HOKKAIDO UNIVERSITY

Title	Differences in ionomic responses to nutrient deficiencies among plant species under field conditions
Author(s)	Watanabe, Toshihiro; Okada, Ryosuke; Urayama, Masaru
Citation	Journal of Plant Nutrition, 45(10), 1493-1503 https://doi.org/10.1080/01904167.2021.2020837
Issue Date	2022-06-15
Doc URL	https://hdl.handle.net/2115/89804
Rights	This is an Accepted Manuscript of an article published by Taylor & Francis in Journal of Plant Nutrition on 15 Jun 2022, available online: http://www.tandfonline.com/10.1080/01904167.2021.2020837.
Type	journal article
File Information	Supplemental materials_1.pdf

Hokkaido University Collection of Scholarly and Academic Papers : HUSCAP

Supplemental materials

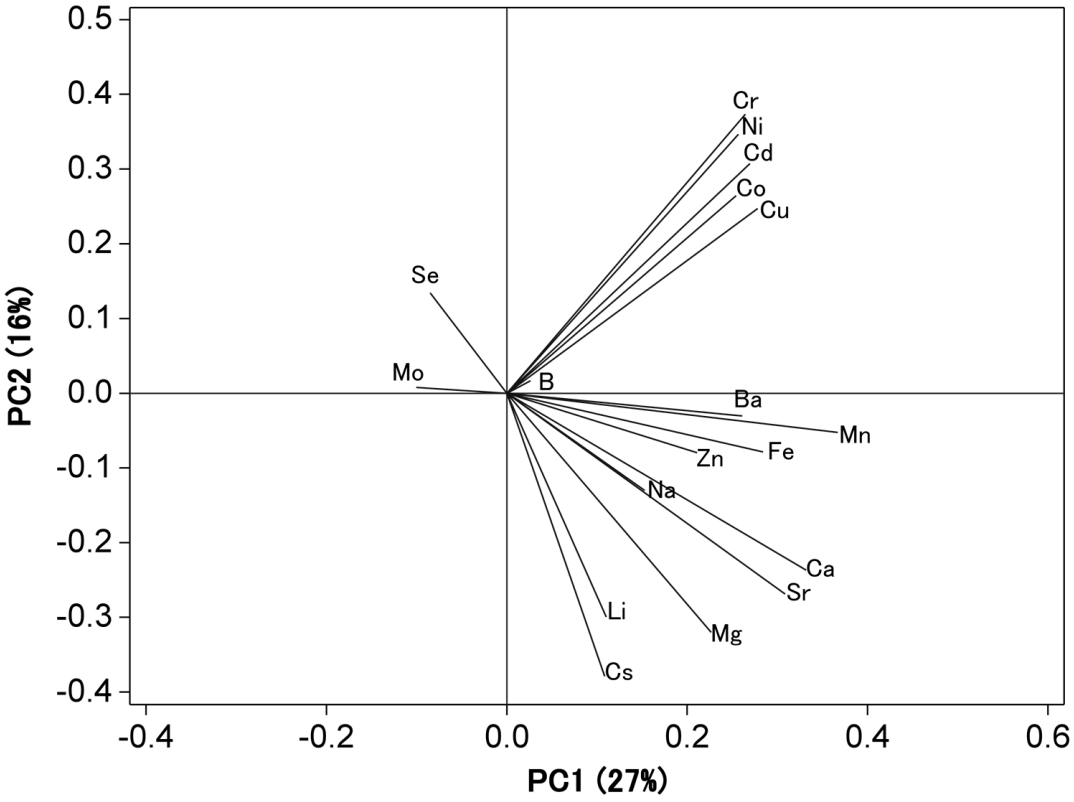

Figure S1. Loading plot for Figure 3.

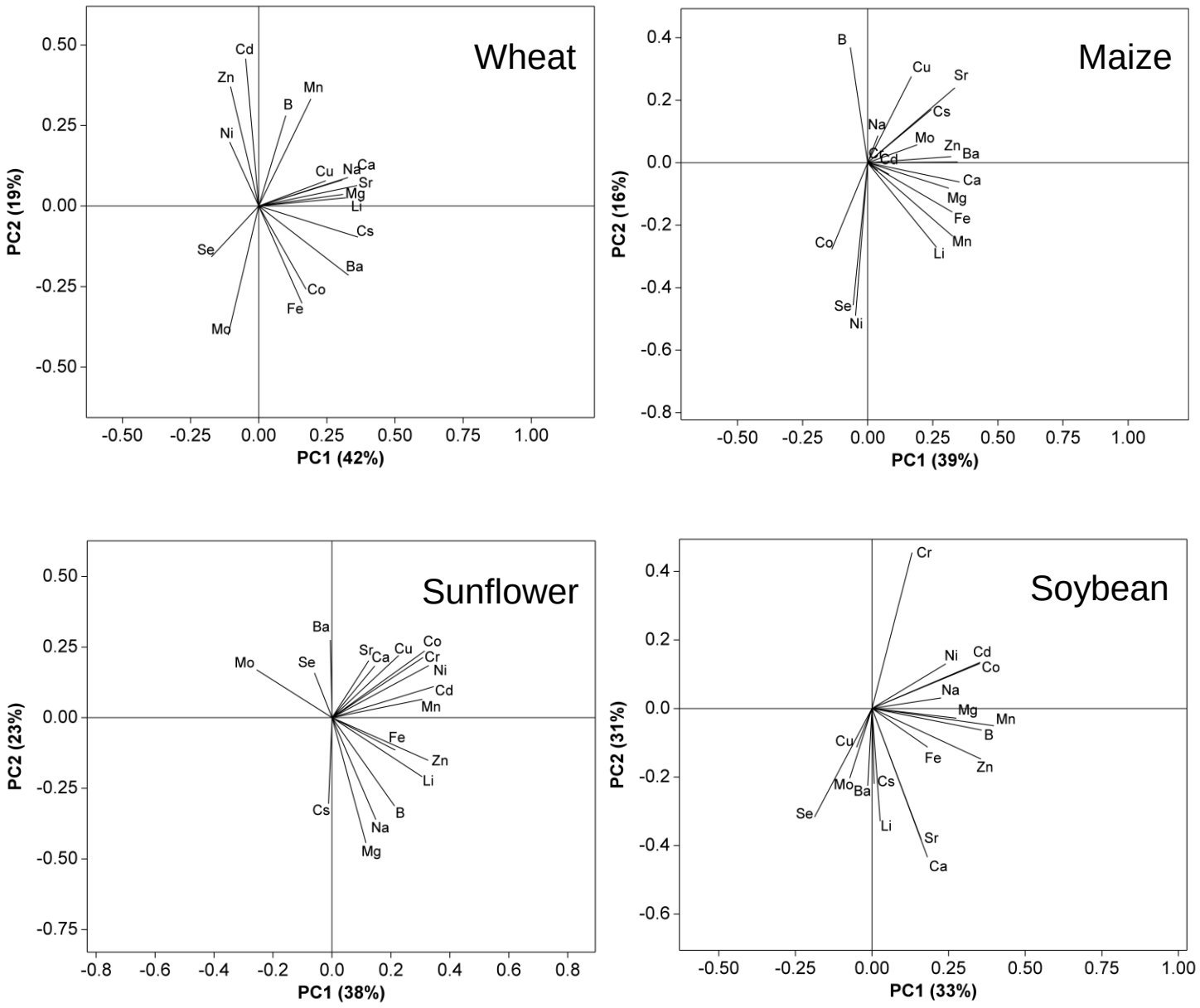

Figure S2. Loading plot for Figure 4.

Table S1. Concentration of each mineral element in leaf, seed, and root of wheat, maize, sunflower, and soybean.

			N (mg g^{-1})	P (mg g^{-1})	K (mg g^{-1})	Ca (mg g^{-1})	Mg (mg g^{-1})	Fe (μg g^{-1})	Mn (μg g^{-1})	Zn (μg g^{-1})	B (μg g^{-1})	Cu (μg g^{-1})	Mo (μg g^{-1})	Ni (μg g^{-1})	Li (μg g^{-1})	Na (μg g^{-1})	Al (μg g^{-1})	Cr (μg g^{-1})	Co (μg g^{-1})	As (μg g^{-1})	Se (μg g^{-1})	Sr (μg g^{-1})	Cd (μg g^{-1})	Cs (μg g^{-1})	Ba (μg g^{-1})
Leaf	Wheat	+NPK	35.0 ±1.4	4.72 ±0.08	29.2 ±0.4	7.19 ±0.33	1.74 ±0.09	153 ±13	132 ±9	32.2 ±1.9	3.0 ±0.2	9.6 ±0.5	0.97 ±0.10	5.5 ±0.4	0.258 ±0.005	236 ±22	60.4 ±11.2	8.28 ±0.83	0.16 ±0.01	0.35 ±0.01	0.137 ±0.015	23.7 ±0.6	0.201 ±0.022	6.23 ±0.33	36.0 ±1.3
		-N	22.2 ±0.3	3.30 ±0.07	25.4 ±0.4	4.62 ±0.08	1.55 ±0.07	151 ±10	41 ±3	31.1 ±10.7	2.5 ±0.1	7.6 ±0.2	2.98 ±0.06	5.5 ±0.6	0.139 ±0.009	49 ±3	72.1 ±10.8	9.93 ±0.86	0.19 ±0.02	0.38 ±0.01	0.324 ±0.026	20.1 ±0.3	0.097 ±0.003	0.90 ±0.03	38.0 ±0.9
		-P	35.0 ±0.8	2.04 ±0.02	29.7 ±1.1	4.05 ±0.06	1.62 ±0.03	146 ±6	104 ±8	56.6 ±2.4	3.1 ±0.1	14.8 ±0.2	0.35 ±0.06	4.5 ±0.6	0.198 ±0.026	61 ±2	66.0 ±3.7	7.77 ±1.23	0.13 ±0.01	0.17 ±0.01	0.143 ±0.019	15.9 ±0.2	0.140 ±0.007	1.72 ±0.19	24.6 ±0.4
		-K	35.5 ±1.0	5.52 ±0.17	6.6 ±0.3	11.71 ±0.44	4.00 ±0.19	150 ±7	195 ±19	38.3 ±3.0	4.4 ±0.3	10.3 ±0.3	0.86 ±0.21	4.4 ±0.3	0.533 ±0.081	5148 ±288	72.7 ±7.3	6.74 ±0.42	0.13 ±0.01	0.38 ±0.01	0.111 ±0.023	43.7 ±1.7	0.230 ±0.021	25.31 ±1.21	63.1 ±0.7
	Maize	+NPK	32.7 ±0.3	4.10 ±0.10	31.6 ±1.2	6.18 ±0.27	1.82 ±0.11	133 ±6	99 ±3	36.9 ±1.4	4.6 ±0.5	11.5 ±0.1	0.29 ±0.03	2.7 ±0.1	0.050 ±0.004	120 ±3	44.9 ±5.9	3.54 ±0.27	0.11 ±0.02	0.26 ±0.02	0.042 ±0.012	16.8 ±0.5	0.137 ±0.003	4.94 ±0.05	2.1 ±0.1
		-N	13.4 ±0.1	4.50 ±0.20	30.1 ±0.7	3.67 ±0.21	1.82 ±0.12	79 ±11	31 ±2	16.6 ±0.5	2.6 ±0.2	6.0 ±0.4	0.42 ±0.00	2.2 ±0.3	0.015 ±0.001	145 ±3	38.4 ±8.9	3.57 ±0.50	0.08 ±0.03	0.20 ±0.03	0.095 ±0.012	13.9 ±0.5	0.057 ±0.004	0.46 ±0.05	2.5 ±0.1
		-P	30.9 ±0.3	2.12 ±0.05	31.8 ±0.8	3.31 ±0.16	1.62 ±0.05	109 ±5	67 ±8	34.8 ±4.0	2.5 ±0.0	12.4 ±0.1	0.29 ±0.15	2.1 ±0.1	0.074 ±0.029	99 ±4	35.3 ±8.1	2.49 ±0.19	0.05 ±0.00	0.05 ±0.01	0.026 ±0.012	10.9 ±0.5	0.085 ±0.007	1.44 ±0.16	2.4 ±0.1
		-K	34.2 ±0.9	6.79 ±0.47	9.2 ±0.2	9.84 ±0.39	1.62 ±0.05	154 ±9	196 ±21	62.6 ±4.8	4.0 ±0.2	11.1 ±0.5	0.52 ±0.05	2.8 ±0.3	0.142 ±0.030	130 ±6	60.3 ±10.4	3.52 ±0.46	0.09 ±0.01	0.36 ±0.01	0.068 ±0.013	31.1 ±0.7	0.197 ±0.009	28.33 ±0.53	4.7 ±0.1
	Sunflower	+NPK	46.5 ±0.8	3.76 ±0.07	32.8 ±1.3	31.02 ±0.67	7.97 ±0.09	157 ±17	298 ±61	69.3 ±7.4	34.5 ±3.0	8.0 ±0.4	0.14 ±0.02	3.5 ±0.2	0.490 ±0.095	55 ±1	65.8 ±4.0	2.79 ±0.11	0.44 ±0.09	0.24 ±0.02	0.167 ±0.027	71.6 ±3.8	0.617 ±0.049	3.77 ±0.38	10.2 ±0.6
		-N	29.9 ±1.2	5.24 ±0.34	40.4 ±1.1	27.83 ±0.39	3.74 ±0.07	162 ±9	55 ±2	43.3 ±2.9	53.8 ±1.2	12.9 ±0.9	0.43 ±0.01	3.5 ±0.2	0.229 ±0.020	34 ±1	83.2 ±9.7	3.99 ±0.31	0.24 ±0.02	0.31 ±0.01	0.215 ±0.043	90.0 ±1.7	0.557 ±0.044	0.31 ±0.04	29.1 ±0.8
		-P	45.6 ±0.3	2.16 ±0.04	41.9 ±0.2	24.10 ±0.44	3.94 ±0.08	219 ±14	262 ±6	111.8 ±5.5	30.9 ±1.4	25.5 ±0.4	0.06 ±0.01	5.2 ±0.3	0.384 ±0.020	51 ±2	146.7 ±21.9	5.85 ±0.62	0.91 ±0.02	0.30 ±0.03	0.085 ±0.009	64.4 ±2.5	0.750 ±0.020	0.81 ±0.16	29.4 ±1.1
		-K	47.2 ±0.9	4.94 ±0.16	10.4 ±0.5	37.81 ±2.11	12.20 ±0.68	201 ±7	525 ±31	102.2 ±1.2	49.1 ±4.3	7.6 ±0.3	0.05 ±0.00	5.3 ±0.2	0.785 ±0.104	1682 ±54	123.8 ±10.6	4.16 ±0.41	0.61 ±0.01	0.34 ±0.02	0.214 ±0.033	93.9 ±5.3	1.103 ±0.037	10.90 ±0.06	14.0 ±1.9
	Soybean	+NPK	46.9 ±0.5	3.21 ±0.06	17.8 ±0.3	19.14 ±1.43	4.08 ±0.22	147 ±2	212 ±16	116.1 ±3.9	34.2 ±0.0	6.8 ±0.3	0.15 ±0.03	4.0 ±0.1	0.054 ±0.007	55 ±6	61.6 ±4.8	2.52 ±0.20	0.15 ±0.01	0.15 ±0.01	0.074 ±0.010	36.9 ±2.8	0.245 ±0.008	2.59 ±0.08	5.0 ±0.4
		-N	40.6 ±0.8	2.82 ±0.05	22.7 ±0.4	12.20 ±0.38	1.93 ±0.08	124 ±4	70 ±2	62.7 ±3.2	31.8 ±0.4	5.1 ±0.2	0.03 ±0.02	2.4 ±0.1	0.034 ±0.011	68 ±7	32.6 ±6.8	2.32 ±0.27	0.13 ±0.01	0.16 ±0.01	0.119 ±0.005	31.2 ±0.6	0.118 ±0.003	0.75 ±0.04	7.1 ±0.1
		-P	41.3 ±1.2	1.16 ±0.04	20.1 ±0.5	11.92 ±0.20	2.54 ±0.06	108 ±5	132 ±10	91.9 ±3.2	25.4 ±0.5	11.1 ±0.1	0.01 ±0.01	3.5 ±0.2	0.157 ±0.009	62 ±3	62.6 ±5.5	2.03 ±0.11	0.16 ±0.01	0.06 ±0.01	0.058 ±0.004	27.3 ±0.4	0.107 ±0.005	0.82 ±0.16	5.6 ±0.3
		-K	42.5 ±0.7	3.48 ±0.05	7.1 ±0.2	24.70 ±1.01	8.53 ±0.15	167 ±16	394 ±7	137.2 ±1.2	41.8 ±0.7	2.1 ±0.0	0.21 ±0.02	4.2 ±0.5	0.092 ±0.020	68 ±5	78.6 ±0.6	3.00 ±0.52	0.23 ±0.01	0.19 ±0.02	0.037 ±0.015	57.7 ±2.6	0.343 ±0.011	8.42 ±0.19	6.6 ±0.5
Seed	Wheat	+NPK	21.9 ±2.0	5.09 ±0.19	4.6 ±0.2	0.62 ±0.03	1.85 ±0.06	51 ±3	57 ±2	45.3 ±1.2	2.8 ±0.5	6.1 ±0.1	0.77 ±0.13	0.8 ±0.0	0.028 ±0.004	24 ±0	0.4 ±0.1	0.97 ±0.25	0.00 ±0.00	UD	0.056 ±0.006	2.8 ±0.0	0.138 ±0.003	1.46 ±0.08	2.0 ±0.1
		-N	22.9 ±1.4	5.22 ±0.11	4.8 ±0.0	0.47 ±0.01	2.23 ±0.06	53 ±4	45 ±0	49.8 ±0.8	1.4 ±0.2	7.4 ±0.1	0.79 ±0.03	0.7 ±0.1	0.013 ±0.001	24 ±1	0.2 ±0.0	0.99 ±0.05	0.01 ±0.00	UD	0.190 ±0.027	2.0 ±0.0	0.103 ±0.003	0.14 ±0.01	1.7 ±0.1
		-P	27.2 ±2.2	4.83 ±0.04	4.6 ±0.1	0.62 ±0.04	2.24 ±0.03	60 ±2	67 ±3	81.1 ±1.5	1.1 ±0.0	11.9 ±0.4	0.27 ±0.00	0.7 ±0.0	0.013 ±0.001	22 ±3	1.6 ±0.9	1.06 ±0.15	0.00 ±0.00	UD	0.077 ±0.007	2.2 ±0.2	0.106 ±0.004	0.39 ±0.02	1.7 ±0.1
		-K	28.5 ±1.0	5.05 ±0.03	4.6 ±0.0	0.82 ±0.02	1.96 ±0.03	67 ±5	50 ±2	45.0 ±1.2	1.6 ±0.5	6.7 ±0.2	0.83 ±0.16	0.8 ±0.0	0.029 ±0.008	32 ±1	2.7 ±0.4	1.01 ±0.10	0.02 ±0.00	UD	0.063 ±0.017	4.0 ±0.3	0.112 ±0.007	5.32 ±0.19	3.8 ±0.2
	Maize	+NPK	27.9 ±1.3	5.31 ±0.07	9.5 ±0.0	0.24 ±0.05	2.16 ±0.05	42 ±8	25 ±0	44.7 ±1.7	3.5 ±0.1	4.7 ±0.4	0.23 ±0.01	0.7 ±0.1	0.003 ±0.000	3 ±1	0.7 ±0.2	1.45 ±0.13	0.01 ±0.00	UD	0.041 ±0.002	0.4 ±0.0	0.012 ±0.000	0.80 ±0.07	0.1 ±0.0
		-N	24.9 ±0.8	5.56 ±0.09	8.7 ±0.3	0.17 ±0.01	2.39 ±0.05	28 ±0	19 ±1	48.1 ±1.2	4.1 ±0.6	4.8 ±0.1	0.55 ±0.18	0.7 ±0.0	0.008 ±0.005	4 ±0	1.0 ±0.3	1.25 ±0.12	0.01 ±0.01	UD	0.184 ±0.021	0.3 ±0.0	0.013 ±0.003	0.19 ±0.02	0.1 ±0.0
		-P	26.5 ±0.9	4.70 ±0.12	8.4 ±0.1	0.17 ±0.02	2.04 ±0.01	30 ±1	20 ±1	42.4 ±0.4	3.4 ±0.2	5.9 ±0.2	0.31 ±0.03	0.5 ±0.0	0.002 ±0.000	3 ±2	UD	1.22 ±0.07	0.00 ±0.00	UD	0.053 ±0.005	0.3 ±0.0	0.011 ±0.001	0.47 ±0.06	0.1 ±0.0
		-K	27.4 ±0.4	5.03 ±0.07	7.8 ±0.1	0.29 ±0.03	2.11 ±0.08	38 ±1	22 ±0	41.6 ±1.3	3.2 ±0.1	4.6 ±0.3	0.39 ±0.03	0.6 ±0.0	0.003 ±0.001	5 ±2	1.1 ±0.5	1.23 ±0.27	0.00 ±0.00	UD	0.058 ±0.005	0.7 ±0.0	0.009 ±0.000	11.60 ±0.79	0.1 ±0.0
	Sunflower	+NPK	33.6 ±1.6	8.12 ±0.28	6.2 ±0.1	4.69 ±0.05	3.67 ±0.06	101 ±6	113 ±9	92.0 ±4.3	19.9 ±1.6	28.3 ±2.0	0.37 ±0.17	8.0 ±0.6	0.016 ±0.009	6 ±2	1.8 ±0.8	5.54 ±0.14	0.28 ±0.04	0.06 ±0.02	0.047 ±0.013	6.7 ±0.5	0.334 ±0.010	0.32 ±0.05	0.9 ±0.1
		-N	34.4 ±1.7	7.46 ±0.28	6.7 ±0.3	4.20 ±0.33	3.25 ±0.12	73 ±9	23 ±1	68.2 ±2.1	17.9 ±0.9	30.7 ±1.6	0.25 ±0.01	4.8 ±0.7	0.004 ±0.000	6 ±1	2.4 ±0.7	5.55 ±1.32	0.11 ±0.02	0.02 ±0.01	0.138 ±0.007	9.4 ±0.9	0.279 ±0.006	0.13 ±0.01	1.7 ±0.2
		-P	37.5 ±2.1	7.58 ±0.28	6.6 ±0.3	4.82 ±0.15	3.39 ±0.02	95 ±4	79 ±1	81.1 ±1.0	19.8 ±0.6	32.3 ±0.7	0.12 ±0.02	5.6 ±0.6	0.005 ±0.001	7 ±0	1.3 ±0.6	7.14 ±1.00	0.39 ±0.01	0.04 ±0.02	0.037 ±0.009	10.6 ±0.1	0.251 ±0.007	0.17 ±0.02	3.0 ±0.1
		-K	45.4 ±1.2	9.20 ±0.16	7.1 ±0.4	4.39 ±0.12	4.44 ±0.08	97 ±12	88 ±17	117.4 ±3.0	19.1 ±0.9	27.9 ±2.1	0.35 ±0.19	10.1 ±1.5	0.018 ±0.011	24 ±11	2.1 ±0.4	4.35 ±1.78	0.38 ±0.07	0.11 ±0.03	0.056 ±0.021	9.6 ±0.6	0.504 ±0.028	3.14 ±0.64	1.5 ±0.1
	Soybean	+NPK	59.4 ±2.1	5.80 ±0.05	21.9 ±0.3	2.34 ±0.07	2.72 ±0.04	80 ±3	46 ±2	53.7 ±2.2	30.8 ±1.9	8.1 ±0.3	1.37 ±0.04	5.2 ±0.1	0.000 ±0.000	7 ±2	UD	1.91 ±0.02	0.11 ±0.00	0.05 ±0.03	0.046 ±0.007	3.2 ±0.2	0.095 ±0.004	2.36 ±0.03	1.1 ±0.1
		-N	61.8 ±0.9	5.85 ±0.10	22.0 ±0.1	2.45 ±0.08	2.44 ±0.06	81 ±1	25 ±1	44.5 ±0.6	23.7 ±1.1	6.4 ±0.5	1.95 ±0.17	2.4 ±0.0	0.009 ±0.007	8 ±1	UD	1.75 ±0.08	0.10 ±0.01	0.10 ±0.01	0.096 ±0.012	4.6 ±0.2	0.064 ±0.005	0.54 ±0.05	2.1 ±0.1
		-P	60.7 ±1.5	3.88 ±0.17	20.1 ±0.3	2.55 ±0.10	2.13 ±0.01	82 ±2	35 ±1	48.9 ±0.8	24.3 ±1.3	16.2 ±0.2	1.15 ±0.05	2.8 ±0.0	0.002 ±0.000	8 ±0	0.3 ±0.1	1.50 ±0.07	0.11 ±0.01	0.04 ±0.03	0.071 ±0.007	5.3 ±0.1	0.023 ±0.001	2.34 ±0.10	1.6 ±0.1
		-K	65.6 ±0.9	5.90 ±0.21	16.5 ±0.8	2.81 ±0.05	1.81 ±0.03	84 ±6	45 ±1	61.1 ±2.1	32.6 ±1.3	5.6 ±0.1	2.15 ±0.10	6.3 ±0.3	0.002 ±0.000	13 ±1	0.2 ±0.1	1.53 ±0.11	0.09 ±0.00	0.02 ±0.01	0.044 ±0.010	4.0 ±0.0	0.075 ±0.001	30.12 ±1.30	1.1 ±0.1
Root	Wheat	+NPK	ND	1.62 ±0.04	7.0 ±0.3	2.60 ±0.16	0.81 ±0.04	1824 ±126	185 ±11	81.8 ±28.1	3.9 ±0.6	25.0 ±3.6	0.86 ±0.08	36.7 ±3.3	1.290 ±0.081	1267 ±172	2029 ±117	41.34 ±4.25	2.40 ±0.08	3.39 ±0.18	0.230 ±0.014	10.0 ±0.5	1.455 ±0.013	4.38 ±0.50	16.5 ±3.5
		-N	ND	1.46 ±0.10	7.3 ±0.5	2.25 ±0.09	0.75 ±0.01	1667 ±47	86 ±0	51.5 ±7.2	2.4 ±0.2	19.6 ±0.3	1.01 ±0.04	37.5 ±2.1	1.175 ±0.045	298 ±9	1618 ±52	48.51 ±3.79	1.64 ±0.07	3.34 ±0.13	0.212 ±0.031	9.5 ±0.3	1.196 ±0.071	0.81 ±0.02	8.9 ±0.5
		-P	ND	0.72 ±0.02	8.0 ±0.3	2.09 ±0.01	0.70 ±0.02	1395 ±112	222 ±17	81.1 ±15.1	2.0 ±0.1	36.0 ±1.3	0.75 ±0.23	41.0 ±9.7	1.087 ±0.071	646 ±52	1507 ±72	61.83 ±22.31	2.98 ±0.15	2.44 ±0.10	0.178 ±0.013	8.0 ±0.2	1.270 ±0.082	1.45 ±0.17	7.1 ±0.3
		-K	ND	1.78 ±0.08	1.0 ±0.0	3.74 ±0.12	0.87 ±0.09	2066 ±456	203 ±19	71.7 ±12.4	2.8 ±0.1	18.2 ±3.1	0.73 ±0.17	41.9 ±7.7	1.610 ±0.251	4930 ±169	2833 ±452	49.16 ±10.65	2.84 ±0.30	3.77 ±0.79	0.268 ±0.024	14.3 ±0.7	0.900 ±0.049	14.55 ±3.54	20.4 ±5.6
	Maize	+NPK	ND	1.88 ±0.09	17.6 ±0.7	3.66 ±0.25	1.60 ±0.16	6088 ±1242	191 ±30	34.9 ±3.0	1.0 ±0.1	12.1 ±1.9	0.54 ±0.09	46.1 ±7.5	2.701 ±0.331	563 ±44	5006 ±753	25.11 ±5.75	2.45 ±0.43	11.49 ±2.27	0.285 ±0.043	11.5 ±1.5	0.534 ±0.042	4.06 ±0.28	11.6 ±1.7
		-N	ND	2.34 ±0.18	16.1 ±1.2	1.66 ±0.13	0.80 ±0.06	2237 ±365	59 ±8	23.5 ±0.3	1.9 ±0.6	11.7 ±1.6	0.49 ±0.06	28.7 ±5.9	1.007 ±0.201	215 ±17	1800 ±369	33.66 ±6.69	1.07 ±0.15	4.35 ±0.58	0.170 ±0.017	6.8 ±0.3	0.636 ±0.026	1.08 ±0.18	5.6 ±2.2
		-P	ND	0.59 ±0.02	18.9 ±0.3	1.96 ±0.11	0.83 ±0.12	2136 ±622	67 ±18	19.5 ±2.0	2.5 ±0.2	19.7 ±0.5	0.28 ±0.05	21.4 ±5.3	1.034 ±0.313	173 ±9	1736 ±530	16.87 ±3.69	1.14 ±0.27	3.74 ±1.05	0.097 ±0.026	6.9 ±0.5	0.290 ±0.011	1.27 ±0.30	4.7 ±1.2
		-K	ND	1.45 ±0.04	5.4 ±0.3	5.41 ±0.90	1.30 ±0.07	2720 ±234	84 ±0	30.4 ±2.6	2.6 ±0.2	7.4 ±0.5	0.35 ±0.03	25.6 ±1.0	1.295 ±0.098	1980 ±267	2484 ±144	20.20 ±3.56	1.34 ±0.06	5.28 ±0.33	0.170 ±0.015	13.6 ±1.6	0.382 ±0.026	7.06 ±0.07	7.4 ±0.3
	Sunflower	+NPK	ND	1.50 ±0.04	17.0 ±0.8	3.46 ±0.01	1.52 ±0.10	487 ±125	48 ±7	47.1 ±3.8	17.2 ±0.7	7.2 ±0.2	0.13 ±0.01	8.8 ±1.8	0.589 ±0.041	5112 ±255	607 ±106	5.91 ±0.93	1.01 ±0.14	1.29 ±0.22	0.072 ±0.010	21.6 ±0.5	0.443 ±0.002	2.33 ±0.26	6.2 ±0.4
		-N	ND	2.23 ±0.07	32.9 ±1.3	4.09 ±0.12	0.94 ±0.05	482 ±27	24 ±1	32.1 ±1.2	18.5 ±0.5	8.6 ±0.4	0.32 ±0.03	8.1 ±0.3	0.388 ±0.030	738 ±64	454 ±29	7.30 ±0.39	0.52 ±0.02	1.35 ±0.07	0.130 ±0.012	34.7 ±1.2	0.365 ±0.027	0.40 ±0.01	10.3 ±0.3
		-P	ND	1.18 ±0.03	41.7 ±0.6	4.22 ±0.04	1.30 ±0.03	685 ±80	82 ±4	54.0 ±2.0	17.5 ±0.0	14.7 ±0.4	0.16 ±0.03	15.1 ±1.9	0.528 ±0.054	664 ±9	749 ±93	17.77 ±2.37	2.16 ±0.19	1.46 ±0.17	0.107 ±0.007	29.5 ±0.7	0.702 ±0.005	0.87 ±0.05	11.2 ±0.5
		-K	ND	1.87 ±0.02	3.6 ±0.1	3.64 ±0.12	2.00 ±0.12	591 ±73	69 ±6	55.1 ±1.4	18.7 ±0.2	7.5 ±0.2	0.16 ±0.02	13.2 ±0.7	0.611 ±0.052	16384 ±579	887 ±103	11.53 ±0.35	1.69 ±0.13	1.56 ±0.18	0.088 ±0.008	22.2 ±0.5	0.618 ±0.023	6.27 ±0.22	6.4 ±0.5
	Soybean	+NPK	ND	1.47 ±0.06	9.0 ±0.2	4.11 ±0.08	2.74 ±0.08	545 ±19	115 ±5	50.8 ±1.1	10.6 ±0.2	8.2 ±0.4	0.75 ±0.06	12.4 ±0.4	0.637 ±0.015	836 ±39	747 ±23	11.17 ±1.19	1.09 ±0.03	1.07 ±0.04	0.100 ±0.014	19.4 ±0.6	0.461 ±0.041	1.59 ±0.09	5.6 ±0.2
		-N	ND	2.06 ±0.04	11.0 ±0.1	3.08 ±0.09	2.07 ±0.06	577 ±150	39 ±8	34.4 ±2.5	8.6 ±0.1	6.5 ±0.4	1.30 ±0.03	11.0 ±2.0	0.465 ±0.101	329 ±29	522 ±153	9.40 ±1.11	0.72 ±0.13	1.12 ±0.31	0.071 ±0.003	20.6 ±0.2	0.307 ±0.031	0.75 ±0.09	5.8 ±0.5
		-P	ND	0.85 ±0.02	12.2 ±0.1	4.09 ±0.09	1.66 ±0.00	653 ±117	127 ±10	47.8 ±2.0	11.2 ±0.5	18.2 ±0.8	0.78 ±0.08	16.0 ±1.2	0.618 ±0.075	215 ±7	813 ±100	18.78 ±3.91	1.86 ±0.13	1.24 ±0.23	0.079 ±0.004	21.6 ±0.1	0.330 ±0.021	0.73 ±0.13	7.3 ±0.3
		-K	ND	2.02 ±0.10	3.0 ±0.1	3.63 ±0.25	2.93 ±0.09	662 ±65	208 ±17	90.2 ±3.8	12.7 ±0.2	5.9 ±0.7	0.43 ±0.03	16.8 ±1.0	0.999 ±0.038	3162 ±92	1470 ±186	14.41 ±1.31	2.15 ±0.06	1.35 ±0.12	0.102 ±0.004	18.2 ±1.4	0.532 ±0.040	3.81 ±0.16	6.4 ±0.5

ND: Not determined due to insufficient amount of the sample.

UD: Undetected.

Values are means of three replicates ±standard errors.

Table S2. Extractable concentration of each mineral and total nitrogen concentration in bulk soils of each plant species (between the rows of each plant species, 0−25 cm)

		N (μg g^{-1})	P (μg g^{-1})	K (μg g^{-1})	Ca (μg g^{-1})	Mg (μg g^{-1})	Fe (μg g^{-1})	Mn (μg g^{-1})	Zn (μg g^{-1})	B (μg g^{-1})	Cu (μg g^{-1})	Mo (μg g^{-1})	Ni (μg g^{-1})	Li (μg g^{-1})	Na (μg g^{-1})	Al (μg g^{-1})	Cr (μg g^{-1})	Co (μg g^{-1})	As (μg g^{-1})	Se (μg g^{-1})	Sr (μg g^{-1})	Cd (μg g^{-1})	Cs (μg g^{-1})	Ba (μg g^{-1})
Wheat	+NPK	1840 ±82	1.81 ±0.09	74.9 ±4.4	3853 ±180	201 ±11	11.4 ±0.6	23.4 ±1.4	9.09 ±0.20	0.270 ±0.015	0.799 ±0.031	0.163 ±0.002	1.048 ±0.009	0.0589 ±0.0096	43.9 ±2.4	894 ±46	2.18 ±0.20	1.15 ±0.07	3.61 ±0.06	1.96 ±0.14	17.0 ±0.9	0.363 ±0.006	3.31 ±0.11	31.0 ±4.3
	-N	1461 ±118	3.64 ±0.39	266.5 ±7.0	4121 ±126	210 ±7	10.3 ±0.3	22.5 ±1.6	10.52 ±1.70	0.326 ±0.013	0.687 ±0.062	0.142 ±0.009	0.773 ±0.039	0.0606 ±0.0037	34.8 ±2.5	782 ±39	3.11 ±0.23	1.45 ±0.11	3.16 ±0.07	2.32 ±0.15	25.7 ±0.6	0.320 ±0.025	2.69 ±0.12	43.0 ±1.5
	-P	1930 ±47	0.06 ±0.03	173.3 ±13.6	3129 ±65	214 ±9	12.1 ±0.7	25.7 ±2.7	9.23 ±0.73	0.174 ±0.008	0.847 ±0.028	0.106 ±0.015	0.684 ±0.079	0.0733 ±0.0060	29.8 ±1.8	623 ±29	2.08 ±0.36	1.44 ±0.11	2.51 ±0.10	1.47 ±0.13	18.0 ±1.6	0.229 ±0.014	3.29 ±0.14	39.5 ±2.7
	-K	2270 ±120	2.07 ±0.12	29.1 ±0.4	4162 ±157	164 ±6	10.7 ±1.5	25.0 ±0.8	10.50 ±0.42	0.306 ±0.020	0.441 ±0.021	0.168 ±0.005	1.024 ±0.028	0.0402 ±0.0005	40.9 ±1.3	1044 ±40	2.16 ±0.04	1.26 ±0.03	4.24 ±0.07	2.38 ±0.14	20.9 ±0.5	0.430 ±0.009	4.73 ±0.07	38.9 ±0.7
Maize	+NPK	1885 ±8	2.44 ±0.09	71.7 ±2.4	3661 ±15	202 ±10	15.2 ±0.2	23.4 ±1.0	7.00 ±0.47	0.238 ±0.005	0.897 ±0.034	0.135 ±0.005	1.068 ±0.033	0.0501 ±0.0047	47.1 ±1.5	941 ±17	1.82 ±0.10	1.44 ±0.19	3.16 ±0.09	3.25 ±0.28	18.5 ±0.3	0.376 ±0.018	2.95 ±0.06	34.0 ±1.8
	-N	1729 ±63	3.21 ±0.14	291.8 ±10.1	3819 ±113	215 ±5	14.5 ±1.2	17.9 ±0.5	8.17 ±1.30	0.281 ±0.024	0.794 ±0.079	0.121 ±0.004	0.731 ±0.062	0.0749 ±0.0019	44.6 ±5.2	712 ±36	1.28 ±0.10	1.10 ±0.20	2.58 ±0.10	2.65 ±0.11	26.4 ±1.2	0.315 ±0.024	1.89 ±0.31	42.2 ±0.7
	-P	1666 ±43	0.02 ±0.02	208.6 ±20.7	3145 ±111	229 ±10	17.0 ±1.9	23.4 ±1.3	4.95 ±0.50	0.169 ±0.024	0.830 ±0.033	0.095 ±0.008	0.652 ±0.018	0.0598 ±0.0037	40.9 ±4.5	607 ±2	0.74 ±0.03	1.34 ±0.11	1.76 ±0.03	1.91 ±0.29	18.0 ±0.3	0.212 ±0.010	2.51 ±0.21	36.1 ±0.6
	-K	2418 ±117	2.48 ±0.16	24.9 ±1.3	3846 ±26	154 ±6	13.8 ±0.5	26.0 ±2.6	7.31 ±0.94	0.215 ±0.021	0.603 ±0.064	0.156 ±0.007	1.014 ±0.065	0.0606 ±0.0171	53.7 ±1.3	1088 ±71	1.42 ±0.19	2.01 ±0.20	3.69 ±0.25	3.34 ±0.19	20.9 ±0.3	0.411 ±0.029	5.84 ±0.22	31.7 ±5.3
Sunflower	+NPK	1946 ±48	2.42 ±0.12	92.1 ±9.1	3860 ±29	205 ±8	14.2 ±0.3	21.6 ±1.9	8.17 ±0.40	0.224 ±0.009	0.754 ±0.024	0.145 ±0.009	0.925 ±0.042	0.0658 ±0.0071	54.3 ±4.1	894 ±41	1.57 ±0.16	3.05 ±0.13	3.58 ±0.14	2.73 ±0.27	18.3 ±0.3	0.311 ±0.016	1.82 ±0.43	36.0 ±1.7
	-N	1747 ±47	4.32 ±0.15	319.5 ±16.3	4146 ±58	240 ±3	13.4 ±0.3	16.7 ±0.3	10.45 ±0.42	0.280 ±0.002	0.673 ±0.009	0.117 ±0.007	0.711 ±0.018	0.0820 ±0.0068	39.1 ±2.4	734 ±5	1.23 ±0.10	4.57 ±0.75	2.93 ±0.09	2.42 ±0.02	27.3 ±0.2	0.280 ±0.006	0.91 ±0.15	44.7 ±0.1
	-P	1953 ±47	0.70 ±0.01	205.4 ±8.5	3533 ±68	250 ±5	13.1 ±1.1	21.5 ±1.6	10.10 ±0.55	0.228 ±0.007	0.628 ±0.038	0.112 ±0.002	0.699 ±0.027	0.0401 ±0.0127	41.0 ±2.9	694 ±15	0.89 ±0.12	2.34 ±0.33	2.38 ±0.10	1.63 ±0.22	19.3 ±0.2	0.222 ±0.007	2.40 ±0.09	41.0 ±1.9
	-K	2184 ±59	2.32 ±0.21	28.8 ±1.4	4224 ±121	174 ±8	12.4 ±0.9	25.0 ±1.7	9.47 ±0.39	0.214 ±0.007	0.468 ±0.029	0.144 ±0.005	0.911 ±0.010	0.0555 ±0.0114	55.2 ±2.2	1016 ±18	0.95 ±0.12	3.62 ±0.27	3.86 ±0.04	2.53 ±0.22	21.3 ±0.6	0.362 ±0.002	3.58 ±0.23	33.6 ±3.9
Soybean	+NPK	1877 ±39	0.98 ±0.14	97.9 ±6.0	3847 ±50	188 ±5	15.9 ±1.9	23.3 ±3.8	8.66 ±1.35	0.157 ±0.005	0.893 ±0.071	0.130 ±0.003	0.854 ±0.043	0.0612 ±0.0043	36.7 ±1.4	781 ±48	1.35 ±0.07	1.63 ±0.27	3.04 ±0.13	2.65 ±0.35	16.8 ±0.4	0.311 ±0.012	2.53 ±0.28	29.2 ±1.8
	-N	1621 ±65	3.46 ±0.40	281.4 ±24.9	4144 ±56	209 ±3	12.9 ±0.7	18.8 ±1.7	10.88 ±0.57	0.228 ±0.003	0.756 ±0.136	0.118 ±0.005	0.735 ±0.008	0.0686 ±0.0060	35.6 ±4.3	770 ±59	1.65 ±0.14	1.95 ±0.35	3.01 ±0.15	3.00 ±0.13	26.1 ±0.7	0.314 ±0.010	0.66 ±0.07	41.2 ±1.7
	-P	1954 ±34	0.08 ±0.04	223.4 ±20.5	3396 ±121	232 ±11	17.6 ±1.7	28.6 ±2.2	8.32 ±0.19	0.128 ±0.007	0.861 ±0.032	0.098 ±0.001	0.610 ±0.019	0.0501 ±0.0094	26.7 ±1.7	602 ±21	1.30 ±0.02	2.97 ±0.51	2.07 ±0.11	1.90 ±0.24	16.7 ±0.6	0.205 ±0.002	2.68 ±0.15	34.7 ±0.6
	-K	2264 ±56	1.72 ±0.10	32.7 ±1.1	4066 ±178	156 ±10	13.4 ±1.3	28.4 ±2.3	9.79 ±0.21	0.152 ±0.011	0.531 ±0.022	0.147 ±0.002	0.851 ±0.052	0.0394 ±0.0054	42.7 ±0.9	938 ±55	1.44 ±0.26	2.59 ±0.44	3.69 ±0.21	2.53 ±0.12	19.0 ±0.8	0.366 ±0.020	4.57 ±0.40	27.9 ±3.1

Values are means of three replicates ±standard errors.

Total: N, Water extractable: P, Cr, Co, Se, Cs, 0.1 M HCl extractable: K, Ca, Mg, Fe, Mn, Zn, B, Cu, Mo, Ni, Li, Na, Al, As, Sr, Cd, Ba.