Table S1 Heavy metal concentration of soil(mg/kg)

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | pH | As | Cd | Cu | Cr | Pb | Mo | W | Zn |
| Mean values in this study | 5.22 | 33.4 | 0.62 | 40.5 | 64.0 | 57.4 | 10.2 | 95.0 | 104 |
| CV% | 8.43 | 80.2 | 117 | 49.6 | 22.1 | 54.5 | 112 | 96.1 | 49.7 |
| Max | 6.67 | 151 | 3.85 | 110 | 99.20 | 142 | 52.29 | 431 | 289 |
| Min | 3.74 | 3.41 | 0.078 | 17.24 | 21.83 | 14.2 | 0.314 | 4.24 | 37.7 |
| SD | 0.44 | 26.77 | 0.73 | 20.09 | 14.15 | 31.29 | 11.42 | 91.23 | 51.71 |
| National average values in soils | 6.5 | 9.20 | 0.07 | 20.0 | 53.9 | 23.6 | 1.20 | 2.22 | 67.7 |
| The average background values (ABV) of Jiangxi Province | / | 10.4 | 0.10 | 20.8 | 48.0 | 32.1 | 0.30 | 4.93 | 69.0 |
| Chinese soil criteria (Grade II) | / | 30 | 0.3 | 50 | 150 | 250 | / | / | 200 |
| Dutch target values | / | 29 | 0.8 | 36 | 100 | 85 | 3 | / | 140 |
| Chifeng, North of China | 6.97 | 248.6 | 3.33 | 67.13 | 45.58 | 388.6 | 5.61 | / | 473.7 |
| Dayu, South of China | 5.4 | 59.0 | 1.60 | 51.7 | 74.8 | 77.3 | / | 80.3 | 327.5 |
| Lianhua mountain, South of China | / | 72.7 | 0.18 | 40.7 | 36.3 | 90.7 | 1.51 | 22.3 | 125.6 |
| Baikal (residential area), Russia | 5.99 | 148 | 42.0 | 6.18 | 157 | 0.59 | 318 | 55.0 | 2.10 |

Table S2 Correlation coefficients of soil properties

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | Fe2O3 | K2O | Na2O | CaO | CEC | pH | TOC |
| Fe2O3 | 1 |  |  |  |  |  |  |
| K2O | **-0.393\*\*** | 1 |  |  |  |  |  |
| Na2O | **-0.243\*** | **0.741\*\*** | 1 |  |  |  |  |
| CaO | -0.035 | **0.266\*** | **0.384\*\*** | 1 |  |  |  |
| CEC | 0.014 | -0.144 | **-0.246\*** | **0.432\*\*** | 1 |  |  |
| pH | 0.144 | 0.071 | 0.211 | **0.514\*\*** | 0.024 | 1 |  |
| TOC | 0.138 | -0.172 | **-0.366\*\*** | 0.077 | **0.507\*\*** | -0.143 | 1 |

Note: \*\* Correlation is signiﬁcant at the 0.01 level(2-tailed). \* Correlation is signiﬁcant at the 0.05 level(2-tailed).

Table S3 Geo-accumulation index( *Igeo*) of heavy metal in soil in sampling sites

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site | As | Cd | Cr | Cu | | Pb | | Mo | | W | | Zn | |
| *Igeo* | *Igeo* | *Igeo* | | *Igeo* | | *Igeo* | | *Igeo* | | *Igeo* | | *Igeo* | |
| FJ-N | 0.94 | 1.06 | 0.06 | | 0.12 | | -0.30 | | 3.02 | | 3.30 | | -0.24 | |
| FJ-S | 1.35 | 2.43 | -0.16 | | 0.68 | | 0.71 | | 4.06 | | 4.07 | | 0.40 | |
| HL | 0.22 | 0.67 | -0.27 | | -0.03 | | -0.27 | | 2.12 | | 2.00 | | -0.49 | |
| QL | 1.16 | 1.82 | -0.25 | | 0.54 | | 0.28 | | 3.45 | | 3.04 | | 0.11 | |
| CJ-W | -0.45 | 0.36 | -0.36 | | -0.31 | | -0.21 | | 1.18 | | 1.19 | | -0.69 | |
| CJ-E | -0.02 | 0.70 | -0.40 | | -0.23 | | -0.54 | | 1.72 | | 1.45 | | -0.63 | |
| Max | 1.35 | 2.43 | 0.06 | | 0.68 | | 0.71 | | 4.06 | | 4.07 | | 0.40 | |
| Min | -0.45 | 0.36 | -0.40 | | -0.31 | | -0.54 | | 1.18 | | 1.19 | | -0.69 | |
| Mean | 0.53 | 1.17 | -0.23 | | 0.13 | | -0.05 | | 2.59 | | 2.51 | | -0.26 | |
| SD | 0.72 | 0.79 | 0.17 | | 0.41 | | 0.46 | | 1.10 | | 1.14 | | 0.44 | |

Table S4 Translocation factor(TF) values of heavy metal in paddy rice

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Site | As | Cd | Cr | Cu | Mo | Pb | Zn |
| FJ-N | 8.75E-03 | 0.623 | 1.07E-03 | 0.111 | 6.37E-04 | 1.28E-03 | 0.198 |
| FJ-S | 5.09E-03 | 2.20 | 1.24E-03 | 0.099 | 7.15E-04 | 8.99E-04 | 0.162 |
| HL | 3.84E-03 | 2.48 | 1.41E-03 | 0.127 | 1.34E-03 | 6.56E-04 | 0.166 |
| QL | 1.20E-02 | 5.34 | 1.41E-03 | 0.195 | 3.46E-03 | 1.08E-03 | 0.306 |
| CJ-W | 2.44E-03 | 0.352 | 1.43E-03 | 0.080 | 1.62E-04 | 5.81E-04 | 0.130 |
| CJ-E | 5.31E-03 | 2.58 | 1.65E-03 | 0.133 | 2.73E-03 | 1.62E-03 | 0.226 |

Table S5 The correlation between soil factors, heavy metal in paddy rice and the translocation factor(TF).

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | As | Cd | Cr | Cu | Mo | Pb | Zn |
| TF | | | | | | | |
| pH | 0.208 | -0.154 | -0.216 | 0.164 | 0.032 | 0.098 | 0.132 |
| TOC | -0.082 | -0.209 | -0.145 | -0.376 | -0.096 | -0.075 | -0.313 |
| K2O | 0.124 | **0.404\*** | **0.414\*** | 0.314 | 0.276 | 0.277 | 0.239 |
| Na2O | 0.089 | **0.526\*\*** | **0.394\*** | 0.313 | 0.207 | 0.234 | 0.229 |
| CaO | 0.267 | 0.153 | 0.067 | 0.227 | 0.270 | -0.071 | 0.222 |
| CEC | 0.025 | -0.007 | -0.018 | -0.149 | -0.086 | -0.282 | -0.138 |
| Fe2O3 | .407\* | 0.255 | 0.002 | 0.222 | 0.059 | 0.074 | 0.323 |
| Heavy metal in paddy rice | | | | | | | |
| pH | **0.424\*** | -0.001 | -0.167 | 0.237 | 0.143 | -0.030 | 0.189 |
| TOC | 0.377 | 0.000 | 0.155 | -0.052 | **0.422\*** | **0.464\*** | 0.325 |
| K2O | 0.095 | **0.482\*** | 0.285 | 0.378 | 0.254 | 0.117 | -0.063 |
| Na2O | 0.161 | **0.630\*\*** | 0.217 | **0.445\*** | 0.382 | 0.281 | 0.144 |
| CaO | 0.052 | 0.182 | -0.106 | 0.058 | 0.131 | -0.093 | -0.016 |
| CEC | 0.030 | -0.087 | 0.053 | -0.321 | -0.195 | -0.255 | -0.145 |
| Fe2O3 | 0.131 | 0.190 | -0.230 | 0.252 | -0.165 | 0.023 | 0.335 |

Notes: \*\* Correlation is signiﬁcant at the 0.01 level(2-tailed). \* Correlation is signiﬁcant at the 0.05 level(2-tailed).

Table S6 The human health risk parameters of heavy metals of paddy rice

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site | As | | Cd | | Cr | | Pb | | Cu | Mo | Zn | HI | TCR |
| HQ | CR | HQ | CR | HQ | CR | HQ | CR | HQ | HQ | HQ |
| FJ-N | 4.03 | 7.77E-04 | 2.41 | 6.31E-03 | 0.187 | 1.20E-04 | 0.093 | 1.35E-06 | 0.729 | 6.55E-03 | 0.465 | 7.92 | 7.21E-03 |
| FJ-S | 3.32 | 6.39E-04 | 7.99 | 2.09E-02 | 0.189 | 1.21E-04 | 0.130 | 1.90E-06 | 0.944 | 1.27E-02 | 0.482 | 13.07 | 2.17E-02 |
| HL | 2.14 | 4.12E-04 | 3.61 | 9.43E-03 | 0.188 | 1.21E-04 | 0.067 | 9.84E-07 | 0.774 | 6.28E-03 | 0.351 | 7.13 | 9.97E-03 |
| QL | 2.48 | 4.78E-04 | 5.61 | 1.47E-02 | 0.177 | 1.14E-04 | 0.062 | 8.98E-07 | 0.794 | 5.53E-03 | 0.394 | 9.52 | 1.53E-02 |
| CJ-W | 1.63 | 3.15E-04 | 0.77 | 2.02E-03 | 0.226 | 1.46E-04 | 0.053 | 7.67E-07 | 0.652 | 1.52E-03 | 0.349 | 3.69 | 2.48E-03 |
| CJ-E | 2.47 | 4.77E-04 | 3.18 | 8.32E-03 | 0.245 | 1.57E-04 | 0.097 | 1.41E-06 | 0.705 | 6.87E-03 | 0.410 | 7.12 | 8.96E-03 |