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Values are mean± SD (n=3). Different letters within a column indicate significant differences between different treatments ($P$< 0.05).

## Supplement Figure

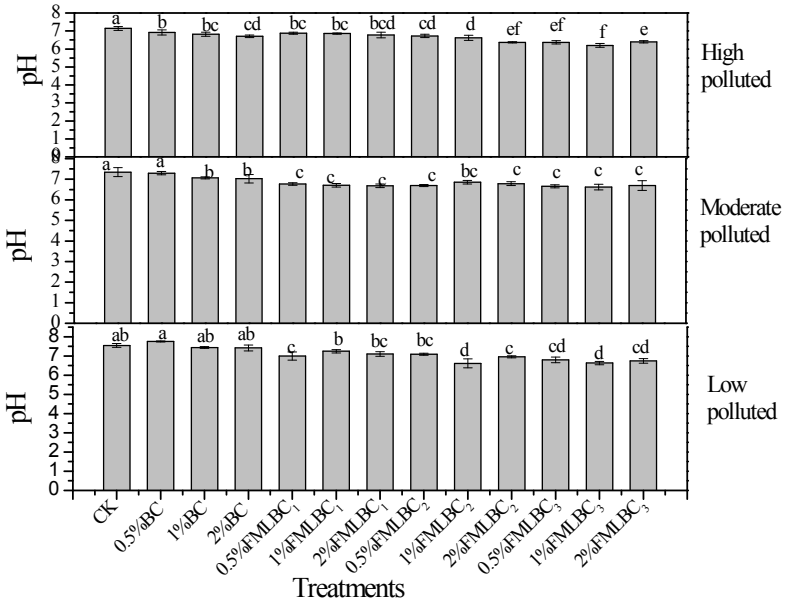


Fig.S1 The pH of soil after adding FMLBCs and BC.The different superscript letters indicate that the means are significantly different between treatments with Duncan test ($P$< 0.05).

## Supplement Table

Table S1Physicochemical characteristics of BC and FMLBCs

| | C | N | H | Ash | $S_{BET}$ | $V_{tot}$ | pH |
|---|---|---|---|---|---|---|---|
| | % | | | | ($m^2 g^{-1}$) | ($cm^3 g^{-1}$) | |
| BC | 75.5±0.5a | 1.91±0.07a | 2.95±0.06a | 16.8±0.12d | 61.0±0.3a | 0.036±0.003d | 8.93±0.1a |
| $FMLBC_1$ | 62.3±0..8b | 1.73±0.03b | 2.58±0.13b | 29.5±0.26c | 2.76±0.22d | 0.089±0.003c | 6.96±0.2b |
| $FMLBC_2$ | 54.8±1.2c | 1.61±0.06c | 2.42±0.25c | 32.6±0.17b | 12.23±0.06c | 0.125±0.007b | 6.83±0.1d |
| $FMLBC_3$ | 47.1±0..4d | 1.32±0.04d | 2.17±0.15d | 35.2±0.22a | 30.63±0.52b | 0.148±0.002a | 6.90±0.2c |

Values are mean± SD (n=3).Different letters within a column indicate significant differences between different treatments ($P$< 0.05).

Table S2 Physicochemical characteristics of soil

| Soils | Total Arsenic | pH | Organic matter | Iron oxides | Available phosphorus |
|---|---|---|---|---|---|
| | mg $kg^{-1}$ | | g $kg^{-1}$ | | mg $kg^{-1}$ |
| High polluted | 138±2.4a | 7.81 | 38.8 | 5.53 | 8.60 |
| Moderate polluted | 92.4±0.72b | 7.25 | 38.6 | 5.38 | 8.47 |
| Low polluted | 33.2±0.31c | 6.08 | 37.1 | 5.42 | 5.03 |

Values are mean± SD (n=3). Different letters within a column indicate significant differences between different treatments ($P<$ 0.05).

Table S3 Correlation coefficient of each index inhigh polluted soil

| | CAT | POD | AKP | UE | F1 | F2 | F3 | F4 | F5 | AP | AK | AN | Proteobacteria | Firmicutes | Acidobacteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAT | 1.000 | | | | | | | | | | | | | | |
| POD | 0.460 | 1.000 | | | | | | | | | | | | | |
| AKP | -0.559* | -0.014 | 1.000 | | | | | | | | | | | | |
| UE | 0.352 | 0.62* | -0.256 | 1.000 | | | | | | | | | | | |
| F1 | -0.213 | -0.308 | 0.264 | -0.159 | 1.000 | | | | | | | | | | |
| F2 | -0.544* | -0.682* | 0.000 | -0.514* | -0.354 | 1.000 | | | | | | | | | |
| F3 | -0.495 | -0.799* | 0.316 | -0.741* | 0.168 | 0.730* | 1.000 | | | | | | | | |
| F4 | 0.677* | 0.710* | -0.266 | 0.625* | 0.050 | -0.903** | -0.895** | 1.000 | | | | | | | |
| F5 | 0.329 | 0.870** | -0.074 | 0.710* | -0.001 | -0.786 | -0.917** | 0.794* | 1.000 | | | | | | |
| AP | -0.551* | -0.792* | 0.546* | -0.587* | 0.556* | 0.396 | 0.773* | -0.610* | -0.680* | 1.000 | | | | | |
| AK | 0.200 | 0.599* | 0.331 | 0.559* | 0.397 | -0.814** | -0.542* | 0.622* | 0.723* | -0.124 | 1.000 | | | | |
| AN | -0.483 | -0.785* | 0.055 | -0.593* | -0.147 | 0.813** | 0.740* | -0.724* | -0.872** | 0.531 | -0.786* | 1.000 | | | |
| Proteobacteria | 0.163 | 0.303 | -0.142 | 0.006 | 0.244 | -0.440 | -0.372 | 0.420 | 0.375 | -0.266 | 0.337 | -0.466 | 1.000 | | |
| Firmicutes | -0.689* | -0.606* | 0.763* | -0.567* | 0.372 | 0.433 | 0.753* | -0.663* | -0.600* | 0.884** | -0.160 | 0.574* | -0.462 | 1.000 | |
| Acidobacteria | 0.617* | 0.076 | -0.799* | 0.279 | -0.529 | 0.159 | -0.129 | 0.077 | -0.064 | -0.516* | -0.409 | 0.022 | -0.329 | -0.568* | 1.000 |

Note: * significant, ** extremely significant.

Table S4 Correlation coefficient of each index inmoderate polluted soil

| | CAT | POD | AKP | UE | F1 | F2 | F3 | F4 | F5 | AP | AK | AN | Proteobacteria | Firmicutes | Acidobacteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAT | 1.000 | | | | | | | | | | | | | | |
| POD | 0.347 | 1.000 | | | | | | | | | | | | | |
| AKP | 0.006 | 0.705* | 1.000 | | | | | | | | | | | | |
| UE | -0.068 | 0.546* | 0.479 | 1.000 | | | | | | | | | | | |
| F1 | -0.817** | -0.160 | 0.020 | 0.036 | 1.000 | | | | | | | | | | |
| F2 | -0.772* | -0.228 | -0.244 | 0.298 | 0.770* | 1.000 | | | | | | | | | |
| F3 | -0.739* | -0.437 | -0.033 | 0.106 | 0.505* | 0.522* | 1.000 | | | | | | | | |
| F4 | 0.824** | 0.365 | 0.193 | -0.265 | -0.747* | -0.918** | -0.793* | 1.000 | | | | | | | |
| F5 | 0.798* | 0.386 | 0.005 | -0.070 | -0.558* | -0.536* | -0.965** | 0.751* | 1.000 | | | | | | |
| AP | -0.656* | -0.095 | -0.036 | 0.298 | 0.722* | 0.856** | 0.607* | -0.843** | -0.634* | 1.000 | | | | | |
| AK | 0.633* | 0.793* | 0.391 | 0.433 | -0.531* | -0.482 | -0.697* | 0.636* | 0.685* | -0.517* | 1.000 | | | | |
| AN | -0.705* | -0.309 | 0.107 | -0.073 | 0.713* | 0.511* | 0.656* | -0.609* | -0.715* | 0.724* | -0.637 | 1.000 | | | |
| Proteobacteria | 0.614* | 0.512 | 0.218 | 0.440 | -0.485 | -0.199 | -0.321 | 0.272 | 0.349 | 0.096 | 0.442 | -0.230 | 1.000 | | |
| Firmicutes | -0.759* | -0.182 | 0.325 | 0.320 | 0.664* | 0.550* | 0.824 | -0.721* | -0.844** | 0.687* | -0.559 | 0.808** | -0.205 | 1.000 | |
| Acidobacteria | 0.015 | -0.505* | -0.607* | -0.712* | -0.059 | -0.186 | -0.085 | 0.144 | 0.114 | -0.430 | -0.227 | -0.304 | -0.657* | -0.467 | 1.000 |

Note: * significant, ** extremely significant.

Table S5 Correlation coefficient of each index inlow polluted soil

| | CAT | POD | AKP | UE | F1 | F2 | F3 | F4 | F5 | AP | AK | AN | Proteobacteria | Firmicutes | Acidobacteria |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| CAT | 1 | | | | | | | | | | | | | | |
| POD | 0.515* | 1.000 | | | | | | | | | | | | | |
| AKP | 0.086 | 0.770* | 1.000 | | | | | | | | | | | | |
| UE | 0.028 | 0.203 | 0.473 | 1.000 | | | | | | | | | | | |
| F1 | 0.165 | -0.255 | -0.199 | -0.010 | 1.000 | | | | | | | | | | |
| F2 | -0.866** | -0.292 | 0.126 | 0.204 | -0.125 | 1.000 | | | | | | | | | |
| F3 | -0.401 | -0.323 | -0.188 | 0.384 | 0.207 | 0.643* | 1.000 | | | | | | | | |
| F4 | 0.647* | 0.398 | 0.122 | -0.293 | -0.163 | -0.835** | -0.942** | 1.000 | | | | | | | |
| F5 | 0.626* | 0.192 | -0.106 | -0.399 | 0.021 | -0.887** | -0.803** | 0.855 | 1.000 | | | | | | |
| AP | -0.062 | 0.134 | 0.017 | 0.175 | 0.174 | 0.395 | 0.806** | -0.712* | -0.558* | 1.000 | | | | | |
| AK | 0.867** | 0.632* | 0.222 | -0.192 | 0.166 | -0.833** | -0.573* | 0.744* | 0.680* | -0.179 | 1.000 | | | | |
| AN | -0.243 | -0.661* | -0.453 | 0.298 | 0.154 | 0.382 | 0.659* | -0.604* | -0.505* | 0.314 | -0.619* | 1.000 | | | |
| Proteobacteria | 0.790* | 0.794* | 0.390 | 0.014 | 0.044 | -0.559* | -0.221 | 0.427 | 0.312 | 0.235 | 0.853 | -0.503* | 1.000 | | |
| Firmicutes | -0.496 | 0.328 | 0.544* | 0.230 | -0.184 | 0.655* | 0.430 | -0.527* | -0.634* | 0.473 | -0.256 | -0.204 | 0.085 | 1.000 | |
| Acidobacteria | -0.373 | -0.812 | -0.577* | -0.031 | 0.165 | 0.185 | 0.113 | -0.209 | -0.043 | -0.281 | -0.599* | 0.635* | -0.845** | -0.556* | 1.000 |

Note: * significant, ** extremely significant.