**Silicon-rich materials detoxify multiple heavy metals in wheat by regulating oxidative stress and heavy metal subcellular distribution**

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**Table S1** Basic physicochemical properties of the experimental topsoils before application of amendments

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Soils | pH | Ntotal | Ptotal | Organic matter | Kavailable | Pavailable | Navailable | bAs | bCd | bPb | bZn |
| g/kg | mg/kg |
| aYB | 6.09 | 0.86 | 0.55 | 12.12 | 112.2 | 26.21 | 57.91 | 2.52 | 11.99 | 152.67 | 234.22 |
| aCA | 7.14 | 2.21 | 0.89 | 10.22 | 56.57 | 41.98 | 41.25 | 5.23 | 12.79 | 155.41 | 300.55 |

a YB, yellow brown soil; CA, calcareous alluvial soil.

b DTPA-extractable fraction

**Table S2** Physicochemical properties of RHB and bentonite used in this experiment

|  |  |  |
| --- | --- | --- |
| Parameters  | RHB | bentonite |
| pH | 10.52±0.2 | 9.06±0.3 |
| Grain size (mm) | 0.15 | 0.15 |
| Total N (g/kg) | 6.86±0.4 | – |
| Total P (g/kg) | 3.52±0.1 | – |
| Total K (g/kg) | 14.21±2.5 | – |
| Total Cd (mg/kg) | – | 1.11±0.4 |
| Total Zn (mg/kg) | 33.74±2.9 | 67.12±3.3 |
| Total Pb (mg/kg) | 3.01±0.2 | 25.67±0.9 |
| Total As (mg/kg) | – | 0.33±0.01 |

–: Not measured.

**Table S3** Effects of Si-rich amendments on growth and yield characters of wheat. Values are the mean ±SD (n = 4). Different letters in the same column indicate a significant difference at p < 0.05.

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment | Seedling stage |  | Maturity stage |
| Shoot length (cm/plant) | Shoot dry weight (g/plant) | Shoot dry weight (g/plant) | Grain dry weight (g/pot) |
| YB soil |
| Control | 61.22±0.81d | 0.52±0.02c | 1.12±0.05c | 3.98±0.51c |
| T1 | 62.71±1.19d | 0.54±0.05c | 1.24±0.12b | 4.32±0.32b |
| T2 | 64.48±1.08c | 0.62±0.01b | 1.22±0.04b | 4.41±0.21b |
| T3 | 65.52±2.77b | 0.63±0.06a | 1.26±0.08b | 4.62±0.49b |
| T4 | 68.84±3.12a | 0.66±0.03a | 1.31±0.21a | 5.05±0.32a |
| CA soil |
| Control | 57.12±2.10b | 0.45±0.02c | 0.92±0.09c | 4.15±0.31d |
| T1 | 56.21±1.92b | 0.44±0.03c | 0.98±0.14b | 4.21±0.56c |
| T2 | 57.33±1.13b | 0.49±0.05b | 0.96±0.11b | 4.28±0.33b |
| T3 | 58.21±4.71a | 0.49±0.02b | 1.02±0.21a | 4.31±0.47b |
| T4 | 58.39±5.12a | 0.52±0.08a | 1.05±0.04a | 4.58±0.27a |

**Figure S1** Effects of Si-rich amendments (T1-T4) on wheat leaf photosynthetic parameters under multi-heavy metal stress in yellow brown soil (YB).

**Figure S2** Effects of Si-rich amendments on wheat leaf photosynthetic parameters under multi-heavy metal stress in calcareous alluvial soil (CA).