Title: A large-scale field investigation revealing the distribution characteristics of arsenic in earthworm tissues

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Total:

Number of tables: 4

Number of pages: 12

Contents

Tables

Table S1 The dominant earthworm species, soil types, and climate at sampling sites from the field survey across China.

Table S2 Total arsenic contents within the earthworm body tissues and surrounding soils of sampling sites across China.

Table S3 Arsenic species within the earthworm body tissues and surrounding soils of sampling sites across China.

Table S4. Environmental variables of soil samples from the field survey across China.

Table S1 The dominant earthworm species and soil types at sampling sites from the field survey across China.

Site	Dominant species	Soil type	MAT (℃)	MAP (mm)
GDGZ1	*Metaphire californica*	Lateritic-red earths	22	1159
GDRH2	*Metaphire californica*	Lateritic-red earths	19.6	1665
CQ1	*Amynthas morrisi*	Brown earths	19.6	1448
CQ2	*Amynthas morrisi*	Brown earths	19.6	1448
LNSY1	*Drawida ghilarovi*	Black soils	8	714
LNSY2	*Drawida ghilarovi*	Black soils	8	714
XJ2	*Aporrectodea caliginosa*	Brown-desert soils	8.9	177
GSLZ2	*Eisenia andrei*	Brown earths	10.3	327
JLTH2	*Drawida sp.*	Brown earths	5.5	870
JLCH1	*Eisenia nordenskioldi*	Black soils	4.8	861
JLCH2	*Eisenia nordenskioldi*	Yellow-brown earths	4.8	861
FJW1	*Metaphire californica*	Red earths	18	1730
FJW2	*Metaphire californica*	Red earths	18	1730
GX2	*Eisenia andrei*	Lateritic-red earths	22.2	1222.3
AR1	*Eisenia nordenskioldi*	Black soils	5.9	533
AR2	*Eisenia nordenskioldi*	Black soils	5.9	533
YNKM2	*Drawida ghilarovi*	Lateritic-red earths	15	1035
HNXC1	*Drawida gisti*	Fluvo-aquic soils	14.8	750.2
HNSQ2	*Drawida gisti*	Fluvo-aquic soils	14.6	736.2
HNLK2	*Eisenia andrei*	Fluvo-aquic soils	15	658
HNZK2	*Eisenia andrei*	Fluvo-aquic soils	15.6	749.7
HNKF2	*Amynthas gracilis*	Fluvo-aquic soils	15	658
HNCS1	*Eisenia nordenskioldi*	Black soils	17.4	1538.2
HNCS2	*Amynthas gracilis*	Brown earths	17.4	1538.2
HNLZY2	*Eisenia andrei*	Brown earths	17.3	1763.5
HN2	*Amynthas gracilis*	Yellow-brown earths	17.4	1538.2
JXYT1	*Metaphire californica*	Red earths	18	1750
JX2	*Amynthas robustus*	Red earths	18	1750
SCGY2	*Drawida ghilarovi*	Yellow earths	15.6	1070.5
SCCX1	*Amynthas morrisi*	Yellow earths	15.6	1070.5
SCCD2	*Amynthas morrisi*	Yellow earths	15.6	1070.5
SDJN1	*Metaphire californica*	Brown earths	15	458
HBBD1	*Drawida japonica*	Cinnamon soils	12.6	506
HBBD2	*Drawida japonica*	Fluvo-aquic soils	12.6	506
HBWH1	*Amynthas morrisi*	Dark-brown earths	16.8	1707.5
HBWH2	*Amynthas hupeiensis*	Fluvo-aquic soils	16.8	1707.5
TJ2	*Drawida sp.*	Fluvo-aquic soils	13.5	600
NJ1	*Amynthas carnosus*	Yellow-brown earths	16.4	1765.6

NJ2	*Amynthas carnosus*	Yellow-brown earths	16.4	1765.6
JSCZ2	*Eisenia andrei*	Yellow-brown earths	16.8	1822.1
SZ2	*Eisenia andrei*	Yellow-brown earths	17.1	1601.1
SH2	*Amynthas morrisi*	Yellow-brown earths	17.1	1649.1
GZGY1	*Amynthas sp.*	Yellow earths	15.2	1430.8
GZGY2	*Metaphire californica*	Lateritic-red earths	15.2	1430.8
ZJHZ1	*Amynthas robustus*	Yellow-brown earths	17.5	2131.9
ZJHZ2	*Metaphire californica*	Yellow-brown earths	17.5	2131.9
ZJ2	*Metaphire californica*	Yellow-brown earths	17.9	1853.7

Table S2 The BFs of earthworms, and total arsenic contents within the earthworm body tissues and surrounding soils of sampling sites across China.

Site	Earthworm (mg/kg)	Soil (mg/kg)	Ratio (BFs)
GDGZ1	3.347	6.790	0.49
GDRH2	9.127	24.627	0.37
CQ1	5.561	6.383	0.87
CQ2	2.595	9.664	0.27
LNSY1	4.482	9.198	0.49
LNSY2	7.206	30.077	0.24
XJ2	1.323	1.824	0.73
GSLZ2	**22.686**	**14.188**	**1.60**
JLTH2	2.655	12.254	0.22
JLCH1	2.482	11.323	0.22
JLCH2	6.626	10.388	0.64
FJW1	0.885	4.674	0.19
FJW2	2.532	6.186	0.41
GX2	5.385	11.763	0.46
AR1	6.326	10.885	0.58
AR2	3.172	8.858	0.36
YNKM2	2.587	*33.667*	0.08
HNXC1	1.568	9.225	0.17
HNSQ2	4.083	15.079	0.27
HNLK2	5.749	10.008	0.57
HNZK2	**22.474**	**8.343**	**2.69**
HNKF2	4.491	12.720	0.35
HNCS1	3.894	16.533	0.24
HNCS2	10.973	38.477	0.29
HNLZY2	15.780	18.912	0.83
HN2	5.732	18.967	0.30
JXYT1	6.448	22.399	0.29
JX2	5.875	14.338	0.41
SCGY2	6.928	7.718	0.90
SCCX1	4.557	10.433	0.44
SCCD2	5.479	13.219	0.41
SDJN1	2.558	10.535	0.24
HBBD1	7.981	11.283	0.71
HBBD2	5.494	12.960	0.42
HBWH1	11.223	16.736	0.67
HBWH2	3.214	14.147	0.23
TJ2	8.263	12.208	0.68
NJ1	5.975	11.057	0.54

NJ2	3.118	9.575	0.33
JSCZ2	**20.851**	**10.721**	**1.94**
SZ2	5.456	9.335	0.58
SH2	2.569	11.168	0.23
GZGY1	2.999	11.186	0.27
GZGY2	7.051	16.808	0.42
ZJHZ1	2.815	6.084	0.46
ZJHZ2	8.315	11.174	0.74
ZJ2	5.028	9.979	0.50
Average	6.21	12.99	0.53

Notes: The place with bold fonts indicated that the sampling sites where total arsenic concentration in earthworm tissues that are higher than in soils.

Table S3 Arsenic species within the earthworm body tissues and surrounding soils of sampling sites across China.

Site	Earthworm					Soil	
	As^{III}	As^{V}	AsB	DMA	MMA	As^{III}	As^{V}
GDGZ1	0.226	0.325	0.070	-	-	0.307	0.617
GDRH2	1.357	2.795	-	-	0.050	0.918	4.452
CQ1	1.248	2.110	-	-	-	0.327	1.002
CQ2	0.321	0.940	0.041	-	-	0.165	1.217
LNSY1	2.595	3.464	0.343	-	-	0.176	4.723
LNSY2	0.264	0.516	0.029	0.088	-	0.082	0.950
XJ2	0.669	0.741	-	-	-	0.185	1.705
GSLZ2	10.038	11.587	0.041	-	-	0.194	1.060
JLTH2	0.286	0.580	0.088	-	-	0.091	1.030
JLCH1	4.673	5.404	0.025	-	-	0.619	2.577
JLCH2	1.142	1.441	-	-	-	0.310	2.445
FJW1	0.026	0.087	-	-	-	0.288	0.714
FJW2	0.082	0.161	0.023	0.024	0.016	0.169	0.833
GX2	2.025	3.041	-	-	-	0.210	1.109
AR1	0.926	2.522	0.059	-	-	0.117	1.348
AR2	0.483	0.603	0.026	-	-	0.138	1.108
YNKM2	0.433	0.498	0.029	0.076	-	0.962	1.547
HNXC1	0.154	0.200	0.050	-	-	0.351	0.676
HNSQ2	0.367	0.628	0.022	-	-	0.118	1.089
HNLK2	2.155	2.361	0.028	-	-	0.127	0.913
HNZK2	2.037	2.926	0.025	-	-	0.337	0.825
HNKF2	0.089	0.249	0.016	0.096	-	0.122	0.829
HNCS1	0.226	0.365	0.070	-	-	0.601	1.087
HNCS2	1.048	1.193	-	-	-	0.185	0.819
HNLZY2	1.618	1.878	-	-	-	0.203	3.228
HN2	1.037	1.389	0.089	-	-	0.130	1.315
JXYT1	1.736	2.718	0.069	-	-	0.226	4.924
JX2	0.209	0.240	0.024	-	-	0.164	0.267
SCGY2	1.192	1.196	-	-	-	0.096	0.339
SCCX1	0.291	0.812	0.061	-	-	0.134	0.558
SCCD2	1.085	1.146	-	-	-	0.060	1.931
SDJN1	0.617	0.629	0.046	-	-	0.094	1.189
HBBD1	1.329	3.283	-	-	-	0.107	1.126
HBBD2	1.081	1.278	0.026	-	-	0.074	0.872
HBWH1	1.583	1.997	-	-	-	0.170	1.571
HBWH2	0.346	0.565	0.022	-	-	0.127	1.017
TJ2	0.306	0.574	0.026	-	-	0.135	0.712
NJ1	1.298	1.509	0.013	-	-	0.131	0.856

NJ2	0.271	0.459	0.045	-	-	0.104	0.926
JSCZ2	3.595	4.412	0.061	-	-	0.147	1.347
SZ2	1.524	1.636	0.000	-	-	0.140	1.291
SH2	0.085	0.276	0.040	-	-	0.338	1.534
GZGY1	0.146	0.346	0.033	-	-	0.094	0.637
GZGY2	0.948	1.657	0.023	0.086	-	0.114	1.940
ZJHZ1	0.121	0.349	0.077	-	0.060	0.101	0.489
ZJHZ2	1.672	2.532	0.000	-	-	0.165	3.708
ZJ2	0.532	0.694	0.014	-	-	0.163	2.123

Note: As^{III} : arsenite; As^{V} : arsenate; AsB: arsenobetaine; DMA: dimethylarsinic acid; MMA: monomethylarsonic acid. “-” indicates the concentration value did not reach the detection baseline.

Table S4 Environmental variables of soil samples from the field survey across China.

Site	Clay	pH	EC	TC	TN	NH_4^+	NO_3^-	Cr	Mn	Co	Ni	Cu	Zn	Cd	Pb
GDGZ1	1.06	4.24	192.0	1.34	0.07	27.31	37.75	23.63	268.61	3.47	9.93	18.78	78.01	0.32	46.76
GDRH2	1.41	4.57	617.0	1.01	0.10	26.81	195.77	59.43	239.43	4.68	18.52	20.38	415.83	1.72	242.30
CQ1	1.76	5.62	153.5	2.80	0.26	9.86	19.19	54.18	404.19	11.89	29.11	20.51	73.78	0.11	26.73
CQ2	1.30	7.60	103.8	4.33	0.32	6.45	11.30	63.87	507.12	13.41	32.83	28.75	92.58	0.35	35.41
LNSY1	0.93	7.49	398.9	2.48	0.22	11.15	68.95	71.04	648.93	12.95	31.82	35.65	85.33	0.19	29.12
LNSY2	1.27	6.37	401.9	3.11	0.22	12.00	67.24	56.30	518.20	10.52	25.45	36.45	110.76	0.24	36.05
XJ2	1.49	7.55	510.9	9.84	0.78	8.41	64.32	45.42	705.89	11.45	26.84	38.49	105.45	0.30	30.33
GSLZ2	0.86	6.96	1468	1.81	0.19	11.92	323.85	62.85	574.58	11.21	32.14	30.71	123.88	0.62	36.83
JLTH2	1.28	5.91	177.7	1.93	0.14	14.53	24.73	59.59	589.82	11.26	23.05	31.17	105.17	0.20	37.75
JLCH1	1.20	7.51	244.4	1.93	0.14	9.20	22.45	47.13	749.07	9.53	21.53	17.62	59.96	0.17	26.64
JLCH2	1.15	7.73	496.4	1.62	0.07	10.26	42.09	46.08	543.45	8.59	21.05	19.51	67.46	0.20	26.04
FJW1	1.34	5.15	92.2	2.20	0.16	12.96	14.60	69.21	212.83	11.97	30.26	37.69	117.38	0.25	72.48
FJW2	1.34	5.15	92.2	2.20	0.16	12.96	14.60	75.37	184.04	5.40	26.76	32.12	76.86	0.19	63.64
GX2	1.63	7.69	675.8	3.17	0.26	14.40	25.24	59.10	583.84	10.61	25.13	26.52	176.46	0.37	29.33
AR1	0.97	6.96	374.9	3.39	0.18	12.12	63.76	46.15	385.78	7.85	21.48	19.20	64.79	0.10	24.02
AR2	0.97	6.47	156.1	1.59	0.14	10.17	23.00	34.59	397.86	7.32	15.63	15.58	67.07	0.17	26.41
YNKM2	1.35	6.68	621.6	3.74	0.37	12.12	15.25	84.78	1358.1	17.37	41.27	58.66	506.78	1.37	231.40
HNXC1	1.06	5.34	192.0	1.45	0.13	27.31	37.75	50.89	394.19	8.23	21.82	22.78	78.12	0.33	32.43
HNSQ2	1.75	7.73	257.9	1.52	0.14	10.15	20.43	63.16	596.63	11.49	30.14	23.18	81.06	0.24	29.52
HNLK2	1.58	7.22	1826	0.74	0.09	7.71	67.20	43.51	432.56	7.99	21.68	21.66	79.63	0.23	27.18
HNZK2	1.58	7.34	826.0	0.74	0.09	7.71	367.20	50.20	350.26	7.34	19.09	17.05	70.66	0.21	25.35
HNKF2	0.95	7.86	278.1	1.39	0.19	8.34	42.83	55.98	543.02	10.47	26.47	20.93	72.82	0.26	28.06
HNCS1	0.66	6.12	518.0	1.30	0.11	9.57	99.77	35.04	252.52	7.95	13.39	21.21	98.50	0.45	62.84

HNCS2	0.66	6.12	518.0	1.30	0.11	9.57	99.77	166.94	956.14	38.84	63.34	170.95	507.36	0.97	298.18
HNLZY2	1.19	6.88	484.9	1.42	0.13	12.56	97.39	58.37	403.34	9.85	17.32	22.60	75.93	0.80	42.39
HN2	1.06	5.34	192.0	1.45	0.13	27.31	37.75	91.51	849.58	16.37	41.68	68.37	190.54	0.35	42.01
JXYT1	1.34	4.97	169.1	1.98	0.15	26.81	24.90	30.47	193.21	3.13	9.33	43.85	204.26	0.84	110.32
JX2	1.40	4.91	272.3	1.34	0.12	15.16	49.14	17.98	624.70	7.25	8.87	15.37	89.92	0.29	31.56
SCGY2	0.26	6.34	810.6	0.19	0.12	16.87	70.45	39.90	443.53	6.38	19.78	38.24	85.96	0.67	24.60
SCCX1	1.05	7.45	236.7	1.34	0.11	7.79	24.87	59.10	583.84	10.61	25.13	26.52	176.46	0.37	29.33
SCCD2	1.63	7.21	353.2	2.13	0.15	8.90	38.66	73.23	617.25	13.80	34.87	32.28	92.66	0.18	29.38
SDJN1	1.34	7.02	411.5	2.80	0.26	7.54	52.65	58.06	491.18	11.22	27.79	22.33	71.07	0.18	26.84
HBBD1	1.30	7.33	211.9	3.81	0.34	12.02	22.61	47.45	437.35	8.85	22.96	19.59	77.58	0.22	34.03
HBBD2	2.23	7.40	703.1	1.68	0.16	8.37	56.68	57.25	505.48	10.93	29.20	26.86	83.26	0.20	29.26
HBWH1	0.53	7.05	564.6	1.92	0.14	18.48	89.40	59.73	358.64	7.09	19.62	29.63	120.13	0.47	48.25
HBWH2	1.84	6.84	400.3	1.72	0.15	7.43	19.07	65.92	575.29	13.41	28.02	35.20	123.38	0.15	30.15
TJ2	2.50	7.27	334.1	2.46	0.12	7.16	26.82	84.70	782.44	13.10	44.07	31.94	124.15	0.37	41.44
NJ1	2.18	5.14	215.1	2.60	0.19	9.59	20.90	67.20	498.07	11.24	29.13	40.25	81.45	0.21	50.77
NJ2	1.56	6.41	110.3	2.23	0.15	7.87	5.49	59.80	439.26	11.77	26.71	25.38	80.31	0.25	34.90
JSCZ2	1.09	7.42	638.7	1.52	0.15	13.29	120.22	68.21	405.71	10.35	30.90	25.06	63.45	0.11	25.32
SZ2	1.02	6.65	268.9	1.77	0.12	9.86	14.58	74.78	408.12	13.21	34.73	28.68	80.92	0.22	30.95
SH2	1.14	6.96	276.2	0.44	0.06	14.37	17.13	64.73	314.44	11.04	30.28	27.75	87.50	0.29	30.42
GZGY1	1.85	7.10	257.3	5.15	0.41	14.35	34.13	98.47	647.48	31.68	57.52	77.10	94.65	0.35	31.60
GZGY2	1.85	7.10	257.3	5.55	0.41	14.35	34.13	102.90	437.50	14.90	30.88	58.03	126.33	0.37	36.65
ZJHZ1	0.51	6.32	140.8	2.62	0.14	9.41	22.63	47.31	1448.7	12.21	15.29	40.78	170.14	0.98	81.07
ZJHZ2	1.59	5.59	91.6	1.68	0.17	8.38	17.59	49.68	338.01	7.24	17.34	38.46	123.52	0.32	52.75
ZJ2	2.22	5.08	162.8	4.78	0.28	9.75	31.18	55.85	176.60	7.06	13.66	41.19	77.12	0.20	35.86