 substances were found at each sampling site.

Atrazine, Desethylatrazine, Alachlor ESA, Hexazinone, Hydroxyatrazine and Metolachlor ESA were detected most frequently in groundwater. Substances found in highest concentrations were Clopyralid, Metolachlor ESA, Hydroxyatrazine, Azoxystrobin, Alachlor ESA and Prometryne. 64 substances were detected in groundwater samples, at least one substance was found at 261 from 653 sites, the groundwater quality standard of 0.1 μg/l was exceeded at 121 sites.

Atrazine, Desethylatrazine, Hexazinone, Carbendazim, Simazine, Methamidophos, Terbuthylazine and Propazine were the most frequently occurring substances in POCIS samplers exposed in groundwater. Substances found in highest concentrations were Chlorotoluron, Atrazine, Desethylatrazine, Prometryne, Bentazone, Hexazinone, Hydroxyterbuthylazine, Terbutryne and MCPP. 43 substances were detected in samplers, at least one pesticide was found at 64 from 65 sampling sites.

Pesticides were found in river water at 100% of sampling sites and at 98% of drinking water reservoirs, in SPM at 100% sampling sites, in sediment at 90% of sampling sites and in groundwater at 40% af sampling sites.

Triazine, chloroacetinilide, phenoxyacetic, phenylurea, organophosphorus herbicides were identified as substances frequently occuring in water ecosystemes in the Czech Republic. Their metabolites were detected in samples very often and even in higher concentrations than parent compounds. Some compounds (atrazine, hexazinone, terbutryne, simazine) were still frequently detected in samples, even though they were legaly used in agriculture for the last time in 2004-2005.

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