Supporting Information for

Robust Matrix Effect-Free Method for Simultaneous Determination of Legacy and Emerging Per- and Polyfluoroalkyl Substances in Crop and Soil Matrices

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Chemicals

Methanol, acetonitrile (ACN), methyl tert-butyl ether (MTBE), tetra-*n*-butyl ammonium hydrogen sulfate (TBA), ammonium acetate and ammonium hydroxide (NH₄OH) purchased from Sigma Aldrich (St. Louis, MO, USA) were HPLC-grade. Others including sodium bicarbonate (NaHCO₃), sodium carbonate (Na₂CO₃), and sodium hydroxide (NaOH) were purchased from Aladdin Testing Co. Ltd. (Shanghai, China) and were all of premium grades. Ultrapure water used in the entire experiment was obtained from Milli-Q IQ 7000 system (Millipore, German) with a resistance of 18.2 MΩ/cm. The solid-phase extraction (SPE) device with 24-port vacuum manifolds (SUPELCO) and Supelclean graphitized carbon (ENVI-Carb) were purchased from Supelco (Bellefonte, PA, USA). The Sep-pak C18 SPE cartridges (6 cc, 500 mg), Florisil SPE cartridges (6 cc, 500 mg), Oasis HLB SPE cartridges (6 cc, 500 mg) and Oasis WAX SPE cartridges (6 cc, 500 mg) were obtained from Waters Corporation (Milford, MA, USA). Acrodisc syringe filters with GHP Pall membrane (13 mm, 0.2 µm) was bought from Pall Corp (Port Washington, NY, USA).

Standard solutions preparation

Mixed stock solutions (1 μg/mL) of fourteen target analytes (*i.e.* PFOA, PFOS, FHEA, FOEA, FDEA, 4:2 FTS, 6:2 FTS, 8:2 FTS, 6:2 Cl-PFESA, 8:2 Cl-PFESA, 8Cl-PFOS, HFPO-DA, HFPO-TA, and HFPO-TeA) and nine internal standards (*i.e.* ¹³C₄-PFOA, ¹³C₄-PFOS, ¹³C₂-FHEA, ¹³C₂-FOEA, ¹³C₂-FDEA, ¹³C₂-4:2 FTS, ¹³C₂-6:2 FTS,

 $^{13}C_2$ -8:2 FTS, and $^{13}C_3$ -HFPO-DA) were prepared using HPLC-grade methanol, labeled as mixed standards solution and mixed internal standards solution, and stored at -20 °C for further use. The mixed standards solution was further diluted using the same solvent to obtain 0.1, 0.25, 0.5, 1, 2.5, 5, 10, 25, and 50 ng/mL working mixed standards solutions for calibration. And the working mixed internal standards solution were prepared by dilution using HPLC-grade methanol to achieve 100 ng/mL.

Spiked sample preparation

Crops were thoroughly washed by tap water and ultrapure water in order, chopped, freeze-dried at -80 °C for 72 h in a vacuum freeze drier (Labconco, MO, USA), and then pulverized (0.3 mm) using a mill (Tianjin TAISITE instrument Co., Ltd., China). Soil samples were air-dried and pestled to a fine powder. These homogenized powder samples were refrigerated at 4 °C as matrix samples in precleaned polypropylene bottles that had been rinsed thoroughly with HPLC-grade methanol. To obtain five concentration levels (0.1, 1, 10, 100, and 1000 ng/g), 0.5 g of crop or 1 g of soil powder samples were spiked with 100 μ L working mixed standards solutions (0.5, 5, 50, 500, and 5000 ng/mL for crops and 1, 10, 100, 1000, and 10000 ng/mL for soils), respectively. Thereafter, the resultant samples were spiked with 50 μ L of isotope labeled mixed internal standards solution (100 ng/mL for each one), homogenized for 2 h and placed in a fume hood for 10 h at room temperature to volatilize the solvent (methanol).

Assay of internal standards recoveries

In order to further determine the optimal extractant and cleanup catridge, the recoveries of nine internal standards (5 ng of each one) in lettuce and water sample under different treatments of extractant and cleanup cartridge were calculated. The pretreatment procedure of lettuce sample was the same as materials and methods in the manuscript. According to previous studies, water sample was purified directly through the cleanup cartridge, which can intuitively reflect the purification effect of different cartridges for target analytes.¹⁻³ Briefly, 40 mL ultrapure water was added into 50 mL polypropylene centrifugal tubes followed by adding 50 µL of isotope labeled mixed internal standards solution (100 ng/mL for each one) to each sample. The spiked samples were ultrasonic homogenized for 30 min. Subsequently, the cartridges (6 cc, 500 mg) were preconditioned with 5 mL methanol followed by 5 mL ultrapure water before loading the homogenized water samples. After discarding the eluent, 5ml 20% methanol solution (methanol/water, v/v) was added into the cartridge to remove impurities and then the target analytes were eluted by 4 mL methanol and 4 mL 0.5% ammonia hydroxide methanol (ammonia hydroxide/methanol, v/v) in turn. The eluent was collected into a 10 mL polypropylene tube, evaporated to dryness using a mild stream of nitrogen in water bath at 40 °C and redissolved with 1 mL methanol. Afterwards, each sample was vortex mixed for 1 min, ultrasounicated for 10 min, and passed through a syringe filter (GHP Pall, 13mm, 0.2 µm) before instrumental analysis. The recovery of each internal standard was evaluated by comparing the peak area of internal standards between different treatments (Areat) and that of methanol standard solution (Area_m). The recovery of each internal standard was calculated as follows:

where R indicates recovery (%), which is provided in Figure S2.

Method application

The developed method was applied to measure trace levels of emerging PFASs in a total of 116 crop (the edible parts) and soil samples collected from several farms at a distance gradient close to a fluorine industrial park, with polytetrafluoroethylene (PTFE), polyvinylidene fluoride (PVDF), fluorinated ethylene propylene resin (FEP) and tetrafluoroethylene (TFE), etc. as main products, in Foshan city of south China's Pearl River Delta area. The types of samples were: amaranth (n = 7), lettuce (n = 7), water spinach (n = 11), sweet potato leaf (n = 13), flowering cabbage (n = 4), romaine lettuce (n = 9), green bean (n = 12), eggplant (n = 9), wax gourd (n = 3), pumpkin (n = 3), bitter gourd (n = 5), cucumber (n = 4), tomato (n = 4) and red soil (n = 25). Each kind of sample was analyzed in quadruplicate. Two quality controls (QCs) at 1 and 25 ng/g were carried out for each crop and soil sample in the analysis sequence.

(S1)

Category	Abbreviation	Chemical name	Manufacturer	Purity (%)	CAS No.
Legacy PFASs	PFOA	Pentadecafluorooctanoic acid	Well-labs ^a	> 98	335-67-1
	PFOS	Sodium perfluorooctane sulfonate	Well-labs	> 98	1763-23-1
Hydrogenous	FHEA*	2-Perfluorohexyl ethanoic acid (6:2)	Well-labs	> 98	53826-12-3
PFASs	FOEA*	2-Perfluorooctyl ethanoic acid (8:2)	Well-labs	> 98	27854-31-5
(H-PFAS)	FDEA*	2-Perfluorodecyl ethanoic acid (10:2)	Well-labs	> 98	53826-13-4
	$4:2 \text{ FTS}^{\#}$	Sodium 1H,1H,2H,2H-perfluorohexane sulfonate (4:2)	Well-labs	> 98	27619-93-8
	$6:2 \text{ FTS}^{\#}$	Sodium 1H,1H,2H,2H-perfluorooctane sulfonate (6:2)	Well-labs	> 98	27619-97-2
	8:2 FTS [#]	Sodium 1H,1H,2H,2H-perfluorodecane sulfonate (8:2)	Well-labs	> 98	27619-96-1
Chlorinated	8C1-PFOS [#]	Sodium 8-chloroperfluoro-1-octanesulfonate	Well-labs	> 98	N/A
PFASs	6:2 Cl-PFESA [#]	Potassium 9-chlorohexadecafluoro-3-oxanonane-1-sulfonate	Well-labs	> 98	73606-16-6
(Cl-PFAS)	8:2 Cl-PFESA [#]	Potassium 11-chloroeicosafluoro-3-oxaundecane-1-sulfonate	Well-labs	> 98	83329-89-9
HFPO	HFPO-DA*	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)propanoic acid	Well-labs	> 98	13252-13-6
homologues	HFPO-TA*	Perfluoro-2,5-dimethyl-3,6-dioxanonanoic acid	$J\&K^b$	95	13252-14-7
	HFPO-TeA*	Perfluoro-(2,5,8-trimethyl-3,6,9-trioxadodecanoic)acid	J&K	98	65294-16-8
Internal standards	¹³ C ₄ -PFOA	Perfluoro[1,2,3,4- ¹³ C ₄]octanoic acid	Well-labs	> 99	N/A
	¹³ C ₄ -PFOS	Sodium perfluoro-1-[1,2,3,4- ¹³ C ₄]octanesulfonate	Well-labs	> 99	N/A
	¹³ C ₂ -FHEA	2-Perfluorohexyl- $[1,2^{-13}C_2]$ -ethanoic acid (6:2)	Well-labs	> 99	N/A
	¹³ C ₂ -FOEA	2-Perfluorooctyl- $[1,2^{-13}C_2]$ -ethanoic acid (8:2)	Well-labs	> 99	N/A
	¹³ C ₂ -FDEA	2-Perfluorodecyl-[1,2- ¹³ C ₂]-ethanoic acid (10:2)	Well-labs	> 99	N/A
	¹³ C ₂ -4:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]-hexane sulfonate (4:2)	Well-labs	> 99	N/A
	¹³ C ₂ -6:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]-octane sulfonate (6:2)	Well-labs	> 99	N/A
	¹³ C ₂ -8:2 FTS	Sodium 1H,1H,2H,2H-perfluoro-1-[1,2- ¹³ C ₂]-decane sulfonate (8:2)	Well-labs	> 99	N/A
	¹³ C ₃ -HFPO-DA	2,3,3,3-Tetrafluoro-2-(1,1,2,2,3,3,3-heptafluoropropoxy)- ¹³ C ₃ -propanoic acid	Well-labs	> 99	N/A

Table S1. The particular chemical names, manufacturer, purity, and CAS No. of the target analytes

* The alternatives for PFOA; ^a Well-labs, Willington Laboratory (Ontario, Canada);

[#] The alternatives for PFOS; ^b J&K, J&K Scientific. Ltd. (Beijing, China).



Table S2. Molecular structures of target PFASs



* The alternatives for PFOA;

[#] The alternatives for PFOS.

Table S3. UPLC-MS/MS in	nstrument parameters	for the quantit	fication of the	target analy	ytes

UPLC-MS/MS conditions

Instrument	Agilent 1 spectrom	Agilent 1290 infinity II UPLC coupled to an API 5500 triple-quadrupole mass spectrometer (AB SCIEX Inc., Framingham, MA, USA)									
Analytical column	Acquity I	BEH C18 col	lumn (100 mm	\times 2.1 mm, 1.7 μ m, Waters, MA, USA)							
Column temperature	40 °C										
Injection volume	2 µL										
Mobile phase	2 mM am	2 mM ammonium acetate in water (A) and acetonitrile (B)									
	Time (min)	A (%)	B (%)	Flow rate (mL/min)							
	0.00	70.00	30.00	0.300							
Credient	0.50	70.00	30.00	0.300							
Gradient	6.00	0.00	100.00	0.300							
	8.10	0.00	100.00	0.300							
	8.50	70.00	30.00	0.300							
	10.50	70.00	30.00	0.300							
	API 5500, AB Sciex										
	Ion Spray	Voltage: -4	.2 kV;								
	Curtain C	Gas: 20 psi;									
Other mass	Collision	Gas: 9 psi;									
parameters	Temperat	ture: 300 °C;									
	Ion Source	ce Gas 1: 50	psi;								
	Ion Source	ce Gas 2: 40	psi								

Analyte	Retention (min)	Precursor ic	on Product ion	Internal standard	\mathbf{DP}^{a}	CE^b
4:2 FTS	1.68	327	307°/81	¹³ C ₂ -4:2 FTS	-78	-28
HFPO-DA	2.60	329	285	¹³ C ₃ -HFPO-DA	-37	-10
FHEA	2.83	377	293	¹³ C ₂ -FHEA	-51	-23
6:2 FTS	3.36	427	407 ^c /81	¹³ C ₂ -6:2 FTS	-81	-33
PFOA	3.55	413	369°/169	¹³ C ₄ -PFOA	-44	-16
FOEA	3.80	477	393	¹³ C ₂ -FOEA	-66	-22
8:2 FTS	4.16	527	507 ^c /81	¹³ C ₂ -8:2 FTS	-95	-37
HFPO-TA	4.18	495	185°/119	¹³ C ₄ -PFOA	-26	-20
PFOS	4.50	499	80 ^c /99	¹³ C ₄ -PFOS	-97	-108
FDEA	4.55	577	493	¹³ C ₂ -FDEA	-60	-25
8Cl-PFOS	4.60	515	99	¹³ C ₄ -PFOS	-106	-94
6:2 Cl-PFESA	4.73	531	351°/83	¹³ C ₄ -PFOS	-98	-38
HFPO-TeA	5.15	661	185°/119	¹³ C ₄ -PFOA	-60	-42
8:2 Cl-PFESA	5.36	631	451°/83	¹³ C ₄ -FFOS	-77	-38
¹³ C ₂ -4:2 FTS	1.68	329	309°/81	-	-85	-29
¹³ C ₃ -HFPO-DA	2.60	332	287	-	-19	-10
¹³ C ₂ -FHEA	2.82	379	294	-	-42	-25
¹³ C ₂ -6:2 FTS	3.34	429	409°/81	-	-85	-34
¹³ C ₄ -PFOA	3.53	417	372°/172	-	-49	-16
¹³ C ₂ -FOEA	3.78	479	394	-	-61	-26
¹³ C ₂ -8:2 FTS	4.16	529	509°/81	-	-83	-38
¹³ C ₄ -PFOS	4.50	503	80	-	-92	-110
¹³ C ₂ -FDEA	4.54	579	494	-	-62	-25

Table S4. Optimal UPLC-MS/MS parameters for the target PFASs and internal standards

^{*a*} Decluster potential.

^b Collision energy.

^c Quantitative ion.

	Spiked levels	Black soil		Brown	Brown soil		Yellow soill		Red soil		Sierozem	
Analyte	ng/g	Recovery%	RSD%	Recovery%	RSD%	Recovery%	RSD%	Recovery%	RSD%	Recovery%	RSD%	
PFOA	0.1	102	8.0	106	9.6	102	4.5	115	6.3	93	9.9	
	1	108	11.3	109	5.6	114	11.4	107	8.8	96	11.0	
	10	114	1.1	98	3.5	100	2.4	96	8.9	111	8.7	
	100	106	1.6	113	2.2	84	5.2	88	8.8	99	6.2	
	1000	92	0.6	100	2.7	97	3.0	105	4.8	99	11.7	
PFOS	0.1	112	8.2	113	6.4	89	12.8	105	9.6	102	8.0	
	1	87	5.6	85	9.0	106	6.3	91	11.0	102	5.4	
	10	116	1.1	108	5.4	90	0.5	83	4.2	88	1.1	
	100	93	0.4	83	5.8	102	1.6	116	5.3	114	3.1	
	1000	110	5.9	101	5.7	109	9.3	95	3.4	99	2.9	
FHEA	0.1	92	16.6	91	7.2	86	10.8	103	10.7	83	13.0	
	1	114	4.1	97	4.6	90	12.0	88	6.3	90	6.3	
	10	96	3.0	73	1.9	74	4.0	88	5.0	99	6.5	
	100	94	5.6	98	1.8	89	3.3	76	7.0	79	9.0	
	1000	110	1.0	88	10.6	110	10.5	100	8.2	94	8.4	
FOEA	0.1	108	7.0	86	13.2	84	5.9	116	7.0	98	7.6	
	1	115	5.2	100	3.5	96	5.1	104	7.8	80	7.2	
	10	86	9.1	94	2.8	95	4.5	104	1.1	89	9.6	
	100	84	4.2	113	3.1	97	6.7	107	1.9	114	7.3	
	1000	105	2.2	103	4.8	101	1.1	116	14.9	114	6.2	
FDEA	0.1	102	10.5	89	10.6	111	4.6	86	5.8	92	14.5	
	1	102	6.2	76	7.4	104	4.4	109	11.3	91	14.0	
	10	83	10.3	82	11.2	83	8.3	100	10.7	112	4.9	
	100	90	6.9	89	2.5	81	8.2	82	11.3	79	12.5	

Table S5 Recoveries (n = 4) and RSD (%) of the target PFASs in various soil matrices

	1000	112	10.0	01	4.0	100	5 /	Q 1	127	101	00
	1000	113	10.0	01	4.0	109	J.4	01	15.7	101	0.0
4:2 F1S	0.1	89	15.4	105	10.8	88	9.6	88	9.2	85	10.3
	1	115	10.8	110	7.5	98	14.3	86	13.4	103	12.1
	10	96	10.1	111	8.9	117	9.7	103	8.6	110	12.8
	100	84	15.4	104	9.8	97	7.8	116	14.0	79	4.1
	1000	90	9.1	109	4.3	80	7.2	111	4.2	79	5.9
6:2 FTS	0.1	85	7.5	89	5.8	81	12.9	87	11.6	77	5.9
	1	94	13.0	104	11.3	111	9.4	103	12.1	96	3.8
	10	97	3.4	94	8.6	107	12.3	111	8.8	117	8.1
	100	94	13.1	93	11.0	88	11.8	94	7.1	82	5.2
	1000	92	7.2	88	8.2	84	6.3	83	2.6	82	3.6
8:2 FTS	0.1	98	7.8	100	8.4	81	10.5	84	8.9	80	6.1
	1	79	3.2	94	8.9	111	1.9	115	7.3	106	11.7
	10	98	11.7	114	4.1	112	4.3	107	3.0	115	6.8
	100	73	9.7	80	6.9	75	2.9	89	1.8	75	8.3
	1000	85	6.5	105	9.6	87	6.5	77	5.6	90	12.4
8Cl-PFOS	0.1	87	11.1	88	5.8	105	11.0	101	6.2	102	9.4
	1	106	13.9	81	7.6	88	4.1	107	7.1	92	10.2
	10	112	1.7	90	5.6	102	7.0	78	9.4	79	3.3
	100	77	13.5	93	10.2	85	3.1	105	9.2	88	4.8
	1000	94	6.6	92	7.4	92	3.2	87	9.7	95	12.3
6:2 Cl-PFESA	0.1	104	12.4	108	8.9	83	4.3	109	11.6	97	7.1
	1	112	2.1	104	13.1	96	11.9	90	5.9	92	1.2
	10	101	3.4	97	4.6	102	7.3	80	13.7	92	2.3
	100	101	4.7	80	8.8	114	11.3	94	6.7	89	10.5
	1000	105	6.6	95	0.8	112	6.6	84	1.4	117	8.1
8:2 Cl-PFESA	0.1	89	5.8	99	6.2	93	6.1	81	8.5	98	11.3

	1	81	3.8	94	8.6	109	3.8	104	15.9	99	4.3
	10	92	2.1	84	7.4	102	4.1	91	2.3	96	12.8
	100	95	6.9	99	5.1	117	1.5	99	2.4	85	14.3
	1000	86	4.2	105	5.5	76	1.2	102	4.6	104	6.6
HFPO-DA	0.1	105	4.5	97	10.1	107	8.1	108	4.3	86	12.9
	1	108	4.5	110	6.5	112	2.6	100	3.9	104	7.5
	10	90	2.9	89	8.2	91	4.9	87	4.3	88	8.8
	100	102	5.2	87	5.7	85	3.4	99	6.9	85	5.8
	1000	109	1.9	95	7.6	108	3.8	98	1.9	96	5.9
HFPO-TA	0.1	82	4.3	86	13.8	107	8.9	109	5.4	82	9.1
	1	84	3.0	84	5.3	73	4.2	90	2.5	81	5.5
	10	73	6.5	82	13.5	100	5.8	80	11.2	89	6.4
	100	89	8.6	106	6.7	80	7.0	88	3.2	112	14.0
	1000	88	4.2	93	4.6	115	5.2	96	13.5	79	2.2
HFPO-TeA	0.1	81	5.5	95	9.8	103	6.9	73	14.1	84	8.5
	1	85	13.8	109	7.5	86	9.8	97	4.8	88	12.8
	10	91	2.1	85	4.2	82	4.5	74	3.8	107	11.0
	100	97	5.2	105	8.2	85	6.9	91	8.0	98	4.2
	1000	91	3.4	98	4.9	105	5.7	79	9.0	79	13.5

Table S6 The moisture content (%) of the crop matrices

Matrix	Moisture content (%)	
grain	12 ± 1.8	
carrot	87 ± 2.9	
tomato	92 ± 4.5	
green bean	88 ± 3.7	
cucumber	92 ± 5.3	
lettuce	87 ± 3.1	

Analytas	Motrix	Instrument	Pacovarias	DSD	MDLs ^a	MDLs	Deferences
Analytes	Wautx	lisuument	Recoveries	KSD	$(pg/g, dw^b)$	$(pg/g, fw^c)$	Keletences
PFOA, PFOS	vegetable composite	UPLC/MS/MS (TQS)	59%, 69%	≤15%	-	3.3, 0.8	1
PFOA, PFOS	cereal (maize)	HPLC-MS/MS (QqQ)	95%-109%	≤12%	240, 410	-	4
PFOA, PFOS	carrot, pumpkin, lettuce, grain	HPLC-MS/MS (Q-Trap)	71%-113%	≤12%	27-150	2-130	2
PFOA, PFOS, HFPO-DA, HFPO-TA, 6:2 Cl-PFESA, 8:2 Cl-PFESA	muscle, liver	UPLC-MS/MS (TQS, Q-Trap)	78%-102%	≤8%	10-430	-	5
PFOA, PFOS, 6:2 Cl-PFESA, 8:2 Cl-PFESA	sediment	UPLC-MS/MS (Orbitrap)	57%-84%	≤18%	2.7-11.1	-	6
PFOA, PFOS, HFPO-DA, HFPO-TA, HFPO-TeA, 6:2 Cl-PFESA	sediment	HPLC-MS/MS (Orbitrap)	83%-107%	≤13%	24-423	-	7
PFOA, PFOS, 6:2 CI-PFESA	tree leaf, pumpkin, peanuts	UPLC-MS/MS (TQS)	91%-92%	≤10%	3-8.4	-	8
PFOA, PFOS, 6:2 FTS, HFPO-DA	grass, leaf	UHPLC-MS/MS (Q-Trap)	57%-129%	≤33%	-	100-200	3
PFOA, PFOS, HFPO-DA, HFPO-TA, HFPO-TeA, 6:2 Cl-PFESA	fish tissue, sediment	HPLC-MS/MS (Orbitrap)	44%-115%	≤18%	30-423	-	9
PFOA, PFOS, FHEA, FOEA, FDEA, 4:2 FTS, 6:2 FTS, 8:2FTS, 6:2 Cl-	tomato, carrot, grain, green bean, cucumber, lettuce,	UPLC-MS/MS (Q-Trap)	72%-117%	≤17%	2.4-83.0	0.4-47.9	This study
PFESA, 8:2 CI-PFESA, 8CI-PFOS, HFPO-DA, HFPO-TA, HFPO-TeA	black soil, brown soil, yellow soil, red soil, sierozem						

Table S7 Comparisons of recovery, RSD, and MDL between this study and recent studies

^{*a*} Method detection limits.

^b Dry weight.

^c Fresh weight.

Matrix	PFOA	PFOS	FHEA	FOEA	FDEA	4:2 FTS	6:2 FTS	8:2 FTS	8Cl-PFOS	6:2 Cl-PFESA	8:2 Cl-PFESA	HFPO-DA	HFPO-TA	HFPO-TeA	PFASs
amaranth ^a	71	100	71	71	ND	ND	ND	71	86	43	ND	100	100	86	+ ^s
lettuce ^b	100	100	ND ^r	43	ND	100	ND	100	43	43	29	100	100	57	+
water spinach ^c	91	100	36	55	ND	100	36	100	64	100	ND	100	91	45	+
sweet potato leaf ^d	100	100	38	54	ND	100	31	38	46	92	ND	100	100	54	+
flowering cabbage ^e	50	100	ND	75	ND	100	75	75	50	100	50	100	100	50	+
romaine lettuce f	89	100	ND	44	ND	100	78	100	22	100	ND	100	100	56	+
green bean ^g	100	100	ND	ND	ND	100	100	8	8	75	92	100	100	83	+
eggplant ^h	89	78	ND	ND	ND	100	22	100	44	100	ND	100	100	100	+
wax gourd ⁱ	100	67	ND	ND	ND	100	ND	ND	ND	100	ND	100	100	ND	+
pumpkin ^j	100	100	ND	ND	ND	ND	ND	67	67	100	ND	100	67	67	+
bitter gourd ^k	100	100	ND	ND	ND	ND	40	80	ND	60	ND	40	100	80	+
cucumber ^l	75	75	ND	ND	ND	ND	ND	25	ND	100	ND	ND	100	ND	+
tomato ^m	100	50	ND	ND	ND	ND	ND	ND	ND	75	ND	50	75	25	+
soil ^p	100	100	40	48	ND	ND	ND	ND	ND	100	100	80	100	100	+

Table S8 Detection rate	(%)) of the target	PFASs i	in real cro	ps and soils
	1 / 0	/ OI HIG HUILOU	1 1 1 1 0 0 1		pb and bond

a = 7, b = 7, c = 11, d = 13, e = 4, f = 9, g = 12, h = 9, i = 3, j = 3, k = 5, l = 4, m = 4, p = 25, r Not detected, s At least one PFAS was detected.

Figure captions:

- Figure S1 Typical UPLC-MS/MS chromatograms of fourteen target PFASs in methanol standard solution (a), lettuce (b), cucumber (c), green bean (d), carrot(e), grain (f), tomato (g), black soil (h), sierozem (i), red soil (j), yellow soil (k), and brown soil blank solution (l) spiked at at 10 ng/mL.
- Figure S2 The recoveries of nine internal standards (5 ng of each one) in lettuce (a) and water (b) sample under different treatments of extractant (a) and cleanup cartridge (b). MTBE, ACN/water, and NaOH methanol indicated methyl tertbutyl ether, acetonitrile/water mixture (90:10, v/v), and 10 mM NaOH methanol solution, respectively.



Figure S1



Figure S1



Time (min)

Figure S1



Figure S2 The recoveries of nine internal standards (5 ng of each one) in lettuce (a) and water (b) sample under different treatments of extractant (a) and cleanup cartridge (b). MTBE, ACN/water, and NaOH methanol indicated methyl tertbutyl ether, acetonitrile/water mixture (90:10, v/v), and 10 mM NaOH methanol solution, respectively.

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