**S4 Table.** **Spearman’s rank correlation matrix between gene abundances and soil properties across all replicate plots in all three soil types.**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Soil properties | Gene abundance (gene copies g-1 dry soil) | | | | | | | | | | |
| 16S rRNAa | 18S rRNAb | AOAc *amoA* | AOBd *amoA* | *nxrB* | *napA* | *narG* | *nirK* | *nirS* | *nosZ* clade I | *nosZ* clade II |
| WFPSe (%) | -0.33\* | 0.05 | 0.79\*\*\* | 0.54\*\*\* | -0.16 | -0.21 | -0.29\* | -0.37\*\* | -0.30\* | -0.32\* | 0.43\*\* |
| Soil pH (1:4 H2O) | -0.74\*\*\* | -0.44\*\* | 0.60\*\*\* | 0.39\*\* | -0.74\*\*\* | -0.83\*\*\* | -0.83\*\*\* | -0.77\*\*\* | -0.51\*\*\* | -0.83\*\*\* | 0.37\*\* |
| Soil organic C  (g C m-2) | 0.76\*\*\* | 0.39\*\* | -0.58\*\*\* | -0.34 | 0.77\*\*\* | 0.84\*\*\* | 0.84\*\*\* | 0.77\*\*\* | 0.63\*\*\* | 0.85\*\*\* | -0.28 |
| Total N (g N m-2) | 0.75\*\*\* | 0.28 | -0.61\*\*\* | -0.39\*\* | 0.75\*\*\* | 0.79\*\*\* | 0.80\*\*\* | 0.77\*\*\* | 0.67\*\*\* | 0.82\*\*\* | -0.28\* |
| Total extractable total N (g N m-2) | 0.32\* | 0.29\* | -0.12 | 0.00 | 0.42\*\* | 0.57\*\*\* | 0.46\*\*\* | 0.27 | 0.26 | 0.40\*\* | -0.12 |
| Plant-available P  (g P m-2) | -0.51\*\*\* | -0.08 | 0.84\*\*\* | 0.49\*\*\* | -0.41\*\* | -0.46\*\*\* | -0.52\*\*\* | -0.62\*\*\* | -0.40\*\* | -0.54\*\*\* | 0.46\*\*\* |
| Exchangeable K  (g K m-2) | -0.57\*\*\* | -0.18 | 0.78\*\*\* | 0.48\*\* | -0.45\*\* | -0.52\*\*\* | -0.55\*\*\* | -0.60\*\*\* | -0.40\*\* | -0.59\*\*\* | 0.47\*\* |
| Exchangeable Mg  (g Mg m-2) | -0.50\*\*\* | -0.15 | 0.81\*\*\* | 0.48\*\* | -0.42\*\*\* | -0.49\*\*\* | -0.53\*\*\* | -0.59\*\*\* | -0.36\*\* | -0.57\*\*\* | 0.55\*\*\* |
| Exchangeable Mn  (g Mn m-2) | 0.87\*\* | 0.38\*\* | -0.09 | -0.06 | 0.48\*\* | 0.57\*\*\* | 0.58\*\*\* | 0.38\*\* | 0.35\*\* | 0.51\*\*\* | -0.03 |
| Exchangeable Na  (g Na m-2) | -0.39\*\* | -0.21 | 0.54\*\*\* | 0.18 | -0.33\* | -0.42\*\* | -0.44\*\* | -0.43\*\* | -0.17 | -0.45\*\* | 0.28\* |

Soil pH, soil organic C, total N, exchangeable K, Mg, Mn, Na were measured in 2016; water-filled pore space (WFPS), extractable total N and plant-available P were measured in 2017 on the same day that soil samples for DNA extraction were taken. a bacterial 16S rRNA gene, b fungal 18S rRNA gene, c ammonia-oxidizing archaea, d ammonia-oxidizing bacteria, e water-filled pore space, \* p ≤ 0.05, \*\* p ≤ 0.01, \*\*\* p < 0.001.