

Quality Evaluation of Taxilli Herba from Different Hosts Based on Simultaneous Determination of Multiple Bioactive Constituents Combined with Multivariate Statistical Analysis

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Supplementary materials

Supplementary figures

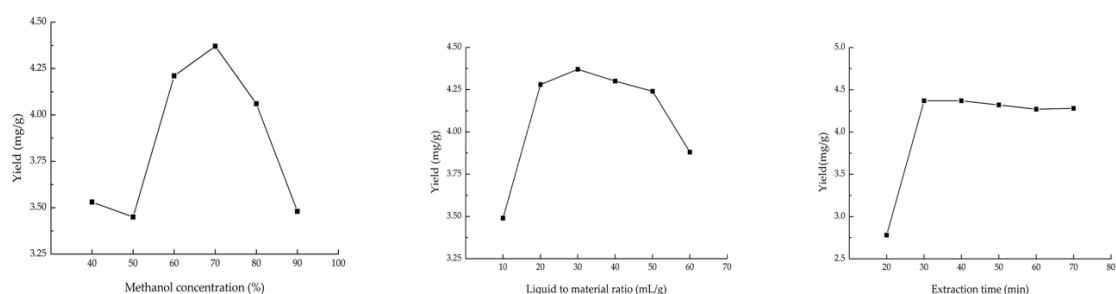


Figure S1. Effects of methanol concentration, liquid to material ratio and extraction time on extraction yields of quercitrin. ("extraction yield (%) = weight of analyte (mg) / weight of dried sample (g) × 100%).

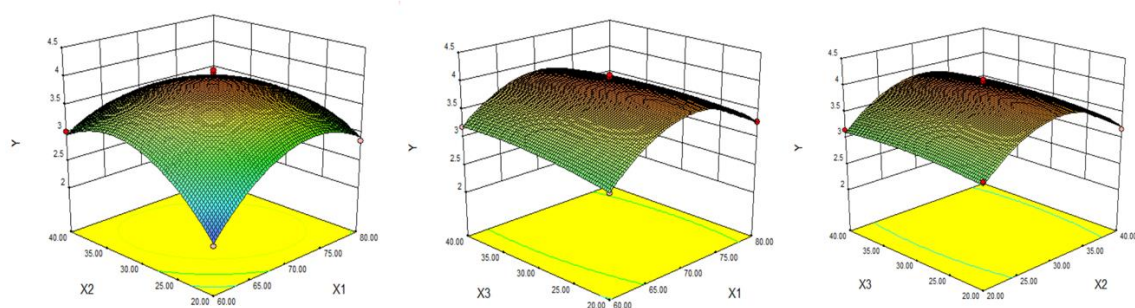
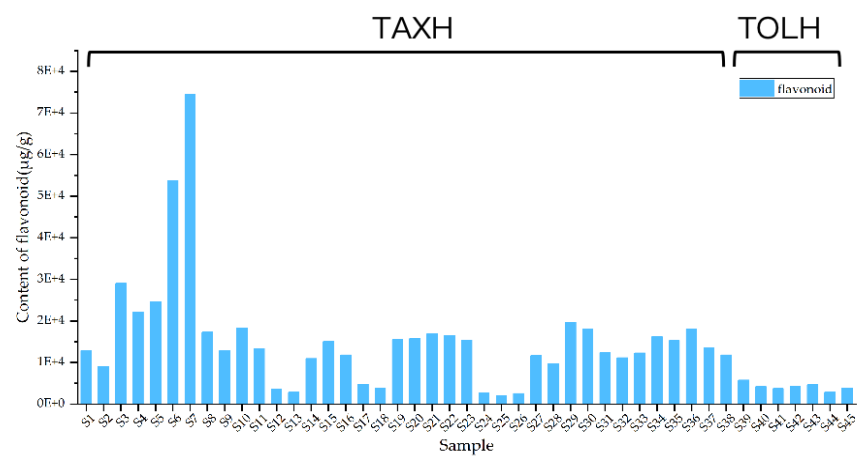
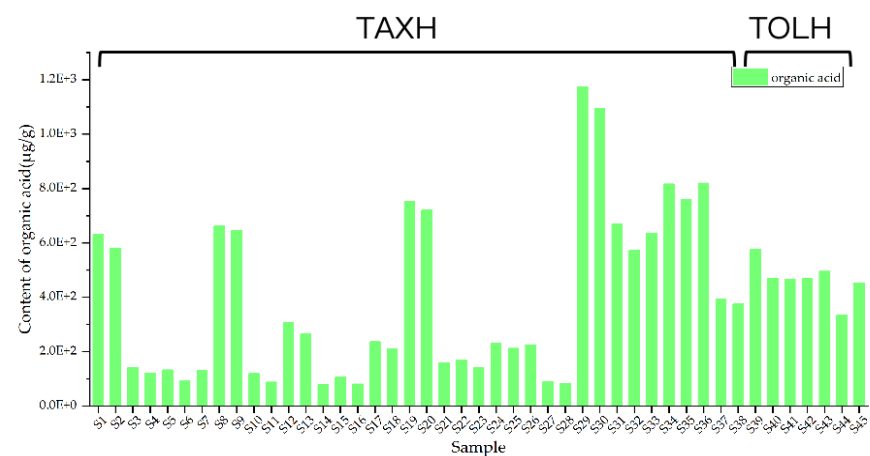


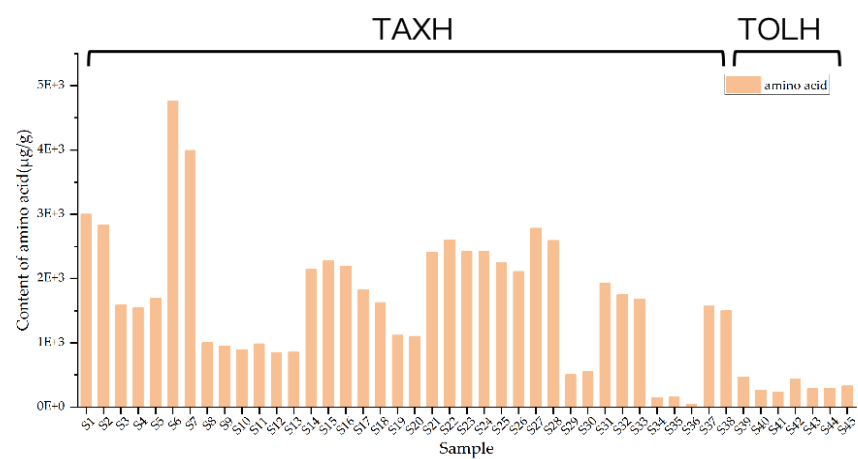
Figure S2. 3D response surface plots showing effects of variables on the extraction yield of quercitrin. X1, methanol concentration (%), X2, liquid to material ratio (mL/g) and X3, extraction time (min).



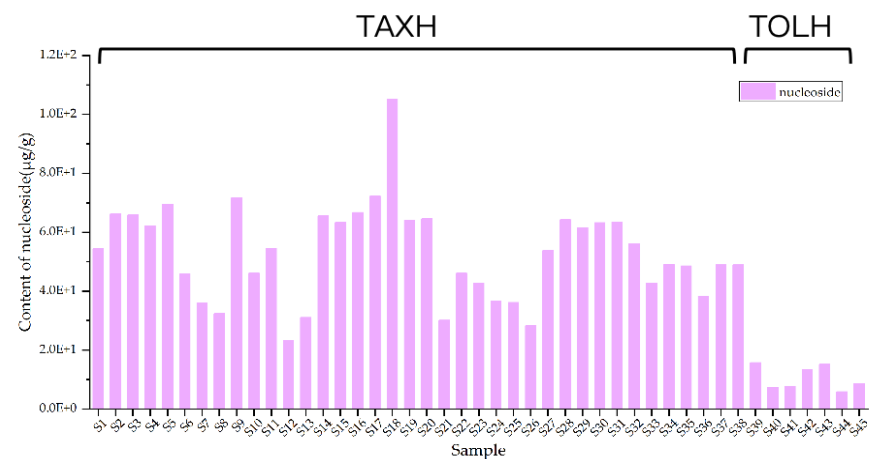
(A)



(B)



(C)



(D)

Figure S3. Histograms of contents of four kinds of constituents in 45 samples.

Supplementary tables

Table S1 Levels and code of extraction variables used in Box-Behnken design.

Variable	Symbols Coded	Coded Levels		
		-1	0	1
Methanol concentration (%)	X ₁	60	70	80
Liquid to material ratio (mL/g)	X ₂	20	30	40
Extraction time (min)	X ₃	20	30	40

Table S2 Box-Behnken experimental design and the results for extraction yield of quercetrin.

Run	X ₁	X ₂	X ₃	Response value
	Methanol concentration (%)	Liquid to material ratio (mL/g)	Extraction time (min)	Y (mg/g)
1	-1	0	1	3.20
2	-1	-1	0	2.01
3	0	1	-1	3.18
4	1	-1	0	2.86
5	0	0	0	3.82
6	0	-1	1	3.17
7	0	0	0	3.87
8	1	1	0	2.43
9	0	-1	-1	3.10
10	-1	1	0	3.03
11	0	0	0	4.07
12	0	1	1	3.23
13	1	0	1	3.20
14	0	0	0	3.78
15	-1	0	-1	2.95
16	0	0	0	4.11
17	1	0	-1	3.29

Note: “Y” the extraction yield of quercetrin. (Y (mg/g) = weight of analyte (mg) / weight of dried sample (g) × 100%).

Table S3 Analysis of variance of the experimental results of the BBD.

Parameter	Sum of Squares	Degree of Freedom	Mean Square	F-value	p-value
Model	4.83	9	0.54	33.39	<0.0001**
X ₁	0.044	1	0.044	2.72	0.1431
X ₂	0.066	1	0.066	4.11	0.0821
X ₃	9.940×10 ⁻³	1	9.940×10 ⁻³	0.62	0.4572

X ₁ X ₂	0.53	1	0.53	32.87	0.0007**
X ₁ X ₃	0.029	1	0.029	1.8	0.2216
X ₂ X ₃	3.600×10 ⁻⁵	1	3.600×10 ⁻⁵	2.242×10 ⁻³	0.9636
X ₁ ²	1.94	1	1.94	120.89	< 0.0001**
X ₂ ²	1.88	1	1.88	117	< 0.0001**
X ₃ ²	0.035	1	0.35	2.21	0.181
Residual	0.11	7	0.016		
Lack of Fit	0.025	3	8.369×10 ⁻³	0.38	0.7715
Pure Error	0.087	4	0.022		
Cor Total	4.94	16			

Note: **p ≤ 0.01

Table S4. Contents of 33 constituents in samples. ($\mu\text{g/g}$, mean \pm SD, $n = 3$)

Analyte	S1	S2	S3	S4	S5	S6	S7	S8	S9
Lysine	7.49 \pm 0.34	9.38 \pm 0.74	7.80 \pm 0.38	9.75 \pm 0.84	10.83 \pm 0.58	153.59 \pm 11.20	204.72 \pm 1.61	-	-
Histidine	31.32 \pm 2.19	20.54 \pm 0.60	18.87 \pm 0.73	10.01 \pm 0.10	12.39 \pm 0.62	44.44 \pm 0.19	48.92 \pm 0.58	4.87 \pm 0.19	5.41 \pm 0.36
Arginine	163.57 \pm 9.56	154.98 \pm 10.05	62.34 \pm 4.73	40.66 \pm 1.28	49.8 \pm 3.04	668.28 \pm 12.53	524.37 \pm 10.68	15.76 \pm 1.82	14.85 \pm 2.01
Serine	28.75 \pm 2.77	14.12 \pm 0.14	17.71 \pm 1.20	22.4 \pm 3.94	35.27 \pm 5.73	94.22 \pm 6.33	54.79 \pm 3.44	22.72 \pm 3.04	12.27 \pm 3.21
Theronine	47.69 \pm 3.60	38.8 \pm 1.03	34.74 \pm 2.93	29.1 \pm 1.93	31.92 \pm 3.04	95.96 \pm 4.82	80.5 \pm 6.40	16.23 \pm 2.93	16.59 \pm 4.32
Glutamic acid	744.25 \pm 5.00	594.28 \pm 28.61	563.98 \pm 20.83	521.1 \pm 13.38	580.35 \pm 10.47	797.77 \pm 30.54	1383.57 \pm 43.22	201.26 \pm 30.20	174.66 \pm 6.28
Proline	1687.36 \pm 30.00	1703.58 \pm 10.00	702.6 \pm 22.11	688.11 \pm 28.73	734.98 \pm 21.03	2349.71 \pm 79.11	1024.84 \pm 32.01	688.41 \pm 14.92	643.61 \pm 43.46
Valine	21.96 \pm 2.06	19.89 \pm 0.91	22.21 \pm 0.51	21.46 \pm 1.92	23.4 \pm 1.02	92.79 \pm 16.38	82.04 \pm 23.99	5.94 \pm 1.00	7.91 \pm 2.08
Tyrosine	87.41 \pm 0.85	92.39 \pm 4.54	47.44 \pm 1.44	61.43 \pm 8.32	77.28 \pm 5.44	84.25 \pm 9.03	114.84 \pm 6.28	12.06 \pm 2.47	11.50 \pm 0.83
Adenosine	19.04 \pm 1.23	29.52 \pm 3.34	44.07 \pm 2.54	37.61 \pm 5.32	39.39 \pm 0.27	30.08 \pm 8.57	22.84 \pm 1.74	25.41 \pm 4.28	42.39 \pm 3.80
2'-Deoxyadenosine	0.14 \pm 0.02	-	0.10 \pm 0.01	0.22 \pm 0.10	0.16 \pm 0.11	0.37 \pm 0.03	0.34 \pm 0.04	0.06 \pm 0.03	0.11 \pm 0.03
Isoleucine	80.78 \pm 4.04	80.93 \pm 4.32	47.78 \pm 1.78	59.87 \pm 1.29	56.36 \pm 5.92	130.76 \pm 36.29	177.29 \pm 7.50	20.17 \pm 4.33	30.70 \pm 3.36
Inosine	7.63 \pm 0.50	8.97 \pm 0.53	3.18 \pm 0.19	2.38 \pm 0.55	4.99 \pm 1.33	3.89 \pm 0.03	2.24 \pm 0.99	4.98 \pm 1.03	6.10 \pm 0.94
Guanosine	25.8 \pm 3.24	25.86 \pm 0.91	16.94 \pm 0.45	20.24 \pm 3.77	22.93 \pm 4.72	10.95 \pm 4.88	10.18 \pm 2.01	-	21.19 \pm 3.67
Gallic acid	448.34 \pm 12.38	401.68 \pm 15.24	104.38 \pm 5.51	91.68 \pm 7.00	95.06 \pm 3.88	82.06 \pm 7.38	121.15 \pm 3.12	587.44 \pm 45.32	570.73 \pm 37.66
Leucine	60.22 \pm 3.65	64.17 \pm 4.08	41.91 \pm 0.90	48.22 \pm 5.55	48.27 \pm 3.00	157.28 \pm 8.33	165.43 \pm 9.00	15.65 \pm 3.24	24.09 \pm 3.82
2'-Deoxyguanosine	1.85 \pm 0.20	1.95 \pm 0.11	1.64 \pm 0.03	1.75 \pm 0.87	2.04 \pm 0.78	0.48 \pm 0.03	0.42 \pm 0.04	1.94 \pm 0.83	1.91 \pm 0.63
Phenylalanine	39.68 \pm 0.87	43.24 \pm 2.59	20.2 \pm 0.12	30.73 \pm 4.58	32.24 \pm 3.02	92.11 \pm 11.47	131.79 \pm 5.38	-	8.79 \pm 2.11
Protocatechuic acid	41.92 \pm 3.87	38.03 \pm 1.03	5.78 \pm 0.55	6.79 \pm 3.22	10.31 \pm 4.44	2.75 \pm 0.04	2.44 \pm 1.00	53.56 \pm 3.58	57.53 \pm 4.27
Catechin	1490.39 \pm 20.28	1184.87 \pm 9.66	9242.27 \pm 70.95	7250.38 \pm 198.04	8028.81 \pm 112.29	5296.78 \pm 100.47	2840.89 \pm 230.11	1643.4 \pm 100.00	1401.6 \pm 112.32
Chlorogenic acid	134.62 \pm 5.13	133.37 \pm 0.76	25.25 \pm 1.23	16.78 \pm 1.03	20.35 \pm 3.02	6.82 \pm 1.48	5.35 \pm 1.22	12.83 \pm 4.28	9.11 \pm 1.33
Coniferic acid	7.74 \pm 0.26	8.11 \pm 0.05	6.64 \pm 0.11	6.14 \pm 0.30	6.85 \pm 1.01	0.17 \pm 0.05	0.25 \pm 0.07	8.86 \pm 2.88	8.68 \pm 1.03

Quercetin-3-O-(6''-galloyl)-β-D-galactopyranoside	17.52±0.60	17.81±1.03	17.54±2.93	16.09±1.83	17.69±4.20	1.52±0.04	1.00±0.34	19.86±8.76	21.47±4.37
Quercetin-3-O-(6''-galloyl)-β-D-glucopyranoside	15.44±0.37	15.72±2.19	16.01±2.38	13.88±4.22	0.92±0.11	4.74±0.57	4.40±1.22	17.88±2.04	17.66±2.20
Quercetin-3-O-β-D-glucuronide	5354.66±115.19	3128.58±70.00	6639.91±88.37	4374.92±86.20	5306.08±170.62	45786.5±450.37	68355.74±374.56	7373.71±122.48	4813.77±4.58
Hyperin	1089.24±15.91	735.48±36.51	2063.26±36.01	1409.46±99.27	1598.27±86.03	296.32±28.36	377.18±12.33	1745.6±144.89	1307.93±110.31
Rutin	162.99±5.51	128.17±0.89	339.49±15.83	254.38±10.78	262.21±33.18	102.89±10.11	136.51±23.22	188.77±2.60	165.01±12.83
Isoquercitrin	1517.73±22.11	1255.23±11.92	4120.71±128.97	3349.72±70.36	3785.79±102.63	323.44±22.34	366.45±12.83	3158.37±113.73	2809.63±45.33
Auicularin	5.93±0.29	6.71±0.04	6.12±2.10	5.06±1.09	5.24±1.32	0.95±0.40	0.74±0.04	4.10±0.75	3.33±1.20
Kaempferol-3,7-bisrhamnoside	0.59±0.03	0.68±0.02	0.74±0.14	0.56±0.12	0.66±0.12	0.99±0.05	1.16±0.04	0.68±0.32	0.71±0.11
Quercetrin	3183.92±26.51	2605.27±112.03	6567.67±120.38	5387.05±63.00	5560.45±94.77	1798.89±57.90	2239.62±77.34	3133.7±45.46	2318.4±170.32
Quercetin	37.97±0.23	29.68±3.49	32.08±4.82	26.67±1.58	30.3±3.67	48.72±4.33	57.08±7.03	45.86±3.84	42.33±9.22
Isosakuranetin	0.71±0.02	0.60±0.02	0.56±0.18	13.93±1.09	1.11±0.08	0.58±0.11	0.57±0.04	0.61±0.08	0.59±0.37

Note: “-” not detected.

Table S4. Contents of 33 constituents in samples. (continued)

Analyte	S10	S11	S12	S13	S14	S15	S16	S17	S18
Lysine	1.47±0.29	1.83±0.12	-	6.40±0.30	13.71±1.94	12.82±1.21	14.13±3.22	10.10±0.50	9.83±3.21
Histidine	7.53±0.72	3.96±0.13	5.79±0.55	7.02±0.23	6.83±1.22	8.59±1.22	14.64±0.92	20.13±0.87	17.75±1.02
Argnine	29.13±2.83	22.92±1.22	151.60±8.21	138.69±9.79	138.67±2.33	147.99±12.32	144.55±9.33	277.28±8.89	251.31±23.44
Serine	10.12±4.11	10.32±3.42	12.21±3.82	20.40±1.33	30.85±3.61	19.52±0.92	29.79±1.03	43.36±12.07	36.77±2.26
Theronine	32.09±10.11	20.94±5.44	14.89±4.22	13.13±0.38	36.51±3.21	45.02±8.66	35.96±4.20	26.38±2.60	31.86±1.47
Glutamic acid	313.09±11.32	318.71±16.74	243.88±11.92	237.93±47.52	584.50±27.93	625.47±23.25	614.95±45.02	424.14±10.54	370.00±9.76
Proline	390.45±77.22	448.95±34.33	350.01±10.33	345.94±15.82	1058.89±44.22	1163.77±88.89	1055.4±100.48	885.11±60.00	786.58±26.44
Valine	13.74±6.42	13.43±1.83	6.92±2.50	5.21±0.83	24.44±10.22	25.91±8.79	25.65±3.84	12.63±2.30	12.49±3.22

Tyrosine	13.7±2.48	43.87±11.32	34.51±9.30	44.95±3.70	92.35±14.22	70.59±12.07	99.56±13.42	67.02±3.85	61.28±0.23
Adenosine	23.84±8.22	20.07±9.55	9.51±0.27	11.98±3.22	30.41±9.42	33.26±3.08	30.20±4.63	34.79±1.81	68.17±1.23
2'-Deoxyadenosine	0.13±0.06	0.21±0.03	0.06±0.03	0.07±0.01	0.20±0.04	0.13±0.02	0.12±0.05	0.07±0.03	0.09±0.02
Isoleucine	39.25±2.08	43.63±12.11	10.47±3.22	15.27±2.03	73.12±16.03	75.53±6.49	74.91±7.43	21.38±0.94	15.77±0.71
Inosine	3.59±0.92	9.28±2.01	2.16±0.42	3.13±1.03	8.50±0.27	7.40±0.72	9.24±3.02	8.52±1.63	7.68±0.23
Guanosine	16.38±1.84	23.22±3.82	10.16±0.43	14.28±3.88	24.94±3.92	21.49±3.70	25.58±3.53	27.25±7.21	27.41±3.28
Gallic acid	91.87±10.73	68.15±10.29	259.44±34.55	225.4±13.22	65.30±5.55	85.62±8.89	67.38±11.03	176.94±4.00	157.63±13.52
Leucine	34.68±7.88	38.83±5.44	10.01±5.93	15.65±8.03	65.86±10.10	69.63±5.33	68.87±3.42	24.90±1.01	21.10±1.46
2'-Deoxyguanosine	2.16±0.48	1.75±0.72	1.30±0.66	1.59±0.43	1.53±0.77	1.06±0.08	1.58±0.10	1.61±0.74	1.72±0.44
Phenylalanine	5.44±0.88	15.51±3.82	-	3.66±1.02	20.20±3.22	10.34±2.38	19.08±3.53	12.75±1.09	10.31±3.21
Protocatechuic acid	9.84±1.84	7.59±1.00	36.08±3.82	30.57±11.83	2.55±0.72	5.95±0.42	2.81±1.02	44.25±1.66	38.45±4.22
Catechin	4617.72±232.47	3498.8±205.66	965.3±47.67	827.44±17.83	3437.49±163.55	4648.09±105.04	3655.98±89.54	739.31±75.62	649.70±19.48
Chlorogenic acid	9.33±2.77	6.16±7.11	4.13±1.03	2.19±0.37	4.88±1.01	8.38±0.72	4.88±1.03	6.38±0.05	5.57±1.00
Coniferic acid	8.03±4.82	5.88±1.04	6.71±1.03	6.24±0.37	5.58±0.99	6.71±0.72	5.67±2.10	9.24±1.28	8.03±0.73
Quercetin-3-O-(6''-galloyl)-β-D-galactopyranoside	19.91±5.55	13.48±4.32	13.01±4.33	13.16±3.21	13.32±3.82	16.18±3.02	13.80±2.22	15.69±0.73	13.61±3.84
Quercetin-3-O-(6''-galloyl)-β-D-glucopyranoside	18.60±2.05	13.04±5.30	11.32±5.03	11.45±6.16	12.25±3.22	14.47±2.22	12.05±1.03	14.23±1.75	12.11±1.23
Quercetin-3-O-β-D-glucuronide	5300.75±222.47	3730.47±41.63	1225.26±77.28	971.11±11.83	3244.96±71.73	4146.91±39.05	3492.1±45.32	1461.42±19.76	964.53±84.45
Hyperin	745.95±56.04	560.01±68.22	311.99±64.00	230.77±19.65	611.21±36.44	853.40±11.09	638.29±32.11	349.40±5.64	286.60±44.03
Rutin	148.01±49.44	102.34±7.21	46.70±12.50	35.24±9.32	122.17±23.69	176.24±36.05	118.95±14.28	247.58±13.51	200.70±34.22
Isoquercitrin	4119.03±120.77	3284.05±128.97	407.63±9.50	266.36±67.32	1218.13±106.28	1674.41±157.16	1246.33±37.02	1021.61±106.93	812.48±74.02
Auicularin	4.74±2.06	3.15±0.32	1.30±0.70	1.36±0.25	3.00±1.02	3.54±0.44	2.63±1.03	1.46±0.06	1.47±0.74
Kaempferol-3,7-bisrhamnoside	0.78±0.07	0.49±0.06	0.53±18	0.57±0.18	0.53±0.03	0.59±0.06	0.63±0.04	0.62±0.12	0.54±0.26
Quercetrin	3305.89±198.66	2095.29±155.89	594.40±32.53	544.92±34.33	2276.69±72.99	3539.07±57.95	2594.44±145.66	904.03±5.02	888.49±100.48
Quercetin	32.66±4.27	22.15±6.83	22.29±9.32	21.76±6.39	21.79±0.82	27.66±3.85	22.11±5.30	26.07±2.52	21.08±5.39

Isosakuranetin	0.56±0.04	0.91±0.11	0.55±0.03	0.67±0.07	0.67±0.21	0.54±0.10	0.71±0.20	0.60±0.11	0.60±0.03
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Table S4. Contents of 33 constituents in samples. (continued)

Analyte	S19	S20	S21	S22	S23	S24	S25	S26	S27
Lysine	1.63±0.32	1.71±0.22	161.79±0.75	75.96±5.32	69.08±3.02	14.09±1.36	13.19±2.72	11.41±5.22	6.14±1.29
Histidine	4.56±1.23	5.28±1.03	41.42±1.63	35.47±8.21	27.10±9.50	9.80±2.01	10.53±1.49	18.15±1.10	8.67±1.10
Argnine	60.89±15.22	57.92±4.38	483.54±41.63	475.74±34.32	465.56±74.52	431.95±52.48	425.44±32.25	377.94±19.51	142.39±12.42
Serine	16.26±5.22	6.30±1.38	26.02±3.38	33.75±12.38	32.28±8.06	18.33±7.90	16.25±7.21	17.66±3.71	20.20±0.70
Theronine	25.89±3.01	12.68±2.32	40.02±7.90	30.69±9.46	29.17±3.38	22.18±1.57	21.60±1.57	33.36±5.17	73.22±1.21
Glutamic acid	161.00±32.94	149.71±2.22	559.73±67.31	612.47±23.74	536.83±18.32	1194.72±486.86	1102.05±110.12	1050.16±90.21	589.47±45.09
Proline	599.51±12.55	610.52±30.63	820.63±74.52	954.04±77.03	937.76±10.58	575.33±74.52	503.57±43.51	481.43±16.37	1751.08±110.29
Valine	15.82±2.26	14.55±1.81	28.82±9.50	34.10±1.32	29.13±0.93	11.81±1.13	12.68±7.55	11.78±3.29	15.34±3.65
Tyrosine	81.60±5.77	91.95±18.80	63.13±1.24	108.87±10.77	80.77±7.36	72.79±37.55	70.56±9.80	53.77±6.26	42.77±5.11
Adenosine	32.98±10.60	32.05±4.80	16.79±1.12	24.28±2.33	23.15±9.61	17.53±4.34	16.73±7.45	13.69±4.66	28.99±6.02
2'-Deoxyadenosine	0.07±0.03	0.04±0.01	0.09±0.03	0.13±0.09	0.12±0.03	0.18±0.04	0.15±0.06	0.12±0.03	0.04±0.02
Isoleucine	49.44±5.69	50.22±4.54	87.90±12.32	115.00±56.20	104.54±32.54	26.08±0.36	23.99±5.82	20.75±1.68	67.11±3.85
Inosine	2.96±1.02	4.59±1.47	1.22±0.03	2.24±0.32	2.68±0.18	2.53±0.93	2.88±0.43	2.48±0.60	7.28±0.87
Guanosine	26.75±3.22	26.56±3.06	10.67±0.93	17.86±1.78	15.09±1.12	14.67±3.79	14.39±1.72	10.42±1.10	15.88±1.10
Gallic acid	612.46±24.80	572.85±23.73	130.58±2.29	142.40±22.04	117.31±8.04	204.78±7.10	181.31±61.55	190.82±14.83	70.11±3.08
Leucine	43.13±4.54	44.37±1.38	87.08±7.79	110.57±19.67	101.01±14.32	34.85±6.32	33.39±8.76	28.56±5.43	61.51±12.07
2'-Deoxyguanosine	1.33±0.32	1.35±0.27	1.30±0.32	1.54±0.47	1.66±0.37	1.76±0.40	2.01±0.05	1.68±0.35	1.69±0.77
Phenylalanine	58.08±3.60	54.55±0.79	8.32±1.13	16.51±0.94	12.60±4.54	12.28±0.38	9.99±0.37	3.12±0.80	3.66±0.38
Protocatechuic acid	116.68±4.29	125.89±1.53	8.25±1.02	8.94±2.49	8.40±1.32	19.56±0.08	24.98±3.55	23.91±1.78	8.03±0.59
Catechin	783.22±28.16	870.00±47.65	7001.57±111.01	6757.64±244.66	6811.49±53.62	486.24±32.24	433.36±16.47	451.88±32.69	4565.18±157.16

Chlorogenic acid	16.25±1.05	16.56±0.94	14.07±2.29	10.14±3.02	10.25±4.43	1.33±0.03	0.65±0.14	4.95±1.27	4.83±1.03
Coniferic acid	5.64±0.14	5.90±0.10	6.16±0.74	6.20±1.77	6.40±1.72	5.74±1.25	5.42±1.33	5.92±1.02	6.81±2.12
Quercetin-3-O-(6''-galloyl)-β-D-galactopyranoside	14.40±1.09	13.94±0.94	14.00±1.21	14.18±2.33	13.58±0.55	12.81±0.69	13.07±0.87	12.83±1.89	16.67±2.77
Quercetin-3-O-(6''-galloyl)-β-D-glucopyranoside	15.48±1.47	14.29±1.09	12.60±1.23	12.79±0.98	12.24±2.29	10.91±3.62	11.15±4.38	11.13±3.21	14.32±1.82
Quercetin-3-O-β-D-glucuronide	4299.41±118.46	4675.71±129.57	3594.55±372.00	2984.72±44.77	2855.76±158.60	1161.32±52.01	819.23±12.57	1091.00±138.27	2910.55±20.28
Hyperin	1346.29±30.55	1282.46±111.83	853.69±79.30	801.82±82.24	804.69±74.25	182.68±3.65	147.68±17.95	185.97±12.42	576.86±32.15
Rutin	220.01±29.43	198.86±4.43	137.15±44.36	138.00±47.25	111.50±7.92	28.17±5.37	29.26±0.87	35.80±10.54	124.5±1.25
Isoquercitrin	5238.41±160.42	4961.59±284.77	2910.27±93.64	3092.09±101.71	2524.60±3.68	192.20±12.60	164.15±10.50	217.78±23.28	981.16±30.00
Auicularin	3.87±0.01	4.19±0.21	2.62±1.22	3.22±0.37	2.45±1.00	1.25±0.43	1.38±0.22	1.43±0.37	3.34±0.43
Kaempferol-3,7-bisrhamnoside	0.53±0.21	0.49±0.07	0.52±0.04	0.59±0.03	0.57±0.22	0.46±0.06	0.52±0.39	0.48±0.06	0.65±0.04
Quercetrin	3609.95±28.47	3738.09±182.50	2366.70±43.22	2594.44±66.39	2176.92±100.32	487.99±17.13	434.67±60.34	506.23±47.47	2429.54±115.67
Quercetin	35.70±1.31	37.69±0.23	24.26±1.18	24.07±7.66	22.10±1.49	20.61±2.28	20.82±3.61	22.17±2.10	27.07±2.60
Isosakuranetin	0.64±0.40	0.59±0.02	0.53±0.04	0.76±0.08	7.95±1.32	0.91±0.11	0.98±0.19	0.53±0.03	0.52±0.04

Table S4. Contents of 33 constituents in samples. (continued)

Analyte	S28	S29	S30	S31	S32	S33	S34	S35	S36
Lysine	6.36±0.78	1.67±0.76	-	0.22±0.02	-	0.18±0.01	-	-	-
Histidine	5.43±0.55	3.93±1.75	4.03±0.23	3.72±0.33	3.74±0.36	5.01±0.42	4.71±0.44	4.62±0.47	3.72±0.35
Arginine	132.50±4.58	15.87±4.45	14.28±1.27	34.93±1.56	31.65±1.23	9.25±1.04	10.05±1.09	7.22±0.51	8.61±0.41
Serine	21.53±3.34	3.78±0.10	18.92±2.88	5.91±1.11	13.16±0.89	0.22±0.01	12.51±0.92	21.22±1.11	-
Theronine	36.52±1.85	4.07±0.62	4.95±1.04	13.53±2.03	15.74±0.68	23.00±0.95	-	-	24.70±1.09
Glutamic acid	558.49±20.27	47.28±1.26	52.66±0.74	318.28±8.59	273.42±5.17	276.60±8.37	106.36±3.68	102.71±2.98	-

Proline	1600.69±52.50	384.52±4.59	372.86±12.14	1309.23±43.39	1179.82±69.05	1187.08±7.11	-	-	-
Valine	14.29±0.67	5.32±0.58	5.37±0.78	17.01±1.53	16.08±1.99	15.38±0.88	2.38±0.03	2.90±0.18	6.31±0.74
Tyrosine	57.14±3.80	6.91±0.21	31.37±7.00	85.17±3.29	82.11±4.16	54.09±1.92	-	-	-
Adenosine	33.95±16.88	34.84±1.27	34.66±3.05	32.16±1.06	27.37±1.10	25.71±0.95	28.12±1.05	29.09±2.56	25.11±0.96
2'-Deoxyadenosine	0.11±0.03	0.12±0.01	0.09±0.01	0.05±0.01	0.01±0.00	0.09±0.01	0.03±0.01	0.15±0.02	0.07±0.01
Isoleucine	76.06±3.36	15.25±1.18	18.91±0.58	67.46±2.11	59.48±2.17	54.79±1.02	5.80±0.09	7.93±0.10	-
Inosine	8.44±0.83	4.02±1.05	3.46±0.36	7.78±0.52	8.22±0.37	4.12±0.03	3.40±0.06	3.33±0.08	1.92±0.01
Guanosine	20.24±0.21	21.02±0.57	23.35±1.96	21.73±0.85	19.00±2.10	11.47±0.35	15.59±0.86	14.39±0.62	9.90±0.17
Gallic acid	68.49±6.12	1026.56±35.01	965.16±54.10	560.72±5.79	493.93±17.06	536.72±4.09	638.74±26.09	591.07±12.07	648.92±4.55
Leucine	69.49±1.01	11.58±0.60	17.52±3.08	52.05±2.17	46.80±1.74	44.85±0.75	6.38±0.07	7.79±0.66	-
2'-Deoxyguanosine	1.49±0.17	1.47±0.13	1.66±0.16	1.82±0.15	1.57±0.06	1.26±0.09	1.90±0.11	1.60±0.09	1.34±0.38
Phenylalanine	12.91±0.95	6.05±0.06	16.43±0.33	24.88±0.95	22.73±0.44	12.80±0.95	1.88±0.09	0.37±0.02	-
Protocatechuic acid	5.85±0.36	96.79±5.55	85.48±0.29	98.74±1.78	70.22±3.17	86.98±3.19	168.90±5.00	163.15±6.99	162.02±3.67
Catechin	3993.17±118.43	1155.59±16.04	1014.35±58.28	529.41±2.07	448.78±4.98	538.93±7.06	1367.60±26.01	1012.36±36.08	1522.04±17.88
Chlorogenic acid	2.61±0.12	44.59±4.43	37.57±1.93	3.98±0.06	3.90±0.02	6.44±0.07	0.77±0.01	0.53±0.06	2.58±0.51
Coniferic acid	5.53±1.33	6.06±1.75	6.48±0.77	5.57±0.09	5.46±0.09	5.61±0.05	7.75±0.09	5.86±0.25	5.72±0.44
Quercetin-3-O-(6''-galloyl)-β-D-galactopyranoside	13.51±0.96	14.74±4.80	15.92±2.38	12.96±0.16	13.49±1.17	13.13±0.15	19.12±1.06	14.07±0.85	14.12±0.25
Quercetin-3-O-(6''-galloyl)-β-D-glucopyranoside	11.68±1.73	16.00±5.46	16.29±0.24	11.76±0.78	11.83±0.19	12.09±0.51	18.04±1.07	13.90±1.09	14.34±0.44
Quercetin-3-O-β-D-glucuronide	2271.08±103.25	5425.27±52.20	5276.65±61.53	5635.54±79.04	5269.47±69.07	5376.21±63.01	4577.67±56.22	4711.36±51.95	5270.52±58.09
Hyperin	418.12±10.21	1346.82±56.20	1238.79±27.22	593.45±4.68	590.89±4.88	655.03±9.74	992.18±7.09	1015.44±10.88	1237.49±20.09
Rutin	101.14±20.04	214.33±12.58	161.8±6.97	142.6±3.27	125.28±3.68	155.74±5.68	210.22±5.96	185.36±6.07	243.28±10.99
Isoquercitrin	767.67±51.25	5794.36±154.32	4910.50±32.16	1865.83±69.57	1516.13±56.14	1967.02±32.09	4291.14±79.04	4234.10±69.07	5207.97±67.09
Auicularin	2.02±0.55	4.05±0.56	3.38±0.67	3.68±0.21	3.24±0.17	4.32±0.01	5.37±0.47	2.94±0.11	3.36±0.37
Kaempferol-3,7-bisrhamnoside	0.49±0.11	0.48±0.02	0.59±0.01	0.46±0.03	0.53±0.05	0.54±0.01	0.72±0.05	0.47±0.03	0.48±0.01
Quercetrin	2101.99±168.74	5609.68±30.57	5282.62±81.35	3597.03±79.99	3129.42±68.93	3500.38±58.05	4678.81±85.98	4038.79±66.40	4518.09±61.00

Quercetin	21.70±5.00	82.44±1.01	57.97±8.32	37.33±1.17	36.48±1.55	41.62±1.79	41.93±1.44	37.49±2.06	45.51±1.89
Isosakuranetin	1.36±0.13	0.57±0.07	0.63±0.22	0.67±0.06	0.70±0.02	0.59±0.02	0.58±0.09	0.73±0.11	0.62±0.11

Table S4. Contents of 33 constituents in samples. (continued)

Analyte	S37	S38	S39	S40	S41	S42	S43	S44	S45
Lysine	0.36±0.04	0.23±0.03	4.17±0.21	2.20±0.11	1.49±0.18	9.86±0.45	10.78±0.41	2.56±0.33	4.17±0.38
Histidine	7.93±0.52	3.79±0.23	6.50±0.12	6.52±0.42	9.50±0.51	-	2.51±0.26	8.58±0.51	-
Arginine	97.21±30.78	94.89±25.19	73.09±28.22	19.42±3.10	13.89±1.11	64.59±2.73	70.24±5.67	11.88±0.98	18.17±0.68
Serine	2.73±0.08	12.66±0.82	15.99±1.03	8.81±0.66	-	35.19±1.89	7.22±0.71	16.45±1.09	22.22±0.77
Theronine	13.38±1.05	11.12±1.11	24.53±0.77	53.30±2.35	29.70±1.27	61.12±2.10	54.19±1.26	61.50±1.08	70.44±1.75
Glutamic acid	505.03±13.09	485.17±7.83	156.35±4.38	79.28±1.73	97.92±3.84	121.25±5.49	8.28±0.87	78.94±1.22	116.16±5.61
Proline	854.69±13.66	799.58±10.95	120.39±3.55	49.32±1.83	47.52±3.99	85.95±2.77	90.33±2.71	38.13±1.81	56.84±3.99
Valine	3.70±0.65	4.62±0.56	13.88±0.89	11.48±0.81	1.55±0.10	21.04±1.09	10.07±0.91	61.44±4.02	18.76±1.89
Tyrosine	28.72±1.44	33.81±1.09	20.58±1.24	12.56±0.95	13.32±0.66	5.42±0.71	5.15±0.25	2.34±0.04	3.68±0.06
Adenosine	23.64±1.25	22.85±0.95	7.64±0.42	3.57±0.11	3.82±0.97	6.33±0.22	7.54±0.76	2.58±0.25	3.82±0.11
2'-Deoxyadenosine	0.07±0.01	0.10±0.01	0.17±0.01	0.18±0.01	0.15±0.01	0.24±0.01	0.26±0.01	0.24±0.03	0.22±0.01
Isoleucine	22.37±1.89	23.99±1.27	5.99±0.62	1.22±0.07	0.65±0.03	5.95±0.29	4.91±0.72	0.57±0.05	0.78±0.07
Inosine	4.77±0.97	4.78±0.45	0.86±0.06	0.42±0.07	0.71±0.02	0.53±0.06	0.87±0.09	0.35±0.01	1.03±0.11
Guanosine	18.82±2.11	19.87±1.88	6.74±0.61	2.90±0.27	2.88±0.12	5.90±0.67	6.18±0.10	2.44±0.11	3.12±0.15
Gallic acid	251.48±9.05	245.86±6.73	482.66±8.82	389.46±7.11	385.23±3.85	392.33±8.63	409.60±7.09	269.11±6.03	365.55±6.91
Leucine	19.11±1.68	18.31±0.89	4.52±0.42	-	-	8.06±0.26	3.75±0.41	0.04±0.01	2.27±0.79
2'-Deoxyguanosine	1.62±0.08	1.37±0.21	0.28±0.06	0.25±0.03	0.17±0.03	0.25±0.02	0.37±0.06	0.24±0.01	0.40±0.02
Phenylalanine	12.88±0.99	15.26±0.66	25.88±1.09	20.02±0.85	12.87±0.81	24.14±1.66	25.40±2.89	12.12±0.61	16.18±0.24
Protocatechuic acid	128.41±3.11	116.53±2.88	64.42±1.22	65.65±1.56	68.96±2.72	46.26±4.69	50.49±3.55	46.95±1.99	63.17±2.88

Catechin	281.97±4.69	205.35±6.04	1202.27±15.84	687.87±9.07	705.13±19.61	943.83±12.94	985.78±40.17	502.92±8.05	703.31±15.05
Chlorogenic acid	7.99±0.13	6.83±0.63	26.86±1.99	11.21±0.67	10.47±0.96	19.12±1.16	22.09±3.01	6.51±0.46	10.02±0.91
Coniferic acid	5.62±0.18	5.67±0.88	2.32±0.86	2.88±0.80	2.23±0.08	12.36±0.95	13.29±1.89	10.87±0.16	13.36±0.56
Quercetin-3-O-(6''-galloyl)-β-D-galactopyranoside	13.15±0.23	12.88±1.00	3.81±0.11	7.89±0.22	3.57±0.21	9.04±1.02	10.89±0.97	7.86±0.24	9.71±0.44
Quercetin-3-O-(6''-galloyl)-β-D-glucopyranoside	11.96±0.97	11.93±0.95	126.00±2.35	111.19±2.65	123.57±5.19	87.12±1.55	96.49±4.22	82.97±2.01	107.66±5.91
Quercetin-3-O-β-D-glucuronide	5629.91±44.63	4824.95±69.41	130.97±2.11	205.41±1.98	79.61±4.77	161.75±3.68	177.32±7.83	123.67±2.96	203.28±7.88
Hyperin	682.18±8.82	657.32±7.90	2.99±0.04	0.11±0.16	0.41±0.02	4.44±0.61	4.06±0.71	1.43±0.08	2.82±0.11
Rutin	157.45±6.17	168.19±3.99	30.50±0.99	6.95±0.17	3.94±0.24	25.63±4.80	27.88±0.55	5.45±0.02	7.47±0.72
Isoquercitrin	2642.20±35.79	2558.28±24.51	1029.48±2.33	695.02±2.16	674.01±14.07	769.66±19.66	846.29±21.63	508.04±8.96	657.03±9.06
Auicularin	3.19±0.11	3.66±0.74	113.04±1.85	18.80±0.79	13.55±0.76	75.13±2.87	85.63±7.55	12.15±0.71	17.02±0.96
Kaempferol-3,7-bisrhamnoside	0.55±0.02	0.51±0.07	2.25±0.07	2.44±0.24	2.25±0.28	0.16±0.01	0.24±0.01	0.14±0.01	0.20±0.09
Quercetrin	3985.24±49.63	3348.14±41.01	2118.16±45.89	2221.8±18.93	1898.34±36.94	1721.49±44.81	1867.1±44.10	1588.1±51.00	2076.94±49.06
Quercetin	34.07±1.56	30.30±1.07	993.77±30.78	256.03±4.96	244.78±3.97	541.10±5.93	617.07±8.09	44.25±1.96	57.75±6.77
Isosakuranetin	0.76±0.05	0.73±0.04	0.70±0.06	2.14±0.08	0.57±0.88	0.56±0.06	0.73±0.07	0.40±0.04	0.52±0.60