

Supplementary Data

Evaluating the Heavy Metal Risk in *Spinacia oleracea* L. and Its Surrounding Soil with Varied Biochar Levels: A Pot Experiment

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Table S1. The grading standards of E_r^i and RI values.

E_r^i	RI	Pollution Degree
$E_r^i < 40$	$RI \leq 150$	Slight
$40 \leq E_r^i < 80$	$150 < RI < 300$	Medium
$80 \leq E_r^i < 160$	$300 \leq RI \leq 600$	Strong
$160 \leq E_r^i < 320$	$RI > 600$	Very strong
$E_r^i > 320$		Extremely strong

Table S2. Health risk assessment exposure parameters.

Parameters	Implication	Adults	Children	References
BW	Weight /kg	56.8	19.2	[1]
IR _{soil}	Ingestion rate of soil / (mg/d)	100	200	[1]
IR _{air}	Inhalation rate of soi /(m ³ /d)	20	10	[1]
IR _{crop}	Ingestion rate of crop /(g/d)	301.4	231.5	[2]
ED	Exposure duration/ a	25	6	[3]
EF	Exposure frequency/(d/a)	350	350	[3]
AF	Adhesion coefficient of soil to skin /(mg·cm ²)	0.07	0.2	[3]
CF	Conversion factor /(kg/mg)	10 ⁻⁶	10 ⁻⁶	[3]
SA	Skin area available for soil contact /(cm ² /d)	5700	2800	[1]
PEF	Particle emission factor /(m ³ /kg)	1.13×10 ⁹	1.13×10 ⁹	[1]
ABSd	Dermal absorption factor	0.001	0.001	[1]
AT	Average time (carcinogenic risk)/d	70×365	70×365	[3]
	Average time (non-carcinogenic risk)/d	ED×365	ED×365	[3]

1. Zhang, H.; Wang, H.; Tang, H.Y. Heavy metal pollution characteristics and health risk evaluation of soil and vegetables in various functional areas of lead-zinc tailings pond. *Acta Scientiae Circumstantiae* 2020, 40(3), 1085-1094. (In Chinese).
2. Feng, Y.J.; Zhao, Q.L.; Sun, H.X. Assessment of soil-vegetable contamination and health risk of heavy metals in vegetables around North China. *Journal of Agricultural University of Hebei* 2017, 40, 1-7. (In Chinese).
3. U.S. EPA. Exposure Factors Handbook 2011 Edition (Final Report). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-09/052F, 2011.

Table S3. Model parameters RfD and SF values.

Routes	Parameters	Cd	Cu	Ni	Zn	Pb	As
Dermal contact	RfD	1×10^{-3}	1.9×10^{-3}	5.40×10^{-3}	6.00×10^{-3}	3.52×10^{-3}	3.00×10^{-4}
	SF	6.1					1.5
Ingestion-soil	RfD	1×10^{-3}	3.7×10^{-2}	2.00×10^{-2}	3.0×10^{-1}	3.50×10^{-3}	3.00×10^{-4}
	SF	6.1					1.5
Inhale-soil	RfD	1×10^{-3}	4.2×10^{-2}	2.06×10^{-2}	3.0×10^{-1}	5.25×10^{-3}	1.23×10^{-4}
	SF	1.8×10^{-3}		8.4×10^{-1}			4.30×10^{-3}
Oral-crop	RfD	1×10^{-3}	4.0×10^{-2}	2.00×10^{-2}	3.0×10^{-1}	4.00×10^{-3}	3.00×10^{-4}
	SF	3.8×10^{-3}				8.50×10^{-3}	1.5

