

Monitoring of pesticides in drinking water: finding the right balance between under- and over-monitoring – experience from the Czech Republic

Supplementary information

SI-1 Complete overview of results of all 195 monitored pesticides in drinking water in the Czech Republic in 2017

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
2,4,5-T	93-76-5	µg.L ⁻¹	< 0.010	< 0.030	0.012	0.011	0.013	0.005	0.015	138	0	138
2,4-D	94-75-7	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.013	0.005	0.013	2420	0	2421
2,4-DDD	53-19-0	µg.L ⁻¹	< 0.002	< 0.025	0.005	0.005	0.005	0.005	0.005	225	0	225
2,4-DDE	3424-82-6	µg.L ⁻¹	< 0.001	< 0.025	0.004	0.003	0.005	0.001	0.005	264	0	264
2,4-DDT	789-02-6	µg.L ⁻¹	< 0.001	< 0.025	0.004	0.004	0.005	0.001	0.005	300	0	303
2,6-dichlorbenzamide	2008-58-4	µg.L ⁻¹	< 0.010	= 0.610	0.009	0.006	0.005	0.005	0.015	442	1	466
4,4-DDD	72-54-8	µg.L ⁻¹	< 0.001	< 0.025	0.002	0.001	0.001	0.001	0.005	813	0	816
4,4-DDE	72-55-9	µg.L ⁻¹	< 0.001	< 0.025	0.002	0.001	0.001	0.001	0.005	1340	0	1346
4,4-DDT	50-29-3	µg.L ⁻¹	< 0.001	< 0.025	0.003	0.002	0.003	0.001	0.005	1490	0	1494
acetochlor	34256-82-1	µg.L ⁻¹	< 0.005	< 0.050	0.011	0.010	0.013	0.005	0.015	3636	0	3641
acetochlor ESA	187022-11-3	µg.L ⁻¹	< 0.020	= 2.900	0.050	0.019	0.013	0.010	0.097	1957	241	2560
acetochlor OA	194992-44-4	µg.L ⁻¹	< 0.010	= 0.270	0.014	0.012	0.013	0.010	0.015	2097	23	2169
alachlor	15972-60-8	µg.L ⁻¹	< 0.005	< 0.050	0.009	0.008	0.010	0.003	0.013	3405	0	3410
alachlor ESA	142363-53-9	µg.L ⁻¹	< 0.005	= 3.820	0.162	0.036	0.015	0.010	0.520	1388	107	2519
alachlor OA	171262-17-2	µg.L ⁻¹	< 0.010	< 0.200	0.012	0.011	0.013	0.010	0.013	2068	0	2076

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
aldicarb	116-06-3	µg.L ⁻¹	< 0.030	< 0.050	0.018	0.018	0.015	0.015	0.025	84	0	87
aldrin	309-00-2	µg.L ⁻¹	< 0.001	= 0.012	0.002	0.001	0.001	0.001	0.005	1301	0	1305
alfa-Endosulfan	959-98-8	µg.L ⁻¹	< 0.001	< 0.025	0.004	0.003	0.005	0.001	0.005	343	0	346
alfa-HCH	319-84-6	µg.L ⁻¹	< 0.001	< 0.025	0.006	0.005	0.005	0.005	0.005	290	0	293
ametryn	834-12-8	µg.L ⁻¹	< 0.005	< 0.050	0.006	0.004	0.003	0.003	0.005	284	0	287
amidosulfuron	120923-37-7	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
aminomethylphosphonic acid	1066-51-9	µg.L ⁻¹	< 0.020	= 0.120	0.023	0.022	0.025	0.013	0.025	574	1	575
aminopyralid	150114-71-9	µg.L ⁻¹	< 0.050	< 0.100	0.025	0.025	0.025	0.025	0.025	148	0	148
atraton	1610-17-9	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	29	0	32
atrazine	1912-24-9	µg.L ⁻¹	< 0.005	= 0.486	0.010	0.008	0.005	0.005	0.013	3635	9	3950
atrazine-desisopropyl	1007-28-9	µg.L ⁻¹	< 0.010	= 0.062	0.011	0.009	0.013	0.005	0.013	4588	0	4642
azoxystrobin	131860-33-8	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.013	0.005	0.013	1936	0	1945
bentazone	25057-89-0	µg.L ⁻¹	< 0.010	= 0.270	0.010	0.009	0.013	0.005	0.013	2443	7	2492
beta-Endosulfan	33213-65-9	µg.L ⁻¹	< 0.001	< 0.025	0.004	0.003	0.005	0.001	0.005	301	0	304
beta-HCH	319-85-7	µg.L ⁻¹	< 0.001	< 0.025	0.005	0.005	0.005	0.005	0.005	263	0	266
boskalid	188425-85-6	µg.L ⁻¹	< 0.010	< 0.025	0.007	0.006	0.005	0.005	0.013	659	0	659
bromacil	314-40-9	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
carbendazim	10605-21-7	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.012	0.013	0.013	0.013	1129	0	1132
carboxin	5234-68-4	µg.L ⁻¹	< 0.020	< 0.050	0.013	0.013	0.013	0.013	0.013	996	0	999
cis-Chlordan	5103-71-9	µg.L ⁻¹	< 0.010	< 0.025	0.006	0.005	0.005	0.005	0.005	24	0	27
clomazone	81777-89-1	µg.L ⁻¹	< 0.010	< 0.050	0.009	0.008	0.013	0.005	0.013	1908	0	1925
clopyralid	1702-17-6	µg.L ⁻¹	< 0.010	= 0.272	0.014	0.014	0.013	0.013	0.015	1881	2	1885
cyanazin	21725-46-2	µg.L ⁻¹	< 0.005	< 0.050	0.010	0.008	0.013	0.005	0.015	2358	0	2361
cyproconazole	94361-06-5	µg.L ⁻¹	< 0.010	< 0.050	0.009	0.008	0.013	0.005	0.013	1982	0	1986
cyprodinil	121552-61-2	µg.L ⁻¹	< 0.020	< 0.050	0.013	0.013	0.013	0.013	0.013	913	0	916
DEET	134-62-9	µg.L ⁻¹	< 0.010	= 0.294	0.011	0.007	0.005	0.005	0.015	110	1	116
delta-HCH	319-86-8	µg.L ⁻¹	< 0.001	< 0.025	0.005	0.004	0.005	0.005	0.005	134	0	137
deltamethrin	52918-63-5	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	19	0	19
desethylatrazine	6190-65-4	µg.L ⁻¹	< 0.005	= 0.579	0.012	0.008	0.008	0.005	0.017	3402	35	3877
desethyl-desisopropyl atrazine	3397-62-4	µg.L ⁻¹	< 0.005	= 0.478	0.018	0.013	0.013	0.005	0.025	543	7	573
desethylterbutylazine	30125-63-4	µg.L ⁻¹	< 0.001	= 0.190	0.011	0.008	0.005	0.005	0.025	2475	1	2798
desmedipham	13684-56-5	µg.L ⁻¹	< 0.010	< 0.025	0.011	0.010	0.013	0.005	0.013	1275	0	1275
desmetryn	1014-69-3	µg.L ⁻¹	< 0.005	< 0.050	0.006	0.006	0.005	0.005	0.010	984	0	987
diazinon	333-41-5	µg.L ⁻¹	< 0.005	< 0.050	0.006	0.006	0.005	0.005	0.010	1008	0	1010

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
dicamba	1918-00-9	µg.L ⁻¹	< 0.010	< 0.050	0.015	0.014	0.015	0.013	0.015	2332	0	2334
dieldrin	60-57-1	µg.L ⁻¹	< 0.001	< 0.010	0.002	0.001	0.001	0.001	0.005	1214	0	1227
difenoconazole	119446-68-3	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.010	0.005	0.013	792	0	793
diflufenican	83164-33-4	µg.L ⁻¹	< 0.010	= 0.096	0.010	0.009	0.010	0.005	0.013	883	0	888
dichlobenil	1194-65-6	µg.L ⁻¹	< 0.010	< 0.050	0.011	0.009	0.005	0.005	0.025	445	0	445
dichlormid	37764-25-3	µg.L ⁻¹	< 0.025	< 0.050	0.013	0.013	0.013	0.013	0.013	974	0	975
dichlorprop	120-36-5	µg.L ⁻¹	< 0.010	= 0.078	0.012	0.011	0.013	0.005	0.013	1574	0	1576
diquat dibromide	85-00-7	µg.L ⁻¹	< 0.010	< 0.050	0.016	0.012	0.025	0.005	0.025	368	0	368
dimethachlor	50563-36-5	µg.L ⁻¹	< 0.005	< 0.050	0.009	0.008	0.013	0.005	0.013	2012	0	2017
dimethachlor ESA	CASID30748	µg.L ⁻¹	< 0.010	= 0.102	0.015	0.011	0.015	0.005	0.015	26	1	28
dimethachlor OA	1086384-49-7	µg.L ⁻¹	< 0.020	= 0.120	0.015	0.013	0.010	0.010	0.015	34	1	35
dimethenamid	87674-68-8	µg.L ⁻¹	< 0.010	= 0.610	0.012	0.009	0.013	0.005	0.013	1902	1	1909
dimethoat	60-51-5	µg.L ⁻¹	< 0.010	< 0.100	0.010	0.009	0.010	0.005	0.013	2216	0	2220
dimethomorph	110488-70-5	µg.L ⁻¹	< 0.010	< 0.050	0.019	0.015	0.025	0.005	0.025	37	0	40
disulfoton	298-04-4	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	19	0	19
diuron	330-54-1	µg.L ⁻¹	< 0.001	< 0.050	0.006	0.002	0.001	0.001	0.015	259	0	263
endosulfan sulfate	1031-07-8	µg.L ⁻¹	< 0.001	< 0.050	0.024	0.021	0.025	0.025	0.025	21	0	21

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
endrin	72-20-8	µg.L ⁻¹	< 0.001	< 0.050	0.004	0.003	0.005	0.001	0.005	420	0	423
endrin aldehyde	7421-93-4	µg.L ⁻¹	< 0.001	< 0.050	0.024	0.021	0.025	0.025	0.025	21	0	21
epoxiconazole	133855-98-8	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.012	0.013	0.005	0.015	2056	0	2060
epsilon-HCH	6108-10-7	µg.L ⁻¹	< 0.010	< 0.010	0.005	0.005	0.005	0.005	0.005	14	0	17
ethofumesate	26225-79-6	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.013	0.005	0.013	1902	0	1907
ethoprophos	13194-48-4	µg.L ⁻¹	< 0.010	< 0.050	0.011	0.008	0.005	0.005	0.025	104	0	107
2,4-acid ethylhexyl ester	1928-43-4	µg.L ⁻¹	< 0.010	< 0.010	0.005	0.005	0.005	0.005	0.005	30	0	30
fenarimol	60168-88-9	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
fenchlorphos	299-84-3	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	19	0	19
fenitrothion	122-14-5	µg.L ⁻¹	< 0.020	< 0.050	0.017	0.015	0.015	0.010	0.025	181	0	181
fenoxycarb	72490-01-8	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
fenpropidin	67306-00-7	µg.L ⁻¹	< 0.005	< 0.050	0.011	0.010	0.013	0.005	0.013	2079	0	2086
fenpropimorph	67564-91-4	µg.L ⁻¹	< 0.005	< 0.050	0.011	0.010	0.013	0.005	0.013	1526	0	1529
fenuron	101-42-8	µg.L ⁻¹	< 0.010	= 0.060	0.006	0.005	0.005	0.005	0.005	458	0	463
florasulam	145701-23-1	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	53	0	56
fluazifop-butyl	79241-46-6	µg.L ⁻¹	< 0.025	< 0.050	0.014	0.014	0.013	0.013	0.025	228	0	228
fluazifop-P-butyl	83066-88-0	µg.L ⁻¹	< 0.020	< 0.025	0.012	0.012	0.013	0.013	0.013	659	0	659

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
fluroxypyr	69377-81-7	µg.L ⁻¹	< 0.010	< 0.050	0.011	0.011	0.013	0.010	0.013	1843	0	1844
flusilazol	85509-19-9	µg.L ⁻¹	< 0.005	< 0.050	0.012	0.011	0.013	0.013	0.013	1134	0	1137
fluzifop-butyl	69806-50-4	µg.L ⁻¹	< 0.025	< 0.025	0.013	0.013	0.013	0.013	0.013	128	0	128
foramsulfuron	173159-57-4	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
glufosinate ammonium	77182-82-2	µg.L ⁻¹	< 0.020	< 0.020	0.010	0.010	0.010	0.010	0.010	11	0	11
glufosinate	51276-47-2	µg.L ⁻¹	< 0.030	= 0.035	0.016	0.015	0.015	0.015	0.015	27	0	28
haloxyfop	69806-34-4	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
haloxyfop-methyl [(R)-isomer]	72619-32-0	µg.L ⁻¹	< 0.025	< 0.050	0.013	0.013	0.013	0.013	0.013	524	0	527
heptachlor	76-44-8	µg.L ⁻¹	< 0.001	< 0.025	0.002	0.001	0.002	0.001	0.005	1496	0	1508
heptachlor epoxide	1024-57-3	µg.L ⁻¹	< 0.001	< 0.010	0.003	0.002	0.002	0.001	0.005	683	0	687
heptachlorepoxy A	28044-83-9	µg.L ⁻¹	< 0.003	< 0.010	0.005	0.004	0.005	0.004	0.005	161	0	164
hexachlorbenzene	118-74-1	µg.L ⁻¹	< 0.001	< 0.025	0.002	0.001	0.001	0.001	0.005	1505	0	1509
hexazinon	51235-04-2	µg.L ⁻¹	< 0.005	= 0.403	0.009	0.007	0.005	0.005	0.013	3128	20	3273
hydroxyatrazine	2163-68-0	µg.L ⁻¹	< 0.005	= 0.250	0.011	0.009	0.013	0.005	0.013	1657	0	1736
hydroxysimazine	255613	µg.L ⁻¹	< 0.010	< 0.050	0.005	0.005	0.005	0.005	0.005	243	0	243
hydroxyterbutylazine	66753-07-9	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.007	0.005	0.005	0.025	215	0	252
chlorbromuron	13360-45-7	µg.L ⁻¹	< 0.010	< 0.050	0.015	0.011	0.005	0.005	0.025	54	0	57

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
chlorfenvinfos	470-90-6	µg.L ⁻¹	< 0.005	= 0.075	0.006	0.005	0.005	0.003	0.005	802	0	806
chloridazon-desphenyl	6339-19-1	µg.L ⁻¹	< 0.010	= 6.850	0.160	0.031	0.015	0.013	0.290	1156	4	1653
chloridazone	1698-60-8	µg.L ⁻¹	< 0.005	= 0.130	0.009	0.008	0.005	0.005	0.013	2403	1	2415
chloridazon-methyl-desphenyl	17254-80-7	µg.L ⁻¹	< 0.010	= 3.780	0.037	0.017	0.025	0.005	0.059	1359	0	1610
chlormequat chloride	999-81-5	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.008	0.005	0.005	0.025	452	0	454
chlorpyrifos	2921-88-2	µg.L ⁻¹	< 0.002	< 0.050	0.007	0.005	0.005	0.003	0.013	2440	0	2443
chlorpyrifos-metyl	5598-13-0	µg.L ⁻¹	< 0.005	< 0.050	0.009	0.006	0.005	0.003	0.025	258	0	261
chlorsulfuron	64902-72-3	µg.L ⁻¹	< 0.010	< 0.050	0.019	0.015	0.025	0.005	0.025	37	0	40
chlortoluron	15545-48-9	µg.L ⁻¹	< 0.005	= 0.540	0.010	0.008	0.010	0.005	0.013	2474	4	2500
chlortoluron desmethyl	22175-22-0	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.010	0.005	0.010	815	0	818
imazamox	114311-32-9	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
imidacloprid	138261-41-3	µg.L ⁻¹	< 0.010	< 0.050	0.019	0.015	0.025	0.005	0.025	37	0	40
iprovalikarb	140923-17-7	µg.L ⁻¹	< 0.010	< 0.050	0.014	0.013	0.013	0.013	0.025	204	0	207
isodrin	465-73-6	µg.L ⁻¹	< 0.002	< 0.010	0.003	0.003	0.005	0.001	0.005	203	0	206
isoproturon	34123-59-6	µg.L ⁻¹	< 0.005	< 0.050	0.009	0.008	0.010	0.005	0.013	2602	0	2609
isoproturon-desmethyl	56046-17-4	µg.L ⁻¹	< 0.010	< 0.050	0.009	0.008	0.010	0.005	0.010	777	0	778
isoproturon-monodesmethyl	34123-57-4	µg.L ⁻¹	< 0.010	< 0.050	0.009	0.009	0.010	0.005	0.010	777	0	778

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
kresoxim-methyl	143390-89-0	µg.L ⁻¹	< 0.025	< 0.050	0.013	0.013	0.013	0.013	0.013	998	0	1001
lenacil	2164-08-1	µg.L ⁻¹	< 0.005	< 0.050	0.012	0.011	0.013	0.005	0.013	1166	0	1169
lindane (gama-HCH)	58-89-9	µg.L ⁻¹	< 0.001	< 0.025	0.003	0.001	0.002	0.001	0.005	1429	0	1448
linuron	330-55-2	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.010	0.010	0.005	0.013	2345	0	2349
MCPA	94-74-6	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.008	0.013	0.005	0.013	2479	0	2482
MCPB	94-81-5	µg.L ⁻¹	< 0.010	= 0.064	0.014	0.013	0.013	0.013	0.025	1354	0	1356
MCPP	93-65-2	µg.L ⁻¹	< 0.010	= 0.300	0.010	0.009	0.013	0.005	0.013	1959	3	1963
mefenpyr-diethyl	135590-91-9	µg.L ⁻¹	< 0.020	< 0.050	0.013	0.013	0.013	0.013	0.013	997	0	1000
mesotrione	104206-82-8	µg.L ⁻¹	< 0.010	< 0.050	0.017	0.016	0.013	0.013	0.025	366	0	369
metalaxyl	57837-19-1	µg.L ⁻¹	< 0.010	< 0.010	0.005	0.005	0.005	0.005	0.005	11	0	11
metamitron	41394-05-2	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.012	0.013	0.005	0.015	1946	0	1950
metazachlor	67129-08-2	µg.L ⁻¹	< 0.005	= 0.250	0.008	0.007	0.005	0.005	0.013	3835	1	3843
metazachlor ESA	172960-62-2	µg.L ⁻¹	< 0.010	= 6.550	0.144	0.034	0.013	0.010	0.330	1391	2	2466
metazachlor OA	1231244-60-2	µg.L ⁻¹	< 0.010	= 2.180	0.028	0.018	0.013	0.013	0.044	1777	0	2093
metconazole	125116-23-6	µg.L ⁻¹	< 0.020	< 0.050	0.012	0.012	0.013	0.010	0.013	1369	0	1372
methabenzthiazuron	18691-97-9	µg.L ⁻¹	< 0.005	< 0.050	0.007	0.005	0.005	0.003	0.025	184	0	187
methoxyfenozide	161050-58-4	µg.L ⁻¹	< 0.025	< 0.050	0.014	0.014	0.013	0.013	0.015	869	0	872

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
methoxychlor	72-43-5	µg.L ⁻¹	< 0.001	< 0.100	0.003	0.002	0.003	0.001	0.005	1462	0	1468
metobromuron	3060-89-7	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.011	0.013	0.005	0.013	1269	0	1273
metolachlor ESA	171118-09-5	µg.L ⁻¹	< 0.010	= 4.200	0.054	0.021	0.013	0.010	0.098	1756	0	2495
metolachlor OA	152019-73-3	µg.L ⁻¹	< 0.010	= 1.500	0.019	0.014	0.013	0.010	0.015	1988	0	2117
metoxuron	19937-59-8	µg.L ⁻¹	< 0.001	< 0.050	0.011	0.010	0.013	0.003	0.013	1193	0	1196
metribuzin	21087-64-9	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.008	0.005	0.005	0.015	670	0	674
metribuzin desamino	35045-02-4	µg.L ⁻¹	< 0.010	< 0.050	0.007	0.007	0.005	0.005	0.010	335	0	335
metsulfuron-methyl	74223-64-6	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
mirex	2385-85-5	µg.L ⁻¹	< 0.001	< 0.010	0.005	0.004	0.005	0.005	0.005	21	0	21
monolinuron	1746-81-2	µg.L ⁻¹	< 0.005	< 0.050	0.008	0.006	0.005	0.003	0.025	247	0	250
N- (fosfonomethyl) glycine	1071-83-6	µg.L ⁻¹	< 0.025	= 1.210	0.030	0.026	0.025	0.013	0.050	867	2	870
napropamide	15299-99-7	µg.L ⁻¹	< 0.010	< 0.050	0.005	0.005	0.005	0.005	0.005	495	0	496
naphtalam	132-66-1	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
nicosulfuron	111991-09-4	µg.L ⁻¹	< 0.010	< 0.050	0.020	0.018	0.025	0.005	0.025	37	0	40
oxychlorodane	27304-13-8	µg.L ⁻¹	< 0.001	< 0.010	0.005	0.004	0.005	0.005	0.005	21	0	24
paclobutrazol	76738-62-0	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	53	0	56
parathion-methyl	298-00-0	µg.L ⁻¹	< 0.010	< 0.050	0.014	0.011	0.005	0.005	0.025	167	0	167

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
pendimethalin	40487-42-1	µg.L ⁻¹	< 0.010	< 0.050	0.013	0.012	0.013	0.005	0.015	2142	0	2146
pentachlorbenzene	608-93-5	µg.L ⁻¹	< 0.010	< 0.010	0.005	0.005	0.005	0.005	0.005	191	0	194
pethoxamid	106700-29-2	µg.L ⁻¹	< 0.010	< 0.025	0.011	0.010	0.013	0.005	0.013	1149	0	1149
phenmedipham	13684-63-4	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.011	0.013	0.005	0.013	1193	0	1193
phosalon	2310-17-0	µg.L ⁻¹	< 0.010	< 0.050	0.011	0.008	0.005	0.005	0.025	107	0	110
pirimifos methyl	29232-93-7	µg.L ⁻¹	< 0.010	< 0.050	0.007	0.006	0.005	0.005	0.005	78	0	78
prochloraz	67747-09-5	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.011	0.013	0.010	0.013	2058	0	2062
prometon	1610-18-0	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	29	0	32
prometryn	7287-19-6	µg.L ⁻¹	< 0.005	< 0.050	0.007	0.006	0.005	0.003	0.010	1391	0	1394
propachlor	1918-16-7	µg.L ⁻¹	< 0.005	< 0.050	0.007	0.006	0.005	0.005	0.013	813	0	816
propamocarb	24579-73-5	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
propazine	139-40-2	µg.L ⁻¹	< 0.005	< 0.050	0.006	0.005	0.005	0.003	0.005	1173	0	1176
propiconazole	60207-90-1	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.009	0.013	0.005	0.013	2101	0	2106
prothiofos	34643-46-4	µg.L ⁻¹	< 0.010	< 0.050	0.012	0.009	0.005	0.005	0.025	55	0	55
prothiokonazol	178928-70-6	µg.L ⁻¹	< 0.010	< 0.050	0.023	0.022	0.025	0.015	0.025	862	0	866
pyrimethanil	53112-28-0	µg.L ⁻¹	< 0.020	< 0.050	0.021	0.020	0.025	0.010	0.025	34	0	37
quinmerac	90717-03-6	µg.L ⁻¹	< 0.010	< 0.100	0.009	0.008	0.013	0.005	0.013	1891	0	1895

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
quinoxifen	124495-18-7	µg.L ⁻¹	< 0.005	< 0.050	0.012	0.011	0.013	0.013	0.013	1139	0	1143
sebutylazine	7286-69-3	µg.L ⁻¹	< 0.005	< 0.050	0.011	0.010	0.013	0.003	0.013	1560	0	1564
secbumeton	26259-45-0	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	29	0	32
simazine	122-34-9	µg.L ⁻¹	< 0.005	= 0.100	0.008	0.007	0.005	0.005	0.013	3231	0	3261
simetryn	1014-70-6	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	28	0	31
S-Metolachlor	87392-12-9	µg.L ⁻¹	< 0.005	= 2.180	0.009	0.007	0.005	0.005	0.013	3403	1	3425
spiroxamine	118134-30-8	µg.L ⁻¹	< 0.010	< 0.050	0.010	0.008	0.013	0.005	0.013	2042	0	2046
sulfosulfuron	141776-32-1	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
tebuconazole	107534-96-3	µg.L ⁻¹	< 0.005	< 0.050	0.009	0.008	0.013	0.005	0.013	2136	0	2140
terbuthylazine	5915-41-3	µg.L ⁻¹	< 0.005	= 1.440	0.010	0.008	0.005	0.005	0.013	3518	3	3834
terbuthylazine hydroxy	66753-07-9	µg.L ⁻¹	< 0.005	= 0.250	0.010	0.009	0.013	0.005	0.013	1672	1	1829
terbuthylazine-desethyl-2-hydro	66753-06-8	µg.L ⁻¹	< 0.010	= 1.120	0.008	0.006	0.005	0.005	0.010	538	2	604
terbutryne	886-50-0	µg.L ⁻¹	< 0.001	< 0.050	0.007	0.006	0.005	0.003	0.013	2110	0	2114
thiakloprid	111988-49-9	µg.L ⁻¹	< 0.010	< 0.025	0.010	0.010	0.013	0.005	0.013	1043	0	1043
thiamethoxam	153719-23-4	µg.L ⁻¹	< 0.010	< 0.050	0.019	0.015	0.025	0.005	0.025	37	0	40
thifensulfuron-methyl	79277-27-3	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
thiophanate-methyl	23564-05-8	µg.L ⁻¹	< 0.010	< 0.050	0.013	0.012	0.013	0.005	0.015	1923	0	1926

Pesticide	CAS No	Unit	Minimum	Maximum	Average	Geometric mean	Median	10% quartile	90% quartile	Number of analyses less than LOQ	Number of analyses above limit value *	Sum of all analyses
trans-Chlordane	5103-74-2	µg.L ⁻¹	< 0.010	< 0.025	0.006	0.005	0.005	0.005	0.005	24	0	24
triadimefon	43121-43-3	µg.L ⁻¹	< 0.010	< 0.050	0.011	0.008	0.005	0.005	0.025	107	0	110
triasulfuron	82097-50-5	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
tribenuron-methyl	101200-48-0	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	53	0	56
trietazine	1912-26-1	µg.L ⁻¹	< 0.005	< 0.005	0.003	0.003	0.003	0.000	0.003	7	0	7
trifluralin	1582-09-8	µg.L ⁻¹	< 0.001	< 0.025	0.003	0.002	0.003	0.001	0.005	422	0	422
triflusulfuron-methyl	126535-15-7	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29
triforin	26644-46-2	µg.L ⁻¹	< 0.050	< 0.050	0.025	0.025	0.025	0.025	0.025	26	0	29

(*) Limit values used for the assessment: 0.1 µg.L⁻¹ for parent compounds and relevant metabolites; specific guideline values for non-relevant metabolites (alachlor OA 1 µg.L⁻¹, for other metabolites see the table SI-2).

SI-2 List of monitored pesticides in representative survey 2017, including limits of quantification (LOQ) for injection volumes 100 µL and 20µL, relative standard deviation (RSD) for sample fortified at 100 ng.L⁻¹ level (inj. vol. 100 µL), and guideline values of non-relevant metabolites in drinking water proposed in the Czech Republic.

Pesticide	CAS	LOQ (µg.L ⁻¹) (inj. v. 100 µL)	RSD (%)	LOQ (µg.L ⁻¹) (inj. v. 20 µL)	Recommended limit values for non-relevant metabolites (µg.L ⁻¹) *
Acetochlor ESA	187022-11-3	0.030	8.0	0.200	-
Acetochlor OA	194992-44-4	0.030	13	0.200	-
Alachlor ESA	142363-53-9	0.030	5.0	0.200	1 ⁺
Atrazine	1912-24-9	0.010	5.0	0.050	-
Bentazone	25057-89-0	0.010	8.8	0.050	-
Desethylatrazine	6190-65-4	0.010	24	0.050	-
Terbuthylazin-desethyl	30125-63-4	0.010	23	0.050	-
Hexazinone	51235-04-2	0.010	5.1	0.050	-
Hydroxyatrazine	2163-68-0	0.010	8.2	0.050	2 ⁺
Chloridazon-desphenyl	6339-19-1	0.050	3.7	0.150	6**
Chloridazon	1698-60-8	0.010	17	0.050	-
Chloridazon-methyl-desphenyl	17254-80-7	0.010	7.6	0.050	6**
Chlortoluron	15545-48-9	0.010	13	0.050	-
Isoproturon	34123-59-6	0.010	9.9	0.050	-
Metazachlor	67129-08-2	0.015	6.6	0.060	-
Metazachlor ESA	172960-62-2	0.030	5.6	0.150	5 ⁺
Metazachlor OA	1231244-60-2	0.030	24	0.120	5 ⁺
Metolachlor ESA	171118-09-5	0.030	9.6	0.200	6 ⁺
Metolachlor OA	152019-73-3	0.030	7.1	0.200	6 ⁺
S-Metolachlor	87392-12-9	0.010	8.2	0.050	-
Terbuthylazine	5915-41-3	0.010	21	0.050	-

(*) If no value is provided in the table, limit value 0.1 µg.L⁻¹ is valid.

(**) Limit value includes the sum of both metabolites (chloridazon-methyl-desphenyl and chloridazon-desphenyl) and condition of parent compound (chloridazon) less than 0.1 µg.L⁻¹ should be fulfilled.

(⁺) The condition of parent compound less than 0.1 µg.L⁻¹ should be fulfilled.

SI-3 Detail information on analytical method

LC/MS/MS analysis conditions

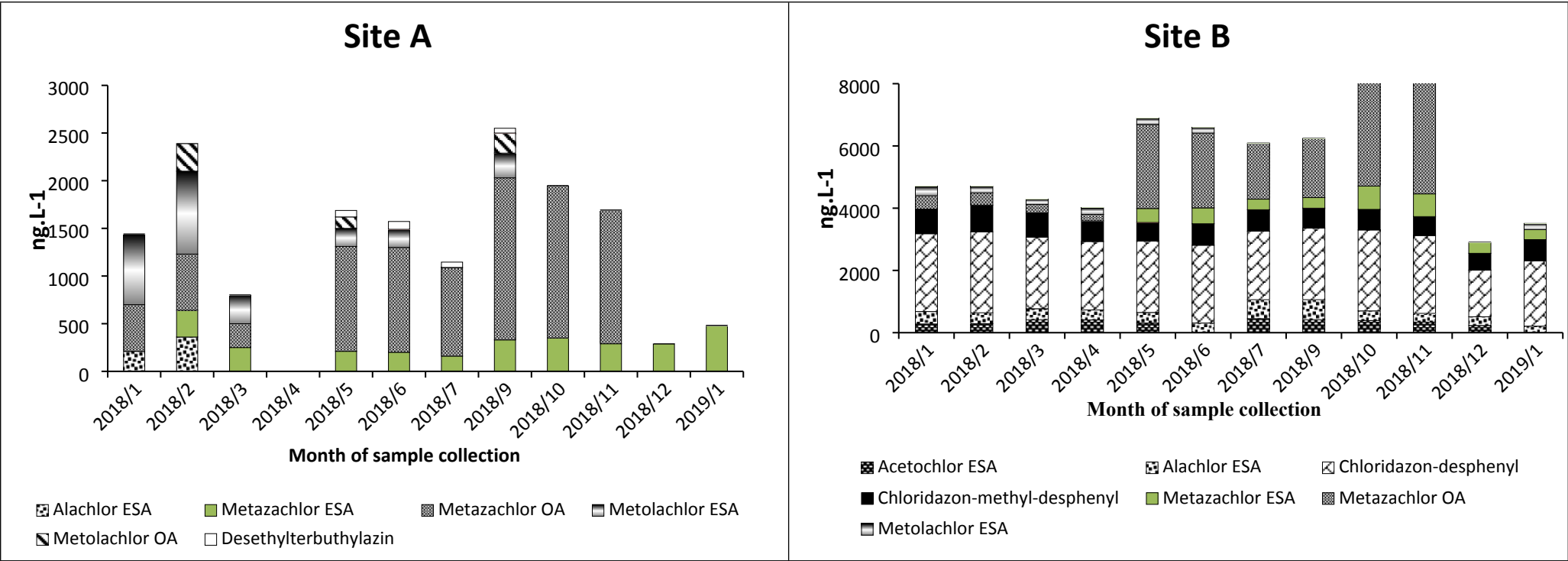
HPLC Instrument	Agilent 1290
Pre-column	C18 SecurityGuard ULTRA (Phenomenex)
Column	Poroshell 120 SB-C18 (150 mm, 3.0 mm, 2.7 μm ; Agilent Technologies)
Injection volume	100 μL or 20 μL (direct injection)
Flow rate	0.4 $\text{mL}\cdot\text{min}^{-1}$
Mobile phase	Gradient: Water (A) : Methanol (B) For more details see table below
Column temperature	40 $^{\circ}\text{C}$
MS/MS Instrument	MS/MS) Agilent 6490 equipped with Jetstream electrospray ionization (ESI) source (Agilent Technologies)
Mode	Polarity switching
Drying gas temperature	150 $^{\circ}\text{C}$
Drying gas flow rate	20 $\text{L}\cdot\text{min}^{-1}$
Sheath gas temperature	380 $^{\circ}\text{C}$

Composition of mobile phase in time

Time (min)	% (B)
0	20
2	60
5	75
6	95
11	95
14	20

Polypropylene vials were used for water sampling to avoid sorption on the wall. Acetic acid was added to prevent decomposition of analytes. Before analysis 15 μL of internal standard solution were added to the sample. Final concentration of internal standard was 0.1 $\mu\text{g}\cdot\text{L}^{-1}$.

SI-4 The development of pesticide concentrations over time in different areas (water supply zones).



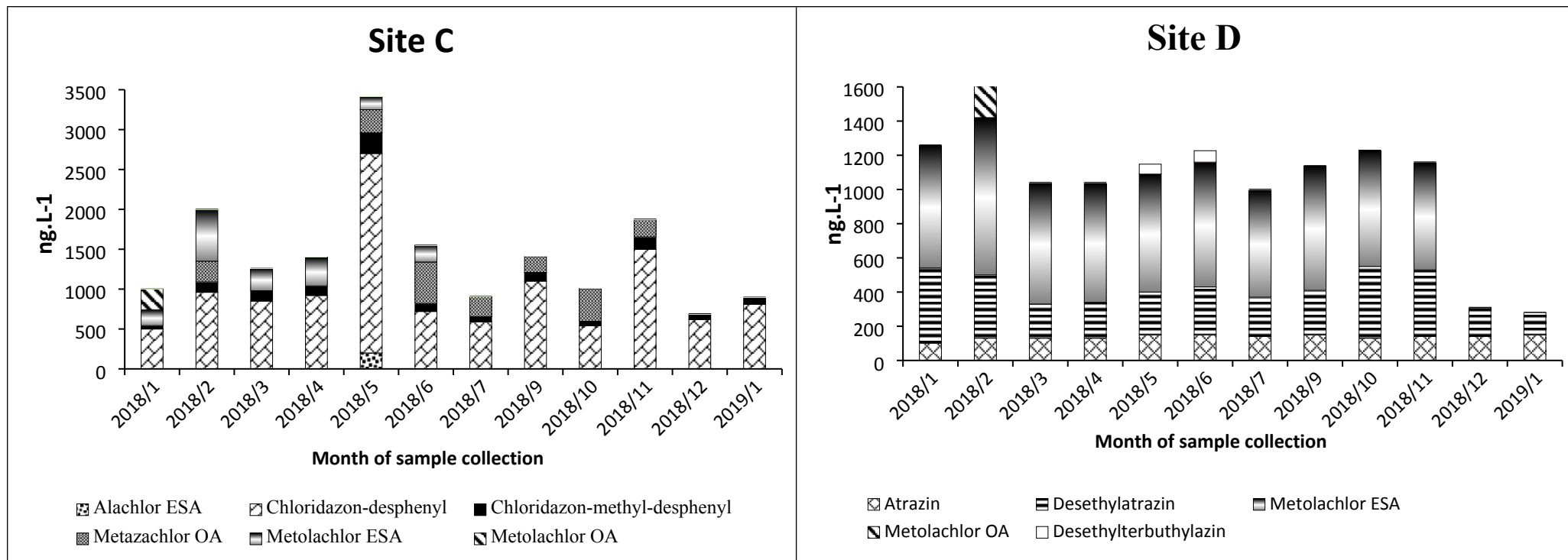


Figure SI-4. Trend in pesticide concentrations in drinking water in four water systems (A, B, C, D) monitored throughout one year. Please note that the concentration is given in ng.L^{-1} and measures differ between water systems. Supply system A is fed from surface water source, systems B, C, and D from groundwater source.

SI-5 Graphical presentation of the results from representative survey (2017) from regional point of view

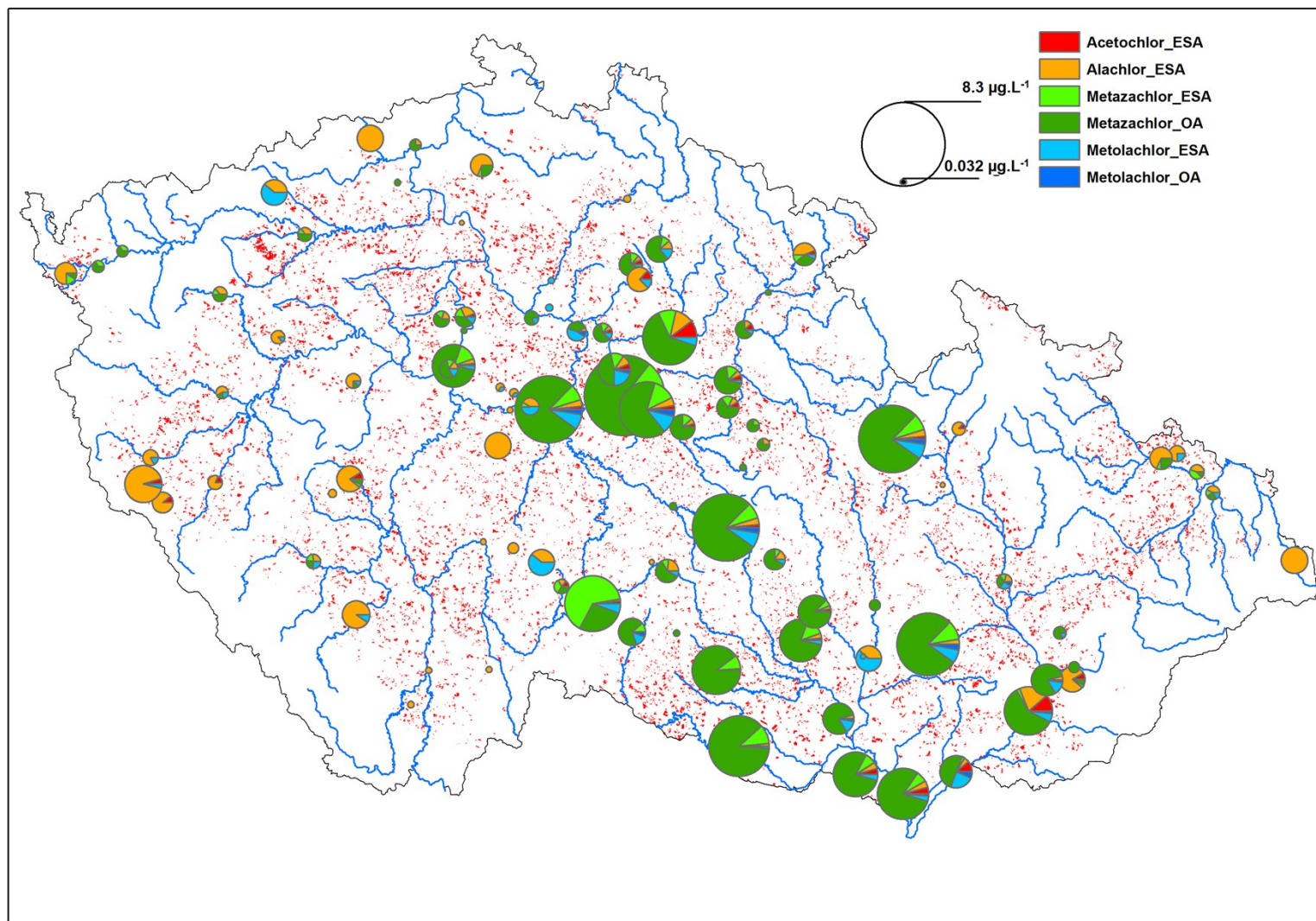


Figure SI-5a. Results of pesticide survey (acetochlor ESA, alachlor ESA, metazachlor ESA, metazachlor OA, metolachlor ESA, metolachlor OA). Spring 2017 sampling. Small red dots represent the fields seeded with rape in 2016.

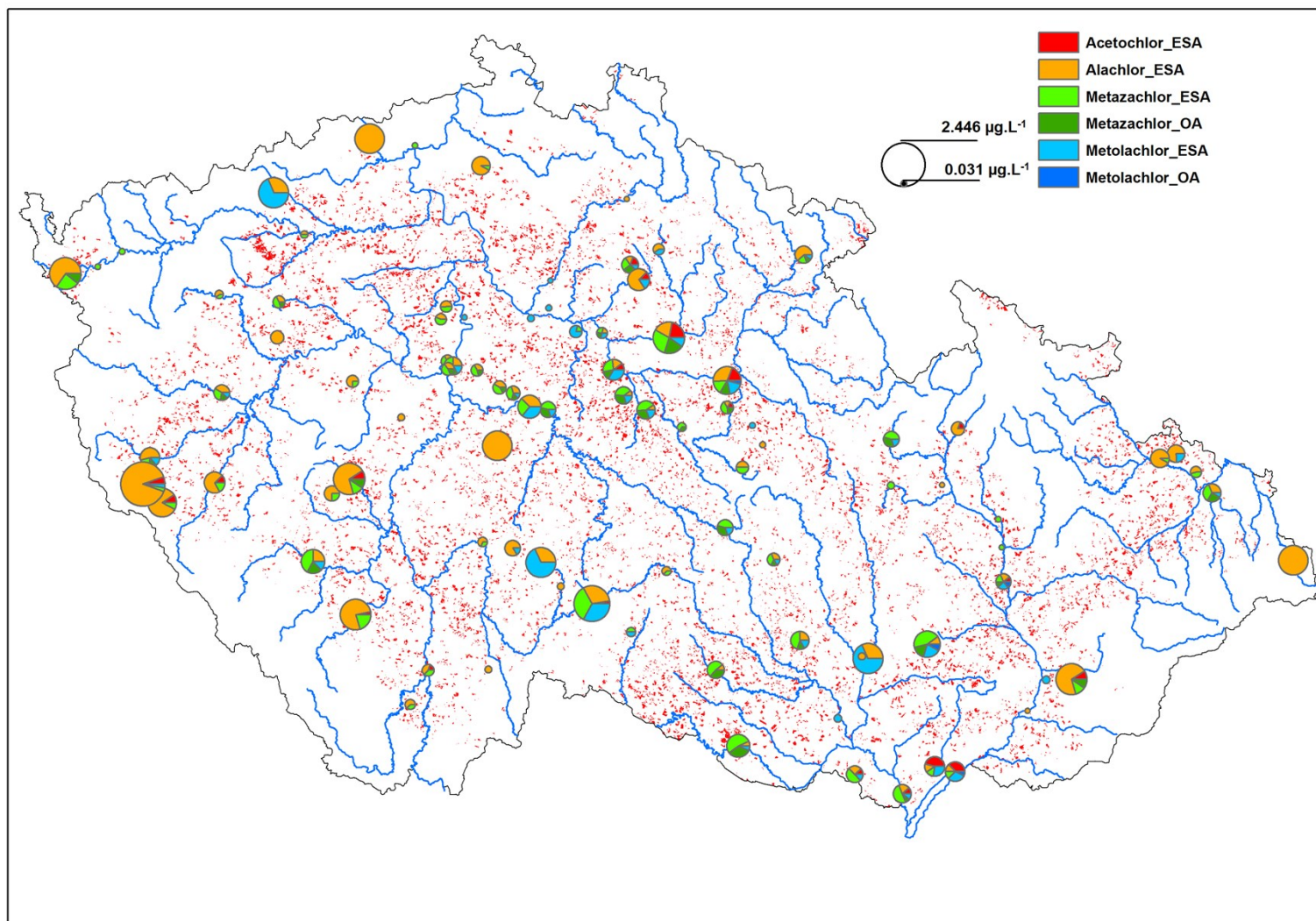


Figure SI-5b. Results of pesticide survey (acetochlor ESA, alachlor ESA, metazachlor ESA, metazachlor OA, metolachlor ESA, metolachlor OA). Autumn 2017 sampling. Small red dots represent the fields seeded with rape in 2016.

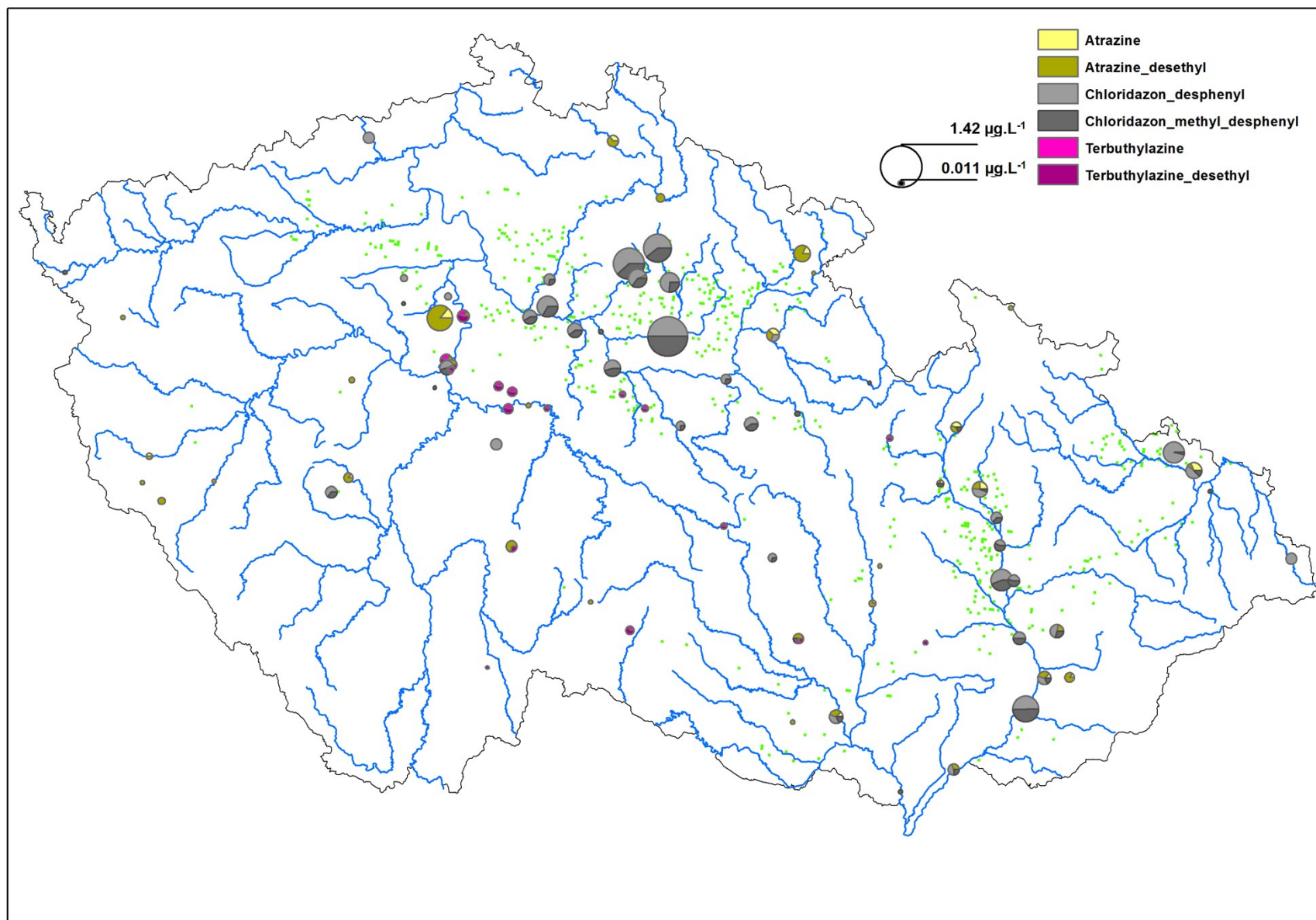


Figure SI-5c. Results of pesticide survey (atrazine, desethylatrazine, chloridazon-desphenyl, chloridazon-methyl-desphenyl, terbuthylazine, desethylterbuthylazine). Spring 2017 sampling. Small green dots represent the fields seeded with sugar beet in 2016.

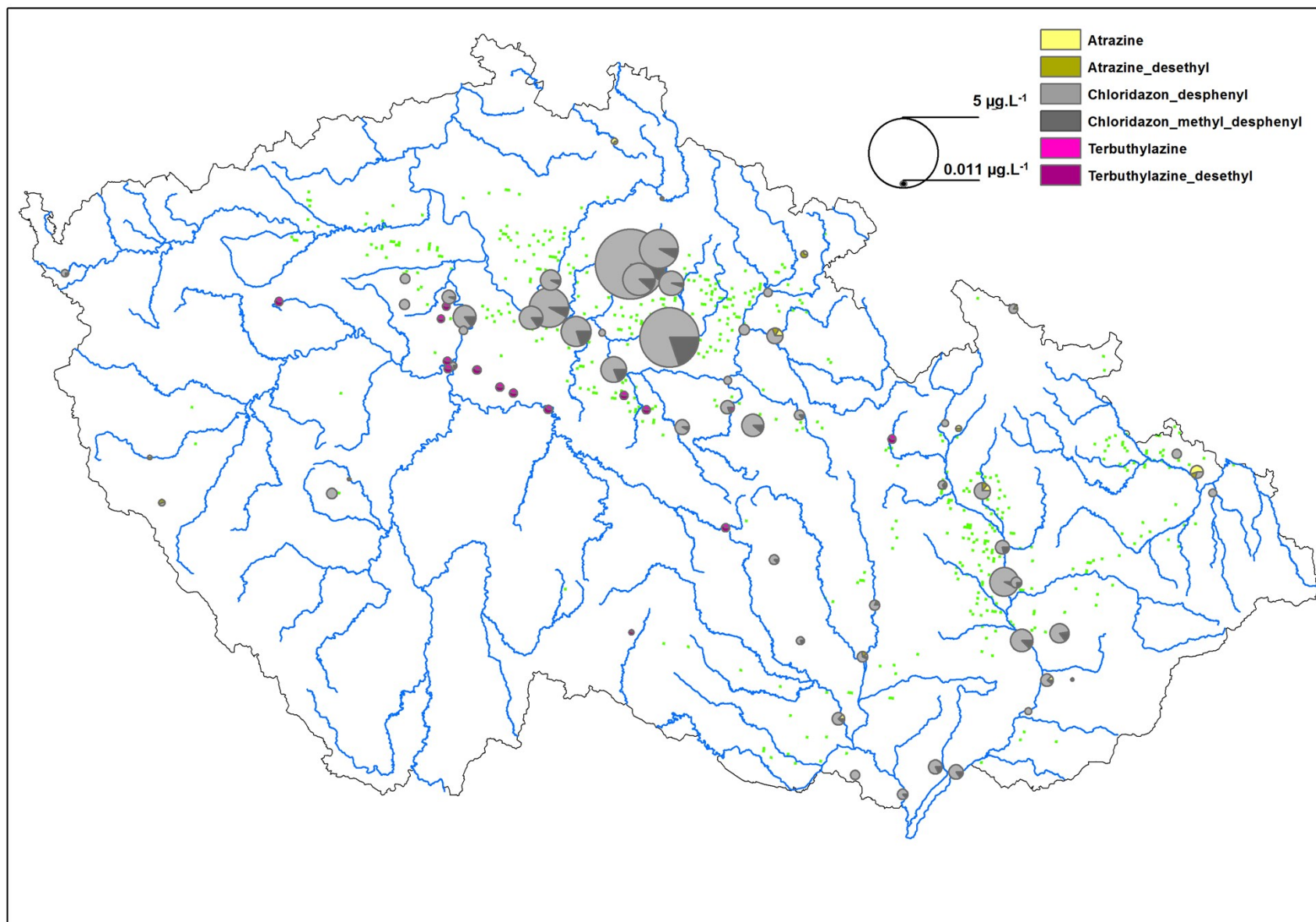


Figure SI-5d. Results of pesticide survey (atrazine, desethylatrazine, chloridazon-desphenyl, chloridazon-methyl-desphenyl, terbutylazine, desethylterbutylazine). Autumn 2017 sampling. Small green dots represent the fields seeded with sugar beet in 2016.

SI-6 Health risk assessment: detailed method of calculations and input data

SI-6a Health risk assessment from exposure of acetochlor ESA (acetochlor t-sulfonic acid) in drinking water: calculation of hazard quotient

Dose-reponse assessment

The European Food Safety Authority (EFSA) established for oral exposure of acetochlor acceptable daily intake (ADI¹) **0.0036 mg.kg⁻¹ bw per day²** based on 78 weeks mice study. The main toxic effect observed was decreased body weight, mild liver toxicity and chronic nephritis (LOAEL³ was established as 1.1 mg.kg⁻¹ bw per day; safety factor of 300). Because of similar or lower toxicity of metabolite acetochlor ESA (comparing with mother compound of acetochlor) it is possible to use this ADI value also for this metabolite.

Exposure assessment

Calculation of oral average daily dose (ADDo)

Conservative approach to calculate exposure (average daily dose) has been used to assess the risk for most vulnerable part of population. We used maximum concentration of acetochlor ESA found in drinking water in the Czech Republic in 2017, i. e. 2.9 µg.L⁻¹.

To respect sensitive population groups we calculated exposure (average daily dose) for four age categories:

- a) infants up to 3 months,
- b) infants 6 – 11.99 month,
- c) children 5 – 5.99 years with relatively high water intake,
- d) adults.

Values of ingestion rate (amount of water consumed per day) was taken from the NIPH's guidelines for health risk assessment.⁴ Average body weights of children have been taken from the 6th nationwide anthropological survey of children and juvenils in the Czech Republic (2001)⁵.

¹ ADI (Acceptable daily intake) – an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population that is likely to be without appreciable risk of deleterious effects during a lifetime.

² EFSA: Conclusion on the peer review of the pesticide risk assessment of the active substance acetochlor. EFSA Journal 2011; 9(5):2143.

³ LOAEL (Lowest observed adverse effect level) – the lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

Formula for calculation of oral average daily dose from drinking water:

$$ADD_0 = \frac{CW \times IR \times EF \times ED}{BW \times AT}$$

Tab. 1 Exposure factors used.

<i>CW (concentration of acetochlor ESA in drinking water)</i>	<i>2.9 µg.L⁻¹</i>
<i>IR (ingestion rate) – infant up to 3 months</i>	<i>0.75 l.day⁻¹</i>
<i>IR - infant 3 – 11.99 months</i>	<i>1.0 l.day⁻¹</i>
<i>IR - children 4 – 10.99 year</i>	<i>1.2 l.day⁻¹</i>
<i>IR - adults</i>	<i>2.0 l.day⁻¹</i>
<i>BW (body weight) - infant up to 3 months</i>	<i>4.32 kg</i>
<i>BW - infant 6 – 11.99 months</i>	<i>8.82 kg</i>
<i>BW - children 5 – 5.99 years</i>	<i>20.45 kg</i>
<i>BW - adults</i>	<i>70 kg</i>
<i>EF (exposure frequency)</i> <i>days/year(15 days out of place of resident is assumed)</i>	<i>350</i>
<i>EF - infants</i>	<i>365 days/year</i>
<i>ED (exposure duration) – noncarcinogenic risk</i> <i>(actual risk for population in defined age is considered for one year average time exposure)</i>	<i>1 year</i>

⁴ Guidelines for authorized persons in health risk assessment AN 19/04 version 5 (Health risk assessment of exposure to chemical contaminants in drinking water). SZÚ Praha, 2018.

5 Vignerová J. et al.: 6. Celostátní antropologický výzkum dětí a mládeže 2001 Česká republika (6th nationwide anthropological survey of children and juvenils 2001, Czech Republic). PšF UK Praha and SZÚ, Praha 2006.

<i>AT (average time of exposure) - noncarcinogenic risk</i>	<i>365 days (365x1)</i>
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Quantitative assessment of exposure – average daily dose (ADD₀) of acetochlor ESA from drinking water

Tab. 2 Calculated values of ADD₀ (mg/kg bw/day) for CW = 2.9 µg.L⁻¹

Age group	ADD ₀ (mg/kg bw/day)
Infants up to 3 months	5.0 E-04
Infants 6 – 11.99 month	3.3 E-04
Children 5 – 5.99 years	1.6 E-04
Adults	7.9 E-05

Risk characterization

The risk of toxic (non-carcinogenic) effects from exposure to acetochlor ESA in drinking water is expressed as hazard quotient (HQ). HQ is calculated as follows: the value of average daily dose (ADD) is divided by safety daily exposure dose, which is likely to be without appreciable risk of deleterious effects during a lifetime. This safety dose is called as oral reference dose (RfDo) by the US EPA, and acceptable daily intake (ADI) or tolerable daily intake (TDI) by the WHO.

Formula for calculation of hazard quotient from drinking water:

$$HQ = \frac{ADD_0}{ADI_0}$$

If HQ value is less than 1, no toxic effects are expected, no risk considered. We used EFSA acceptable daily intake value 0.0036 mg/kg bw/day for calculation of HQ.

Risk of toxic non-carcinogenic effect of acetochlor ESA in drinking water – hazard quotients (HQ) in different age categories of the exposed population

Tab. 3 Calculated values of hazard quotient (HQ) for CW = 2.9 µg.L⁻¹

Age group	HQ
Infants up to 3 months	0.140
Infants 6 – 11.99 month	0.091
Children 5 – 5.99 years	0.044
Adults	0.022

Conclusions: Based on calculated HQ values, which are in all cases markedly lower than 1, we can conclude that there is no health risk (non-carcinogenic effects) for any population groups.

SI-6b Health risk assessment from exposure of mixture of pesticides (metabolites) in drinking water: calculation of hazard quotients and hazard index from the worst case supply system found in representative survey (Site X, groundwater source, population supplied 28,000; 11 pesticides found above the LOQ)

For the method of calculation and exposure factors used see above part SI-6a. Specific concentrations of pesticides found in site X and ADI/TDI for respective pesticides as well as the ADDo and HQs are provided in the table below.

Analyte	Chemical group	Concentration found (µg.L ⁻¹)	ADI/TDI (mg/kg/day)	ADDo infants up to 3 months (mg/kg bw/day)	HQ infants up to 3 months	ADDo infants 6-11.99 months (mg/kg bw/day)	HQ infants 6-11.99 months

Acetochlor ESA	chloroacetanilides	0.140	0.0036	2.4 E-05	7.0 E-03	1.6 E-05	4.0 E-03
Acetochlor OA	chloroacetanilides	0.037	0.0036	6.4 E-06	2.0 E-03	4.2 E-06	1.0 E-03
Alachlor ESA	chloroacetanilides	0.150	0.012	2.6 E-05	2.0 E-03	*	*
Bentazone	benzothiadiazoles	0.012	0.09	2.1 E-06	2.0 E-05	*	*
Hydroxyatrazine	triazines	0.027	0.04	4.7 E-06	1.0 E-04	*	*
Chloridazone	pyridazinones	0.021	0.1	3.6 E-06	4.0 E-05	*	*
Chloridazon-methyl- desphenyl	pyridazinones	0.015	0,1	2.6 E-06	3.0 E-05	*	*
Metazachlor ESA	chloroacetanilides	0.230	0.2	4.0 E-05	2.0 E-04	*	*
Metazachlor OA	chloroacetanilides	2.700	0.33	4.7 E-04	1.0 E-03	*	*
Metolachlor ESA	chloroacetanilides	0.120	0.17	2.1 E-05	1.0 E-04	*	*
Metolachlor OA	chloroacetanilides	0.046	0.17	8.0 E-06	5.0 E-05	*	*

(*) HQ for older children is always lower than for younger age category. Calculations for acetochlor and its metabolite were provided just to illustrate this fact.

Hazard index (sum of 11 HQs: 0.007 + 0.002 + 0.002 + 0.00002 + 0.0001 + 0.00004 + 0.00003 + 0.0002 + 0.001 + 0.0001 + 0.00005) for infants up to 3 months: 0.0125

Note: In this case, we obtained HI by simply summing the HQ of the individual pesticides, which belong to 4 different chemical groups. Although 7 of them belong to the same group, we realize that it is not correct to add HQ of pesticides across different chemical groups that have different health effects. It would be more accurate to calculate HI only within individual chemical groups and evaluate them separately. We have chosen the method of summing all HQs in order to conservatively evaluate the most serious finding of our monitoring.

Conclusions: In spite of using very conservative approach, the hazard index of mixture of 11 pesticides (the worst case found) is still markedly lower than 1, and we can thus conclude that there is no health risk even for the most sensitive population group.