Supplementary Materials

Multi-Element Analysis and Origin Discrimination of *Panax notoginseng* Based on Inductively Coupled Plasma Tandem Mass Spectrometry (ICP-MS/MS)

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Table S1. Linear ranges, equations, correlation coefficients (R^2), LODs, and LOQs of the ICP-MS/MS for the determination of multi-elements in *P. notoginseng*.

Element	Linear Range (ng/mL)	Equation	R^2	LODs (mg/kg)	LOQs (mg/kg)
^{23}Na	6.62-4000	y = 155.08x + 15060	0.9994	0.2484	0.8280
^{24}Mg	7.93-4000	y = 59.433x + 375.77	0.9995	0.2975	0.9916
^{27}Al	5.22-400	y = 13.565x + 79.102	0.9992	0.1956	0.6520
^{39}K	32.00-4000	y = 19.893x + 4234.7	0.9996	1.2000	4.0001
^{43}Ca	110.89-4000	y = 0.2365x + 50.829	0.9926	4.1585	13.8618
^{44}Ca	205.76-4000	y = 2.2262x + 284.74	0.9989	7.7160	25.7202
^{51}V	0.09-40	y = 578.88x + 23.959	0.9996	0.0035	0.0115
^{52}Cr	0.24-40	y = 785.24x + 386.76	0.9993	0.0088	0.0295
^{53}Cr	0.20-40	y = 98.633x + 61.657	0.9987	0.0073	0.0244
^{55}Mn	0.16-40	y = 252.05x + 169.71	0.9994	0.0058	0.0195
^{56}Fe	5.49-4000	y = 699.73x - 46446	0.9989	0.2059	0.6863
^{57}Fe	8.56-4000	y = 14.033x + 18.482	0.9995	0.3212	1.0706
^{59}Co	0.15-40	y = 1422.6x + 313.2	0.9993	0.0056	0.0185
^{60}Ni	0.35-40	y = 402.28x + 367.71	0.9994	0.0131	0.0438
^{63}Cu	1.25-40	y = 1061.6x + 1238.9	0.9992	0.0468	0.1559
^{65}Cu	0.94-40	y = 531.46x + 648.87	0.9993	0.0354	0.1181
^{66}Zn	2.54-400	y = 126.07x + 400.91	0.9994	0.0954	0.3179
^{75}As	0.08-40	y = 77.049x + 23.903	0.9987	0.0031	0.0104
^{78}Se	0.22-40	y = 7.9761x - 1.3532	0.9987	0.0083	0.0275
^{88}Sr	0.97-400	y = 180.8x + 634.56	0.9992	0.0362	0.1208
^{89}Y	0.02-40	y = 30488x - 40468	0.9919	0.0006	0.0022
^{97}Mo	0.07-40	y = 323.98x + 61.331	0.9995	0.0026	0.0088
^{98}Mo	0.05-40	y = 867.47x + 31.601	0.9997	0.0018	0.0059
^{107}Ag	0.08-40	y = 935.77x + 35.634	0.9995	0.0031	0.0103
^{111}Cd	0.09-40	y = 171.63x + 2.9439	0.9997	0.0033	0.0109
^{114}Cd	0.10-40	y = 438.28x + 65.226	0.9995	0.0037	0.0122
^{118}Sn	0.64-400	y = 25.977x + 29.411	0.9996	0.0241	0.0802
^{123}Sb	0.08-40	y = 284.63x + 20.599	0.9991	0.0030	0.0102
^{137}Ba	0.71-40	y = 97.506x + 55.9	0.9987	0.0267	0.0890
^{139}La	0.07-12.5	y = 34256x - 6346.8	0.9993	0.0028	0.0093
^{140}Ce	0.09-12.5	y = 31855x - 4472.6	0.999	0.0033	0.0111
^{141}Pr	0.04-12.5	y = 35858x - 4611.6	0.9991	0.0014	0.0045
^{146}Nd	0.06-40	y = 3677.4x - 136.72	0.9995	0.0024	0.0079
^{147}Sm	0.05-40	y = 3048.4x - 324.62	0.9997	0.0019	0.0062
^{153}Eu	0.01-40	y = 10360x - 1141.9	0.9995	0.0005	0.0016
^{157}Gd	0.03-40	y = 3300.1x + 119.2	0.9992	0.0010	0.0034

Element	Linear Range (ng/mL)	Equation	R^2	LODs (mg/kg)	LOQs (mg/kg)
^{163}Dy	0.01-40	y = 4476.5x - 458.3	0.9996	0.0005	0.0016
^{165}Ho	0.03-12.5	y = 28814x - 5256.3	0.9995	0.0011	0.0037
^{166}Er	0.01-40	y = 5846.5x - 597.19	0.9996	0.0005	0.0015
^{169}Tm	0.03-12.5	y = 28662x - 5784.1	0.9994	0.0012	0.0038
^{172}Yb	0.01-40	y = 3743.8x - 668.1	0.9996	0.0004	0.0013
^{200}Hg	0.01-8	y = 2359.2x + 38.878	0.9995	0.0003	0.0011
^{202}Hg	0.01-8	y = 3119.2x + 10.011	0.9995	0.0004	0.0012
^{205}Tl	0.02-40	y = 3232.2x + 820.02	0.9991	0.0008	0.0027
^{206}Pb	0.12-40	y = 1052.3x + 274.81	0.9992	0.0043	0.0144
^{207}Pb	0.09-40	y = 922.91x + 192.78	0.9993	0.0032	0.0108
^{208}Pb	0.11-40	y = 4246.2x + 1077.5	0.9992	0.0043	0.0143
^{232}Th	0.03-40	y = 7967.5x + 50.934	0.9994	0.0010	0.0034
^{238}U	0.02-40	y = 4664.6x + 1836.9	0.9989	0.0009	0.0028

Table S2. The spike recovery and reproducibility of *P. notoginseng* (n= 3).

Element	Background (mg/kg)	Added (mg/kg)	Recovery (%)	RSD (%)
^{23}Na	31.21	200	99.56	1.87
		20	100.62	4.29
^{24}Mg	2453.25	2000	96.12	7.60
		200	95.04	9.35
^{27}Al	232.26	200	87.04	5.93
		20	93.70	6.66
^{39}K	28495.69	2000	94.77	3.63
		200	95.05	9.14
^{43}Ca	1064.43	2000	97.00	3.54
		200	91.95	5.54
^{44}Ca	1491.75	2000	98.60	3.56
		200	86.79	3.20
^{51}V	0.40	20	99.45	4.27
		5	92.97	7.08
^{52}Cr	0.54	20	97.16	4.66
		5	97.09	5.67
^{53}Cr	0.60	20	99.20	6.55
		5	96.72	5.01
^{55}Mn	67.92	20	90.54	4.35
		5	99.45	9.31
^{56}Fe	51.17	20	96.99	3.46
		5	92.93	3.97
^{57}Fe	70.49	20	94.41	9.40
		5	86.75	4.01
^{59}Co	0.12	2	96.02	4.44
		0.5	96.73	7.88
^{60}Ni	2.64	2	95.88	7.56
		0.5	96.20	9.63
^{63}Cu	5.23	20	94.57	2.48
		5	101.62	4.41
^{65}Cu	5.27	20	99.13	3.58
		5	93.20	8.66
^{66}Zn	14.50	20	95.83	7.37
		5	88.66	3.83
^{75}As	0.14	2	95.71	4.06
		0.5	93.51	1.67
^{78}Se	0.12	2	93.35	2.09
		0.5	96.05	6.83

Element	Background (mg/kg)	Added (mg/kg)	Recovery (%)	RSD (%)
^{88}Sr	5.53	20	95.66	5.92
		5	97.31	4.99
^{89}Y	0.71	2	95.31	7.95
		0.5	91.90	5.01
^{97}Mo	0.02	2	97.38	8.02
		0.5	96.19	1.56
^{98}Mo	0.02	2	100.75	3.11
		0.5	104.98	2.42
^{107}Ag	0.01	2	98.76	3.90
		0.5	98.36	4.22
^{111}Cd	0.54	2	94.47	8.35
		0.5	94.55	5.05
^{114}Cd	0.54	2	95.36	5.99
		0.5	94.78	9.26
^{118}Sn	0.05	2	100.91	2.77
		0.5	89.62	5.79
^{123}Sb	0.07	2	96.62	9.38
		0.5	85.82	2.17
^{137}Ba	17.64	2	95.12	8.59
		0.5	93.74	9.70
^{139}La	0.57	2	96.66	8.42
		0.5	98.66	9.47
^{140}Ce	0.34	2	95.61	7.05
		0.5	97.79	5.30
^{141}Pr	0.08	2	95.78	4.55
		0.5	88.46	5.69
^{146}Nd	0.57	2	91.72	5.63
		0.5	98.87	9.63
^{147}Sm	0.10	2	92.45	3.35
		0.5	97.11	5.79
^{153}Eu	0.03	2	97.71	3.71
		0.5	96.86	3.76
^{157}Gd	0.12	2	98.85	7.58
		0.5	95.41	5.70
^{163}Dy	0.09	2	93.64	2.09
		0.5	95.21	8.29
^{165}Ho	0.01	2	100.47	3.71
		0.5	98.53	2.99
^{166}Er	0.06	2	98.04	2.02

Element	Background (mg/kg)	Added (mg/kg)	Recovery (%)	RSD (%)
		0.5	91.51	8.31
^{169}Tm	0.003	2	98.33	7.80
		0.5	99.97	2.97
^{172}Yb	0.04	2	97.24	4.62
		0.5	88.31	6.40
^{200}Hg	0.003	2	100.84	2.59
		0.5	102.70	6.00
^{202}Hg	0.003	2	100.86	2.61
		0.5	102.75	5.95
^{205}Tl	0.02	2	99.78	5.19
		0.5	100.44	5.30
^{206}Pb	0.53	2	95.17	8.20
		0.5	97.34	4.76
^{207}Pb	0.53	2	95.26	8.25
		0.5	97.73	5.93
^{208}Pb	0.53	2	95.00	8.47
		0.5	96.65	6.14
^{232}Th	0.01	2	100.73	2.69
		0.5	98.93	2.43
^{238}U	0.005	2	96.42	6.05
		0.5	95.02	5.63

Table S3. Multi-element contents and comparison results using Duncan'test for *P.notoginseng* of different geographical origins (mg/kg). Different uppercase and lowercase letters indicate significant differences between origins (P＜0.05).

Elements	HongHe (n=15)	KunMing (n=15)	PuEr (n=15)	QuJing (n=36)	WenShan (n=8)	F-value	P-value
^{23}Na	25.41 ± 2.88a	19.64 ± 2.47a	23.86 ± 4.66a	26.78 ± 3.77a	22.74 ± 2.69a	1.457	0.223
^{24}Mg	1791.29 ± 134.49bc	1513.98 ± 156.71c	2265.59 ± 181.24a	1501.54 ± 127.61c	1843.46 ± 149.06b	10.33	0.000
^{27}Al	425.63 ± 58.51b	558.28 ± 94.08ab	323.5 ± 29.99b	669.35 ± 62.95a	377.73 ± 72.88b	4.424	0.003
^{39}K	24682.91 ± 757.19a	18585.65 ± 1281.09c	21590.17 ± 843.64b	24082.02 ± 482.13ab	24437.46 ± 876.67a	9.318	0.000
^{43}Ca	979.63 ± 66.21bc	955.17 ± 71.16c	1232.66 ± 61.6a	958.34 ± 24.57c	1124.39 ± 43.09ab	5.699	0.000
^{44}Ca	1353.93 ± 89.79b	1333.55 ± 99.4b	1729.79 ± 86.82a	1304.64 ± 34b	1570.86 ± 67.3a	6.764	0.000
^{51}V	1.3 ± 0.27ab	1.25 ± 0.2ab	0.58 ± 0.07b	1.7 ± 0.18a	1.14 ± 0.27ab	4.17	0.004
^{52}Cr	1.49 ± 0.28ab	1.38 ± 0.21ab	0.79 ± 0.1b	2.18 ± 0.34a	0.76 ± 0.2b	3.433	0.012
^{53}Cr	1.38 ± 0.26ab	1.32 ± 0.2ab	0.75 ± 0.09b	2.09 ± 0.32a	0.77 ± 0.2b	3.405	0.013
^{55}Mn	49.28 ± 3.97ab	57.57 ± 5.21a	40.27 ± 2.96b	41.75 ± 3.85b	40.52 ± 6.53b	2.313	0.064
^{56}Fe	263.33 ± 67.07b	264.33 ± 47.88b	115.29 ± 15.16b	493.33 ± 69.36a	226.21 ± 76.52b	4.991	0.001
^{57}Fe	262.74 ± 63.4ab	260.59 ± 43.33ab	135.85 ± 12.5b	477.91 ± 67.41a	223.87 ± 68.86b	4.57	0.002
^{59}Co	0.33 ± 0.04ab	0.23 ± 0.03bc	0.11 ± 0.01c	0.47 ± 0.05a	0.26 ± 0.02bc	9.456	0.000
^{60}Ni	1.73 ± 0.14b	2.53 ± 0.32a	2.01 ± 0.11ab	2 ± 0.11ab	1.93 ± 0.52ab	1.872	0.123
^{63}Cu	3.48 ± 0.23b	3.39 ± 0.22b	4.55 ± 0.29a	3.87 ± 0.18ab	4.64 ± 0.47a	3.98	0.005
^{65}Cu	3.43 ± 0.31b	3.39 ± 0.3b	4.56 ± 0.4a	3.78 ± 0.37b	4.68 ± 0.5a	4.434	0.003
^{66}Zn	11.16 ± 0.8c	19.16 ± 3.28a	17.8 ± 2.18ab	14.32 ± 1.69bc	15.44 ± 1.5abc	4.673	0.002
^{75}As	0.46 ± 0.18a	0.26 ± 0.06ab	0.18 ± 0.03b	0.33 ± 0.08ab	0.28 ± 0.07ab	2.154	0.081
^{78}Se	0.03 ± 0.01ab	0.02 ± 0.01b	0.03 ± 0.01ab	0.05 ± 0.01a	0.04 ± 0.005ab	3.268	0.015

Elements	HongHe (n=15)	KunMing (n=15)	PuEr (n=15)	QuJing (n=36)	WenShan (n=8)	F-value	P-value
^{88}Sr	7.86 ± 1.55a	5.99 ± 0.81a	8.24 ± 1.87a	6.56 ± 0.47a	6.26 ± 0.46a	1.571	0.190
^{89}Y	0.11 ± 0.01ab	0.09 ± 0.01b	0.12 ± 0.01ab	0.19 ± 0.02a	0.16 ± 0.04ab	3.806	0.007
^{97}Mo	0.09 ± 0.06ab	0.04 ± 0.01b	0.08 ± 0.01b	0.06 ± 0.01b	0.16 ± 0.08a	2.018	0.099
^{98}Mo	0.09 ± 0.06ab	0.04 ± 0.01b	0.07 ± 0.01b	0.06 ± 0.01b	0.16 ± 0.08a	1.955	0.109
^{107}Ag	0.004 ± 0.001b	0.006 ± 0.001b	0.037 ± 0.016a	0.005 ± 0.001b	0.004 ± 0.001b	9.284	0.000
^{111}Cd	0.26 ± 0.05b	0.81 ± 0.17a	0.35 ± 0.14b	0.46 ± 0.08b	0.34 ± 0.13b	6.705	0.000
^{114}Cd	0.25 ± 0.05b	0.8 ± 0.17a	0.35 ± 0.14b	0.45 ± 0.08b	0.33 ± 0.13b	7.023	0.000
^{118}Sn	0.07 ± 0.03ab	0.12 ± 0.03ab	0.07 ± 0.01ab	0.15 ± 0.06a	0.02 ± 0.01b	2.443	0.053
^{123}Sb	0.18 ± 0.05a	0.08 ± 0.01b	0.07 ± 0.01b	0.09 ± 0.02b	0.11 ± 0.01b	6.586	0.000
^{137}Ba	13.38 ± 0.97c	19.4 ± 4b	24.73 ± 2.84a	15.09 ± 0.98bc	16.34 ± 2.2bc	8.214	0.000
^{139}La	0.17 ± 0.02b	0.2 ± 0.03ab	0.16 ± 0.02b	0.29 ± 0.08a	0.3 ± 0.06a	3.268	0.015
^{140}Ce	0.29 ± 0.03bc	0.39 ± 0.05abc	0.19 ± 0.03c	0.59 ± 0.07a	0.52 ± 0.1ab	5.839	0.000
^{141}Pr	0.03 ± 0.004b	0.03 ± 0.01b	0.03 ± 0.003b	0.06 ± 0.01a	0.05 ± 0.01ab	5.351	0.001
^{146}Nd	0.19 ± 0.03b	0.21 ± 0.03b	0.16 ± 0.02b	0.35 ± 0.09a	0.27 ± 0.04ab	4.594	0.002
^{147}Sm	0.04 ± 0.01b	0.04 ± 0.01b	0.03 ± 0.005b	0.07 ± 0.02a	0.05 ± 0.01ab	4.312	0.003
^{153}Eu	0.01 ± 0.002b	0.01 ± 0.001ab	0.01 ± 0.002ab	0.02 ± 0.003a	0.01 ± 0.001ab	3.473	0.011
^{157}Gd	0.04 ± 0.01b	0.04 ± 0.01b	0.03 ± 0.004b	0.07 ± 0.02a	0.05 ± 0.01ab	4.357	0.003
^{163}Dy	0.03 ± 0.01ab	0.02 ± 0.003b	0.02 ± 0.003b	0.04 ± 0.01a	0.03 ± 0.005ab	3.639	0.009
^{165}Ho	0.003 ± 0.001b	0.002 ± 0.0003b	0.002 ± 0.0002b	0.005 ± 0.001a	0.004 ± 0.001ab	4.7	0.002
^{166}Er	0.01 ± 0.003ab	0.01 ± 0.002b	0.01 ± 0.001b	0.02 ± 0.01a	0.02 ± 0.002ab	3.915	0.006
^{169}Tm	0.001 ± 0.0002ab	0.001 ± 0.0001b	0.001 ± 0.0001b	0.002 ± 0.0007a	0.001 ± 0.0002ab	4.011	0.005
^{172}Yb	0.01 ± 0.002ab	0.01 ± 0.001b	0.01 ± 0.001b	0.02 ± 0.003a	0.01 ± 0.002ab	4.364	0.003

Elements	HongHe (n=15)	KunMing (n=15)	PuEr (n=15)	QuJing (n=36)	WenShan (n=8)	F-value	P-value
^{200}Hg	0.003 ± 0.001a	0.003 ± 0.0002a	0.003 ± 0.0002a	0.004 ± 0.0004a	0.003 ± 0.0002a	1.44	0.228
^{202}Hg	0.003 ± 0.001a	0.003 ± 0.0002a	0.003 ± 0.0002a	0.004 ± 0.0004a	0.003 ± 0.0002a	2.047	0.095
^{205}Tl	0.02 ± 0.0032a	0.03 ± 0.01a	0.02 ± 0.001a	0.04 ± 0.02a	0.03 ± 0.01a	0.709	0.588
^{206}Pb	0.735 ± 0.16a	0.528 ± 0.06abc	0.277 ± 0.03c	0.612 ± 0.09ab	0.325 ± 0.06bc	3.111	0.020
^{207}Pb	0.711 ± 0.16a	0.526 ± 0.06abc	0.282 ± 0.03c	0.612 ± 0.09ab	0.305 ± 0.06bc	3.058	0.021
^{208}Pb	0.72 ± 0.16a	0.52 ± 0.09abc	0.28 ± 0.04c	0.61 ± 0.12ab	0.31 ± 0.08bc	3.054	0.022
^{232}Th	0.003 ± 0.001a	0.01 ± 0.003a	0.01 ± 0.002a	0.01 ± 0.01a	0.003 ± 0.001a	1.496	0.211
^{238}U	0.023 ± 0.007a	0.019 ± 0.0043ab	0.007 ± 0.0011b	0.023 ± 0.007a	0.016 ± 0.003ab	2.943	0.025

Table S4. Multi-element contents and comparison results using T'test for *P.notoginseng* of different cultivation models (mg/kg). T'test was used to determine significance, **** (P < 0.0001), *** (P < 0.001), ** (P < 0.01), * (P < 0.05), and ns (P > 0.05).

Elements	Field(n=65)	Forest(n=24)
^{23}Na	24.34 ± 0.95ns	24.91 ± 3.08
^{24}Mg	1563.74 ± 46.42****	2113.44 ± 112.7
^{27}Al	613.99 ± 42.6****	284.17 ± 23.21
^{39}K	24035.51 ± 352.59***	19709.39 ± 977.07
^{43}Ca	958.42 ± 22.56***	1196.26 ± 52.58
^{44}Ca	1320.97 ± 31.54***	1663.73 ± 75.39
^{51}V	1.59 ± 0.12****	0.56 ± 0.05
^{52}Cr	1.88 ± 0.21****	0.72 ± 0.07
^{53}Cr	1.8 ± 0.2****	0.68 ± 0.07
^{55}Mn	47.68 ± 2.61*	38.94 ± 3.25
^{56}Fe	410.92 ± 43.92****	104.32 ± 10.6
^{57}Fe	398.15 ± 42.44****	125.16 ± 8.9
^{59}Co	0.41 ± 0.03****	0.12 ± 0.01
^{60}Ni	1.95 ± 0.1ns	2.28 ± 0.21
^{63}Cu	3.79 ± 0.13ns	4.23 ± 0.25
^{65}Cu	3.73 ± 0.13ns	4.24 ± 0.25
^{66}Zn	13.39 ± 0.52***	20.42 ± 1.58
^{75}As	0.37 ± 0.04****	0.15 ± 0.02
^{78}Se	0.04 ± 0.004*	0.03 ± 0.003
^{88}Sr	6.68 ± 0.31ns	7.65 ± 0.91
^{89}Y	0.16 ± 0.02**	0.1 ± 0.01
^{97}Mo	0.08 ± 0.01ns	0.06 ± 0.01
^{98}Mo	0.08 ± 0.01ns	0.06 ± 0.01
^{107}Ag	0.005 ± 0.0003*	0.02 ± 0.01
^{111}Cd	0.38 ± 0.03****	0.16 ± 0.01
^{114}Cd	0.38 ± 0.03****	0.16 ± 0.01
^{118}Sn	0.13 ± 0.02ns	0.1 ± 0.02
^{123}Sb	0.11 ± 0.01***	0.07 ± 0.003
^{137}Ba	14.48 ± 0.47****	24.8 ± 1.83
^{139}La	0.26 ± 0.02****	0.15 ± 0.01
^{140}Ce	0.52 ± 0.04****	0.21 ± 0.03
^{141}Pr	0.05 ± 0.004****	0.02 ± 0.002
^{146}Nd	0.3 ± 0.03****	0.15 ± 0.01
^{147}Sm	0.06 ± 0.005****	0.03 ± 0.003
^{153}Eu	0.02 ± 0.001ns	0.01 ± 0.001
^{157}Gd	0.06 ± 0.005****	0.03 ± 0.002
^{163}Dy	0.04 ± 0.003****	0.02 ± 0.001

Elements	Field(n=65)	Forest(n=24)
^{165}Ho	0.004 ± 0.0004****	0.002 ± 0.0001
^{166}Er	0.019 ± 0.0019****	0.01 ± 0.0008
^{169}Tm	0.002 ± 0.0002****	0.001 ± 0.00005
^{172}Yb	0.015 ± 0.0014****	0.007 ± 0.0007
^{200}Hg	0.003 ± 0.0002ns	0.003 ± 0.0002
^{202}Hg	0.003 ± 0.0002ns	0.003 ± 0.0002
^{205}Tl	0.03 ± 0.01ns	0.03 ± 0.002
^{206}Pb	0.61 ± 0.05****	0.34 ± 0.03
^{207}Pb	0.61 ± 0.05****	0.34 ± 0.03
^{208}Pb	0.61 ± 0.05****	0.34 ± 0.03
^{232}Th	0.01 ± 0.002ns	0.01 ± 0.002
^{238}U	0.02 ± 0.002****	0.01 ± 0.001

Table S5. The allocation of sampling areas for the *P. notoginseng* in Yunnan province, China.

Bases	Time	Cultivation Model	Origins	Bases	Time	Cultivation Model	Origins
JianShui1-1	2019	Field	HongHe	ShiLin1-1	2020	Field	KunMing
JianShui1-2	2019	Field	HongHe	ShiLin1-2	2020	Field	KunMing
JianShui1-3	2019	Field	HongHe	ShiLin1-3	2020	Field	KunMing
JianShui2-1	2019	Field	HongHe	XuanWei1-1	2020	Field	QuJing
JianShui2-2	2019	Field	HongHe	XuanWei1-2	2020	Field	QuJing
JianShui2-3	2019	Field	HongHe	XuanWei1-3	2020	Field	QuJing
ShiZong1-1	2019	Field	QuJing	XuanWei2-1	2020	Field	QuJing
ShiZong1-2	2019	Field	QuJing	XuanWei2-2	2020	Field	QuJing
ShiZong1-3	2019	Field	QuJing	XuanWei2-3	2020	Field	QuJing
ZhanYi1-1	2019	Field	QuJing	ZhanYi1-1	2020	Field	QuJing
ZhanYi1-2	2019	Field	QuJing	ZhanYi1-2	2020	Field	QuJing
ZhanYi1-3	2019	Field	QuJing	ZhanYi1-3	2020	Field	QuJing
ZhanYi2-1	2019	Field	QuJing	LuLiang1-1	2020	Field	QuJing
ZhanYi2-2	2019	Field	QuJing	LuLiang1-2	2020	Field	QuJing
ZhanYi2-3	2019	Field	QuJing	LuLiang1-3	2020	Field	QuJing
XuanWei1-1	2019	Field	QuJing	MaLong1-1	2020	Field	QuJing
XuanWei1-2	2019	Field	QuJing	MaLong1-2	2020	Field	QuJing
XuanWei1-3	2019	Field	QuJing	MaLong1-3	2020	Field	QuJing
XuanWei2-1	2019	Field	QuJing	ShiZong1-1	2020	Field	QuJing
XuanWei2-2	2019	Field	QuJing	ShiZong1-2	2020	Field	QuJing
XuanWei2-3	2019	Field	QuJing	ShiZong1-3	2020	Field	QuJing
QiuBei1-1	2019	Field	WenShan	QiuBei1-1	2020	Field	WenShan

Bases	Time	Cultivation Model	Origins	Bases	Time	Cultivation Model	Origins
QiuBei1-2	2019	Field	WenShan	QiuBei1-2	2020	Field	WenShan
QiuBei1-3	2019	Field	WenShan	QiuBei1-3	2020	Field	WenShan
DaTangZi1-1	2019	Forest	PuEr	YanShan1-1	2020	Field	WenShan
DaTangZi1-2	2019	Forest	PuEr	YanShan1-2	2020	Field	WenShan
DaTangZi1-3	2019	Forest	PuEr	BaZi1-1	2020	Forest	PuEr
DaTangZi2-1	2019	Forest	PuEr	BaZi1-2	2020	Forest	PuEr
DaTangZi2-2	2019	Forest	PuEr	BaZi1-3	2020	Forest	PuEr
DaTangZi2-3	2019	Forest	PuEr	LaoMianZhai1-1	2020	Forest	PuEr
JianShui1-1	2020	Field	HongHe	LaoMianZhai1-2	2020	Forest	PuEr
JianShui1-2	2020	Field	HongHe	LaoMianZhai1-3	2020	Forest	PuEr
JianShui1-3	2020	Field	HongHe	LaoMianZhai2-1	2020	Forest	PuEr
MengZi1-1	2020	Field	HongHe	LaoMianZhai2-2	2020	Forest	PuEr
MengZi1-2	2020	Field	HongHe	LaoMianZhai2-3	2020	Forest	PuEr
MengZi1-3	2020	Field	HongHe	HuiZe1-1	2020	Forest	QuJing
ShiPing1-1	2020	Field	HongHe	HuiZe1-2	2020	Forest	QuJing
ShiPing1-2	2020	Field	HongHe	HuiZe1-3	2020	Forest	QuJing
ShiPing1-3	2020	Field	HongHe	XunDian1-1	2020	Forest	KunMing
XunDian3-1	2020	Field	KunMing	XunDian1-2	2020	Forest	KunMing
XunDian3-2	2020	Field	KunMing	XunDian1-3	2020	Forest	KunMing
XunDian3-3	2020	Field	KunMing	XunDian2-1	2020	Forest	KunMing
XunDian4-1	2020	Field	KunMing	XunDian2-2	2020	Forest	KunMing
XunDian4-2	2020	Field	KunMing	XunDian2-3	2020	Forest	KunMing
XunDian4-3	2020	Field	KunMing				

Table S6. Agilent 8800 ICP-MS/MS operating parameters.

Parameter	Operating condition
RF power	1500 W
Sampling depth	8.0 mm
Number of replicates	3
Stabilization time	10 s
Auxiliary gas flow rate	0.40 L/min
Makeup gas flow rate	0.20 L/min
Carrier gas flow rate	1.05 L/min
Spray chamber temperature	2.0 ℃
Quadrupole bias V	-16 V
Octo pole bias V	-18 V
Internal standard	^{45}Sc, ^{72}Ge, ^{74}Ge, ^{115}In and ^{209}Bi
Isotopes	^{23}Na, ^{24}Mg, ^{39}K, ^{43}Ca, ^{44}Ca, ^{51}V, ^{52}Cr, ^{53}Cr, ^{55}Mn, ^{56}Fe, ^{57}Fe, ^{59}Co, ^{60}Ni, ^{63}Cu, ^{65}Cu, ^{66}Zn, ^{75}As, ^{78}Se, ^{88}Sr, ^{89}Y, ^{97}Mo, ^{98}Mo, ^{107}Ag, ^{111}Cd, ^{114}Cd, ^{118}Sn, ^{123}Sb, ^{137}Ba, ^{139}La, ^{140}Ce, ^{141}Pr, ^{146}Nd, ^{147}Sm, ^{153}Eu, ^{157}Gd, ^{163}Dy, ^{165}Ho, ^{166}Er, ^{169}Tm, ^{172}Yb, ^{200}Hg, ^{202}Hg, ^{205}Tl, ^{206}Pb, ^{207}Pb, ^{208}Pb, ^{232}Th and ^{238}U