Supplementary File

Methods

Determination of Fatty acid

Walnut oil (WO) was extracted from crushed walnuts kernels through solvent extraction. Fatty acid methyl esters (FAME) from the WO were obtained by alkaline treatment with 2.0 mol/L KOH in methanol. The FAMEs were analyzed using a 7890A Gas Chromatography equipped with a flame ionization detector (Agilent Technologies, Santa Clara, CA, USA). The GC analysis was carried out using an HP-INNOWax fused silica capillary column (30 m × 0.25 mm × 0.25 μm). The detailed operation conditions were as follows: He as carrier gas, the injector temperature at 220°C, split ratio 1:100, and detector temperature 275°C. The column was held for 1 min at 140°C and then programmed at 4°C/min to 250°C.

Determination of tocopherol

The analysis procedure was as follows: approximately 0.3 g of oil was dissolved in 5 mL of n-hexane and vortexed for 30 s. The mixture was filtered through a 0.45 μm nylon filter, and vitamin E was analyzed using high-performance liquid chromatography (HPLC) (Agilent Technologies, Palo Alto, CA, USA) and a Prodigy ODS-2 column (2150 mm, 5 μm).

Determination of mineral elements

Potassium (K), Calcium (Ca), Phosphorus (P), Magnesium (Mg), Copper (Cu), Zinc (Zn), Iron (Fe), Sodium(Na), Manganese(Mn), Boron(B), Molybdenum(Mo), Nickel(Ni), Cadmium(Cr), Cobalt(Co), Selenium(Se), Vanadium(V), were determined by ICP-OES (iCAP 7000); Briefly, 0.2 g milled samples were accurately weighted and transferred to polytetrafluoroethylene (PTFE) tube, then added 6 mL nitric acid (HNO3) and 2 mL hydrogen peroxide (H2O2). The PTFE tube was heated gradually to 200 ℃ for 20 min with the microwave oven (CEM, Matthews, NC, USA). After cooling at the room temperature, the PTFE tube was placed into digestion furnace and the solution was heated to near dryness at 200 ℃. Then the solution diluted to 25 mL polypropylene tubes for ICP-OES analysis.

Determination of amino acids

Walnut flour (0.1 g) were accurately weighted and hydrolyzed with 10 of mL HCl (6 m) at 105 ℃ for 24 h under a nitrogen atmosphere. After hydrolysis, the hydrolysate was analyzed by an amino acid automatic analysis apparatus (L-8900, Hitachi High Technologies Corporation, Tokyo, Japan) after precolumn derivatization with O-phthaldialdehyde (OPA) or 9-fluorenylmethyl chloroformate (FMOC).

Figure and Table

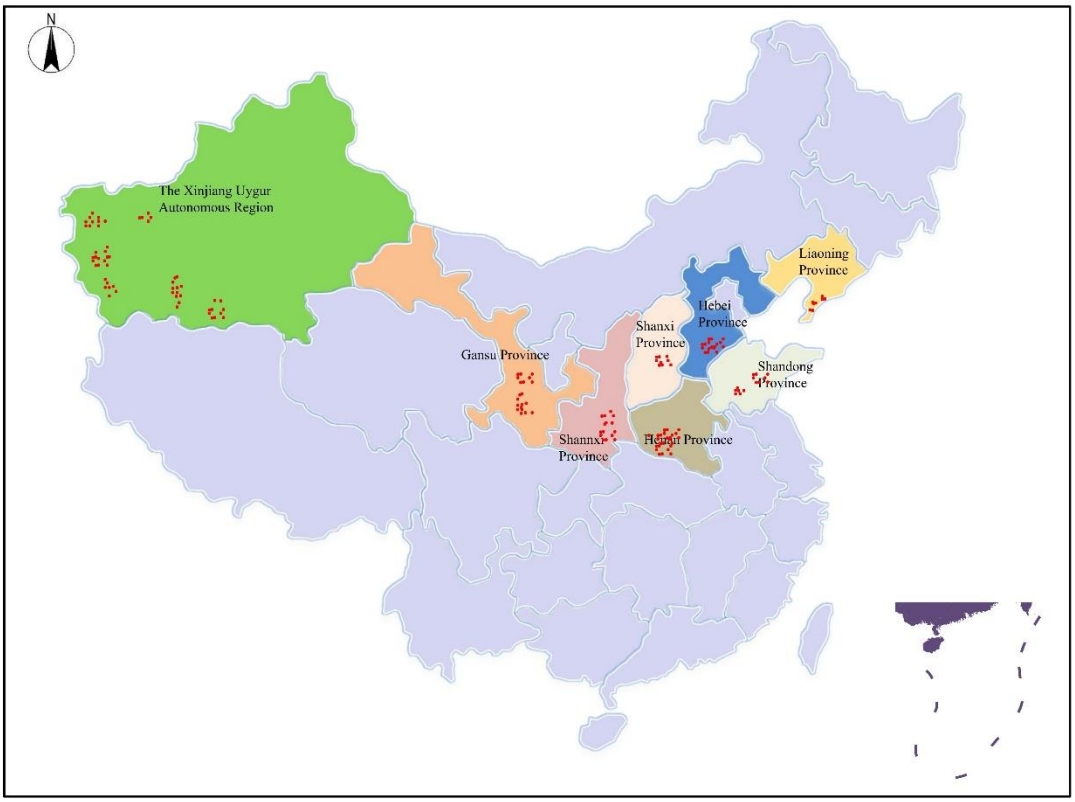

Figure S1. Geographical location of walnut sample collection sites in eight provinces

Table S1 Information on where soil samples were collected

Province	Sample size	Latitude	Longitude
Xinjiang	55	37°44-38°85N	77°31-114°39E
Shanxi	26	36°40-38°06N	111°25-114°05E
Shandong	20	36°55-37°17N	117°32-118°31E
Hebei	48	36°01-42°37N	113°04-119°53E
Liaoning	20	38°43-43°26N	118°53-125°46E
Shaanxi	39	33°39-34°45N	107°40-109°49E
Henan	28	31°23-36°22N	110°21-116°39E
Gansu	37	32°31-42°57N	92°13-108°46E

Note: “N” is for North, “E” is for East, “m” is for metres

Table S2 Comparison of the mineral composition in walnut flour from eight provinces.

	Province	Shaanxi	Shanxi	Xinjiang	Henan	Hebei	Liaoning	Gansu	Shandong
	N	37	26	55	28	48	20	39	20
Macroelements	Ca	1350.29±274.11	1208.16±266.20	1060.02±211.53	1590.61±205.61	1503.72±194.15	1419.17±170.63	1139.46±324.99	1363.98±135.37
	Mg	1502.92±116.07	1694.72±213.61	1699.09±122.08	1786.94±133.62	1481.32±117.13	1570.71±114.71	1710.16±89.86	1688.79±100.84
	K	3965.76±396.82	3739.53±471.86	4401.22±508.97	3746.60±365.94	3455.30±319.21	3656.79±744.39	4572.05±668.76	3659.96±91.40
	P	3189.16±318.41	3674.34±656.83	3043.44±417.49	3480.23±234.85	3084.74±403.48	3793.19±398.90	3483.22±603.69	3684.06±548.44
Microelements	Na	8.35±3.98	12.51±6.85	14.45±9.25	5.57±2.38	8.71±3.88	14.18±8.68	13.99±9.95	15.34±5.19
	Mn	35.50±16.01	42.79±9.81	33.13±10.58	33.94±12.36	52.53±23.89	54.39±30.51	47.16±40.31	45.59±9.93
	Fe	23.99±6.44	43.28±8.90	29.43±8.22	34.35±6.89	32.28±11.90	42.25±12.59	29.77±6.24	43.40±11.14
	Cu	15.68±1.99	14.47±2.61	17.72±3.56	11.03±2.09	14.37±2.73	15.26±2.09	17.04±2.87	12.79±2.94
	Zn	17.63±3.76	23.44±3.82	23.13±6.13	24.45±4.33	21.33±4.44	31.46±3.33	19.32±3.61	21.78±6.51
	B	11.28±3.99	14.41±2.67	11.49±2.74	12.96±1.38	8.77±1.97	13.05±2.48	12.91±3.13	9.31±3.06
	Mo	0.27±0.13	0.15±0.09	0.61±0.17	0.27±0.07	0.15±0.06	0.11±0.05	0.33±0.15	0.37±0.06
	Ni	1.42±0.54	1.11±0.28	1.96±0.59	1.24±0.43	1.23±0.78	1.93±0.55	2.09±1.09	1.14±0.13
	Cr	0.32±0.14	0.36±0.08	0.39±0.13	0.37±0.09	0.32±0.13	0.32±0.04	0.42±0.17	0.35±0.05
	Co	0.07±0.02	0.09±0.04	0.08±0.03	0.11±0.04	0.10±0.04	0.13±0.04	0.09±0.04	0.11±0.03
	Se	0.02±0.01	0.03±0.02	0.06±0.02	0.04±0.01	0.04±0.01	0.03±0.01	0.03±0.02	0.06±0.01
	V	0.01±0.01	0.02±0.01	0.01±0.01	0.02±0.01	0.01±0.01	0.02±0.01	0.01±0.01	0.03±0.01

Table S3. Correlation among the nutritional components of walnuts

(a). Correlation values

r Value	Tocopherol	C16:0	C18:0	C18:1	C18:2	C18:3
Tocopherol	1.00	0.22	0.03	0.07	-0.06	0.06
C16:0	0.22	1.00	-0.10	-0.12	0.14	0.14
C18:0	0.03	-0.10	1.00	-0.18	0.16	-0.07
C18:1	0.07	-0.12	-0.18	1.00	-0.54	-0.31
C18:2	-0.06	0.14	0.16	-0.54	1.00	0.11
C18:3	0.06	0.14	-0.07	-0.31	0.11	1.00
SFA	-0.18	0.05	-0.06	-0.01	0.01	-0.02
MUFA	-0.18	-0.04	-0.12	0.20	-0.14	-0.03
Ca	-0.28	-0.22	0.34	-0.15	0.24	-0.16
K	-0.17	0.07	-0.28	-0.09	0.11	0.12
Mg	0.12	0.12	-0.13	-0.08	0.15	0.16
Na	0.45	0.36	-0.10	-0.02	-0.06	0.20
P	0.46	0.29	0.07	0.01	0.02	0.05
B	0.54	0.12	-0.15	0.16	-0.05	-0.14
Mn	0.43	0.12	0.07	0.11	-0.03	-0.15
Fe	0.69	0.14	0.26	0.04	0.02	-0.03
Cu	-0.02	0.10	-0.12	0.19	-0.10	-0.11
Zn	0.35	0.20	0.28	0.04	-0.04	0.03
Mo	-0.21	0.22	-0.22	0.01	0.02	0.19
Ni	0.21	0.19	0.00	0.07	-0.03	-0.04
Cr	-0.06	-0.16	0.03	-0.01	0.09	-0.06
Co	0.02	-0.05	0.25	-0.10	0.09	-0.17
Se	-0.07	0.13	-0.05	0.02	0.04	0.02
V	0.24	-0.10	0.13	-0.11	0.13	0.03
Asp	-0.74	-0.31	-0.11	-0.14	0.21	-0.15
Ser	-0.75	-0.30	-0.11	-0.14	0.19	-0.16
Glu	-0.75	-0.29	-0.12	-0.14	0.20	-0.15
Gly	-0.76	-0.30	-0.11	-0.15	0.19	-0.14
Ala	-0.74	-0.29	-0.11	-0.15	0.21	-0.16
Cys	-0.39	-0.18	-0.01	-0.12	0.26	-0.06
Tyr	-0.75	-0.26	-0.12	-0.14	0.19	-0.14
His	-0.74	-0.30	-0.11	-0.15	0.21	-0.16
Arg	-0.72	-0.31	-0.11	-0.14	0.21	-0.16
Pro	-0.79	-0.30	-0.11	-0.13	0.17	-0.17
Thr	-0.72	-0.31	-0.12	-0.14	0.22	-0.15
Val	-0.71	-0.31	-0.11	-0.14	0.21	-0.17
Met	-0.70	-0.32	-0.09	-0.16	0.23	-0.15
Ile	-0.77	-0.33	-0.09	-0.15	0.19	-0.15
Leu	-0.73	-0.33	-0.09	-0.15	0.21	-0.15
Phe	-0.73	-0.30	-0.11	-0.13	0.21	-0.16
Lys	-0.74	-0.29	-0.11	-0.13	0.19	-0.14

(a). Correlation values

r Value	SFA	MUFA	Ca	K	Mg	Na
Tocopherol	-0.18	-0.18	-0.28	-0.17	0.12	0.45
C16:0	0.05	-0.04	-0.22	0.07	0.12	0.36
C18:0	-0.06	-0.12	0.34	-0.28	-0.13	-0.10
C18:1	-0.01	0.20	-0.15	-0.09	-0.08	-0.02
C18:2	0.01	-0.14	0.24	0.11	0.15	-0.06
C18:3	-0.02	-0.03	-0.16	0.12	0.16	0.20
SFA	1.00	0.90	0.00	-0.01	-0.17	-0.19
MUFA	0.90	1.00	-0.03	0.02	-0.17	-0.17
Ca	0.00	-0.03	1.00	-0.13	-0.18	-0.40
K	-0.01	0.02	-0.13	1.00	0.39	0.02
Mg	-0.17	-0.17	-0.18	0.39	1.00	0.19
Na	-0.19	-0.17	-0.40	0.02	0.19	1.00
P	-0.19	-0.15	-0.07	0.04	0.51	0.46
B	-0.20	-0.18	-0.17	0.15	0.33	0.20
Mn	-0.10	-0.09	0.10	-0.06	-0.08	0.06
Fe	-0.14	-0.18	0.05	-0.45	-0.04	0.20
Cu	0.06	0.13	-0.24	0.48	0.10	0.08
Zn	-0.28	-0.21	0.04	-0.17	0.21	0.35
Mo	-0.03	-0.04	-0.24	0.53	0.29	0.21
Ni	-0.06	0.01	-0.21	0.34	0.18	0.20
Cr	-0.01	-0.02	0.01	0.07	0.05	-0.17
Co	-0.12	-0.15	0.32	0.01	0.08	-0.12
Se	-0.09	-0.12	-0.02	0.16	0.17	0.13
V	-0.19	-0.20	0.15	-0.07	0.23	0.00
Asp	0.10	0.07	0.34	0.34	0.08	-0.60
Ser	0.13	0.10	0.36	0.31	0.05	-0.61
Glu	0.11	0.08	0.34	0.34	0.08	-0.60
Gly	0.13	0.09	0.34	0.33	0.06	-0.61
Ala	0.11	0.07	0.35	0.33	0.08	-0.60
Cys	-0.21	-0.19	0.15	0.42	0.45	-0.28
Tyr	0.11	0.07	0.30	0.38	0.08	-0.57
His	0.11	0.07	0.35	0.34	0.08	-0.60
Arg	0.11	0.07	0.35	0.34	0.09	-0.60
Pro	0.16	0.12	0.36	0.29	0.02	-0.61
Thr	0.06	0.04	0.32	0.37	0.12	-0.58
Val	0.13	0.07	0.36	0.29	0.02	-0.64
Met	0.10	0.06	0.38	0.30	0.11	-0.60
Ile	0.17	0.13	0.40	0.25	0.02	-0.64
Leu	0.11	0.08	0.39	0.28	0.07	-0.62
Phe	0.09	0.06	0.33	0.37	0.10	-0.60
Lys	0.08	0.05	0.32	0.40	0.09	-0.60

(a). Correlation values

r Value	P	B	Mn	Fe	Cu	Zn
Tocopherol	0.46	0.54	0.43	0.69	-0.02	0.35
C16:0	0.29	0.12	0.12	0.14	0.10	0.20
C18:0	0.07	-0.15	0.07	0.26	-0.12	0.28
C18:1	0.01	0.16	0.11	0.04	0.19	0.04
C18:2	0.02	-0.05	-0.03	0.02	-0.10	-0.04
C18:3	0.05	-0.14	-0.15	-0.03	-0.11	0.03
SFA	-0.19	-0.20	-0.10	-0.14	0.06	-0.28
MUFA	-0.15	-0.18	-0.09	-0.18	0.13	-0.21
Ca	-0.07	-0.17	0.10	0.05	-0.24	0.04
K	0.04	0.15	-0.06	-0.45	0.48	-0.17
Mg	0.51	0.33	-0.08	-0.04	0.10	0.21
Na	0.46	0.20	0.06	0.20	0.08	0.35
P	1.00	0.41	0.22	0.36	0.04	0.60
B	0.41	1.00	0.27	0.38	0.03	0.20
Mn	0.22	0.27	1.00	0.27	0.04	0.16
Fe	0.36	0.38	0.27	1.00	-0.19	0.49
Cu	0.04	0.03	0.04	-0.19	1.00	0.18
Zn	0.60	0.20	0.16	0.49	0.18	1.00
Mo	-0.12	0.01	-0.30	-0.31	0.36	-0.09
Ni	0.17	0.26	0.44	0.01	0.41	0.23
Cr	-0.08	-0.02	-0.17	0.01	-0.02	-0.12
Co	0.09	0.11	0.45	0.17	0.08	0.35
Se	-0.04	-0.02	-0.18	-0.06	0.15	0.15
V	0.31	0.27	-0.09	0.44	-0.26	0.29
Asp	-0.42	-0.22	-0.24	-0.60	-0.04	-0.42
Ser	-0.43	-0.25	-0.23	-0.62	-0.04	-0.42
Glu	-0.42	-0.24	-0.25	-0.62	-0.03	-0.41
Gly	-0.45	-0.25	-0.25	-0.61	-0.04	-0.42
Ala	-0.42	-0.22	-0.25	-0.60	-0.06	-0.41
Cys	0.09	0.10	-0.23	-0.34	0.00	0.03
Tyr	-0.44	-0.24	-0.26	-0.64	0.01	-0.44
His	-0.43	-0.21	-0.24	-0.60	-0.04	-0.42
Arg	-0.41	-0.19	-0.24	-0.59	-0.04	-0.42
Pro	-0.45	-0.29	-0.25	-0.64	-0.04	-0.42
Thr	-0.40	-0.19	-0.25	-0.60	-0.03	-0.40
Val	-0.51	-0.22	-0.23	-0.54	-0.08	-0.48
Met	-0.38	-0.17	-0.24	-0.53	-0.11	-0.39
Ile	-0.46	-0.28	-0.25	-0.60	-0.10	-0.43
Leu	-0.41	-0.22	-0.23	-0.56	-0.11	-0.39
Phe	-0.42	-0.20	-0.25	-0.61	-0.02	-0.42
Lys	-0.45	-0.21	-0.25	-0.62	-0.01	-0.43

(a). Correlation values

r Value	Mo	Ni	Cr	Co	Se	V
Tocopherol	-0.21	0.21	-0.06	0.02	-0.07	0.24
C16:0	0.22	0.19	-0.16	-0.05	0.13	-0.10
C18:0	-0.22	0.00	0.03	0.25	-0.05	0.13
C18:1	0.01	0.07	-0.01	-0.10	0.02	-0.11
C18:2	0.02	-0.03	0.09	0.09	0.04	0.13
C18:3	0.19	-0.04	-0.06	-0.17	0.02	0.03
SFA	-0.03	-0.06	-0.01	-0.12	-0.09	-0.19
MUFA	-0.04	0.01	-0.02	-0.15	-0.12	-0.20
Ca	-0.24	-0.21	0.01	0.32	-0.02	0.15
K	0.53	0.34	0.07	0.01	0.16	-0.07
Mg	0.29	0.18	0.05	0.08	0.17	0.23
Na	0.21	0.20	-0.17	-0.12	0.13	0.00
P	-0.12	0.17	-0.08	0.09	-0.04	0.31
B	0.01	0.26	-0.02	0.11	-0.02	0.27
Mn	-0.30	0.44	-0.17	0.45	-0.18	-0.09
Fe	-0.31	0.01	0.01	0.17	-0.06	0.44
Cu	0.36	0.41	-0.02	0.08	0.15	-0.26
Zn	-0.09	0.23	-0.12	0.35	0.15	0.29
Mo	1.00	0.21	0.07	-0.13	0.51	-0.10
Ni	0.21	1.00	-0.03	0.39	0.09	-0.13
Cr	0.07	-0.03	1.00	-0.08	-0.03	0.32
Co	-0.13	0.39	-0.08	1.00	0.03	0.18
Se	0.51	0.09	-0.03	0.03	1.00	0.02
V	-0.10	-0.13	0.32	0.18	0.02	1.00
Asp	0.20	-0.08	0.20	0.12	0.06	-0.03
Ser	0.16	-0.09	0.18	0.12	0.04	-0.06
Glu	0.20	-0.06	0.19	0.12	0.06	-0.05
Gly	0.19	-0.08	0.19	0.12	0.05	-0.05
Ala	0.20	-0.08	0.20	0.13	0.06	-0.02
Cys	0.31	0.08	0.30	0.15	0.15	0.25
Tyr	0.26	-0.05	0.20	0.09	0.09	-0.08
His	0.21	-0.06	0.20	0.13	0.06	-0.02
Arg	0.21	-0.07	0.20	0.12	0.06	-0.01
Pro	0.15	-0.10	0.12	0.13	0.03	-0.09
Thr	0.24	-0.05	0.23	0.11	0.08	-0.01
Val	0.21	-0.10	0.20	0.11	0.06	-0.01
Met	0.18	-0.09	0.23	0.13	0.04	0.05
Ile	0.12	-0.14	0.17	0.12	0.01	-0.04
Leu	0.14	-0.11	0.19	0.14	0.03	0.01
Phe	0.24	-0.06	0.22	0.11	0.08	-0.03
Lys	0.27	-0.04	0.22	0.12	0.09	-0.02

(a). Correlation values

r Value	Asp	Ser	Glu	Gly	Ala	Cys
Tocopherol	-0.74	-0.75	-0.75	-0.76	-0.74	-0.39
C16:0	-0.31	-0.30	-0.29	-0.30	-0.29	-0.18
C18:0	-0.11	-0.11	-0.12	-0.11	-0.11	-0.01
C18:1	-0.14	-0.14	-0.14	-0.15	-0.15	-0.12
C18:2	0.21	0.19	0.20	0.19	0.21	0.26
C18:3	-0.15	-0.16	-0.15	-0.14	-0.16	-0.06
SFA	0.10	0.13	0.11	0.13	0.11	-0.21
MUFA	0.07	0.10	0.08	0.09	0.07	-0.19
Ca	0.34	0.36	0.34	0.34	0.35	0.15
K	0.34	0.31	0.34	0.33	0.33	0.42
Mg	0.08	0.05	0.08	0.06	0.08	0.45
Na	-0.60	-0.61	-0.60	-0.61	-0.60	-0.28
P	-0.42	-0.43	-0.42	-0.45	-0.42	0.09
B	-0.22	-0.25	-0.24	-0.25	-0.22	0.10
Mn	-0.24	-0.23	-0.25	-0.25	-0.25	-0.23
Fe	-0.60	-0.62	-0.62	-0.61	-0.60	-0.34
Cu	-0.04	-0.04	-0.03	-0.04	-0.06	0.00
Zn	-0.42	-0.42	-0.41	-0.42	-0.41	0.03
Mo	0.20	0.16	0.20	0.19	0.20	0.31
Ni	-0.08	-0.09	-0.06	-0.08	-0.08	0.08
Cr	0.20	0.18	0.19	0.19	0.20	0.30
Co	0.12	0.12	0.12	0.12	0.13	0.15
Se	0.06	0.04	0.06	0.05	0.06	0.15
V	-0.03	-0.06	-0.05	-0.05	-0.02	0.25
Asp	1.00	1.00	1.00	0.99	1.00	0.73
Ser	1.00	1.00	1.00	0.99	0.99	0.68
Glu	1.00	1.00	1.00	1.00	0.99	0.71
Gly	0.99	0.99	1.00	1.00	0.99	0.69
Ala	1.00	0.99	0.99	0.99	1.00	0.72
Cys	0.73	0.68	0.71	0.69	0.72	1.00
Tyr	0.99	0.98	0.99	0.99	0.99	0.71
His	1.00	0.99	1.00	1.00	1.00	0.72
Arg	1.00	0.99	0.99	0.99	1.00	0.73
Pro	0.98	0.99	0.99	0.99	0.99	0.64
Thr	1.00	0.98	0.99	0.99	0.99	0.77
Val	0.98	0.97	0.98	0.98	0.98	0.65
Met	0.98	0.97	0.98	0.98	0.98	0.75
Ile	0.98	0.99	0.98	0.99	0.98	0.64
Leu	0.99	0.99	0.99	0.99	0.99	0.71
Phe	1.00	0.99	0.99	0.99	0.99	0.74
Lys	0.99	0.98	0.98	0.99	0.99	0.73

(a). Correlation values

r Value	Asp	Ser	Glu	Gly	Ala	Cys
Tocopherol	-0.74	-0.75	-0.75	-0.76	-0.74	-0.39
C16:0	-0.31	-0.30	-0.29	-0.30	-0.29	-0.18
C18:0	-0.11	-0.11	-0.12	-0.11	-0.11	-0.01
C18:1	-0.14	-0.14	-0.14	-0.15	-0.15	-0.12
C18:2	0.21	0.19	0.20	0.19	0.21	0.26
C18:3	-0.15	-0.16	-0.15	-0.14	-0.16	-0.06
SFA	0.10	0.13	0.11	0.13	0.11	-0.21
MUFA	0.07	0.10	0.08	0.09	0.07	-0.19
Ca	0.34	0.36	0.34	0.34	0.35	0.15
K	0.34	0.31	0.34	0.33	0.33	0.42
Mg	0.08	0.05	0.08	0.06	0.08	0.45
Na	-0.60	-0.61	-0.60	-0.61	-0.60	-0.28
P	-0.42	-0.43	-0.42	-0.45	-0.42	0.09
B	-0.22	-0.25	-0.24	-0.25	-0.22	0.10
Mn	-0.24	-0.23	-0.25	-0.25	-0.25	-0.23
Fe	-0.60	-0.62	-0.62	-0.61	-0.60	-0.34
Cu	-0.04	-0.04	-0.03	-0.04	-0.06	0.00
Zn	-0.42	-0.42	-0.41	-0.42	-0.41	0.03
Mo	0.20	0.16	0.20	0.19	0.20	0.31
Ni	-0.08	-0.09	-0.06	-0.08	-0.08	0.08
Cr	0.20	0.18	0.19	0.19	0.20	0.30
Co	0.12	0.12	0.12	0.12	0.13	0.15
Se	0.06	0.04	0.06	0.05	0.06	0.15
V	-0.03	-0.06	-0.05	-0.05	-0.02	0.25
Asp	1.00	1.00	1.00	0.99	1.00	0.73
Ser	1.00	1.00	1.00	0.99	0.99	0.68
Glu	1.00	1.00	1.00	1.00	0.99	0.71
Gly	0.99	0.99	1.00	1.00	0.99	0.69
Ala	1.00	0.99	0.99	0.99	1.00	0.72
Cys	0.73	0.68	0.71	0.69	0.72	1.00
Tyr	0.99	0.98	0.99	0.99	0.99	0.71
His	1.00	0.99	1.00	1.00	1.00	0.72
Arg	1.00	0.99	0.99	0.99	1.00	0.73
Pro	0.98	0.99	0.99	0.99	0.99	0.64
Thr	1.00	0.98	0.99	0.99	0.99	0.77
Val	0.98	0.97	0.98	0.98	0.98	0.65
Met	0.98	0.97	0.98	0.98	0.98	0.75
Ile	0.98	0.99	0.98	0.99	0.98	0.64
Leu	0.99	0.99	0.99	0.99	0.99	0.71
Phe	1.00	0.99	0.99	0.99	0.99	0.74
Lys	0.99	0.98	0.98	0.99	0.99	0.73

(a). Correlation values

r Value	Tyr	His	Arg	Pro	Thr	Val
Tocopherol	-0.75	-0.74	-0.72	-0.79	-0.72	-0.71
C16:0	-0.26	-0.30	-0.31	-0.30	-0.31	-0.31
C18:0	-0.12	-0.11	-0.11	-0.11	-0.12	-0.11
C18:1	-0.14	-0.15	-0.14	-0.13	-0.14	-0.14
C18:2	0.19	0.21	0.21	0.17	0.22	0.21
C18:3	-0.14	-0.16	-0.16	-0.17	-0.15	-0.17
SFA	0.11	0.11	0.11	0.16	0.06	0.13
MUFA	0.07	0.07	0.07	0.12	0.04	0.07
Ca	0.30	0.35	0.35	0.36	0.32	0.36
K	0.38	0.34	0.34	0.29	0.37	0.29
Mg	0.08	0.08	0.09	0.02	0.12	0.02
Na	-0.57	-0.60	-0.60	-0.61	-0.58	-0.64
P	-0.44	-0.43	-0.41	-0.45	-0.40	-0.51
B	-0.24	-0.21	-0.19	-0.29	-0.19	-0.22
Mn	-0.26	-0.24	-0.24	-0.25	-0.25	-0.23
Fe	-0.64	-0.60	-0.59	-0.64	-0.60	-0.54
Cu	0.01	-0.04	-0.04	-0.04	-0.03	-0.08
Zn	-0.44	-0.42	-0.42	-0.42	-0.40	-0.48
Mo	0.26	0.21	0.21	0.15	0.24	0.21
Ni	-0.05	-0.06	-0.07	-0.10	-0.05	-0.10
Cr	0.20	0.20	0.20	0.12	0.23	0.20
Co	0.09	0.13	0.12	0.13	0.11	0.11
Se	0.09	0.06	0.06	0.03	0.08	0.06
V	-0.08	-0.02	-0.01	-0.09	-0.01	-0.01
Asp	0.99	1.00	1.00	0.98	1.00	0.98
Ser	0.98	0.99	0.99	0.99	0.98	0.97
Glu	0.99	1.00	0.99	0.99	0.99	0.98
Gly	0.99	1.00	0.99	0.99	0.99	0.98
Ala	0.99	1.00	1.00	0.99	0.99	0.98
Cys	0.71	0.72	0.73	0.64	0.77	0.65
Tyr	1.00	0.99	0.99	0.98	0.99	0.97
His	0.99	1.00	1.00	0.98	0.99	0.99
Arg	0.99	1.00	1.00	0.98	0.99	0.98
Pro	0.98	0.98	0.98	1.00	0.97	0.97
Thr	0.99	0.99	0.99	0.97	1.00	0.98
Val	0.97	0.99	0.98	0.97	0.98	1.00
Met	0.96	0.98	0.98	0.96	0.98	0.97
Ile	0.96	0.98	0.98	0.99	0.97	0.97
Leu	0.97	0.99	0.99	0.98	0.98	0.98
Phe	0.99	1.00	1.00	0.97	1.00	0.98
Lys	0.98	0.99	0.99	0.97	0.99	0.98

(a). Correlation values

r Value	Met	Ile	Leu	Phe	Lys
Tocopherol	-0.70	-0.77	-0.73	-0.73	-0.74
C16:0	-0.32	-0.33	-0.33	-0.30	-0.29
C18:0	-0.09	-0.09	-0.09	-0.11	-0.11
C18:1	-0.16	-0.15	-0.15	-0.13	-0.13
C18:2	0.23	0.19	0.21	0.21	0.19
C18:3	-0.15	-0.15	-0.15	-0.16	-0.14
SFA	0.10	0.17	0.11	0.09	0.08
MUFA	0.06	0.13	0.08	0.06	0.05
Ca	0.38	0.40	0.39	0.33	0.32
K	0.30	0.25	0.28	0.37	0.40
Mg	0.11	0.02	0.07	0.10	0.09
Na	-0.60	-0.64	-0.62	-0.60	-0.60
P	-0.38	-0.46	-0.41	-0.42	-0.45
B	-0.17	-0.28	-0.22	-0.20	-0.21
Mn	-0.24	-0.25	-0.23	-0.25	-0.25
Fe	-0.53	-0.60	-0.56	-0.61	-0.62
Cu	-0.11	-0.10	-0.11	-0.02	-0.01
Zn	-0.39	-0.43	-0.39	-0.42	-0.43
Mo	0.18	0.12	0.14	0.24	0.27
Ni	-0.09	-0.14	-0.11	-0.06	-0.04
Cr	0.23	0.17	0.19	0.22	0.22
Co	0.13	0.12	0.14	0.11	0.12
Se	0.04	0.01	0.03	0.08	0.09
V	0.05	-0.04	0.01	-0.03	-0.02
Asp	0.98	0.98	0.99	1.00	0.99
Ser	0.97	0.99	0.99	0.99	0.98
Glu	0.98	0.98	0.99	0.99	0.98
Gly	0.98	0.99	0.99	0.99	0.99
Ala	0.98	0.98	0.99	0.99	0.99
Cys	0.75	0.64	0.71	0.74	0.73
Tyr	0.96	0.96	0.97	0.99	0.98
His	0.98	0.98	0.99	1.00	0.99
Arg	0.98	0.98	0.99	1.00	0.99
Pro	0.96	0.99	0.98	0.97	0.97
Thr	0.98	0.97	0.98	1.00	0.99
Val	0.97	0.97	0.98	0.98	0.98
Met	1.00	0.97	0.99	0.98	0.97
Ile	0.97	1.00	0.99	0.97	0.97
Leu	0.99	0.99	1.00	0.98	0.97
Phe	0.98	0.97	0.98	1.00	0.99
Lys	0.97	0.97	0.97	0.99	1.00

(b). Significant values

P Value	Tocopherol	C16:0	C16:1	C18:0	C18:1	C18:2	C18:3	SFA
Tocopherol	1.00	<0.01	<0.01	0.59	0.27	0.39	0.38	<0.01
C16:0	<0.01	1.00	<0.01	0.09	0.04	0.02	0.02	0.38
C16:1	<0.01	<0.01	1.00	<0.01	0.59	0.40	0.66	0.36
C18:0	0.59	0.09	<0.01	1.00	<0.01	0.01	0.23	0.31
C18:1	0.27	0.04	0.59	<0.01	1.00	<0.01	<0.01	0.87
C18:2	0.39	0.02	0.40	0.01	<0.01	1.00	0.07	0.90
C18:3	0.38	0.02	0.66	0.23	<0.01	0.07	1.00	0.78
SFA	<0.01	0.38	0.36	0.31	0.87	0.90	0.78	1.00
MUFA	<0.01	0.56	0.14	0.06	<0.01	0.02	0.60	<0.01
Ca	<0.01	<0.01	0.04	<0.01	0.01	<0.01	0.01	1.00
K	0.01	0.22	<0.01	<0.01	0.16	0.06	0.05	0.85
Mg	0.07	0.05	<0.01	0.03	0.16	0.02	0.01	<0.01
Na	<0.01	<0.01	0.04	0.10	0.69	0.34	<0.01	<0.01
P	<0.01	<0.01	<0.01	0.28	0.82	0.73	0.38	<0.01
B	<0.01	0.05	0.47	0.02	0.01	0.46	0.02	<0.01
Mn	<0.01	0.05	<0.01	0.26	0.06	0.67	0.01	0.11
Fe	<0.01	0.02	0.23	<0.01	0.49	0.79	0.61	0.02
Cu	0.71	0.09	0.01	0.04	<0.01	0.09	0.06	0.33
Zn	<0.01	<0.01	0.18	<0.01	0.47	0.49	0.59	<0.01
Mo	<0.01	<0.01	0.87	<0.01	0.87	0.74	<0.01	0.60
Ni	<0.01	<0.01	<0.01	1.00	0.27	0.58	0.51	0.29
Cr	0.37	0.01	0.57	0.59	0.83	0.12	0.28	0.91
Co	0.79	0.43	0.26	<0.01	0.09	0.12	<0.01	0.05
Se	0.31	0.04	0.61	0.47	0.77	0.49	0.81	0.15
V	<0.01	0.12	0.88	0.04	0.09	0.04	0.63	<0.01
Asp	<0.01	<0.01	<0.01	0.06	0.02	<0.01	0.01	0.09
Ser	<0.01	<0.01	<0.01	0.06	0.02	<0.01	0.01	0.03
Glu	<0.01	<0.01	<0.01	0.05	0.02	<0.01	0.02	0.06
Gly	<0.01	<0.01	<0.01	0.08	0.02	<0.01	0.02	0.03
Ala	<0.01	<0.01	<0.01	0.08	0.02	<0.01	0.01	0.08
Cys	<0.01	<0.01	0.13	0.88	0.06	<0.01	0.29	<0.01
Tyr	<0.01	<0.01	<0.01	0.05	0.02	<0.01	0.02	0.08
His	<0.01	<0.01	<0.01	0.07	0.02	<0.01	0.01	0.07
Arg	<0.01	<0.01	0.02	0.06	0.02	<0.01	0.01	0.08
Pro	<0.01	<0.01	0.01	0.06	0.03	<0.01	0.01	0.01
Thr	<0.01	<0.01	0.01	0.06	0.02	<0.01	0.01	0.29
Val	<0.01	<0.01	0.57	0.08	0.02	<0.01	0.01	0.03
Met	<0.01	<0.01	0.23	0.16	0.01	<0.01	0.01	0.10
Ile	<0.01	<0.01	0.10	0.13	0.01	<0.01	0.01	<0.01
Leu	<0.01	<0.01	0.05	0.14	0.01	<0.01	0.01	0.06
Phe	<0.01	<0.01	0.03	0.07	0.03	<0.01	0.01	0.13
Lys	<0.01	<0.01	<0.01	0.06	0.04	<0.01	0.02	0.18

(b). Significant values

P Value	MUFA	Ca	K	Mg	Na	P	B	Mn
Tocopherol	<0.01	<0.01	0.01	0.07	<0.01	<0.01	<0.01	<0.01
C16:0	0.56	<0.01	0.22	0.05	<0.01	<0.01	0.05	0.05
C16:1	0.14	0.04	<0.01	<0.01	0.04	<0.01	0.47	<0.01
C18:0	0.06	<0.01	<0.01	0.03	0.10	0.28	0.02	0.26
C18:1	<0.01	0.01	0.16	0.16	0.69	0.82	0.01	0.06
C18:2	0.02	<0.01	0.06	0.02	0.34	0.73	0.46	0.67
C18:3	0.60	0.01	0.05	0.01	<0.01	0.38	0.02	0.01
SFA	<0.01	1.00	0.85	<0.01	<0.01	<0.01	<0.01	0.11
MUFA	1.00	0.68	0.80	0.01	0.01	0.01	<0.01	0.14
Ca	0.68	1.00	0.03	<0.01	<0.01	0.23	0.01	0.11
K	0.80	0.03	1.00	<0.01	0.80	0.51	0.02	0.30
Mg	0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	0.18
Na	0.01	<0.01	0.80	<0.01	1.00	<0.01	<0.01	0.32
P	0.01	0.23	0.51	<0.01	<0.01	1.00	<0.01	<0.01
B	<0.01	0.01	0.02	<0.01	<0.01	<0.01	1.00	<0.01
Mn	0.14	0.11	0.30	0.18	0.32	<0.01	<0.01	1.00
Fe	<0.01	0.39	<0.01	0.54	<0.01	<0.01	<0.01	<0.01
Cu	0.03	<0.01	<0.01	0.11	0.17	0.46	0.63	0.46
Zn	<0.01	0.47	0.01	<0.01	<0.01	<0.01	<0.01	0.01
Mo	0.53	<0.01	<0.01	<0.01	<0.01	0.07	0.89	<0.01
Ni	0.82	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cr	0.74	0.91	0.24	0.40	<0.01	0.21	0.69	<0.01
Co	0.01	<0.01	0.86	0.21	0.05	0.12	0.07	<0.01
Se	0.07	0.77	0.01	0.01	0.05	0.55	0.76	<0.01
V	<0.01	0.02	0.25	<0.01	0.99	<0.01	<0.01	0.15
Asp	0.26	<0.01	<0.01	0.17	<0.01	<0.01	<0.01	<0.01
Ser	0.10	<0.01	<0.01	0.39	<0.01	<0.01	<0.01	<0.01
Glu	0.17	<0.01	<0.01	0.20	<0.01	<0.01	<0.01	<0.01
Gly	0.12	<0.01	<0.01	0.31	<0.01	<0.01	<0.01	<0.01
Ala	0.28	<0.01	<0.01	0.17	<0.01	<0.01	<0.01	<0.01
Cys	<0.01	0.01	<0.01	<0.01	<0.01	0.13	0.11	<0.01
Tyr	0.26	<0.01	<0.01	0.20	<0.01	<0.01	<0.01	<0.01
His	0.23	<0.01	<0.01	0.21	<0.01	<0.01	<0.01	<0.01
Arg	0.26	<0.01	<0.01	0.13	<0.01	<0.01	<0.01	<0.01
Pro	0.04	<0.01	<0.01	0.69	<0.01	<0.01	<0.01	<0.01
Thr	0.56	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01
Val	0.22	<0.01	<0.01	0.78	<0.01	<0.01	<0.01	<0.01
Met	0.36	<0.01	<0.01	0.07	<0.01	<0.01	<0.01	<0.01
Ile	0.03	<0.01	<0.01	0.78	<0.01	<0.01	<0.01	<0.01
Leu	0.20	<0.01	<0.01	0.22	<0.01	<0.01	<0.01	<0.01
Phe	0.34	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	<0.01
Lys	0.40	<0.01	<0.01	0.12	<0.01	<0.01	<0.01	<0.01

(b). Significant values

P Value	Fe	Cu	Zn	Mo	Ni	Cr	Co	Se
Tocopherol	<0.01	0.71	<0.01	<0.01	<0.01	0.37	0.79	0.31
C16:0	0.02	0.09	<0.01	<0.01	<0.01	0.01	0.43	0.04
C16:1	0.23	0.01	0.18	0.87	<0.01	0.57	0.26	0.61
C18:0	<0.01	0.04	<0.01	<0.01	1.00	0.59	<0.01	0.47
C18:1	0.49	<0.01	0.47	0.87	0.27	0.83	0.09	0.77
C18:2	0.79	0.09	0.49	0.74	0.58	0.12	0.12	0.49
C18:3	0.61	0.06	0.59	<0.01	0.51	0.28	<0.01	0.81
SFA	0.02	0.33	<0.01	0.60	0.29	0.91	0.05	0.15
MUFA	<0.01	0.03	<0.01	0.53	0.82	0.74	0.01	0.07
Ca	0.39	<0.01	0.47	<0.01	<0.01	0.91	<0.01	0.77
K	<0.01	<0.01	0.01	<0.01	<0.01	0.24	0.86	0.01
Mg	0.54	0.11	<0.01	<0.01	<0.01	0.40	0.21	0.01
Na	<0.01	0.17	<0.01	<0.01	<0.01	<0.01	0.05	0.05
P	<0.01	0.46	<0.01	0.07	<0.01	0.21	0.12	0.55
B	<0.01	0.63	<0.01	0.89	<0.01	0.69	0.07	0.76
Mn	<0.01	0.46	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fe	1.00	<0.01	<0.01	<0.01	0.88	0.85	0.01	0.32
Cu	<0.01	1.00	<0.01	<0.01	<0.01	0.69	0.17	0.02
Zn	<0.01	<0.01	1.00	0.16	<0.01	0.05	<0.01	0.02
Mo	<0.01	<0.01	0.16	1.00	<0.01	0.26	0.04	<0.01
Ni	0.88	<0.01	<0.01	<0.01	1.00	0.59	<0.01	0.16
Cr	0.85	0.69	0.05	0.26	0.59	1.00	0.18	0.66
Co	0.01	0.17	<0.01	0.04	<0.01	0.18	1.00	0.65
Se	0.32	0.02	0.02	<0.01	0.16	0.66	0.65	1.00
V	<0.01	<0.01	<0.01	0.13	0.04	<0.01	<0.01	0.72
Asp	<0.01	0.49	<0.01	<0.01	0.21	<0.01	0.05	0.38
Ser	<0.01	0.48	<0.01	0.01	0.14	<0.01	0.05	0.57
Glu	<0.01	0.65	<0.01	<0.01	0.28	<0.01	0.05	0.34
Gly	<0.01	0.54	<0.01	<0.01	0.20	<0.01	0.04	0.40
Ala	<0.01	0.35	<0.01	<0.01	0.20	<0.01	0.04	0.33
Cys	<0.01	0.97	0.59	<0.01	0.21	<0.01	0.01	0.02
Tyr	<0.01	0.87	<0.01	<0.01	0.44	<0.01	0.13	0.18
His	<0.01	0.47	<0.01	<0.01	0.28	<0.01	0.04	0.36
Arg	<0.01	0.47	<0.01	<0.01	0.22	<0.01	0.04	0.35
Pro	<0.01	0.49	<0.01	0.02	0.09	0.05	0.04	0.60
Thr	<0.01	0.59	<0.01	<0.01	0.37	<0.01	0.06	0.21
Val	<0.01	0.17	<0.01	<0.01	0.10	<0.01	0.06	0.32
Met	<0.01	0.08	<0.01	<0.01	0.15	<0.01	0.03	0.51
Ile	<0.01	0.12	<0.01	0.06	0.02	<0.01	0.05	0.84
Leu	<0.01	0.08	<0.01	0.03	0.08	<0.01	0.02	0.67
Phe	<0.01	0.78	<0.01	<0.01	0.34	<0.01	0.07	0.21
Lys	<0.01	0.86	<0.01	<0.01	0.52	<0.01	0.04	0.15

(b). Significant values

P Value	V	Asp	Ser	Glu	Gly	Ala	Cys	Tyr
Tocopherol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C16:0	0.12	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C16:1	0.88	<0.01	<0.01	<0.01	<0.01	<0.01	0.13	<0.01
C18:0	0.04	0.06	0.06	0.05	0.08	0.08	0.88	0.05
C18:1	0.09	0.02	0.02	0.02	0.02	0.02	0.06	0.02
C18:2	0.04	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C18:3	0.63	0.01	0.01	0.02	0.02	0.01	0.29	0.02
SFA	<0.01	0.09	0.03	0.06	0.03	0.08	<0.01	0.08
MUFA	<0.01	0.26	0.10	0.17	0.12	0.28	<0.01	0.26
Ca	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01
K	0.25	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mg	<0.01	0.17	0.39	0.20	0.31	0.17	<0.01	0.20
Na	0.99	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.13	<0.01
B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.11	<0.01
Mn	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fe	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu	<0.01	0.49	0.48	0.65	0.54	0.35	0.97	0.87
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.59	<0.01
Mo	0.13	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ni	0.04	0.21	0.14	0.28	0.20	0.20	0.21	0.44
Cr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co	<0.01	0.05	0.05	0.05	0.04	0.04	0.01	0.13
Se	0.72	0.38	0.57	0.34	0.40	0.33	0.02	0.18
V	1.00	0.62	0.31	0.47	0.47	0.75	<0.01	0.20
Asp	0.62	1.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ser	0.31	<0.01	1.00	<0.01	<0.01	<0.01	<0.01	<0.01
Glu	0.47	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01
Gly	0.47	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01
Ala	0.75	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01
Cys	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00	<0.01
Tyr	0.20	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00
His	0.70	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arg	0.85	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pro	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thr	0.93	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Val	0.82	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Met	0.42	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ile	0.58	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Leu	0.85	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Phe	0.66	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Lys	0.75	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

(b). Significant values

P Value	His	Arg	Pro	Thr	Val	Met	Ile	Leu	Phe	Lys
Tocopherol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C16:0	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C16:1	<0.01	0.02	0.01	0.01	0.57	0.23	0.10	0.05	0.03	<0.01
C18:0	0.07	0.06	0.06	0.06	0.08	0.16	0.13	0.14	0.07	0.06
C18:1	0.02	0.02	0.03	0.02	0.02	0.01	0.01	0.01	0.03	0.04
C18:2	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
C18:3	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02
SFA	0.07	0.08	0.01	0.29	0.03	0.10	<0.01	0.06	0.13	0.18
MUFA	0.23	0.26	0.04	0.56	0.22	0.36	0.03	0.20	0.34	0.40
Ca	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
K	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mg	0.21	0.13	0.69	0.05	0.78	0.07	0.78	0.22	0.12	0.12
Na	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
P	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
B	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fe	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cu	0.47	0.47	0.49	0.59	0.17	0.08	0.12	0.08	0.78	0.86
Zn	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Mo	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	0.06	0.03	<0.01	<0.01
Ni	0.28	0.22	0.09	0.37	0.10	0.15	0.02	0.08	0.34	0.52
Cr	<0.01	<0.01	0.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Co	0.04	0.04	0.04	0.06	0.06	0.03	0.05	0.02	0.07	0.04
Se	0.36	0.35	0.60	0.21	0.32	0.51	0.84	0.67	0.21	0.15
V	0.70	0.85	0.16	0.93	0.82	0.42	0.58	0.85	0.66	0.75
Asp	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ser	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Glu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gly	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Ala	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Cys	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Tyr	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
His	1.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arg	<0.01	1.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pro	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Thr	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Val	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01	<0.01
Met	<0.01	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01	<0.01
Ile	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01	<0.01
Leu	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00	<0.01	<0.01
Phe	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00	<0.01
Lys	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.00

Table S4. Soil properties (pH and OM) and content of 12 mineral elements in the soil

	Mean	Min	Max	SD	CV (%)
Fe	25843.56 mg/kg	19717.70 mg/kg	41802.39 mg/kg	6474.22 mg/kg	25.05
K	21968.95 mg/kg	18715.00 mg/kg	26423.33 mg/kg	1639.09 mg/kg	7.46
Mg	13995.88 mg/kg	5663.33 mg/kg	22146.67 mg/kg	3590.14 mg/kg	25.65
Mn	565.48 mg/kg	422.53 mg/kg	1087.17 mg/kg	129.86 mg/kg	22.97
Na	15935.09 mg/kg	8660.00 mg/kg	18071.67 mg/kg	1947.28 mg/kg	12.22
Ni	26.24 mg/kg	19.08 mg/kg	43.73 mg/kg	7.70 mg/kg	29.34
P	839.38 mg/kg	349.72 mg/kg	1024.17 mg/kg	153.57 mg/kg	18.3
Cu	19.84 mg/kg	12.57 mg/kg	36.53 mg/kg	7.48 mg/kg	37.73
Zn	67.04 mg/kg	53.50 mg/kg	91.07 mg/kg	10.02 mg/kg	14.94
Mo	0.69 mg/kg	0.54 mg/kg	0.82 mg/kg	0.08 mg/kg	11.7
Co	12.83 mg/kg	10.12 mg/kg	21.11 mg/kg	3.26 mg/kg	25.38
Ba	479.39 mg/kg	402.42 mg/kg	621.83 mg/kg	43.26 mg/kg	9.02
Cr	59.92 mg/kg	41.72 mg/kg	116.07 mg/kg	21.89 mg/kg	36.53
Pb	12.76 mg/kg	10.07 mg/kg	18.95 mg/kg	2.42 mg/kg	18.99
Cd	0.33 mg/kg	0.29 mg/kg	0.45 mg/kg	0.04 mg/kg	11.09
pH	7.79	6.57	8.43	0.49	6.31
OM	16.58 g/kg	7.79 g/kg	26.69 g/kg	5.58 g/kg	33.68

Table S5 Correlations between soil properties

Correlation values

(a)

r Value	Zn	Mo	Co	Ba	Cr	Pb	Cd	pH	OM
Fe	0.78	-0.19	0.96	-0.17	0.94	-0.11	0.58	-0.38	0.82
K	0.21	-0.04	-0.25	0.91	-0.28	0.76	0.38	-0.31	0.20
Mg	0.38	0.17	0.63	-0.81	0.57	-0.55	0.05	0.38	0.12
Mn	0.69	0.17	0.47	0.59	0.38	0.43	0.77	-0.40	0.53
Na	-0.36	-0.17	-0.04	-0.84	0.08	-0.64	-0.56	0.50	-0.28
Ni	0.82	-0.19	0.98	-0.10	0.97	-0.12	0.60	-0.43	0.84
P	0.37	0.28	0.08	0.04	-0.03	0.17	0.33	0.48	-0.03
Cu	0.57	-0.14	0.75	-0.10	0.74	-0.01	0.50	-0.65	0.63
Zn	1.00	0.00	0.83	0.16	0.74	0.23	0.83	-0.32	0.74
Mo	0.00	1.00	-0.11	-0.02	-0.24	0.27	0.24	0.02	-0.47
Co	0.83	-0.11	1.00	-0.24	0.97	-0.17	0.59	-0.31	0.77
Ba	0.16	-0.02	-0.24	1.00	-0.27	0.74	0.42	-0.48	0.22
Cr	0.74	-0.24	0.97	-0.27	1.00	-0.27	0.48	-0.34	0.79
Pb	0.23	0.27	-0.17	0.74	-0.27	1.00	0.58	-0.38	0.08
Cd	0.83	0.24	0.59	0.42	0.48	0.58	1.00	-0.52	0.55
pH	-0.32	0.02	-0.31	-0.48	-0.34	-0.38	-0.52	1.00	-0.40
OM	0.74	-0.47	0.77	0.22	0.79	0.08	0.55	-0.40	1.00

(b)Significance values

P Value	Zn	Mo	Co	Ba	Cr	Pb	Cd	pH	OM
Fe	<0.01	0.45	<0.01	0.49	<0.01	0.65	0.01	0.11	<0.01
K	0.40	0.89	0.29	<0.01	0.24	<0.01	0.10	0.20	0.42
Mg	0.11	0.50	<0.01	<0.01	0.01	0.02	0.83	0.10	0.63
Mn	<0.01	0.50	0.04	0.01	0.11	0.06	<0.01	0.09	0.02
Na	0.13	0.49	0.88	<0.01	0.76	<0.01	0.01	0.03	0.24
Ni	<0.01	0.45	<0.01	0.68	<0.01	0.62	0.01	0.07	<0.01
P	0.12	0.24	0.74	0.87	0.92	0.49	0.17	0.04	0.92
Cu	0.01	0.57	<0.01	0.67	<0.01	0.96	0.03	<0.01	<0.01
Zn	1.00	0.99	<0.01	0.52	<0.01	0.34	<0.01	0.18	<0.01
Mo	0.99	1.00	0.65	0.93	0.32	0.26	0.33	0.92	0.04
Co	<0.01	0.65	1.00	0.31	<0.01	0.50	0.01	0.19	<0.01
Ba	0.52	0.93	0.31	1.00	0.27	<0.01	0.07	0.04	0.37
Cr	<0.01	0.32	<0.01	0.27	1.00	0.26	0.04	0.15	<0.01
Pb	0.34	0.26	0.50	<0.01	0.26	1.00	0.01	0.11	0.75
Cd	<0.01	0.33	0.01	0.07	0.04	0.01	1.00	0.02	0.01
pH	0.18	0.92	0.19	0.04	0.15	0.11	0.02	1.00	0.09
OM	<0.01	0.04	<0.01	0.37	<0.01	0.75	0.01	0.09	1.00