Supplementary Table 1 Correlations between soil properties and microbial activity based on Mantel tests

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| Soil microbial activities | Soil properties | 0-10cm | 10-20cm |
| Mantel’s r | Mantel’s P | Mantel’s r | Mantel’s P |
| Enzyme activities | BD | -0.133  | 0.731  | 0.132  | 0.207  |
| NCP | -0.030  | 0.512  | 0.135  | 0.153  |
| Clay | 0.079  | 0.294  | -0.015  | 0.480  |
| pH | -0.125  | 0.834  | 0.187  | 0.091  |
| SOC | -0.247  | 0.957  | -0.103  | 0.719  |
| TN | 0.061  | 0.363  | -0.134  | 0.813  |
| AN | 0.053  | 0.340  | -0.140  | 0.856  |
| TP  | 0.079  | 0.309  | 0.244  | 0.075  |
| AP | 0.024  | 0.396  | 0.149  | 0.193  |
| TK | 0.402  | **0.042**  | -0.114  | 0.820  |
| AK | -0.170  | 0.865  | -0.025  | 0.515  |
| Microbial biomass | BD | 0.012  | 0.402  | 0.341  | **0.040**  |
| NCP | -0.043  | 0.531  | 0.066  | 0.309  |
| Clay | 0.193  | 0.125  | 0.185  | 0.123  |
| pH | -0.124  | 0.823  | 0.047  | 0.349  |
| SOC | -0.203  | 0.917  | 0.458  | **0.028**  |
| TN | -0.038  | 0.495  | -0.024  | 0.520  |
| AN | -0.114  | 0.756  | -0.090  | 0.680  |
| TP  | -0.033  | 0.441  | -0.014  | 0.419  |
| AP | -0.127  | 0.667  | -0.102  | 0.628  |
| TK | 0.287  | 0.102  | 0.153  | 0.135  |
| AK | -0.162  | 0.889  | -0.129  | 0.839  |

Bold fonts indicate significant (*p* < 0.05) or extreme significance (*p* < 0.01).