

Supplementary data

Table S1: Composition of nutrient solution used in the experimental work.

Salts	Molecular weight	Concentration in nutrient solution
$\text{Ca}(\text{NO}_3)_2 \cdot 4 \text{H}_2\text{O}$	236.15	2 mM
K_2SO_4	174.27	1 mM
$\text{MgSO}_4 \cdot 7 \text{H}_2\text{O}$	246.48	0.5 mM
$\text{CaCl}_2 \cdot 2 \text{H}_2\text{O}$	147.02	2 mM
KH_2PO_4	136.09	0.2 mM
Fe-EDTA	367.05	0.2 mM
H_3BO_3	61.83	10 μM
$\text{MnSO}_4 \cdot \text{H}_2\text{O}$	169.02	2 μM
$\text{ZnSO}_4 \cdot 7\text{H}_2\text{O}$	287.55	0.5 μM
$\text{CuSO}_4 \cdot 5\text{H}_2\text{O}$	249.68	0.3 μM
$(\text{NH}_4)\text{Mo}_7\text{O}_{24}$	1235.86	0.01 μM

Table S2: Effect of Se and Si on elemental composition of macro and micro elements for uptake in root and shoot of wheat under Cd stress. Data presented in the mean of 4 replicates \pm standard error. A (*) represents statistical difference at $p>0.05$.

Elemental composition►	Cd (mg kg ⁻¹)	Se (ug kg ⁻¹)	Si (ug kg ⁻¹)	Zn (mg kg ⁻¹)	Cu (mg kg ⁻¹)	Mn (mg kg ⁻¹)	Ca (g kg ⁻¹)	Mg (g kg ⁻¹)	P (g kg ⁻¹)	S (g kg ⁻¹)	Fe (g kg ⁻¹)	Na (g kg ⁻¹)
Treatments▼	Root											
Control	0.12 \pm 0.0	15.93 \pm 1.0	0.9 \pm 0.2	*4.01 \pm 0.4	3.68 \pm 0.3	5.02 \pm 1.0	48.91 \pm 11.4	*0.53 \pm 0.1	0.44 \pm 0.1	*0.78 \pm 0.1	2376 \pm 382	*1050 \pm 66
Se	0.09 \pm 0.0	*72.06 \pm 8.3	0.8 \pm 0.1	3.41 \pm 0.2	3.09 \pm 0.4	6.31 \pm 1.6	49.38 \pm 27.1	0.39 \pm 0.1	0.50 \pm 0.0	0.76 \pm 0.1	*3761 \pm 570	1002 \pm 126
Se+Si	0.71 \pm 0.4	55.95 \pm 2.5	1.8 \pm 0.1	2.90 \pm 0.1	4.71 \pm 0.9	5.17 \pm 0.5	18.04 \pm 6.3	0.43 \pm 0.1	0.47 \pm 0.1	0.67 \pm 0.1	2954 \pm 257	861 \pm 194
Cd	*840.8 \pm 55.3	23.17 \pm 0.6	0.6 \pm 0.1	2.16 \pm 0.2	3.42 \pm 0.5	5.71 \pm 1.0	37.42 \pm 7.5	0.48 \pm 0.1	0.39 \pm 0.1	0.63 \pm 0.0	3494 \pm 514	978 \pm 42.2
Cd+Se	362.1 \pm 47.0	34.87 \pm 4.2	0.9 \pm 0.1	1.46 \pm 0.1	2.21 \pm 0.3	6.93 \pm 1.3	32.11 \pm 4.1	0.35 \pm 0.1	0.40 \pm 0.0	0.46 \pm 0.0	2512 \pm 241	389 \pm 55
Cd+Si	472.4 \pm 17.3	22.10 \pm 1.5	2.1 \pm 0.3	2.15 \pm 0.1	*5.18 \pm 0.8	*8.31 \pm 1.3	34.30 \pm 7.2	0.44 \pm 0.1	0.45 \pm 0.0	0.57 \pm 0.0	3246 \pm 339	710 \pm 101
Cd+Se+Si	325.4 \pm 31.3	49.83 \pm 5.4	*2.3 \pm 0.1	2.00 \pm 0.1	3.40 \pm 0.7	6.72 \pm 1.0	25.76 \pm 3.6	0.40 \pm 0.1	*0.60 \pm 0.1	0.46 \pm 0.1	2858 \pm 404	641 \pm 52
	Shoot											
Control	0.02 \pm 0.0	7.65 \pm 1.1	0.5 \pm 0.1	3.20 \pm 0.1	1.05 \pm 0.1	9.37 \pm 1.1	0.96 \pm 0.1	0.26 \pm 0.1	0.40 \pm 0.0	0.49 \pm 0.0	15 \pm 1.7	22 \pm 2.3
Se	0.01 \pm 0.0	*50.37 \pm 10.1	0.7 \pm 0.1	*3.52 \pm 0.5	1.21 \pm 0.2	11.86 \pm 1.8	1.24 \pm 0.2	0.28 \pm 0.1	0.47 \pm 0.1	0.56 \pm 0.1	24 \pm 4.0	20 \pm 2.8
Se+Si	0.07 \pm 0.0	29.99 \pm 0.9	1.2 \pm 0.2	3.48 \pm 0.4	0.70 \pm 0.1	12.61 \pm 1.2	1.22 \pm 0.1	0.25 \pm 0.1	0.47 \pm 0.1	0.58 \pm 0.1	18 \pm 0.9	17 \pm 1.8
Cd	*65.4 \pm 4.6	9.58 \pm 1.9	0.5 \pm 0.1	2.94 \pm 0.2	1.28 \pm 0.1	8.12 \pm 0.5	1.18 \pm 0.1	0.32 \pm 0.1	0.30 \pm 0.1	0.56 \pm 0.1	*22 \pm 2.0	22 \pm 1.3
Cd+Se	47.0 \pm 3.3	29.47 \pm 2.5	0.5 \pm 0.1	3.47 \pm 0.2	0.90 \pm 0.1	12.05 \pm 1.5	1.26 \pm 0.1	0.29 \pm 0.1	0.45 \pm 0.1	*0.65 \pm 0.1	*22 \pm 0.8	18 \pm 1.3
Cd+Si	41.2 \pm 6.3	8.28 \pm 1.2	*1.6 \pm 0.2	3.48 \pm 0.3	1.00 \pm 0.2	*12.34 \pm 1.7	1.30 \pm 0.2	0.31 \pm 0.1	0.46 \pm 0.1	0.61 \pm 0.1	19 \pm 2.5	21 \pm 33
Cd+Se+Si	30.9 \pm 2.6	25.42 \pm 3.8	1.4 \pm 0.1	2.47 \pm 0.4	0.70 \pm 0.1	8.60 \pm 1.1	0.86 \pm 0.2	0.19 \pm 0.1	0.41 \pm 0.1	0.42 \pm 0.1	13 \pm 2.5	14 \pm 1.4

Table S3: Input file of ionic composition in nutrients solution for possible chemical interaction study in Visual MINTEQ 3.1 .

0.2 Hoagland's Solution																				
Stock Solution	mM	Ca	NO ³⁻	K	NH ₄	PO ₄ ⁻³	Mg	SO ₄	Cl ⁻¹	H ₃ BO ₃	Mn	Cu	Zn	MoO ₄ ⁻²	Fe	EDTA	Na	SeO ₃ ⁻²	SiO ₃ ⁻²	Cd ⁺²
Ca(NO ₃) ₂ · 4H ₂ O	2	2	4																	
K ₂ SO ₄	1			1				0.5												
Mg(SO ₄) · 7H ₂ O	0.5						0.5	0.5												
CaCl ₂ .2H ₂ O	2	2							4											
KH ₂ PO ₄	0.2			0.2		0.2														
Fe-EDTA	0.2							0.1							0.2	0.2				
H ₃ BO ₃	0.01									0.01										
MnSO ₄ · H ₂ O	0.0045							0.002			0.002									
CuSO ₄ · 5H ₂ O	0.0003							0.0003				0.0003								
ZnSO ₄ · 7H ₂ O	0.0015							0.0005					0.0005							
(NH ₄) ₆ Mo ₇ O ₂₄ · 4H ₂ O	0.0001				0.00001									0.00001						
Na ₂ SeO ₃	0.0015																0.0032	0.0015		
Na ₂ SiO ₃	0.002																0.004		0.002	
CdCl ₂	0.01								0.02											0.01
	Pura	4	4	1.2	0.00001	0.2	0.5	1.1028	4.02	0.01	0.002	0.0003	0.0005	0.00001	0.2	0.2	0.0072	0.0015	0.002	0.01

Table S4: Interaction of Si-Cd in nutrient solution.

Treatments	% of total concentration	Species name
Si	97.21	H_4SiO_4
	0.023	$\text{H}_4\text{SiO}_4\text{SO}_4^{-2}$
Cd	2.766	H_3SiO_4^-
	1.692	Cd^{+2}
	0.015	CdOH^+
	0.394	CdCl^+
	0.121	CdSO_4 (aq)
	0.013	CdNO_3^+
	0.305	CdHPO_4 (aq)
	97.451	CdEDTA^{-2}
Cd+Si	97.625	H_4SiO_4
	0.023	$\text{H}_4\text{SiO}_4\text{SO}_4^{-2}$
	2.352	H_3SiO_4^-
	1.853	Cd^{+2}
	0.015	CdOH^+
	0.429	CdCl^+
	0.132	CdSO_4 (aq)
	0.014	CdNO_3^+
	0.336	CdHPO_4 (aq)
	97.212	CdEDTA^{-2}

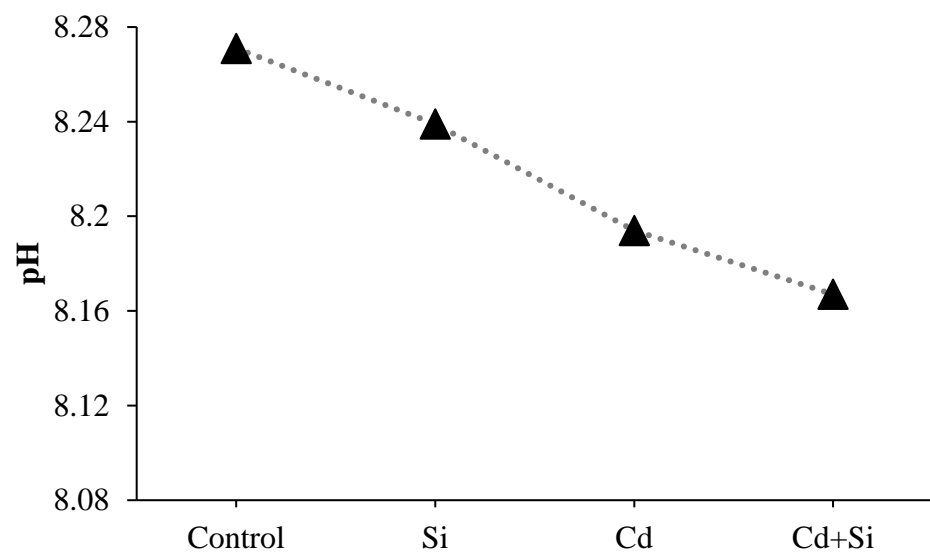


Figure S1: Effect of Si-Cd addition on pH change in nutrient solution inferred by visual MINTEQ 3.1