https://doi.org/10.17221/30/2026-SWR

Discovering complex pesticide pollution in river water irrigated soil/groundwater systems: From targeted analyses to non-targeted screening and back

Alina Sadchenko[1], Petra Nováková[1], Aleš Klement[2], Miroslav Fér[2], Antonín Nikodem[2], Vít Kodeš[3], Radka Kodešová[2], Roman Grabic[1]

[1]South Bohemian Research Center of Aquaculture and Biodiversity of Hydrocenoses, Faculty of Fisheries and Protection of Waters, University of South Bohemia in České Budějovice, Vodňany, Czech Republic
[2]Department of Soil Science and Soil Protection, Faculty of Agrobiology, Food and Natural Resources, Czech University of Life Sciences Prague, Prague, Czech Republic
[3]Department of Water Quality, Czech Hydrometeorological Institute, Prague, Czech Republic

Electronic Supplementary Material (ESM)

The authors are fully responsible for both the content and the formal aspects of the electronic supplementary material. No editorial adjustments were made.

Electronic Supplementary Material 2 (ESM 2)

MATERIALS AND METHODS

Table S1 in ESM 2. LC Gradient for Target Analyte Separation on QqQ Quantiva and Q Exactive-HF Using a Hypersil GOLD aQ column (2.1 × 50 mm, 5 µm particle size, Thermo Fisher Scientific)

QqQ Quantiva

Time	Water + 0.1% FA	ACN + 0.1% FA	Flow
[min]	[%]	[%]	[µL / min]
0	95	5	300
1	95	5	350
4	75	25	350
8	40	60	400
10	0	100	400
12	0	100	400
12.05	95	5	400
15	95	5	350

Q Exactive-HF

Time	Water +10 mmol AmAc	ACN +10 mmol AmAc	Flow
[min]	[%]	[%]	[µL / min]
0	100	0	350
1	100	0	350
4	75	25	400
7.5	40	60	400
10	0	100	400
12	0	100	400
12.05	100	0	400
15	100	0	350

FA – formic acid; ACN – acetonitrile

Table S2 in ESM 2. MS conditions for LC-MS and LC-HRMS analysis

Data were acquired separately for positive and negative electrospray ionization using combined full-scan MS1 and data-independent acquisition (DIA) MS2 modes to enable target, suspect, and non-target screening of pesticides and their transformation products. Full-scan spectra were recorded at 60,000 FWHM (at m/z 200) over the m/z 100–800 range, and DIA MS2 spectra were acquired at 15,000 resolution using stepped normalized collision energies.

Quantiva and Q Exactive-HF with Direct Injection (10 µL on QqQ Quantiva, 10 µL on Q Exactive-HF)

MS conditions	QqQ Quantiva	Q Exactive-HF
Ion source type	H-ESI	H-ESI
Positive ionization spray volatage (V)	3500	
Negative ionization spray volatage (V)	2800	2800
Sheath gas (N2) au	42	40
Auxiliary gas (Ar) au	12	10
Vaporizer temp. (°C)	338	
Ion transfer tube temp. (°C)	338	
Capillary temp. (°C)		325
Aux gas heater temp. (°C)		275

Table S3 in ESM 2. Data-processing workflow parameters in Compound Discoverer software (version 3.3.2.31) Positive vs Negative mode.

Workflow Node	**Positive Mode Parameters**	**Negative Mode Parameters**
Polarity / Ion type	Polarity: +; Ion: [M+H]+	Polarity: −; Ion: [M–H]−
Select Spectra	Precursor mass range: 100–800 Da; RT: 1–12 min; S/N: 1.5; Mass analyzer: FTMS; Activation: HCD; MS order: MS1 & MS2; Store chromatograms: no	
Align Retention Times	Model: Adaptive curve; Maximum shift: 0.5 min; Mass tolerance: 5 ppm	Model: Adaptive curve; Maximum shift: 0.6 min; Mass tolerance: 5 ppm
Detect Compounds	Mass tolerance: 5 ppm; Minimum intensity: 100 000; Minimum scans: 6; Isotope groups: Br, Cl; Zig-zag threshold: 0.2; Remove false isotopes: No; Ion: [M+H]+; Remove singlets: yes	Mass tolerance: 5 ppm; Minimum intensity: 100 000; Minimum scans: 6; Isotope groups: Br, Cl; Zig-zag threshold: 0.3; Remove false isotopes: Yes; Ion: [M–H]−; Remove singlets: yes
Group Compounds	Mass tolerance: 5 ppm; RT tolerance: 0.4 min; Align peaks: No; Preferred ions: [M+H]+; Jaggedness contribution: 4	Mass tolerance: 5 ppm; RT tolerance: 0.4 min; Align peaks: Yes; Preferred ions: [M–H]−; Jaggedness contribution: 3
Fill Gaps	Not included	Mass tolerance: 5 ppm; S/N threshold: 1.5; Real peak detection: yes; Restrictive gap filling: yes
Mark Background Compounds	Max Sample/Blank: 5; Max Blank/Sample: 0; Hide background: yes	Max Sample/Blank: 4; Max Blank/Sample: 0; Hide background: yes

Pattern Scoring	Isotope patterns: $Cl_{1–8}$, $Br_{1–5}$, mixed Cl/Br; Minimum spectral fit: 60%; Preferred ions: [M+H]+	Isotope patterns: $Cl_{1–8}$, $Br_{1–5}$, mixed Cl/Br, S, S_2; Minimum spectral fit: 60%
Search mzCloud	Match factor threshold (DDA): 40; Library: Reference + Autoprocessed; Precursor tolerance: 5 ppm; FT fragments: 5 ppm; IT fragments: 0.4 Da; Max results: 10	Match factor threshold (DDA): 30; Library: Reference + Autoprocessed; Precursor tolerance: 5 ppm; FT fragments: 5 ppm; IT fragments: 0.4 Da; Max results: 10
Predict Compositions	Max H/C ratio: 3.5; Max candidates: 25; Allowed elements: C, H, N, O, S, P, F, Cl, Br, I; RDBE: 0–40; Dynamic recalibration: yes	Max H/C ratio: 3.0; Max candidates: 25; Allowed elements: C, H, N, O, S, P, F, Cl, Br, I; RDBE: 0–40; Dynamic recalibration: yes
Search Mass Lists	Mass list: NAZV_POCIS_pos02; Mass tolerance: 5 ppm; Use RT: no; RT tolerance: 2 min	Mass list: NAZV_POCIS_2023_neg01; Mass tolerance: 5 ppm; Use RT: no; RT tolerance: 2 min
Merge Features	Mass tolerance: 5 ppm; RT tolerance: 0.5 min	Mass tolerance: 5 ppm; RT tolerance: 0.7 min
Differential Analysis	Log10 transform: yes; Peak rating update: yes; Contributions (Area/CV/FWHM/Jaggedness/Modality/Zig-zag): 3/10/5/5/5/5	Log10 transform: yes; Peak rating update: yes; Contributions (Area/CV/FWHM/Jaggedness/Modality/Zig-zag): 3/10/5/5/5/5

Method validation

For the extraction method validation, three different soil types commonly found in the Czech Republic were selected to represent a range of soil properties. These included Haplic Chernozem on loess, Haplic Cambisol on paragneiss, and Arenosol Epieuric on sand. The properties of the selected soils and concentrations of target analytes in blank soil are detailed in Tables S4 and S5 in ESM 2.

Table S4 in ESM 2. Chemical and physical characteristics of the selected soils.

Parameter	AE Arenosol Epieuric	HCa Haplic Cambisol	HCh Haplic Chernozem
pH_{H2O}	6.29	6.91	8.08
pH_{KCl}	4.28	5.66	7.00
pH_{CaCl2}	5.01	6.90	7.13
Cox (%)	1.23	1.46	1.77
CaCO3 (%)	0.00	0.00	4.40
Salinity H2O (µS cm-1)	21.2	56.6	104.3
ρs (g cm-3)	2.66	2.62	2.53
Clay (%)	5.3	8.6	15.5
Silt (%)	6.7	29.7	68.5
Sand (%)	88.0	61.7	16.0

Table S5 in ESM 2. Concentrations of target analytes in blank soil and in three soil types (Arenosol Epieuric, Haplic Cambisol, and Haplic Chernozem) used for method validation.

Compounds	BLANK µg/kg dry weight	Arenosol Epieuric µg/kg dry weight	Haplic Cambisol µg/kg dry weight	Haplic Chernozem µg/kg dry weight
Alachlor	<2	<1.4	<1.6	<1.4
Atrazine	<0.24	<0.18	0.55	1.5
Atrazine 2-hydroxy	<0.23	15	2.2	9.7
Azoxystrobin	<0.53	<0.39	1.4	<0.41
Bentazone	<27	<20	<22	<20
Boscalid(nicobifen)	<0.42	0.42	1.5	<0.39
Butachlor	<1.8	<1.3	<1.4	<1.3
Carbendazim	<0.38	<0.38	5.6	<0.36
Chlorantraniliprole	<0.2	0.18	1	<0.16
Chloridazon	<20	<20	<23	<19
Chlorotoluron	<2.7	<2.1	2.5	<2.1
Clothianidin	<2.7	<2.1	<2.4	<2.1
Cyantraniliprole	<0.47	<0.36	0.85	<0.37
Cyprodinil	<23	<17	<19	<18
Difenoconazole	<1.4	<0.98	1.6	<1.3
Dimethomorph	<0.18	0.19	1.2	<0.14
Epoxiconazole	<0.31	0.41	1.3	<0.27
Fenpropidin	<0.5	1.7	11	<0.39
Fenpropimorph	<0.49	<0.36	3.8	<0.38
Fluazinam	<1.8	<1.3	<1.5	<1.3
Flufenacet	<0.33	<0.24	0.56	<0.29
Fluopicolide	<0.54	<0.39	1.2	<0.42
Fluopyram	<0.24	0.27	0.94	<0.19
Flusilazole	<1.4	<1	8.1	<1.3
Imidacloprid	<0.51	<0.4	0.93	<0.41
Linuron	<2.1	<1.6	<1.8	<1.7

Mandipropamid	<2.1	<1.5	1.7	<1.5
Metalaxyl	<0.24	0.27	0.67	<0.19
Metamitron	<0.23	<0.18	<0.21	<0.19
Metazachlor	<0.27	<0.19	17	<0.19
Metazachlor_ESA	<1.5	<1.1	6.8	<1.2
Metazachlor_OA	<2.6	<2	5.7	<2.1
Methabenzthiazuron	<0.48	<0.36	1.1	<0.37
Metobromuron	<2.6	<2	<2.3	<2
Metolachlor	<0.23	0.38	0.8	0.45
Metolachlor_ESA	<0.22	<0.18	0.68	<0.18
Metolachlor_OA	<0.23	0.19	0.58	<0.17
Metribuzin	<0.24	<0.19	1.4	<0.19
Metribuzin_desamino	<0.27	<0.21	0.7	<0.21
Monuron	<0.38	<0.29	0.78	<0.3
Napropamide	<0.42	<0.3	0.91	<0.3
Pendimethalin	<1.8	<1.3	<1.5	<1.3
Prochloraz	<0.52	0.72	9.8	0.47
Prometon	<0.27	0.26	1.4	<0.22
Prometryn	<0.23	0.41	1.3	<0.18
Propamocarb	<0.16	<0.15	1.4	<0.15
Propazine	<2.1	<1.6	<1.9	<1.6
Propazine 2 hydroxy	<0.46	4.4	2.1	0.83
Propiconazole	<0.3	0.31	3.2	0.29
Pyraclostrobin	<1.9	<1.3	2.1	<1.6
Secbumeton	<0.25	0.27	1.9	<0.2
Simazine	<0.47	<0.37	0.7	<0.38
Simazine_2-hydroxy	<0.43	3	3	0.79
Tebuconazole	<1.6	<1.1	4.8	<1.4
Terbuthylazine	<6.2	<4.5	<5.2	<4.8
Terbuthylazine 2-hydroxy	<0.42	26	24	<0.33
Tetraconazole	<0.29	0.31	1.1	<0.26

Thiamethoxam	<2.8	<2.2	<2.5	<2.2

Fortification experiments were conducted at three concentration levels (10, 50, and 500 µg/kg), with each level replicated seven times. Recoveries were calculated as the percentage of the measured concentration relative to the theoretical value, corrected for background contamination in the corresponding soil.

Tables S6-S8 in ESM 2 provide detailed recovery data for each compound and soil type, while average recoveries and standard deviations are presented in Table S9 in ESM 2. At the highest fortification level (500 µg/kg), all pesticides—except simazine 2- hydroxy—met the recovery acceptance range of 70–120%, depending on soil type. Persistent deviations were observed for simazine 2-hydroxy, propamocarb, and fenpropidin, for which recoveries consistently remained below 70% across multiple soils and fortification levels.

Matrix effects and linearity were also assessed over the tested concentration range. Limits of quantification (LOQs) are summarized in Table S10 in ESM 2, with values ranging from 0.16 to 6 µg/kg for most analytes, whereas Bentazone, Chloridazon, and Cyprodinil exhibited substantially higher LOQs of 15–120 µg/kg . Calibration curves demonstrated strong linearity, with coefficients of determination (R^2) typically exceeding the 0.99 threshold required for method validation. The only exception was chloridazon, which yielded R^2 values around ~0.97.

Overall, the method exhibited satisfactory performance across diverse soil types, demonstrating robustness and suitability for pesticide residue monitoring in agricultural soils. Most analytes complied with SANTE validation criteria, confirming the method's appropriateness for routine analytical applications. The observed deviations for a limited number of compounds (e.g., simazine 2-hydroxy, propamocarb, and fenpropidin) are likely related to strong matrix interactions or compound instability during extraction and analysis.

Table S6 in ESM 2. Recovery data for analyzed compounds in Arenosol Epieuric (AE) at spiking levels of 10, 50, and 500 µg/kg.

	Recovery at level 10 µg/kg							Recovery at level 50 µg/kg							Recovery at level 500 µg/kg						
Compounds	**AE 1, %**	**AE 2, %**	**AE 3, %**	**AE 4, %**	**AE 5, %**	**AE 6, %**	**AE 7, %**	**AE 1, %**	**AE 2, %**	**AE 3, %**	**AE 4, %**	**AE 5, %**	**AE 6, %**	**AE 7, %**	**AE 1, %**	**AE 2, %**	**AE 3, %**	**AE 4, %**	**AE 5, %**	**AE 6, %**	**AE 7, %**
Alachlor	76	72	64	84	69	79	74	92	96	93	87	86	83	87	104	108	103	101	117	128	118
Atrazine	87	81	69	88	72	83	82	120	120	101	97	98	95	101	104	110	103	103	113	126	114
Atrazine_2-hydroxy	90	98	98	119	20	120	89	122	124	69	111	105	97	101	107	107	102	110	114	127	105
Azoxystrobin	111	108	98	119	86	110	109	132	135	127	137	133	129	129	106	103	99	103	107	120	108
Bentazone	n/a	n/a	n/a	n/a	n/a	n/a	n/a	106	108	176	133	129	131	125	67	65	61	73	68	80	72
Boscalid(nicobifen)	70	60	62	70	62	62	64	109	113	86	86	82	82	78	97	93	93	89	100	108	108
Butachlor	69	70	61	78	65	73	65	104	102	87	77	78	85	81	108	110	97	105	119	132	118
Carbendazim	85	80	74	87	72	79	83	110	108	101	101	98	95	101	106	116	99	105	113	126	116
Chlorantraniliprole	63	55	48	61	50	61	58	98	98	81	68	70	70	70	89	89	85	83	96	108	92
Chloridazon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	118	122	139	105	101	97	101	69	74	65	69	76	84	82
Chlorotoluron	101	93	82	100	86	97	99	108	106	115	109	109	105	107	91	91	87	91	98	110	94
Clothianidin	88	84	85	93	85	93	89	122	122	117	105	107	101	105	97	95	97	93	105	114	106
Cyantraniliprole	84	75	71	89	71	84	80	104	100	103	95	96	99	99	108	114	109	105	119	130	120
Cyprodinil	n/a	n/a	n/a	n/a	n/a	n/a	n/a	122	122	125	109	109	101	101	89	84	83	85	90	98	96
Difenoconazole	58	56	50	62	48	52	53	98	110	59	67	66	67	67	87	89	87	83	94	108	100
Dimethomorph	72	70	62	74	54	65	65	114	104	83	86	88	84	84	95	93	93	91	96	108	98
Epoxiconazole	57	50	49	63	49	51	51	83	89	67	70	70	72	66	89	89	91	83	98	108	98
Fenpropidin	71	76	70	71	63	103	66	93	92	80	96	83	83	73	71	67	65	79	78	78	68
Fenpropimorph	83	83	74	87	79	86	82	142	137	101	101	101	97	91	83	78	73	83	86	90	84
Fluazinam	65	62	57	72	58	65	54	118	122	83	73	66	77	75	87	101	91	87	109	120	116
Flufenacet	55	53	51	64	52	59	54	106	116	67	69	68	67	67	87	91	89	85	98	110	98
Fluopicolide	93	92	83	96	86	89	88	112	106	107	109	105	105	101	97	97	97	95	103	110	108
Fluopyram	92	90	82	97	80	85	88	117	112	110	115	110	102	104	95	93	91	91	100	108	106
Flusilazole	60	55	51	64	49	56	54	84	90	67	69	70	69	71	89	95	89	87	98	112	100
Imidacloprid	86	84	79	96	81	79	88	120	118	113	99	105	93	103	87	84	85	85	92	102	96
Linuron	91	83	75	92	100	83	92	116	118	101	105	103	95	93	112	110	109	113	117	128	118
Mandipropamid	97	96	84	100	80	88	87	134	137	107	109	109	111	111	104	103	99	97	109	126	110

Metalaxyl	108	95	88	107	83	97	96	123	124	126	119	124	119	117	99	99	93	95	102	120	106
Metamitron	81	76	70	83	83	79	81	n/a	n/a	105	95	101	93	99	87	84	85	87	92	100	94
Metazachlor	91	80	73	92	70	80	79	n/a	n/a	113	95	101	99	101	93	97	91	91	103	116	106
Metazachlor_ESA	101	88	86	93	94	97	99	116	100	113	109	105	103	107	106	103	107	113	105	126	110
Metazachlor_OA	95	87	81	96	74	93	93	112	108	95	101	107	99	101	102	99	99	97	107	118	108
Methabenzthiazuron	88	79	73	92	71	84	85	112	110	101	99	98	97	99	89	97	91	93	101	114	100
Metobromuron	94	81	84	95	101	87	89	124	116	107	99	105	103	105	99	97	97	93	103	114	108
Metolachlor	83	76	68	89	69	82	87	123	120	102	94	98	94	94	101	105	99	99	114	128	110
Metolachlor ESA	91	89	78	88	79	83	86	80	86	115	101	103	103	101	99	99	97	97	109	118	106
Metolachlor_OA	86	78	70	94	74	81	81	122	132	109	95	98	99	101	95	97	91	91	104	118	106
Metribuzin	87	85	78	89	79	80	83	n/a	n/a	105	95	101	95	97	95	93	93	93	98	108	98
Metribuzin desamino	84	80	73	86	83	77	78	n/a	n/a	115	95	94	95	95	77	76	75	75	82	86	82
Monuron	86	80	79	90	88	81	85	132	122	115	99	96	99	95	85	82	83	81	88	96	90
Napropamide	86	79	70	89	71	77	81	118	122	99	93	96	97	97	91	93	85	89	96	112	100
Pendimethalin	72	65	59	83	65	68	65	102	112	79	77	72	77	77	102	108	103	99	115	132	116
Prochloraz	103	90	88	102	70	92	90	137	135	98	118	117	110	114	118	118	111	115	122	134	124
Prometon	94	90	81	97	83	89	93	117	116	120	109	112	109	111	83	80	77	83	86	96	88
Prometryn	87	82	72	88	70	81	81	109	109	102	100	100	96	96	97	99	91	95	104	114	104
Propamocarb	49	52	50	58	48	53	48	80	94	57	69	64	73	44	91	89	83	81	107	96	90
Propazine	79	75	66	78	70	75	72	126	122	101	87	94	89	97	91	93	89	91	94	108	94
Propazine 2-hydroxy	96	94	84	96	67	86	95	125	124	106	110	114	112	114	101	98	96	98	110	119	109
Propiconazole	53	49	45	58	42	49	47	81	85	59	64	64	64	64	87	93	89	83	96	108	98
Pyraclostrobin	81	77	69	87	73	71	74	n/a	n/a	83	83	88	89	89	87	89	83	85	92	106	94
Secbumeton	94	91	82	97	80	88	92	111	112	116	107	110	107	111	81	78	75	79	84	90	84
Simazine	87	83	75	91	75	81	84	118	114	103	99	103	99	103	99	97	97	95	101	114	102
Simazine 2-hydroxy	40	48	35	38	23	57	44	46	45	42	53	50	48	44	48	42	47	55	52	49	41
Tebuconazole	59	56	50	65	47	62	55	84	92	61	69	64	63	67	87	93	89	85	96	110	100
Terbuthylazine	77	74	68	83			74	106	102	91	93	90	89	85	97	91	93	91	101	108	98
Terbuthylazine 2-hydroxy	90	127	117	149	20	150	99	116	114	69	117	96	99	93	100	96	96	96	113	119	113
Tetraconazole	59	54	50	61	49	53	54	113	130	73	72	70	68	70	87	91	89	85	98	108	100
Thiamethoxam	121	127	107	129	102	130	129	166	159	154	141	139	133	143	106	97	101	101	107	118	108

Table S7 in ESM 2. Recovery data for analyzed compounds in Haplic Cambisol (HCa) at spiking levels of 10, 50, and 500 µg/kg.

Compounds	Recovery at level 10 µg/kg							Recovery at level 50 µg/kg							Recovery at level 500 µg/kg						
	HCa 1, %	HCa 2, %	HCa 3,%	HCa 4,%	HCa 5,%	HCa 6,%	HCa 7,%	HCa 1, %	HCa 2, %	HCa 3,%	HCa 4,%	HCa 5,%	HCa 6,%	HCa 7,%	HCa 1, %	HCa 2, %	HCa 3,%	HCa 4,%	HCa 5,%	HCa 6,%	HCa 7,%
Alachlor	89	70	71	74	62	69	89	89	91	89	84	85	90	84	108	118	123	109	117	108	110
Atrazine	85	72	74	79	69	74	93	116	107	102	101	96	104	99	107	114	121	109	120	112	108
Atrazine 2-hydroxy	51	38	42	42	36	44	51	120	84	79	74	79	75	79	95	90	99	95	88	92	84
Azoxystrobin	104	96	102	107	85	96	115	128	141	135	134	134	129	122	103	107	115	113	116	108	106
Bentazone	n/a	n/a	n/a	n/a	n/a	n/a	n/a	107	142	136	143	131	129	126	67	70	73	71	72	64	72
Boscalid	73	65	65	66	54	62	83	98	105	96	95	100	99	91	109	109	122	109	120	108	108
Butachlor	70	61	66	69	58	77	86	105	83	83	76	81	80	75	110	131	121	113	115	108	106
Carbendazim	53	43	52	54	35	54	64	102	101	94	93	98	98	93	111	115	124	108	111	109	107
Chlorantraniliprole	79	64	65	71	54	76	77	85	97	93	90	83	96	86	120	139	134	123	128	120	122
Chloridazon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	109	106	101	105	97	109	94	71	78	79	75	78	72	74
Chlorotoluron	93	75	82	85	73	75	95	108	121	115	114	102	110	113	95	103	102	99	106	96	98
Clothianidin	108	89	85	92	81	81	100	115	110	99	103	105	111	96	102	101	113	99	107	102	100
Cyantraniliprole	85	71	72	72	67	68	88	101	101	95	97	89	100	98	114	120	125	115	126	114	112
Cyprodinil	n/a	n/a	n/a	n/a	n/a	n/a	n/a	129	108	101	117	101	92	84	91	95	101	95	92	92	90
Difenoconazole	63	52	55	51	43	72	68	88	89	86	81	90	86	82	117	137	134	118	124	116	120
Dimethomorph	86	76	85	84	72	83	98	110	120	114	110	114	111	108	122	128	138	130	132	124	124
Epoxiconazole	63	51	57	53	45	61	71	75	84	83	78	85	87	81	111	126	123	109	114	106	110
Fenpropidin	29	10	19	20	10	60	30	97	99	93	94	97	80	90	101	93	103	105	82	100	86
Fenpropimorph	71	57	59	59	47	72	72	139	119	111	111	115	102	104	101	100	108	106	98	103	95
Fluazinam	71	60	58	58	47	76	74	111	75	76	74	77	78	73	102	112	105	103	107	100	102
Flufenacet	67	59	61	59	50	58	75	96	82	82	75	82	86	74	110	120	123	113	118	108	110
Fluopicolide	86	75	75	81	70	72	98	107	110	104	104	110	105	100	97	97	107	101	104	98	98
Fluopyram	89	80	84	83	75	75	100	111	116	111	107	121	112	102	95	95	103	99	102	96	96
Flusilazole	48	29	47	39	19	39	49	73	83	83	78	87	85	83	114	127	131	113	121	110	116
Imidacloprid	83	78	83	88	73	74	90	119	99	99	99	103	106	100	93	93	99	93	94	90	92
Linuron	98	75	92	83	75	83	119	109	110	101	101	103	100	94	114	118	125	111	119	110	116
Mandipropamid	81	72	73	78	61	83	93	121	109	107	109	111	114	107	107	122	116	107	112	108	106

Metalaxyl	111	90	100	104	83	92	113	125	129	125	125	110	122	121	101	107	111	107	112	104	102
Metamitron	79	72	82	81	72	73	93	150	99	95	94	95	98	90	91	93	97	89	94	90	90
Metazachlor	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	100	101	94	79	105	100	100	117	109	104	105	99	99
Metazachlor_ESA	71	62	79	62	63	62	82	99	107	97	101	97	108	102	141	119	123	110	115	117	115
Metazachlor_OA	62	63	70	73	54	53	73	108	97	94	93	96	100	94	102	106	112	100	105	101	101
Methabenzthiazuron	73	64	70	74	63	72	87	111	110	103	102	95	99	98	95	107	107	103	106	100	102
Metobromuron	98	84	95	86	81	89	100	117	104	105	101	93	103	96	95	106	105	99	107	100	102
Metolachlor	80	68	73	74	64	72	92	119	103	101	95	97	104	94	105	114	119	109	114	110	108
Metolachlor_ESA	89	81	80	85	75	75	93	72	105	102	103	106	108	101	107	107	117	105	106	106	108
Metolachlor_OA	87	70	76	76	65	83	91	112	101	100	97	90	104	97	105	118	113	103	108	104	100
Metribuzin	76	72	79	78	64	68	86	n/a	106	100	102	100	105	97	95	103	105	97	102	98	98
Metribuzin_desamino	101	90	99	104	84	93	112	143	129	121	125	123	130	123	103	107	109	103	106	102	102
Monuron	87	78	81	87	71	78	92	119	109	103	103	107	104	98	87	91	95	87	94	88	88
Napropamide	76	65	67	70	59	71	87	105	101	99	93	95	100	90	97	107	107	99	98	96	96
Pendimethalin	75	62	62	61	55	75	79	87	81	78	72	79	82	78	106	127	117	103	115	104	106
Prochloraz	61	32	50	42	22	62	62	127	121	115	109	125	108	111	118	122	129	123	121	118	114
Prometon	84	77	83	86	70	78	96	110	112	106	108	108	109	101	85	88	89	85	86	86	86
Prometryn	82	66	69	73	62	69	87	108	102	98	96	96	99	93	99	101	107	103	108	100	100
Propamocarb	41	37	41	38	35	38	54	84	78	65	76	70	73	75	99	105	109	99	86	92	92
Propazine	82	76	75	82	70	78	89	121	99	93	94	87	101	92	95	99	103	95	103	94	96
Propazine 2-hydroxy	74	69	73	76	60	69	79	115	110	107	104	109	109	108	107	107	112	107	104	108	104
Propiconazole	66	45	53	46	40	55	66	69	84	83	78	87	85	81	115	130	134	118	126	115	115
Pyraclostrobin	77	60	71	67	55	89	79	n/a	106	107	96	109	97	98	109	130	122	114	120	108	112
Secbumeton	79	71	76	80	64	75	91	109	109	105	105	105	108	102	83	84	89	83	82	84	82
Simazine	83	73	79	82	70	76	93	109	105	101	103	104	108	101	101	105	107	101	106	102	102
Simazine 2-hydroxy	30	23	24	22	21	37	29	61	67	54	52	53	46	49	66	54	59	63	48	61	45
Tebuconazole	51	40	44	42	35	46	62	80	81	82	79	84	88	76	115	126	128	114	122	113	115
Terbuthylazine	84	73	77	77	69	74	93	95	97	91	92	95	94	86	95	99	107	99	98	96	94
Terbuthylazine 2-hydroxy	n/a	n/a	n/a	n/a	n/a	n/a	n/a	107	83	89	80	99	84	88	111	105	120	108	100	107	99
Tetraconazole	66	54	58	55	47	58	72	103	86	85	82	83	87	83	111	118	123	111	116	112	110
Thiamethoxam	127	119	125	141	111	120	139	n/a	144	134	137	133	141	135	108	106	107	109	107	106	100

Table S8 in ESM 2. Recovery data for analyzed compounds in Haplic Chernozem (HCh) at spiking levels of 10, 50, and 500 µg/kg.

Compounds	Recovery at level 10 µg/kg							Recovery at level 50 µg/kg							Recovery at level 500 µg/kg						
	HCh 1, %	HCh 2, %	HCh 3,%	HCh 4,%	HCh 5,%	HCh 6,%	HCh 7,%	HCh 1, %	HCh 2, %	HCh 3,%	HCh 4,%	HCh 5,%	HCh 6,%	HCh 7,%	HCh 1, %	HCh 2, %	HCh 3,%	HCh 4,%	HCh 5,%	HCh 6,%	HCh 7,%
Alachlor	76	77	86		84	74	84	108	100	104	103	101	103	100	108	100	104	103	101	103	100
Atrazine	79	97	97	103	94	80	86	103	101	103	106	103	100	97	103	101	103	106	103	100	97
Atrazine 2-hydroxy	62	106	75	101	92	63	85	109	107	109	75	95	102	86	109	107	109	75	95	102	86
Azoxystrobin	127	133	133	137	129	120	113	96	97	92	104	96	91	93	96	97	92	104	96	91	93
Bentazone	n/a	n/a	n/a	n/a	n/a	n/a	n/a	76	74	67	130	81	74	74	76	74	67	130	81	74	74
Boscalid	89	94	97	98	99	97	84	103	100	101	98	103	102	100	103	100	101	98	103	102	100
Butachlor	74	86	86	98	69	73	78	107	88	105	101	105	100	100	107	88	105	101	105	100	100
Carbendazim	88	98	99	97	99	85	88	105	102	101	123	97	102	102	105	102	101	123	97	102	102
Chlorantraniliprole	71	75	81	84	72	73	77	97	90	100	103	94	89	90	97	90	100	103	94	89	90
Chloridazon	n/a	n/a	n/a	n/a	n/a	n/a	n/a	66	66	63	115	67	68	70	66	66	63	115	67	68	70
Chlorotoluron	95	113	113		109	93	95	86	85	85	106	89	88	81	86	85	85	106	89	88	81
Clothianidin	93	103	113		109	97	96	97	92	93	84	89	90	92	97	92	93	84	89	90	92
Cyantraniliprole	88	101	92	108	93	84	92	99	102	107	98	105	100	96	99	102	107	98	105	100	96
Cyprodinil	n/a	n/a	n/a	n/a	n/a	n/a	n/a	82	82	83	105	85	80	78	82	82	83	105	85	80	78
Difenoconazole	79	84	87	93	83	77	79	120	106	122	111	107	112	106	120	106	122	111	107	112	106
Dimethomorph	81	89	91	89	89	82	83	95	92	93	88	95	90	90	95	92	93	88	95	90	90
Epoxiconazole	74	81	84	88	82	74	77	110	102	110	105	105	102	100	110	102	110	105	105	102	100
Fenpropidin	76	74	84	118	72	65	77	69	70	67	70	62	59	50	69	70	67	70	62	59	50
Fenpropimorph	88	94	95	118	95	84	88	74	74	71	80	71	70	64	74	74	71	80	71	70	64
Fluazinam	65	49	52		41	47	35	100	79	98	95	84	77	83	100	79	98	95	84	77	83
Flufenacet	70	78	78	98	84	73	76	108	100	104	103	101	102	102	108	100	104	103	101	102	102
Fluopicolide	95	103	113	118	109	93	103	91	90	87	94	91	88	88	91	90	87	94	91	88	88
Fluopyram	98	113	113	108	109	100	101	88	87	83	90	89	86	83	88	87	83	90	89	86	83
Flusilazole	78	82	87	93	83	77	77	112	106	107	101	105	106	104	112	106	107	101	105	106	104
Imidacloprid	92	100	113	118	97	95	97	85	78	81	75	79	80	80	85	78	81	75	79	80	80
Linuron	92	100	113	137	99	92	91	103	100	103	102	107	102	100	103	100	103	102	107	102	100

Mandipropamid	98	103	113	118	109	100	103	103	98	101	109	99	98	98	103	98	101	109	99	98	98
Metalaxyl	108	123	123	137	119	110	113	86	89	97	102	93	92	85	86	89	97	102	93	92	85
Metamitron	83	89	94	98	82	72	79	83	80	77	84	77	76	76	83	80	77	84	77	76	76
Metazachlor	90	99	103	108	98	87	93	95	90	99	115	91	92	92	95	90	99	115	91	92	92
Metazachlor_ESA	86	113	100	108	99	94	91	109	103	105	102	105	102	95	109	103	105	102	105	102	95
Metazachlor_OA	98	98	101	n/a	99	87	98	93	88	91	69	83	88	84	93	88	91	69	83	88	84
Methabenzthiazuron	85	100	96	98	93	84	91	93	92	91	102	91	90	86	93	92	91	102	91	90	86
Metobromuron	86	103	92	n/a	98	92	95	91	88	91	88	95	94	88	91	88	91	88	95	94	88
Metolachlor	84	92	98	93	95	84	87	101	98	99	109	97	98	98	101	98	99	109	97	98	98
Metolachlor_ESA	86	98	99	108	99	85	94	97	88	95	77	89	92	88	97	88	95	77	89	92	88
Metolachlor_OA	90	96	101	108	96	84	89	93	90	103	111	91	90	90	93	90	103	111	91	90	90
Metribuzin	91	103	100	95	99	92	94	91	90	89	94	91	90	88	91	90	89	94	91	90	88
Metribuzin_desamino	81	94	95	98	94	85	88	74	72	71	84	75	72	72	74	72	71	84	75	72	72
Monuron	91	99	103	108	99	92	90	82	78	79	86	79	78	78	82	78	79	86	79	78	78
Napropamide	84	96	96	108	92	85	89	95	90	89	111	89	86	88	95	90	89	111	89	86	88
Pendimethalin	75	79	85	n/a	68	68	79	110	96	114	103	103	100	100	110	96	114	103	103	100	100
Prochloraz	93	118	118	133	104	105	108	111	107	105	104	109	108	103	111	107	105	104	109	108	103
Prometon	98	113	113	108	109	98	101	78	77	75	94	77	76	73	78	77	75	94	77	76	73
Prometryn	88	99	100	98	97	88	89	93	92	93	107	93	90	86	93	92	93	107	93	90	86
Propamocarb	62	54	69	77	46	57	64	85	75	80	78	76	71	65	85	75	80	78	76	71	65
Propazine	83	91	94	n/a	91	83	90	85	82	83	84	83	82	82	85	82	83	84	83	82	82
Propazine 2-hydroxy	100	114	114	100	111	92	104	101	97	97	79	93	98	87	101	97	97	79	93	98	87
Propiconazole	75	80	80	86	79	73	73	116	108	114	105	105	110	106	116	108	114	105	105	110	106
Pyraclostrobin	98	113	113	118	99	94	97	109	93	107	121	101	100	97	109	93	107	121	101	100	97
Secbumeton	98	113	113	108	109	99	101	76	73	73	92	77	74	71	76	73	73	92	77	74	71
Simazine	91	103	100	98	99	91	95	93	90	93	96	95	94	90	93	90	93	96	95	94	90
Simazine 2-hydroxy	68	80	82	81	65	59	80	64	70	57	44	58	56	44	64	70	57	44	58	56	44
Tebuconazole	91	87	94	98	87	80	83	112	104	111	101	105	104	108	112	104	111	101	105	104	108
Terbuthylazine	82	85	90	n/a	90	83	82	89	86	85	90	89	82	86	89	86	85	90	89	82	86
Terbuthylazine 2-hydroxy	89	100	97	98	99	83	90	105	96	99	77	91	94	84	105	96	99	77	91	94	84
Tetraconazole	77	82	87	94	81	74	79	112	104	107	103	103	104	104	112	104	107	103	103	104	104
Thiamethoxam	127	144	144	147	139	120	123	94	91	88	91	86	87	85	94	91	88	91	86	87	85

Table S9 in ESM 2. Average recovery (Rec) and repeatability (RSD) for analytes from investigated soils at three concentration levels (10, 50, and 500 µg/kg) analyzed in seven replicates.

Compounds	Arenosol Epieuric						Haplic Cambisol						Haplic Chernozem					
	10 µg/kg		50 µg/kg		500 µg/kg		10 µg/kg		50 µg/kg		500 µg/kg		10 µg/kg		50 µg/kg		500 µg/kg	
	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %	Rec, %	RSD %
Alachlor	74%	6%	89%	5%	111%	10%	75%	10%	87%	3%	113%	6%	80%	5%	71%	7%	103%	3%
Atrazine	80%	7%	105%	11%	110%	8%	78%	8%	104%	6%	113%	6%	91%	9%	83%	11%	102%	3%
Atrazine_2-hydroxy	n/a	n/a	104%	19%	110%	8%	44%	6%	84%	16%	92%	5%	n/a	n/a	89%	13%	98%	13%
Azoxystrobin	106%	11%	132%	4%	106%	7%	101%	10%	132%	6%	110%	5%	128%	9%	104%	9%	96%	4%
Bentazone	n/a	n/a	130%	23%	70%	6%	n/a	n/a	131%	12%	70%	3%	n/a	n/a	132%	10%	82%	21%
Boscalid(nicobifen)	64%	4%	91%	14%	98%	7%	67%	9%	98%	4%	112%	6%	94%	6%	80%	7%	101%	2%
Butachlor	69%	5%	88%	11%	113%	11%	69%	10%	83%	10%	115%	9%	81%	10%	65%	14%	101%	6%
Carbendazim	80%	5%	102%	5%	111%	9%	51%	9%	97%	4%	112%	6%	94%	6%	83%	6%	105%	9%
Chlorantraniliprole	56%	6%	79%	13%	92%	8%	69%	9%	90%	5%	127%	8%	76%	5%	67%	13%	95%	5%
Chloridazon	n/a	n/a	112%	15%	74%	7%	n/a	n/a	103%	6%	75%	3%	n/a	n/a	102%	14%	73%	18%
Chlorotoluron	94%	7%	108%	3%	95%	8%	82%	9%	112%	6%	100%	4%	103%	9%	84%	9%	89%	8%
Clothianidin	88%	4%	111%	9%	101%	7%	91%	10%	106%	7%	103%	5%	102%	8%	82%	11%	91%	4%
Cyantraniliprole	79%	7%	99%	3%	115%	9%	75%	8%	97%	4%	118%	6%	94%	8%	75%	7%	101%	4%
Cyprodinil	n/a	n/a	113%	10%	89%	6%	n/a	n/a	104%	15%	94%	4%	n/a	n/a	120%	26%	85%	9%
Difenoconazole	54%	5%	76%	19%	93%	9%	58%	10%	86%	3%	124%	8%	83%	6%	72%	6%	112%	6%
Dimethomorph	66%	7%	92%	12%	96%	6%	83%	8%	113%	4%	128%	6%	86%	4%	80%	13%	92%	3%
Epoxiconazole	53%	5%	74%	9%	94%	8%	57%	8%	82%	4%	114%	8%	80%	5%	69%	5%	105%	4%
Fenpropidin	74%	13%	86%	8%	72%	6%	26%	17%	93%	7%	96%	9%	81%	17%	60%	12%	64%	7%
Fenpropimorph	82%	4%	110%	21%	83%	5%	62%	9%	114%	12%	102%	5%	95%	11%	89%	21%	72%	5%
Fluazinam	62%	6%	88%	23%	102%	14%	63%	10%	81%	13%	104%	4%	48%	10%	70%	17%	88%	10%
Flufenacet	55%	5%	80%	21%	94%	9%	61%	8%	83%	7%	114%	6%	79%	9%	67%	10%	103%	2%
Fluopicolide	90%	4%	106%	3%	101%	6%	80%	10%	106%	4%	100%	4%	105%	9%	84%	6%	90%	2%
Fluopyram	88%	6%	110%	5%	98%	7%	84%	9%	111%	6%	98%	3%	106%	6%	84%	7%	87%	3%
Flusilazole	56%	5%	74%	9%	96%	9%	39%	11%	82%	5%	119%	8%	83%	6%	68%	6%	106%	3%
Imidacloprid	85%	6%	107%	10%	90%	7%	81%	7%	103%	7%	93%	3%	102%	10%	85%	14%	80%	3%

Linuron	88%	8%	104%	10%	115%	7%	89%	16%	102%	6%	116%	5%	104%	17%	81%	12%	102%	3%
Mandipropamid	90%	8%	117%	13%	107%	10%	77%	10%	111%	5%	111%	6%	106%	7%	94%	9%	101%	4%
Metalaxyl	96%	9%	122%	4%	102%	9%	99%	11%	122%	6%	106%	4%	119%	10%	93%	8%	92%	6%
Metamitron	79%	4%	98%	5%	90%	6%	79%	8%	103%	21%	92%	3%	85%	9%	82%	23%	79%	3%
Metazachlor	81%	8%	102%	7%	100%	9%	n/a	n/a	97%	9%	105%	7%	97%	7%	80%	11%	96%	9%
Metazachlor_ESA	94%	5%	108%	6%	110%	8%	69%	9%	102%	4%	120%	10%	99%	9%	80%	11%	103%	4%
Metazachlor_OA	89%	8%	103%	6%	104%	7%	64%	9%	97%	5%	104%	4%	97%	5%	79%	13%	85%	8%
Methabenzthiazuron	82%	8%	102%	6%	98%	8%	72%	8%	103%	6%	103%	4%	93%	6%	82%	11%	92%	5%
Metobromuron	90%	7%	108%	9%	102%	7%	90%	7%	103%	8%	102%	4%	94%	6%	85%	13%	90%	3%
Metolachlor	79%	8%	104%	13%	108%	10%	75%	9%	102%	8%	111%	5%	90%	6%	83%	14%	100%	4%
Metolachlor_ESA	85%	5%	98%	12%	104%	8%	83%	7%	99%	12%	108%	4%	96%	8%	72%	15%	89%	6%
Metolachlor_OA	80%	8%	108%	14%	100%	10%	78%	9%	100%	7%	107%	6%	95%	8%	83%	14%	95%	8%
Metribuzin	83%	4%	98%	4%	97%	5%	75%	7%	102%	3%	100%	4%	96%	4%	78%	7%	90%	2%
Metribuzin_desamino	80%	4%	99%	9%	79%	4%	98%	10%	128%	8%	105%	3%	91%	6%	77%	8%	74%	4%
Monuron	84%	4%	108%	15%	87%	5%	82%	7%	106%	7%	90%	3%	97%	7%	86%	15%	80%	3%
Napropamide	79%	7%	103%	12%	95%	9%	71%	9%	97%	5%	100%	5%	93%	8%	79%	9%	92%	9%
Pendimethalin	68%	8%	85%	15%	111%	11%	67%	9%	79%	5%	111%	9%	76%	7%	66%	9%	104%	6%
Prochloraz	91%	11%	118%	14%	120%	7%	47%	16%	116%	8%	121%	5%	111%	13%	98%	6%	107%	3%
Prometon	90%	6%	113%	5%	85%	6%	82%	8%	108%	3%	86%	2%	106%	6%	88%	8%	79%	7%
Prometryn	80%	7%	102%	6%	101%	8%	73%	9%	99%	5%	102%	4%	94%	6%	81%	8%	93%	6%
Propamocarb	51%	4%	69%	16%	91%	8%	41%	6%	74%	6%	97%	8%	61%	10%	52%	14%	76%	7%
Propazine	74%	4%	102%	16%	94%	6%	79%	6%	98%	11%	98%	4%	89%	5%	80%	20%	83%	1%
Propazine 2-hydroxy	88%	11%	115%	7%	104%	8%	71%	6%	109%	3%	107%	3%	105%	9%	93%	10%	93%	8%
Propiconazole	49%	5%	69%	10%	93%	8%	53%	10%	81%	6%	122%	8%	78%	5%	65%	5%	109%	4%
Pyraclostrobin	76%	6%	86%	3%	91%	8%	71%	12%	102%	6%	117%	8%	104%	9%	81%	10%	104%	9%
Secbumeton	89%	6%	110%	3%	82%	5%	77%	8%	106%	2%	84%	2%	106%	6%	88%	9%	77%	7%
Simazine	82%	6%	106%	8%	101%	6%	79%	8%	104%	3%	103%	3%	97%	4%	85%	9%	93%	3%
Simazine 2-hydroxy	41%	11%	47%	4%	48%	5%	27%	6%	55%	7%	57%	8%	74%	9%	53%	11%	56%	10%
Tebuconazole	56%	6%	71%	12%	94%	9%	46%	9%	81%	4%	119%	6%	89%	6%	67%	5%	106%	4%
Terbuthylazine	75%	5%	94%	8%	97%	6%	78%	8%	93%	4%	98%	4%	85%	4%	74%	7%	87%	3%
Terbuthylazine 2-hydroxy	n/a	n/a	101%	17%	105%	10%	n/a	n/a	90%	10%	107%	7%	94%	6%	83%	13%	92%	9%

Tetraconazole	54%	4%	85%	25%	94%	8%	59%	8%	87%	7%	114%	5%	82%	7%	75%	10%	105%	3%
Thiamethoxam	121%	12%	148%	12%	105%	7%	126%	11%	137%	4%	106%	3%	135%	11%	103%	15%	89%	3%

Table S10 in ESM 2. Limits of quantification (LOQ_min, LOQ_max) and matrix effects (ME) for analytes in three soil types (Arenosol Epieuric, Haplic Cambisol, and Haplic Chernozem), including the determination coefficient (R^2).

	Arenosol Epieuric			**Haplic Cambisol**			**Haplic Chernozem**			**R^2**
	LOQ min	**LOQ max**	**ME,**	**LOQ min**	**LOQ max**	**ME,**	**LOQ min**	**LOQ max**	**ME ,**	
Ccompounds	**µg/kg dry weight**		**%**	**µg/kg dry weight**		**%**	**µg/kg dry weight**		**%**	
Alachlor	<1.3	<3.7	98%	<1.3	<2	91%	<1.3	<10	93%	0.9891
Atrazine	<0.16	<0.45	113%	<0.16	<0.22	109%	<0.17	<1.2	109%	0.9979
Atrazine 2-hydroxy	<0.16	<0.43	118%	<0.12	<0.17	118%	<0.16	<1.2	112%	0.9945
Azoxystrobin	<0.35	<1	161%	<0.34	<0.47	163%	<0.34	<2.7	157%	0.9946
Bentazone	<17	<55	172%	<17	<25	170%	<17	<120	161%	0.9900
Boscalid(nicobifen)	<0.27	<0.81	116%	<0.32	<0.45	103%	<0.33	<2.5	113%	0.9988
Butachlor	<1.2	<3.3	87%	<1.2	<1.8	69%	<1.2	<9.1	78%	0.9920
Carbendazim	<0.34	<1	109%	<0.33	<0.49	103%	<0.34	<2.3	107%	0.9960
Chlorantraniliprole	<0.13	<0.38	164%	<0.18	<0.27	145%	<0.15	<1.1	154%	0.9841
Chloridazon	<18	<53	132%	<17	<26	130%	<18	<120	132%	0.9937
Chlorotoluron	<1.9	<5.1	106%	<1.8	<2.5	103%	<1.9	<14	105%	0.9993
Clothianidin	<1.6	<5.6	105%	<1.7	<2.4	95%	<1.6	<13	99%	0.9982
Cyantraniliprole	<0.33	<0.91	115%	<0.32	<0.44	105%	<0.34	<2.5	101%	0.9959
Cyprodinil	<15	<44	115%	<15	<20	121%	<15	<110	107%	0.9904
Difenoconazole	<0.91	<2.6	101%	<1.2	<1.9	92%	<1.2	<9.4	91%	0.9923
Dimethomorph	<0.12	<0.34	120%	<0.14	<0.2	114%	<0.12	<0.91	117%	0.9920
Epoxiconazole	<0.2	<0.58	102%	<0.25	<0.38	97%	<0.25	<1.9	98%	0.9926
Fenpropidin	<0.33	<0.97	144%	<0.42	<0.58	138%	<0.33	<2.5	144%	0.9937
Fenpropimorph	<0.32	<0.95	144%	<0.4	<0.55	136%	<0.32	<2.5	136%	0.9959
Fluazinam	<1.2	<3.4	97%	<1.2	<1.8	79%	<1.2	<9.3	89%	0.9956
Flufenacet	<0.22	<0.62	96%	<0.28	<0.41	86%	<0.27	<2.1	87%	0.9982

Fluopicolide	<0.35	<1	128%	<0.35	<0.48	121%	<0.35	<2.7	123%	0.9959
Fluopyram	<0.16	<0.46	130%	<0.15	<0.21	122%	<0.16	<1.2	125%	0.9903
Flusilazole	<0.95	<2.7	98%	<1.2	<1.8	94%	<1.2	<9.1	94%	0.9972
Imidacloprid	<0.31	<1.1	117%	<0.33	<0.46	110%	<0.3	<2.6	115%	0.9987
Linuron	<1.4	<4.1	114%	<1.4	<1.9	103%	<1.4	<11	108%	0.9980
Mandipropamid	<1.4	<3.9	117%	<1.4	<2.1	115%	<1.4	<11	111%	0.9950
Metalaxyl	<0.17	<0.46	141%	<0.16	<0.22	139%	<0.17	<1.3	142%	0.9953
Metamitron	<0.14	<0.49	122%	<0.15	<0.21	112%	<0.14	<1.2	114%	0.9891
Metazachlor	<0.18	<0.51	127%	<0.18	<0.28	119%	<0.18	<1.4	123%	0.9821
Metazachlor_ESA	<1	<3.1	117%	<1	<1.7	109%	<1	<8	111%	0.9711
Metazachlor_OA	<1.5	<5.4	85%	<1.6	<2.3	78%	<1.5	<13	80%	0.9984
Methabenzthiazuron	<0.33	<0.91	80%	<0.32	<0.44	117%	<0.34	<2.5	116%	0.9992
Metobromuron	<1.5	<5.3	111%	<1.6	<2.3	102%	<1.5	<13	110%	0.9966
Metolachlor	<0.15	<0.43	110%	<0.15	<0.23	106%	<0.15	<1.2	106%	0.9829
Metolachlor_ESA	<0.13	<0.47	103%	<0.14	<0.2	94%	<0.13	<1.1	101%	0.9936
Metolachlor_OA	<0.15	<0.43	131%	<0.16	<0.24	123%	<0.15	<1.2	125%	0.9985
Metribuzin	<0.15	<0.51	116%	<0.16	<0.22	110%	<0.14	<1.2	113%	0.9973
Metribuzin_desamino	<0.16	<0.56	123%	<0.22	<0.3	113%	<0.16	<1.3	124%	0.9982
Monuron	<0.23	<0.78	117%	<0.24	<0.34	111%	<0.22	<1.9	118%	0.9970
Napropamide	<0.28	<0.8	128%	<0.29	<0.43	122%	<0.28	<2.2	123%	0.9950
Pendimethalin	<1.2	<3.4	91%	<1.2	<1.8	83%	<1.2	<9.2	85%	0.9999
Prochloraz	<0.34	<1	123%	<0.33	<0.46	125%	<0.34	<2.6	122%	0.9915
Prometon	<0.16	<0.57	149%	<0.17	<0.24	142%	<0.16	<1.4	148%	0.9972
Prometryn	<0.16	<0.44	125%	<0.15	<0.21	120%	<0.16	<1.2	122%	0.9985
Propamocarb	<0.11	<0.33	131%	<0.13	<0.2	118%	<0.14	<0.91	128%	0.9975
Propazine	<1.2	<4.3	102%	<1.4	<1.9	98%	<1.2	<10	104%	0.9981
Propazine 2-hydroxy	<0.28	<0.96	126%	<0.3	<0.41	124%	<0.27	<2.3	123%	0.9834
Propiconazole	<0.2	<0.56	99%	<0.26	<0.4	93%	<0.26	<2	92%	0.9947
Pyraclostrobin	<1.2	<3.5	139%	<1.5	<2.3	109%	<1.5	<12	115%	0.9924
Secbumeton	<0.15	<0.53	148%	<0.16	<0.23	139%	<0.15	<1.3	147%	0.9984
Simazine	<0.28	<0.98	116%	<0.3	<0.42	109%	<0.27	<2.3	114%	0.9865
Simazine 2-hydroxy	<0.26	<0.9	119%	<0.28	<0.39	116%	<0.25	<2.2	120%	0.9866

Tebuconazole	<1	<2.9	98%	<1.3	<2	96%	<1.3	<9.9	94%	0.9986
Terbuthylazine	<4	<12	115%	<4	<5.5	111%	<4	<31	111%	0.9956
Terbuthylazine 2-hydroxy	<0.27	<0.81	122%	<0.27	<0.37	119%	<0.27	<2.1	119%	0.9950
Tetraconazole	<0.19	<0.55	101%	<0.24	<0.36	95%	<0.24	<1.8	95%	0.9912
Thiamethoxam	<1.7	<5.8	166%	<1.8	<2.5	137%	<1.6	<14	153%	0.9937