

Supporting information to article:

Long-term Persistence of Pesticides and TPs in Archived Agricultural Soil Samples and Comparison with Pesticide Application

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Standards and Reagents

Methanol and water of HPLC grade were purchased from Acros Organics (Geel, Belgium). Acetone, ethyl acetate, phosphoric acid, and formic acid were of pro analysis grade and obtained from Fluka (Buchs, Switzerland) or Merck (Darmstadt, Germany). Diatomaceous earth was obtained from Dionex (Sunnyvale, CA, USA). Pure pesticide standard compounds and isotope labeled internal standards were purchased from Sigma Aldrich (Steinheim, Germany), TRC Canada (Toronto, Canada), TCI Europe (Antwerpen, Belgium), Dr. Ehrenstorfer (Augsburg Germany), Novartis (Basel, Switzerland), ReseaLIFEchem GmbH (Burgdorf Switzerland), CDN Isotopes Inc. (Augsburg, Germany), and Lipomed AG (Arlesheim, Switzerland). Pesticide-free soil was obtained from the topsoil of an Eutric Cambisol (FAO) and contained 33% sand, 23% clay and 3.6% organic carbon and had a pH of 5.7 (in 0.01 M CaCl₂).

Method development

Using a set of 39 pesticides and TPs the following method parameters were optimized based in the method of Chiaia-Hernandez et al.¹ combining pressurized liquid extraction (PLE) and the multiresidue “QuEChERS” (Quick, Easy, Cheap, Effective, Rugged, and Safe) clean-up method of the obtained extracts developed by Anastassiades et al.² Different extraction solvents and temperatures (acetone/ethyl acetate/water 45:40:15, acetone/ethyl acetate 30:70,

and acetone/water 70:30 at 80, 100, 120, and 140°C) were tested for PLE, and an additional dispersive SPE (d-SPE) clean-up step of the QuEChERS extract utilizing primary secondary amine (PSA), C₁₈-modified silica gel, and graphitized carbon black (GCB) was evaluated.

Study design

For each sampling site, composite samples are collected from the top 20 cm of soil and transported in sealed plastic bags to the laboratory. Subsequently, soils are dried at 40°C for 48 hours, homogenized, passed through a 2 mm sieve, and stored in plastic containers (high density polyethylene) under cold (12 - 15°C) and dry (30 - 40% humidity) conditions in a soil archive, which has been described in detail elsewhere.³ In addition, at selected agricultural monitoring sites, land management data are collected annually to assess input and output fluxes of nutrients, trace metals and pesticides.

Table S1. Date of sampling and soil characteristics of the selected 14 NABO monitoring sites.

ID	Land use	C _{org} (%)	CaCO ₃ (%)	Clay (%)	Silt (%)	pH (CaCl ₂)	No. of Samples	Sampling Dates dd/mm/yyyy
Cl.1	Cropland	18.5	0.0	48.0	30.0	6.2	2	05/06/2000, 16/08/2005
Cl.2	Cropland	2.8	0.0	31.0	31.0	5.7	1	23/03/2006
Cl.3	Cropland	2.0	0.0	28.0	23.0	5.9	1	09/10/2001
Cl.4	Cropland	1.3	0.0	12.0	35.0	6.0	2	06/01/1998, 08/07/2003
Cl.5	Cropland	1.4	0.0	19.0	45.0	7.1	2	16/04/1998, 13/03/2003
Cl.6	Cropland	1.7	0.0	20.8	38.0	5.9	2	17/03/1998, 13/05/2003
Cl.7	Cropland	1.3	8.0	5.8	59.8	7.3	2	26/04/1999, 17/03/2004
Or.1	Orchard	3.3	24.0	6.0	14.0	7.1	3	26/09/1995, 28/06/2000, 30/08/2005
Or.2	Orchard	2.1	0.0	20.0	42.0	5.3	3	17/04/1996, 27/06/2001, 11/07/2006
Or.3	Orchard	6.6	30.0	34.8	39.3	7.0	1	07/05/2008
Ve.1	Vegetable	1.5	0.0	6.0	39.0	7.3	2	15/10/1997, 14/08/2002
Vi.1	Viticulture	1.8	0.0	8.0	15.0	7.3	3	22/03/1995, 12/07/2000, 26/04/2005
Vi.2	Viticulture	1.3	1.0	24.5	36.5	7.0	3	16/04/1998, 13/03/2003, 21/05/2008
Vi.3	Viticulture	4.8	0.0	5.5	14.5	5.9	2	24/03/1999, 02/03/2004

Table S2. Ionization mode, ion used for the detection of analytes, limits of quantification (LOQ) and method performance.

Compound name	Class	Ionization mode	ion used	Used for method development	Recovery (average, n=4) [%]	Recovery (std.dev., n=4) [%]	LOQ [ng/g _{dw}]
2,4-D	herbicide	ESI-	M-H-	yes	95	24	1.5
2-Aminobenzimidazole	TP of carbendazim	ESI+	M+H+	no	33	5	1.5
3,5,6-Trichloro-2-pyridinol	TP of chlorpyrifos/triclopyr	ESI-	M-H-	no	354	26	0.7
3,5-Dibromo-4-hydroxybenzoic acid	TP of bromoxynil	ESI-	M-H-	no	24	19	1.5
Alachlor+Acetochlor	herbicide	ESI+	M+H+	no	87	11	1.5
Alachlor+Acetochlor-ESA	TP of alachlor/acetochlor	ESI-	M-H-	no	31	15	3.0
Alachlor+Acetochlor-OA	TP of alachlor/acetochlor	ESI-	M-H-	no	42	37	7.0
Atrazine	herbicide	ESI+	M+H+	yes	105	10	1.5
Atrazine-2-Hydroxy	TP of atrazine	ESI+	M+H+	no	36	8	1.5
Atrazine-Desethyl	TP of atrazine	ESI+	M+H+	no	99	15	1.5
Atrazine-Desisopropyl	TP of atrazine	ESI+	M+H+	no	108	17	1.5
Azoxystrobin	fungicide	ESI+	M+H+	yes	79	8	1.5
Bentazone	herbicide	ESI+	M+H+	yes	104	9	0.7
Bifenox	herbicide	ESI+	M+Na+	no	215	7	4.0
Bifenox acid	TP of bifenox	ESI-	M-H-	no	73	5	3.0
Bromoxynil	herbicide	ESI-	M-H-	yes	245	17	1.5
Captan	fungicide	ESI+	M+H+	yes	nd	nd	nd
Carbendazim	fungicide	ESI+	M+H+	no	109	11	0.7
Carbetamide	herbicide	ESI+	M+H+	no	100	15	1.5
Carbofuran	insecticide	ESI+	M+H+	yes	82	9	0.7
Chloridazon	herbicide	ESI+	M+H+	yes	106	2	1.5
Chlorpyrifos	insecticide	ESI+	M+H+	yes	106	13	1.5

Compound name	Class	Ionization mode	ion used	Used for method development	Recovery (average, n=4) [%]	Recovery (std.dev., n=4) [%]	LOQ [ng/g _{dw}]
Chlorotoluron	herbicide	ESI+	M+H+	no	99	7	0.7
Clomazone	herbicide	ESI+	M+H+	no	80	19	1.5
Cypermethrin	insecticide	ESI+	M+Na+	yes	216	10	25.0
Cyproconazole	fungicide	ESI+	M+H+	yes	79	9	0.7
Cyprodinil	fungicide	ESI+	M+H+	yes	100	5	0.7
Desmedipham	herbicide	ESI+	M+Na+	no	131	16	0.7
Diazinon	insecticide	ESI+	M+H+	no	113	19	0.7
Diflufenican	herbicide	ESI+	M+H+	no	135	30	3.0
Dimethachlor	herbicide	ESI+	M+H+	no	83	5	1.5
Dimethachlor-ESA	TP of dimethachlor	ESI-	M-H-	no	81	12	1.5
Dimethachlor-OA	TP of dimethachlor	ESI-	M-H-	no	33	10	3.0
Dimethenamid	herbicide	ESI+	M+H+	yes	94	10	0.7
Dimethenamid-ESA	TP of dimethenamid	ESI-	M-H-	no	26	11	1.5
Dimethenamid-OA	TP of dimethenamid	ESI-	M-H-	no	54	21	3.0
Dimethoate	insecticide	ESI+	M+H+	no	91	2	0.7
Dinoseb	herbicide	ESI-	M-H-	yes	232	32	1.5
Diuron	herbicide	ESI+	M+H+	yes	92	16	1.5
Diuron-desdimethyl	TP of diuron	ESI+	M+H+	no	92	16	1.5
Diuron-Desmonomethyl	TP of diuron	ESI+	M+H+	no	89	12	1.5
Epoxiconazole	fungicide	ESI+	M+H+	yes	96	10	0.7
Ethofumesate	herbicide	ESI+	M+H+	yes	95	17	0.7
Fenpropidin	fungicide	ESI+	M+H+	yes	72	9	0.7
Fenpropimorph	fungicide	ESI+	M+H+	no	87	3	0.7
Fluazifop-P-acid	TP of Fluazifop-P-butyl	ESI-	M-H-	no	86	13	1.5
Fluazinam	herbicide	ESI-	M-H-	yes	108	13	1.5

Compound name	Class	Ionization mode	ion used	Used for method development	Recovery (average, n=4) [%]	Recovery (std.dev., n=4) [%]	LOQ [ng/g _{dw}]
Fludioxonil	fungicide	ESI+	M+Na+	yes	194	24	1.5
Flusilazole	fungicide	ESI+	M+H+	yes	101	9	0.7
Imidacloprid	insecticide	ESI+	M+H+	yes	168	8	3.0
Ioxynil	herbicide	ESI-	M-H-	no	134	39	1.5
Isoproturon	herbicide	ESI+	M+H+	yes	96	9	0.7
Isoproturon-didemethyl	TP of isoproturon	ESI+	M+H+	no	80	15	0.7
Isoproturon-monodemethyl	TP of isoproturon	ESI+	M+H+	no	96	11	0.7
Kresoxim methyl	fungicide	ESI+	M+H+	no	92	36	3.0
Linuron	herbicide	ESI+	M+H+	no	84	11	1.5
MCPA	herbicide	ESI-	M-H-	no	90	14	0.7
Mecoprop	herbicide	ESI-	M-H-	yes	94	20	1.5
Metalaxyl	fungicide	ESI+	M+H+	yes	86	11	1.5
Metamitron	herbicide	ESI+	M+H+	yes	117	11	1.5
Metamitron-desamino	TP of metamitron	ESI+	M+H+	no	83	10	0.7
Metazachlor	herbicide	ESI+	M+H+	no	92	8	1.5
Metazachlor-OA	TP of metazachlor	ESI-	M-H-	no	89	12	7.0
Methyldesphenylchloridazon	TP of chloridazon	ESI+	M+H+	no	200	24	1.5
Metolachlor	herbicide	ESI+	M+H+	yes	80	21	0.7
Metolachlor-ESA	TP of metolachlor	ESI-	M-H-	yes	88	14	1.5
Metolachlor-OA	TP of metolachlor	ESI-	M-H-	yes	70	18	1.5
Metribuzin	herbicide	ESI+	M+H+	no	107	14	0.7
Metribuzin-desamino	TP of metribuzin	ESI+	M+H+	no	90	8	1.5
Napropamide	herbicide	ESI+	M+H+	no	85	21	0.7
Orbencarb	herbicide	ESI+	M+H+	yes	105	17	0.7
Pendimethalin	herbicide	ESI+	M+H+	yes	97	14	1.5

Compound name	Class	Ionization mode	ion used	Used for method development	Recovery (average, n=4) [%]	Recovery (std.dev., n=4) [%]	LOQ [ng/g _{dw}]
Phenmedipham	herbicide	ESI+	M+Na+	yes	126	19	0.7
Phosalone	acaricide/insecticide	ESI+	M+H+	no	119	7	1.5
Pirimicarb	insecticide	ESI+	M+H+	no	100	8	0.7
Prochloraz	fungicide	ESI+	M+H+	no	97	8	1.5
Propachlor	herbicide	ESI+	M+H+	yes	89	7	0.7
Propachlor-ESA	TP of propachlor	ESI-	M-H-	no	54	1	3.0
Propachlor-OA	TP of propachlor	ESI-	M-H-	no	40	24	3.0
Propiconazole	fungicide	ESI+	M+H+	yes	93	9	0.7
Prosulfocarb	herbicide	ESI+	M+H+	no	109	18	0.7
Pyrimethanil	fungicide	ESI+	M+H+	no	106	5	0.7
Simazin-2-hydroxy+Terbuthylazine-desethyl-2-hydroxy	TP of simazine/terbuthylazine	ESI+	M+H+	no	26	6	0.7
Simazine	herbicide	ESI+	M+H+	no	105	10	0.7
Spiroxamine	fungicide	ESI+	M+H+	no	72	12	0.7
Sulcotrione	herbicide	ESI+	M+Na+	yes	77	13	7.0
Sulcotrione-CMBA	TP of sulcotrione	ESI-	M-H-	no	109	16	7.0
Tebuconazole	fungicide	ESI+	M+H+	yes	98	10	0.7
Tebufenozide	insecticide	ESI+	M+H+	yes	86	13	1.5
Tebutam	herbicide	ESI+	M+H+	yes	105	2	0.7
Terbuthylazin+Sebuthylazin	herbicide	ESI+	M+H+	no	101	16	1.5
Terbuthylazine-desethyl	TP of terbuthylazine	ESI+	M+H+	no	87	13	0.7
Trinexapac-ethyl	growth regulator	ESI+	M+H+	yes	78	24	3.0

Table S3. Half-life times, physico-chemical properties and employed amount of compounds used for method development and soils analysis.

Compound name	Class	Used for method development	Half-life time [d]	pK _a ¹	log K _{ow} ¹	Employed amount ² [g/ha]
2,4-D	herbicide	yes	11	2.9	-0.8	6'705
2-Aminobenzimidazole	TP of carbendazim	no	NA	NA	0.91	--- ^b
3,5,6-Trichloro-2-pyridinol	TP of chlorpyrifos/triclopyr	no	38.5	NA	3.21	--- ^b
3,5-Dibromo-4-hydroxybenzoic acid	TP of bromoxynil	no	NA	NA	NA	--- ^b
Alachlor+Acetochlor	herbicide	no	14	--- ^a	4.14	
Alachlor+Acetochlor-ESA	TP of alachlor/acetochlor	no	NA	NA	NA	--- ^b
Alachlor+Acetochlor-OA	TP of alachlor/acetochlor	no	NA	NA	NA	--- ^b
Atrazine	herbicide	yes	50	2.0; 1.6	2.7	21'840
Atrazine-2-Hydroxy	TP of atrazine	no	NA	NA	NA	--- ^b
Atrazine-Desethyl	TP of atrazine	no	NA	NA	NA	--- ^b
Atrazine-Desisopropyl	TP of atrazine	no	NA	NA	NA	--- ^b
Azoxystrobin	fungicide	yes	70	--- ^a	2.5	9'834
Bentazone	herbicide	yes	13	3.3	-0.5	4'160
Bifenox	herbicide	no	6	--- ^a	3.64	
Bifenox acid	TP of bifenox	no	56	NA	4.55	--- ^b
Bromoxynil	herbicide	yes	8	3.9	1	1'780
Captan	fungicide	yes	4	--- ^a	2.5	271'260
Carbendazim	fungicide	no	40	4.2	1.48	
Carbetamide	herbicide	no	12.4	11.3	1.78	
Carbofuran	insecticide	yes	45	--- ^a	1.7	3'804
Chloridazon	herbicide	yes	43	3.4	1.2	5'655
Chlorpyrifos	insecticide	yes	43	--- ^a	4.7	3'750

Compound name	Class	Used for method development	Half-life time [d]	pK _a ¹	log K _{ow} ¹	Employed amount ² [g/ha]
Chlorotoluron	herbicide	no	45	--- ^a	2.5	
Clomazone	herbicide	no	83	--- ^a	2.54	
Cypermethrin	insecticide	yes	27	--- ^a	5.5	300
Cyproconazole	fungicide	yes	114	--- ^a	3.1	107'036
Cyprodinil	fungicide	yes	27	4.4	4	7'305
Desmedipham	herbicide	no	25	--- ^a	2.7	
Diazinon	insecticide	no	9.1	2.6	3.69	
Diflufenican	herbicide	no	180	--- ^a	4.2	
Dimethachlor	herbicide	no	7	--- ^a	2.17	
Dimethachlor-ESA	TP of dimethachlor	no	NA	NA	NA	--- ^b
Dimethachlor-OA	TP of dimethachlor	no	NA	NA	NA	--- ^b
Dimethenamid	herbicide	yes	8	--- ^a	2.2	6'690
Dimethenamid-ESA	TP of dimethenamid	no	NA	NA	NA	--- ^b
Dimethenamid-OA	TP of dimethenamid	no	NA	NA	NA	--- ^b
Dimethoate	insecticide	no	2.6	--- ^a	0.704	
Dinoseb	herbicide	yes	30	4.6	2.3	13'285
Diuron	herbicide	yes	63	--- ^a	2.9	11'666
Diuron-desdimethyl	TP of diuron	no	NA	NA	NA	--- ^b
Diuron-Desmonomethyl	TP of diuron	no	NA	NA	NA	--- ^b
Epoxiconazole	fungicide	yes	487	--- ^a	3.4	2'464
Ethofumesate	herbicide	yes	61	--- ^a	2.7	7'817
Fenpropidin	fungicide	yes	602	10.1	3	1'785
Fenpropimorph	fungicide	no	35	6.98	4.5	
Fluazifop-P-acid	TP of Fluazifop-P-butyl	no	NA	NA	NA	--- ^b
Fluazinam	herbicide	yes	89	6.3	3.6	2'850

Compound name	Class	Used for method development	Half-life time [d]	pK _a ¹	log K _{ow} ¹	Employed amount ² [g/ha]
Fludioxonil	fungicide	yes	125	--- ^a	4.1	4'150
Flusilazole	fungicide	yes	141	2.5	3.8	964
Imidacloprid	insecticide	yes	118	--- ^a	0.6	980
Ioxynil	herbicide	no	6	4.1	2.2	
Isoproturon	herbicide	yes	11	--- ^a	2.5	36'352
Isoproturon-didemethyl	TP of isoproturon	no	NA	NA	NA	--- ^b
Isoproturon-monodemethyl	TP of isoproturon	no	NA	NA	NA	--- ^b
Kresoxim methyl	fungicide	no	NA	--- ^a	NA	
Linuron	herbicide	no	57.6	--- ^a	3	
MCPA	herbicide	no	24	3.73	-0.81	
Mecoprop	herbicide	yes	8	3.1	-0.2	16'619
Metalaxyl	fungicide	yes	45	--- ^a	1.7	3'645
Metamitron	herbicide	yes	26	--- ^a	0.8	34'455
Metamitron-desamino	TP of metamitron	no	NA	NA	NA	--- ^b
Metazachlor	herbicide	no	8.6	--- ^a	2.49	
Metazachlor-OA	TP of metazachlor	no	NA	NA	NA	--- ^b
Methyldesphenylchloridazon	TP of chloridazon	no	NA	NA	NA	--- ^b
Metolachlor	herbicide	yes	30	--- ^a	3.4	1'520
Metolachlor-ESA	TP of metolachlor	yes	132	--- ^a	3.4	--- ^b
Metolachlor-OA	TP of metolachlor	yes	NA	NA	NA	--- ^b
Metribuzin	herbicide	no	11.5	0.99	1.65	
Metribuzin-desamino	TP of metribuzin	no	NA	NA	NA	--- ^b
Napropamide	herbicide	no	70	--- ^a	3.3	
Orbencarb	herbicide	yes	22	--- ^a	3.4	12'854
Pendimethalin	herbicide	yes	146	2.8	5.2	13'367

Compound name	Class	Used for method development	Half-life time [d]	pK _a ¹	log K _{ow} ¹	Employed amount ² [g/ha]
Phenmedipham	herbicide	yes	28	0.1	3.6	9'003
Phosalone	acaricide/insecticide	no	2	NA	4.01	
Pirimicarb	insecticide	no	86	4.4	1.7	
Prochloraz	fungicide	no	120	3.8	3.5	
Propachlor	herbicide	yes	31	--- ^a	1.6	5'760
Propachlor-ESA	TP of propachlor	no	NA	NA	NA	--- ^b
Propachlor-OA	TP of propachlor	no	NA	NA	NA	--- ^b
Propiconazole	fungicide	yes	91	1.1	3.7	654
Prosulfocarb	herbicide	no	11.9	--- ^a	4.48	
Pyrimethanil	fungicide	no	55	3.52	2.84	
Simazin-2-hydroxy+Terbuthylazine-desethyl-2-hydroxy	TP of simazine/terbuthylazine	no	NA	NA	NA	--- ^b
Simazine	herbicide	no	60	1.62	2.3	
Spiroxamine	fungicide	no	25	6.9	2.89	
Sulcotrione	herbicide	yes	25	3.1	-1.7	2'980
Sulcotrione-CMBA	TP of sulcotrione	no	NA	NA	NA	--- ^b
Tebuconazole	fungicide	yes	119	--- ^a	3.7	4'787
Tebufenozide	insecticide	yes	348	--- ^a	4.3	1'152
Tebutam	herbicide	yes	60	--- ^a	3	16'380
Terbuthylazin+Sebuthylazin	herbicide	no	75.1	1.9	3.4	--- ^b
Terbuthylazine-desethyl	TP of terbuthylazine	no	NA	NA	NA	--- ^b
Trinexapac-ethyl	growth regulator	yes	20	4.6	-0.3	3'789

^ano dissociation. ^bMetabolites of metolachlor. ¹Physicochemical properties of pesticides (K_{ow} and pKa in soil) were obtained from literature data, the pesticide properties database (PPDB) or estimated using the Calculator Plugins of Marvin (Chemaxon).^{4, 5} Overview of the employed amounts of described pesticide between 1996 and 2003. NA= No data available

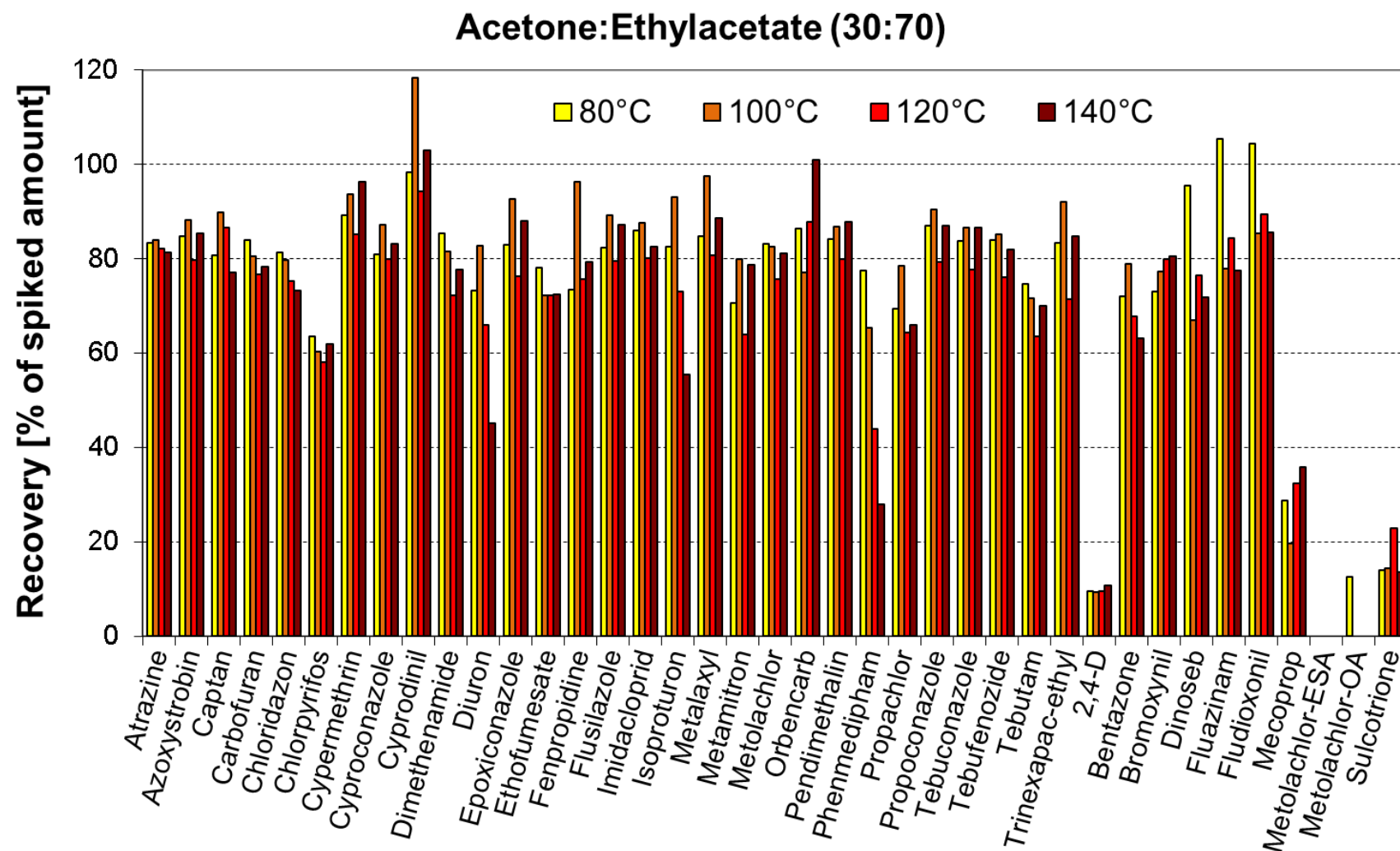


Figure S1. Extraction recoveries of target substances after ASE extraction of spiked diatomaceous earth (50 ng) with acetone:ethyl acetate 30:70 (v/v) at 80, 100, 120 and 140°C.

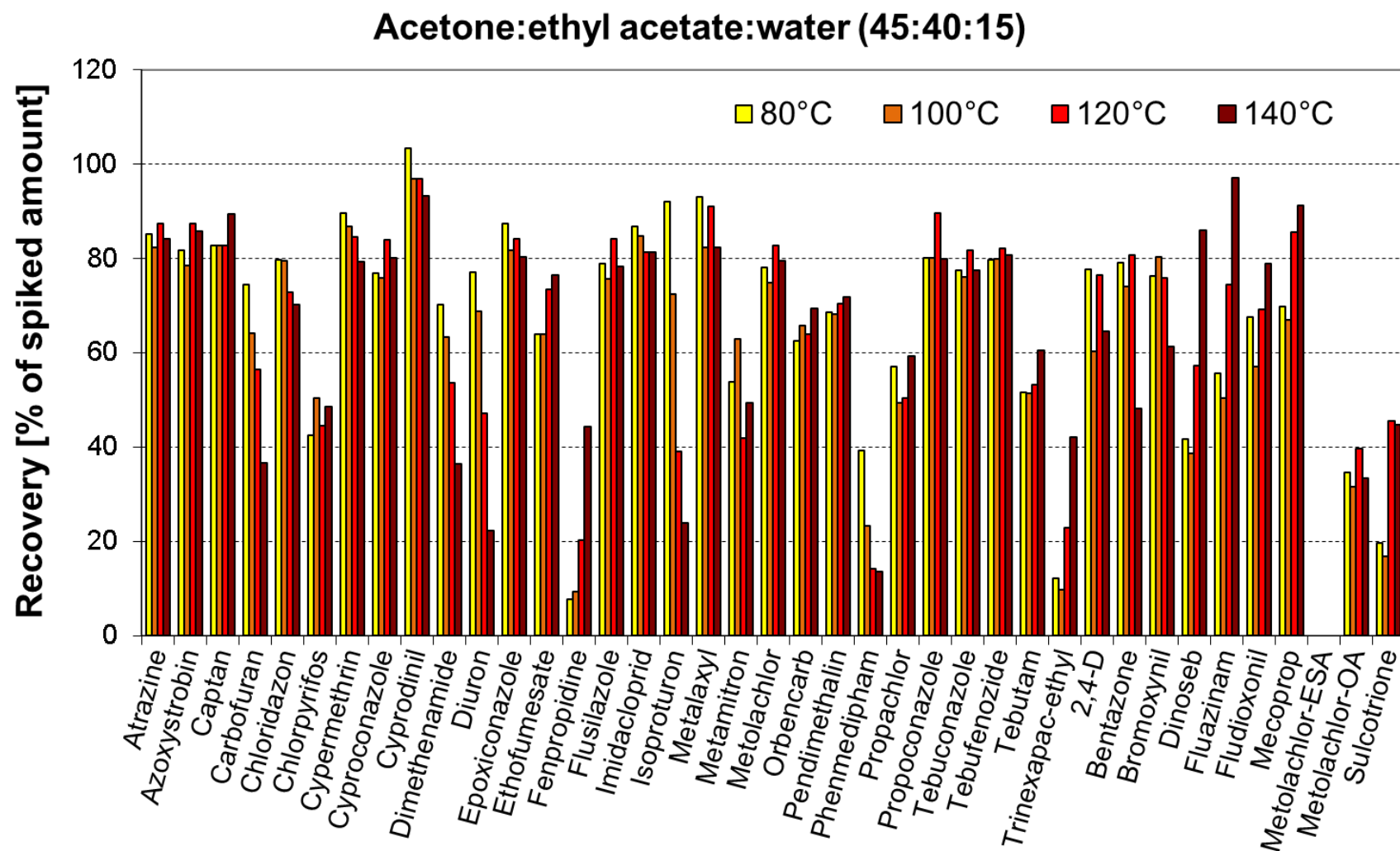


Figure S2. Extraction recoveries of target substances after ASE extraction of spiked diatomaceous earth (50 ng) with acetone:ethyl acetate:water 45:40:15 (v/v) at 80, 100, 120 and 140°C.

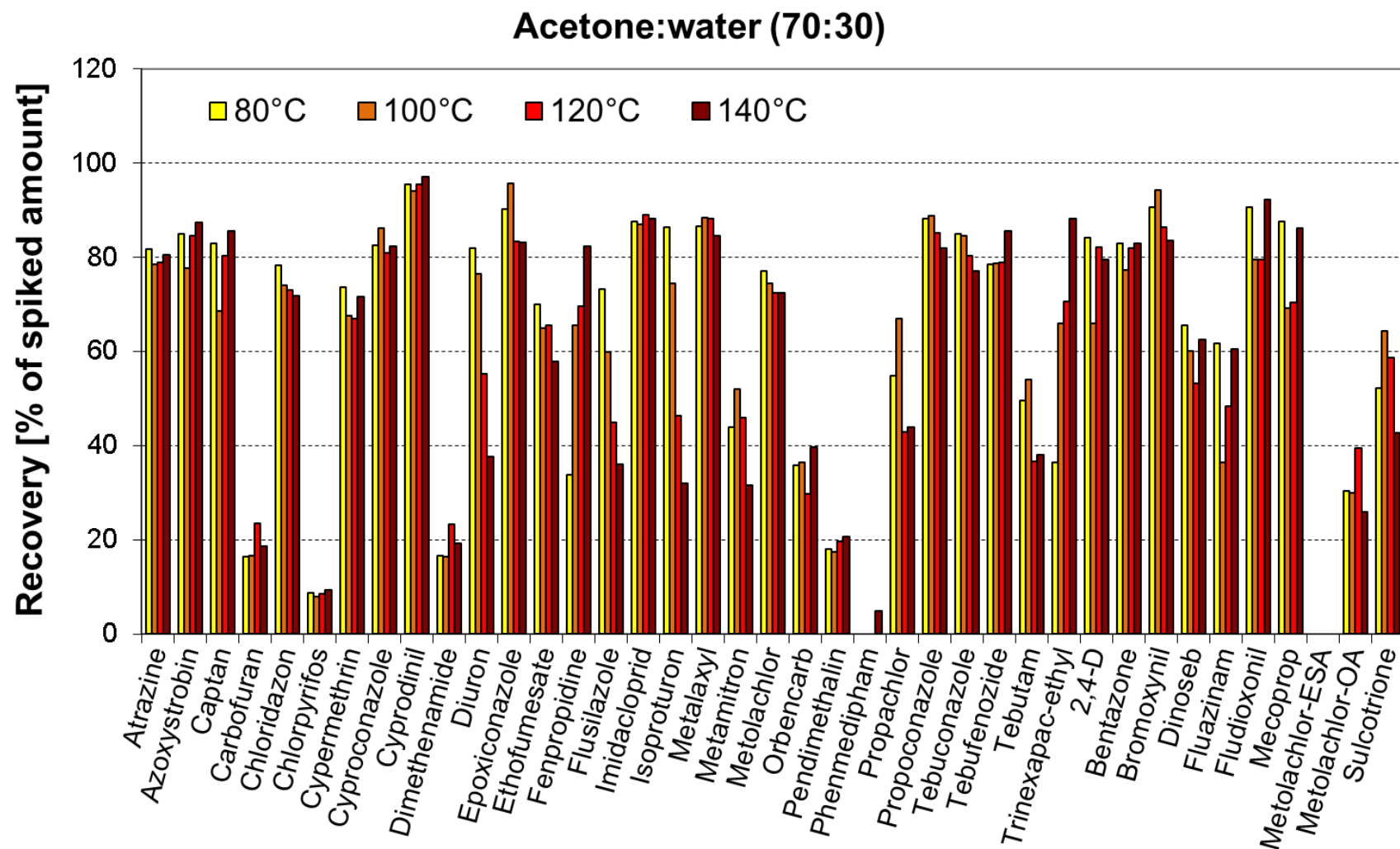


Figure S3. Extraction recoveries of target substances after ASE extraction of spiked diatomaceous earth (50 ng) with acetone:water 70:30 (v/v) at 80, 100, 120 and 140°C.

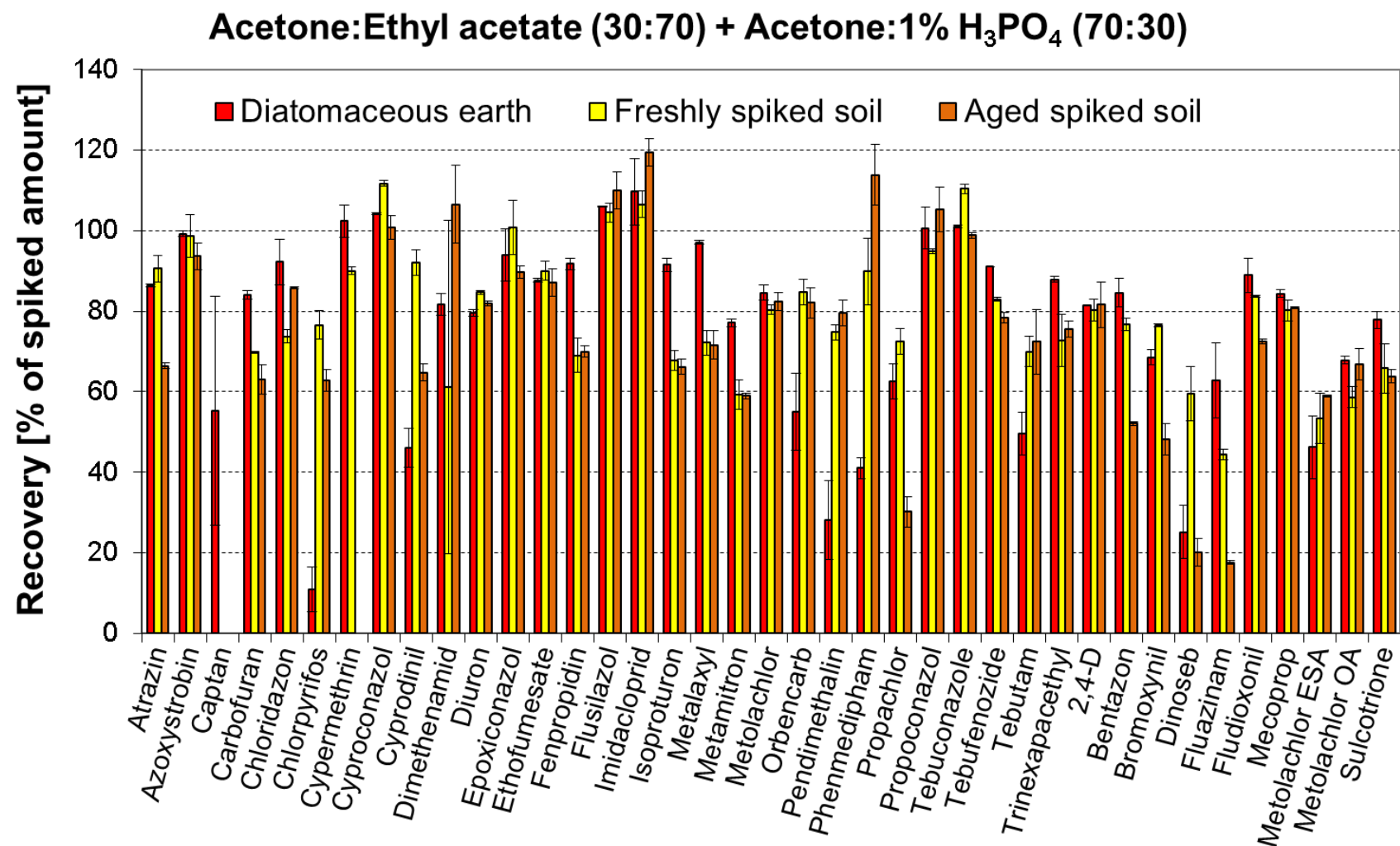


Figure S4. Extraction recoveries of target compounds after ASE extraction of diatomaceous earth, fresh and aged soil (spiked with 50 ng for each, aging was done for 30 days at 4°C) with a sequential extraction using Ac/EtAc (30:70) and Ac/H₂O with 1 % phosphoric acid (70:30).

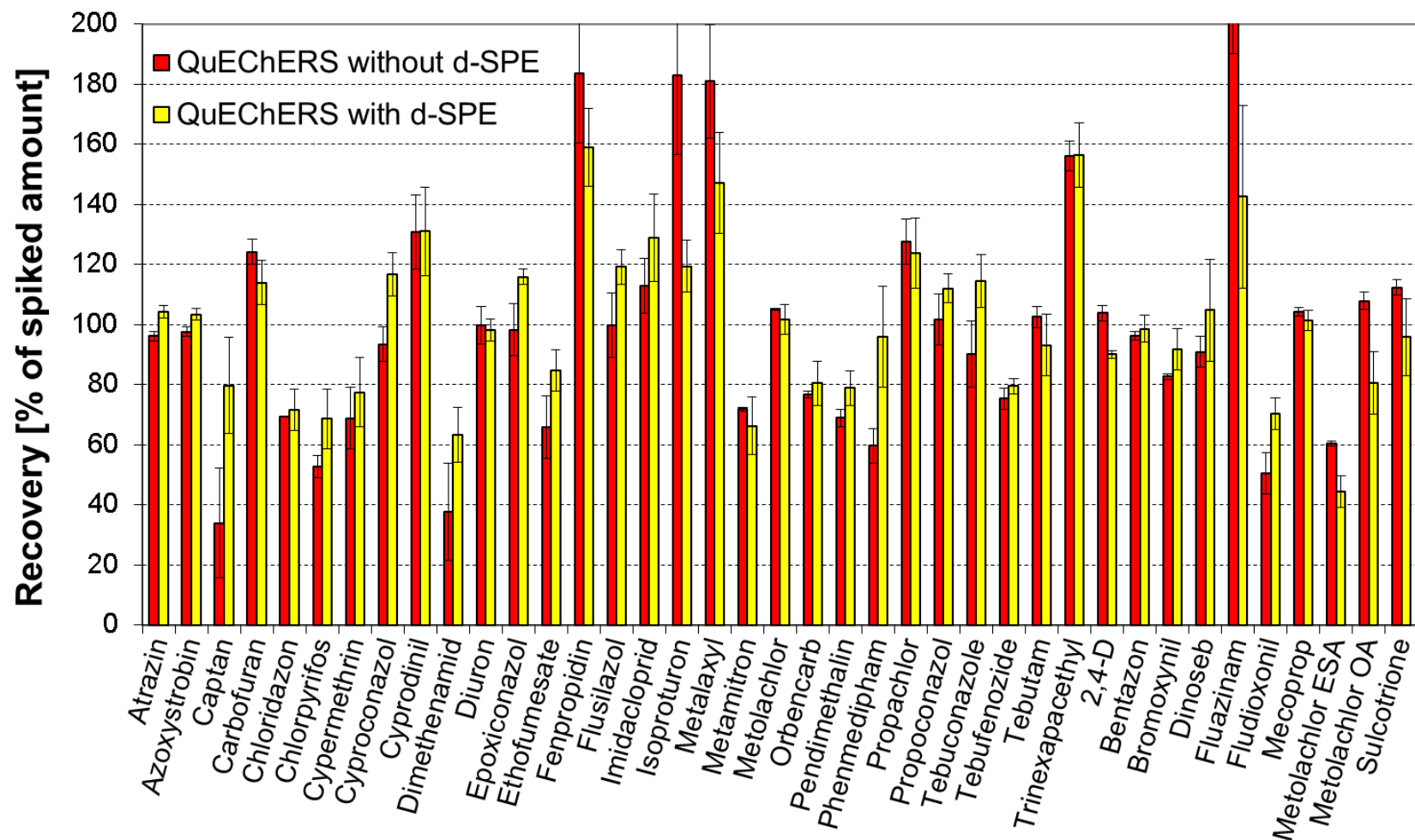


Figure S5. Relative recoveries of target compounds from a spiked soil extract (50 ng) after QuEChERS extraction with and without an additional d-SPE clean-up step using C18/PSA/GCB.

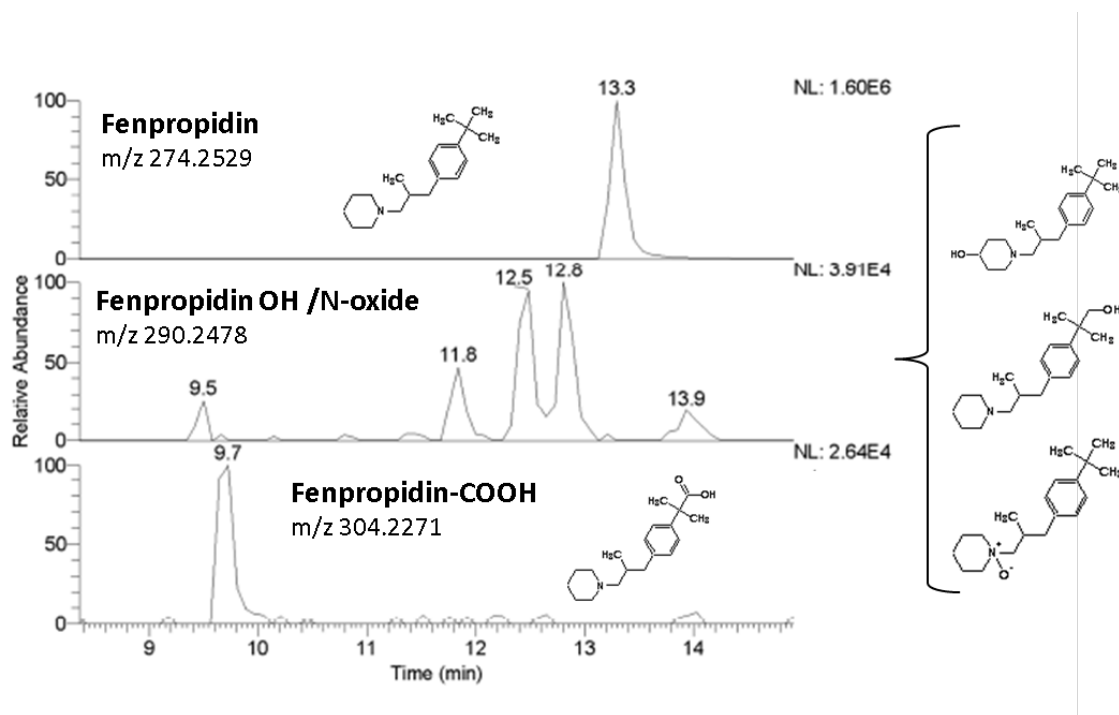


Figure S6A. Extracted ion chromatogram of the target compound fenpropidin and of four of its suspected transformation products in the extract from soil sample of the site Vi.2 (NL: signal intensity at 100% of relative abundance).

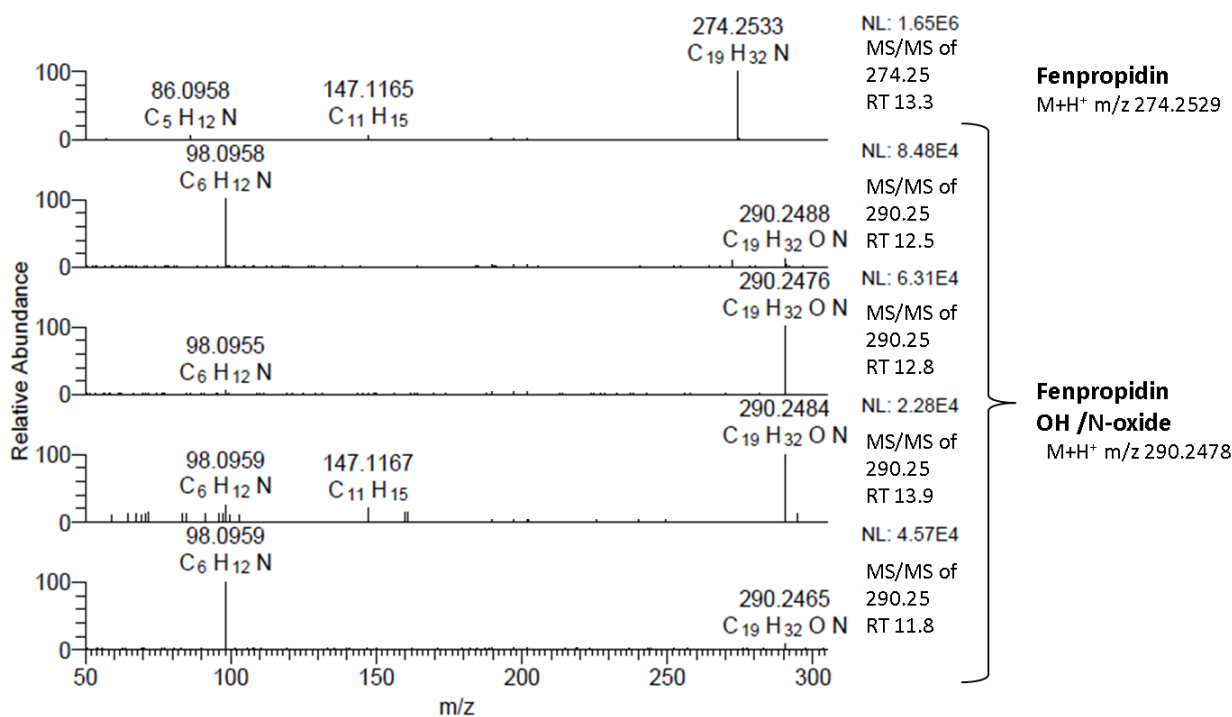


Figure S6B: MS/MS spectra of fenpropidin and four tentative hydroxylated or N-oxide transformation products at m/z 290.2478 from a soil sample of the site Vi.2

Table S4. Pesticides detected in 29 soils samples (0-20 cm) from 14 NABO monitoring sites.

Rank	Name	CAS No.	No. of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				Cases (%)				STD
						Cl	Or	Ve	Vi	Applied-Detected	Applied-not Detected	Not Applied-Detected	Not Applied-not Detected	
1	Simazine	122-34-9	28	97	1 - 80	1	9	1	2	38	0	59	3	Yes
2	Atrazine	1912-24-9	25	86	2 - 249	5	3	8	ND	34	0	52	14	Yes
3	Tebutam	35256-85-0	23	79	1 - 22	2	ND	ND	1	14	0	66	21	Yes
4	Carbendazim	10605-21-7	21	72	1 - 61	6	4	ND	3	31	0	41	28	Yes
5	Terbuthylazine/ Sebuthylazin	5915-41-3	18	62	1 - 9	2	2	ND	2	17	0	45	38	Yes
6	Dinoseb	88-85-7	17	59	2 - 318	6	5	17	4	0	0	59	41	Yes
7	Metolachlor	51218-45-2	16	55	2 - 25	2	ND	2	ND	34	0	21	45	Yes
8	Alachlor/ Acetochlor	15972-60-8	15	52	1 - 37	2	2	24	2	14	3	38	45	Yes
9	Cyprodinil	121552-61-2	14	48	1 - 31	1	1	ND	13	24	0	24	52	Yes
10	Diuron	330-54-1	14	48	2 - 334	ND	8	ND	8	31	0	17	52	Yes
11	Linuron	330-55-2	14	48	2 - 185	3	ND	9	185	24	0	24	52	Yes
12	Pendimethalin	40487-42-1	14	48	2 - 163	16	ND	2	ND	34	0	14	52	Yes
13	Chlorotoluron	15545-48-9	12	41	3 - 6	5	ND	ND	ND	0	0	41	59	Yes
14	Ethofumesate	26225-79-6	12	41	2 - 78	4	ND	ND	ND	28	3	14	55	Yes
15	Fludioxonil	131341-86-1	12	41	2 - 329	4	2	ND	144	21	0	21	59	Yes
16	Isoproturon	34123-59-6	12	41	2 - 4	3	ND	ND	ND	31	0	10	59	Yes
17	Mecoprop	7085-19-0	11	38	4 - 20	ND	12	ND	ND	31	10	7	52	Yes
18	Metamitron	41394-05-2	11	38	6 - 141	12	ND	ND	ND	34	0	3	62	Yes

Rank	Name	CAS No.	No. of Samples Detected	% of Detected Samples	Con. Range (µg/kg _{dw})	Median Concentration by Land use (µg/kg _{dw})				Cases (%)				STD
						CI	Or	Ve	Vi	Applied-Detected	Applied-not Detected	Not Applied-Detected	Not Applied-not Detected	
19	Propiconazole	60207-90-1	11	38	1 - 5	4	ND	ND	ND	28	3	10	59	Yes
20	Fenpropidin	67306-00-7	10	34	1 - 14	1	ND	ND	10	21	0	14	66	Yes
21	Triadimenol	55219-65-3	11	38	D	D	D	D	D	17	0	21	62	No
22	Difenoconazole	119446-68-3	10	34	D	D	D	D	D	31	14	3	52	No
23	Flusilazole	85509-19-9	10	34	1 - 34	22	1	ND	ND	10	0	24	66	Yes
24	Imidacloprid	138261-41-3	10	34	4 - 138	35	24	ND	ND	10	0	24	66	Yes
25	Phenmedipham	13684-63-4	10	34	1 - 76	7	ND	ND	ND	31	3	3	62	Yes
26	Phosalone	2310-17-0	10	34	2 - 9	ND	6	ND	ND	10	3	24	62	Yes
27	Azoxystrobin	131860-33-8	9	31	2 - 86	2	ND	43	20	31	7	0	62	Yes
28	Cyproconazole	94361-06-5	9	31	1 - 3	2	1	ND	1	17	0	14	69	Yes
29	Metalaxyl	57837-19-1	9	31	2 - 6	2	ND	ND	4	24	7	7	62	Yes
30	Dimethomorph	110488-70-5	8	28	D	D	D	D	D	21	3	7	69	no
31	Orbencarb	34622-58-7	8	28	1 - 32	4	1	ND	ND	17	0	10	72	Yes
32	Tebuconazole	107534-96-3	8	28	1 - 89	1	ND	ND	86	21	3	7	69	Yes
33	2,4-D	94-75-7	7	24	4 - 4	4	ND	ND	ND	21	17	3	59	Yes
34	Bentazon	25057-89-0	7	24	D	D	D	D	D	14	3	10	72	Yes
35	Cymoxanil	57966-95-7	7	24	2 - 2	ND	ND	ND	2	21	31	3	45	Yes
36	Metribuzin	21087-64-9	7	24	1 - 2	1	ND	1	ND	17	10	7	66	Yes
37	Pirimicarb	23103-98-2	7	24	1 - 3	ND	2	ND	ND	24	7	0	69	Yes
38	Fenpropimorph	67564-91-4	6	21	3 - 34	18	ND	ND	ND	21	3	0	76	Yes
39	Oryzalin	19044-88-3	6	21	D	D	D	D	D	21	0	0	79	No
40	Bromoxynil	1689-84-5	5	17	3 - 7	5	ND	ND	ND	7	10	10	72	Yes
41	Carbofuran	1563-66-2	5	17	D	D	D	D	D	7	0	10	83	Yes

Rank	Name	CAS No.	No. of Samples Detected	% of Detected Samples	Con. Range (µg/kg _{dw})	Median Concentration by Land use (µg/kg _{dw})				Cases (%)				STD
						Cl	Or	Ve	Vi	Applied-Detected	Applied-not Detected	Not Applied-Detected	Not Applied-not Detected	
42	Chloridazon	1698-60-8	5	17	2 - 11	4	ND	ND	ND	0	0	17	83	Yes
43	MCPA	94-74-6	5	17	D	D	D	D	D	3	10	14	72	Yes
44	Napropamid	15299-99-7	5	17	2 - 119	3	ND	ND	ND	7	0	10	83	Yes
45	Pyrifenox	88283-41-4	5	17	D	D	D	D	D	14	17	3	66	No
46	Trifloxystrobin	141517-21-7	5	17	D	D	D	D	D	14	7	3	76	No
47	Bifenox	42576-02-3	4	14	4 - 18	16	4	ND	ND	7	7	7	79	Yes
48	Bitertanol	55179-31-2	4	14	D	D	D	D	D	10	10	3	76	No
49	Clomazone	81777-89-1	4	14	2 - 16	3	ND	ND	ND	7	0	7	86	Yes
50	Epoxyconazole	133855-98-8	4	14	5 - 23	12	ND	ND	ND	14	0	0	86	Yes
51	Myclobutanil	88671-89-0	4	14	D	D	D	D	D	10	0	3	86	No
52	Prochloraz	67747-09-5	4	14	2 - 2	2	ND	ND	ND	3	3	10	83	Yes
53	Tebufenozid	112410-23-8	4	14	3 - 6	ND	5	ND	ND	10	0	3	86	Yes
54	Diflufenican	83164-33-4	3	10	4 - 10	6	ND	ND	ND	7	7	3	83	Yes
55	Metazachlor	67129-08-2	3	10	2 - 10	6	ND	ND	ND	3	14	7	76	Yes
56	Pyraclostrobin	175013-18-0	3	10	D	D	D	D	D	10	0	0	90	No
57	Spiroxamine	118134-30-8	3	10	9 - 26	ND	ND	ND	17	7	3	3	86	Yes
58	Carbetamide	16118-49-3	2	7	4 - 5	5	ND	ND	ND	0	0	7	93	Yes
59	Chlorpyrifos	2921-88-2	2	7	37 - 62	ND	50	ND	ND	7	7	0	86	Yes
60	Diazinon	333-41-5	2	7	1 - 1	ND	1	ND	ND	7	14	0	79	Yes
61	Dimethachlor	50563-36-5	2	7	14 - 14	14	ND	ND	ND	3	0	3	93	Yes
62	Dimethenamid	87674-68-8	2	7	1 - 1	1	ND	ND	ND	3	0	3	93	Yes
63	Fluazifop-P-butyl	79241-46-6	2	7	D	D	D	D	D	3	3	3	90	Yes

Rank	Name	CAS No.	No. of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				Cases (%)				STD
						Cl	Or	Ve	Vi	Applied-Detected	Applied-not Detected	Not Applied-Detected	Not Applied-not Detected	
64	Lenacil	2164-08-1	2	7	D	D	D	D	D	7	0	0	93	No
65	Picoxystrobin	117428-22-5	2	7	D	D	D	D	D	7	3	0	90	No
66	Pyrimethanil	53112-28-0	2	7	3 - 11	ND	7	ND	ND	7	0	0	93	Yes
67	Desmedipham	13684-56-5	1	3	D	D	D	D	D	0	14	3	83	Yes
68	Dicamba	1918-00-9	1	3	D	D	D	D	D	0	17	3	79	No
69	Fluazinam	79622-59-6	1	3	D	D	D	D	D	3	0	0	97	Yes
70	Propachlor	1918-16-7	1	3	D	D	D	D	D	0	0	3	97	Yes
71	Propamocarb	24579-73-5	1	3	D	D	D	D	D	3	0	0	97	No
72	Sulcotrione	99105-77-8	1	3	69 - 69	69	ND	ND	ND	0	21	3	76	Yes
73	Thiacloprid	111988-49-9	1	3	D	D	D	D	D	3	0	0	97	No
74	Bupirimate	41483-43-6	0	0	ND	ND	ND	ND	ND	0	3	0	97	No
75	Chlorothalonil	1897-45-6	0	0	ND	ND	ND	ND	ND	0	14	0	86	No
76	Dimethoate	60-51-5	0	0	ND	ND	ND	ND	ND	0	3	0	97	Yes
77	Ioxynil	1689-83-4	0	0	ND	ND	ND	ND	ND	0	24	0	76	Yes
78	Kresoxim-methyl	143390-89-0	0	0	ND	ND	ND	ND	ND	0	10	0	90	Yes
79	Prosulfocarb	52888-80-9	0	0	ND	ND	ND	ND	ND	0	0	0	100	Yes
80	Trinexapac-ethyl	95266-40-3	0	0	ND	ND	ND	ND	ND	0	31	0	69	Yes

Land use: Cropland sites (Cl), orchards (Or), vegetable growing (Ve), and viticulture (Vi)

ND= Not Detectable, D= detectable but not quantified

STD= Standard Available. Yes=Target screening (standard available). No= suspect screening (standard no available).

Table S5. Pesticide transformation products (tentatively) detected in 29 soils samples (0-20 cm) from 14 NABO monitoring sites.

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
1	Atrazine	Herbicide	Atrazine-2-Hydroxy	major	29	100	2 - 220	23	2	10	4	Yes
2	Simazine	Herbicide	Simazine-2-hydroxy+ Terbutylazine-desethyl-2-hydroxy	major	27	93	2 - 680	6	208	ND	20	Yes
3	Terbutylazine/ Sebutylazine	Herbicide	Terbutylazine-desethyl	major	26	90	1 - 2	1	1	ND	1	Yes
4	Atrazine	Herbicide	Atrazine-desisopropyl	major	25	86	1 - 9	3	5	4	2	Yes
5	Diuron/Linuron	Herbicide	Diuron-desmonomethyl	major	22	76	2 - 130	3	6	ND	12	Yes
6	Chlorothalonil	Fungicide	Chlorothalonil-4-hydroxy	major	19	66	D	D	D	D	D	Yes
7	Terbutylazine/ Sebutylazine	Herbicide	Terbutylazine-hydroxy	major	16	55	D	D	D	D	D	No
8	Chlorpyrifos	Insecticide	3,5,6-Trichloro-2-pyridinol	major	15	52	6 - 70	ND	27	ND	6	Yes
9	Diuron/Linuron	Herbicide	Diuron-desdimethyl	major	15	52	2 - 30	ND	3	5	17	Yes
10	Chlorothalonil	Fungicide	3-cyano-6-hydroxy-2,4,5-trichlorobenzamide / 3-cyano-4-hydroxy-2,5,6-trichlorobenzamide	major	14	48	D	D	D	D	D	No

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								CI	Or	Ve	Vi	
11	Terbutylazine/ Sebuthylazine	Herbicide	Terbutylazine-desethyl- hydroxy	minor	14	48	D	D	D	D	D	No
12	Atrazine	Herbicide	Atrazine-desethyl	major	12	41	3 - 9	5	ND	6	ND	Yes
13	Carbendazim	Fungicide & TP ¹	2-Aminobenzimidazole	major	12	41	2 - 3	ND	ND	ND	2	Yes
14	Pendimethalin	Herbicide	Pendimethalin-Benzimidazol	minor	12	41	D	D	D	D	D	No
15	Metamitron	Herbicide	Metamitron-desamino	major	11	38	2 - 20	5	ND	ND	ND	Yes
16	Isoproturon	Herbicide	Isoproturon-monodemethyl	major	10	34	1 - 5	2	ND	ND	ND	Yes
17	Difenoconazole	Fungicide	1-[2-chloro-4-(4- chlorophenoxy) phenyl]-2- (1H-1,2,4-triazol-1-yl)ethanol	major	9	31	D	D	D	D	D	No
18	Azoxystrobin	Fungicide	Azoxystrobin acid	major	8	28	D	D	D	D	D	No
19	Dinoseb	Acaricide	Acetyl-dinoseb-6-amino	unknown	8	28	D	D	D	D	D	No
20	Dinoseb	Acaricide	Dinoseb-6-amino	unknown	8	28	D	D	D	D	D	No
21	Isoproturon	Herbicide	Isoproturon-didemethyl	major	8	28	1	1	ND	ND	ND	Yes

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
22	Metolachlor	Herbicide	Metolachlor-OA	major	8	28	D	D	D	D	D	Yes
23	Cyprodinil	Fungicide	4-cyclopropyl-6-methylpyrimidine-2-amine	major	7	24	D	D	D	D	D	No
24	Fenpropidin	Fungicide	1-[3-(p-2-carboxymethylisopropyl)phenyl-2-methylpropyl]piperidine	major	7	24	D	D	D	D	D	No
25	Metribuzin	Herbicide	Metribuzin-desamino	major	7	24	2 - 3	2	ND	2	ND	Yes
26	Cyprodinil	Fungicide	4-cyclopropyl-6-methyl-N-(4'-hydroxyphenyl)pyrimidine-2-amine	major	6	21	D	D	D	D	D	No
27	Pirimicarb	Insecticide	Pirimicarb desmethyl	minor	6	21	D	D	D	D	D	No
28	Bifenox	Herbicide	Amino-bifenox	minor	5	17	D	D	D	D	D	No
29	Difenoconazole	Fungicide	1-[2-chloro-4-(4-chlorophenoxy) phenyl]-2-(1H-1,2,4-triazol-1-yl)ethanone	minor	5	17	D	D	D	D	D	No
30	Fenpropidin	Fungicide	1-[3-(p-2-hydroxymethylisopropyl)phenyl-2-methylpropyl]piperidine	minor	5	17	D	D	D	D	D	No

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
31	Fenpropidin	Fungicide	Fenpropidine-hydroxy	minor	5	17	D	D	D	D	D	No
32	Fenpropidin	Fungicide	Fenpropidine-N-oxide	minor	5	17	D	D	D	D	D	No
33	Imidacloprid	Insecticide	Imidacloprid-guanidine	minor	5	17	D	D	D	D	D	No
34	Orbencarb	Herbicide	Orbencarb desethyl	minor	5	17	D	D	D	D	D	No
35	Tebuconazole	Fungicide	Tebuconazole-5-enol or -5-keto	minor	5	17	D	D	D	D	D	No
36	Triadimenol	Fungicide	Triadimefon	major	5	17	D	D	D	D	D	No
37	Trifloxystrobin	Fungicide	Trifloxystrobin acid	major	5	17	D	D	D	D	D	No
38	Azoxystrobin	Fungicide	cyanophenoxypyrimidinol	minor	4	14	D	D	D	D	D	No
39	Bifenox	Herbicide	Bifenox-acid	major	4	14	D	D	D	D	D	Yes
40	Bitertanol	Fungicide	Bitertanol ketone	minor	4	14	D	D	D	D	D	No
41	Chloridazon	Herbicide	Methyl-desphenylchloridazon	minor	4	14	2 - 4	3	ND	ND	ND	Yes

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
42	Chlorothalonil	Fungicide	3-cyano-2,5,6-trichlorobenzamide	minor	4	14	D	D	D	D	D	No
43	Fenpropimorph	Fungicide	1-[[3-(4-tert-butylphenyl)-2-methylpropyl]amino]propan-2-ol	minor	4	14	D	D	D	D	D	No
44	Fluazifop-p-butyl	Herbicide	Fluazifop-P-acid	major	4	14	D	D	D	D	D	Yes
45	Metolachlor	Herbicide	Metolachlor-ESA	major	4	14	NA	3	ND	ND	ND	Yes
46	Napropamide	Herbicide	Napropamide didesethyl	minor	4	14	D	D	D	D	D	No
47	Oryzalin	Herbicide	2-ethyl-7-nitro-1-propyl-1H-benzimidazole-5-sulfonamide	minor	4	14	D	D	D	D	D	No
48	Oryzalin	Herbicide	2-ethyl-7-nitro-1-propyl-1H-benzimidazole-5-sulfonamide 3-oxide	minor	4	14	D	D	D	D	D	No
49	Oryzalin	Herbicide	Despropyl-oryzalin	minor	4	14	D	D	D	D	D	No
50	Bitertanol	Fungicide	Bitertanol benzoic acid	minor	3	10	D	D	D	D	D	No
51	Dimethomorph	Fungicide	Dimethomorph (3or 4) demethyl	minor	3	10	D	D	D	D	D	No

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
52	Linuron	Herbicide	Linuron-desmethyl	minor	3	10	D	D	D	D	D	No
53	Metolachlor	Herbicide	Metolachlor-demethyl	minor	3	10	D	D	D	D	D	No
54	Metribuzin	Herbicide	Metribuzin-diketo_(DK)	major	3	10	6 - 8	6	ND	ND	ND	Yes
55	Prochloraz	Fungicide	N-propyl-N-(2-(2,4,6-trichlorophenoxy)ethyl)urea	major	3	10	D	D	D	D	D	No
56	Prochloraz	Fungicide	N-propyl-N-2-(2,4,6-trichlorophenoxy)-ethylamine	major	3	10	D	D	D	D	D	No
57	Tebuconazole	Fungicide	3,3-dimethyl-1-(1H-1,2,4-triazol-1-yl)butan-2-one	minor	3	10	D	D	D	D	D	No
58	Tebuconazole	Fungicide	5-tert-butyl-5-(1H-1,2,4-triazol-1-ylmethyl)dihydrofuran-2(3H)-one	minor	3	10	D	D	D	D	D	No
59	Tebuconazole	Fungicide	Tebuconazole-4-hydroxy	minor	3	10	D	D	D	D	D	No
60	Alachlor/ Acetochlor	Herbicide	Alachlor-hydroxy	minor	2	7	D	D	D	D	D	No
61	Chlorotoluron	Herbicide	Chlorotoluron-desmethyl	major	2	7	D	D	D	D	D	No

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
62	Chlorotoluron	Herbicide	Chlorotoluron-didesmethyl	major	2	7	D	D	D	D	D	No
63	Fenpropimorph	Fungicide	Fenpropimorph carboxy	minor	2	7	D	D	D	D	D	No
64	Imidacloprid	Insecticide	Imidacloprid-urea	minor	2	7	D	D	D	D	D	No
65	Lenacil	Herbicide	oxo-Lenacil	major	2	7	D	D	D	D	D	No
66	Metazachlor	Herbicide	Metazachlor-deschloro	minor	2	7	D	D	D	D	D	No
67	Metazachlor	Herbicide	Metazachlor-hydroxy	minor	2	7	D	D	D	D	D	No
68	Metazachlor	Herbicide	Metazachlor OA	major	2	7	2 - 3	2	ND	ND	ND	Yes
69	Pyraclostrobin	Fungicide	1-(4-chlorophenyl)-1H-pyrazol-3-ol	minor	2	7	D	D	D	D	D	No
70	Spiroxamine	Fungicide	Spiroxamine-desethyl	minor	2	7	D	D	D	D	D	No
71	Spiroxamine	Fungicide	Spiroxamine-despropyl	minor	2	7	D	D	D	D	D	No
72	Spiroxamine	Fungicide	Spiroxamine acid	minor	2	7	D	D	D	D	D	No

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								CI	Or	Ve	Vi	
73	Spiroxamine	Fungicide	Spiroxamine desethyl acid	minor	2	7	D	D	D	D	D	No
74	Alachlor/ Acetochlor	Herbicide	Alachlor+ Acetochlor OA	major	1	3	D	D	D	D	D	Yes
75	Bupirimate	Fungicide	Ethirimol	major	1	3	D	D	D	D	D	No
76	Dimethachlor	Herbicide	Dimethachlor ESA	major	1	3	NA	8	ND	ND	ND	Yes
77	Dimethachlor	Herbicide	Dimethachlor-hydroxy	minor	1	3	D	D	D	D	D	No
78	Dimethachlor	Herbicide	Dimethachlor OA	major	1	3	D	D	D	D	D	Yes
79	Diuron	Herbicide	3-(3-chlorophenyl)-1,1-dimethylurea	minor	1	3	D	D	D	D	D	No
80	Fluazinam	Fungicide	Fluazinam-3-hydroxy	major	1	3	D	D	D	D	D	No
81	Metalaxyl	Fungicide	2-[(2,6-dimethylphenyl)(methoxy-acetyl)amino]propanoic acid	major	1	3	D	D	D	D	D	No
82	Metazachlor	Herbicide	Metazachlor ESA	major	1	3	D	D	D	D	D	Yes
83	Sulcotrione	Herbicide	Sulcotrione-CMBA	major	1	3	NA	7	ND	ND	ND	Yes

Rank	Parent Compound	Type	Transformation Product (TP)	TP Type	No. Of Samples Detected	% of Detected Samples	Con. Range ($\mu\text{g}/\text{kg}_{\text{dw}}$)	Median Concentration by Land use ($\mu\text{g}/\text{kg}_{\text{dw}}$)				STD
								Cl	Or	Ve	Vi	
84	Tebufozide	Insecticide	Tebufozide-phenylacetic acid	minor	1	3	D	D	D	D	D	No
85	Thiacloprid	Insecticide	Thiacloprid amide	major	1	3	D	D	D	D	D	No
86	Thiacloprid	Insecticide	Thiacloprid diamide	minor	1	3	D	D	D	D	D	No
87	Bromoxynil	Herbicide	3,5-Dibromo-4-hydroxybenzoic acid	major	0	0	ND	ND	ND	ND	ND	Yes
87	Alachlor/ Acetochlor	Herbicide	Alachlor+Acetochlor ESA	major	0	0	ND	ND	ND	ND	ND	Yes
87	Dimethenamid	Herbicide	Dimethenamid ESA	major	0	0	ND	ND	ND	ND	ND	Yes
87	Dimethenamid	Herbicide	Dimethenamid OA	major	0	0	ND	ND	ND	ND	ND	Yes
87	Phenmedipham	Herbicide	Methyl-N-(3-hydroxyphenyl)carbamate	major	0	0	ND	ND	ND	ND	ND	No
87	Propachlor	Herbicide	Propachlor-ESA	major	0	0	ND	ND	ND	ND	ND	Yes
87	Propachlor	Herbicide	Propachlor-OA	major	0	0	ND	ND	ND	ND	ND	Yes

Land use: Cropland sites (Cl), orchards (Or), vegetable growing (Ve), and viticulture (Vi)

¹Transformation product of other pesticides such as thiophanate, thiophanate-methyl, and benomyl

D detectable but not quantified

NA Not available

< LOQ lower than the limit of quantification

STD= Standard Available. Yes=Target screening (standard available). No= suspect screening (standard no available).

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