Table S1 Pearson's correlation coefﬁcients between soil properties and *nosZ* gene abundance

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | pH | NO3- | NH4+ | TN | AP | AK | OM |
| *nosZ* gene abundance | coefﬁcient  | 0.627 | 0.327 | -0.468 | -0.550 | -0.117 | 0.047 | 0.056 |
| *P* value | 0.012 | 0.233 | 0.078 | 0.034 | 0.679 | 0.868 | 0.844 |

Table S2 Basic information of *nosZ* clade I sequencing

|  |  |  |  |
| --- | --- | --- | --- |
| Sample | Row data | Clean data | Coverage |
| TN10-1 | 198517 | 187720 | 0.992  |
| TN10-2 | 158456 | 146816 | 0.993  |
| TN10-3 | 219472 | 205396 | 0.993  |
| TN10-4 | 86372 | 81924 | 0.996  |
| TN10-5 | 162423 | 150286 | 0.996  |
| TN10-6 | 163993 | 152140 | 0.994  |
| TN20-1 | 169380 | 157024 | 0.995  |
| TN20-2 | 40526 | 37617 | 0.991  |
| TN20-3 | 103597 | 97182 | 0.993  |
| TN20-4 | 100172 | 91128 | 0.993  |
| TN20-5 | 159968 | 146256 | 0.990  |
| TN20-6 | 186814 | 172944 | 0.992  |
| TN30-1 | 151439 | 140530 | 0.994  |
| TN30-2 | 45155 | 39685 | 0.993  |
| TN30-3 | 134022 | 124090 | 0.993  |
| TN30-4 | 150463 | 138649 | 0.993  |
| TN30-5 | 43848 | 41651 | 0.995  |
| TN30-6 | 23298 | 22270 | 0.996  |
| TN40-1 | 135048 | 124946 | 0.995  |
| TN40-2 | 91774 | 86557 | 0.993  |
| TN40-3 | 144798 | 133797 | 0.990  |
| TN40-4 | 103417 | 97158 | 0.989  |
| TN40-5 | 63588 | 59190 | 0.996  |
| TN40-6 | 47102 | 44006 | 0.989  |
| TN50-1 | 25729 | 24358 | 0.993  |
| TN50-2 | 153155 | 143238 | 0.991  |
| TN50-3 | 199670 | 188569 | 0.990  |
| TN50-4 | 221374 | 209349 | 0.991  |
| TN50-5 | 266329 | 254928 | 0.993  |
| TN50-6 | 163059 | 153388 | 0.993  |

Table S3 Total relative abundances of all genera and significant effects across N levels

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| #OTU ID | TN10 | TN20 | TN30 | TN40 | TN50 |
| Bradyrhizobium | 0.22 | 0.09 | 23.62 | 1.95 | 0.27 |
| Mesorhizobium | 6.65 | 10.54 | 5.28 | 1.47 | 0.42 |
| Azospira | 3.14 | 2.67 | 6.91 | 3.18 | 1.19 |
| Zoogloea | 1.45 | 2.25 | 7.12 | 0.64 | 1.35 |
| Thauera | 1.17 | 1.15 | 3.27 | 0.73 | 0.32 |
| Thiobacillus | 1.05 | 2.11 | 15.12 | 4.69 | 1.63 |
| Massilia | 1.07 | 0.46 | 1.65 | 0.92 | 0.10 |
| Acidovorax | 0.59 | 0.87 | 4.34 | 2.86 | 0.56 |
| Alcanivorax | 0.17 | 0.09 | 6.73 | 7.52 | 4.57 |
| Azospirillum | 0.18 | 0.34 | 0.39 | 0.50 | 0.13 |
| Burkholderia | 0.13 | 0.03 | 0.22 | 0.21 | 0.03 |
| Cupriavidus | 0.38 | 0.87 | 0.81 | 1.91 | 0.24 |
| Dyella | 0.00 | 0.04 | 0.19 | 0.35 | 0.01 |
| Marinobacter | 0.04 | 0.03 | 0.06 | 0.25 | 0.04 |
| Maritimibacter | 0.01 | 0.01 | 0.00 | 0.00 | 0.00 |
| Methylobacillus | 0.13 | 0.53 | 0.17 | 0.17 | 0.08 |
| Nitrospirillum | 0.00 | 0.01 | 0.01 | 0.05 | 0.01 |
| Nocardioidaceae | 0.04 | 0.15 | 0.02 | 0.12 | 0.11 |
| Pelomonas | 0.32 | 0.37 | 0.65 | 0.49 | 0.30 |
| Pseudogulbenkiania | 0.09 | 0.24 | 0.35 | 0.19 | 0.02 |
| Pseudomonas | 0.04 | 0.03 | 0.23 | 0.36 | 0.24 |
| Ralstonia | 0.79 | 0.87 | 2.03 | 0.28 | 0.19 |
| Rhizobium | 0.11 | 0.01 | 0.30 | 0.12 | 0.09 |
| Rhodobacter | 0.08 | 0.02 | 0.08 | 0.04 | 0.02 |
| Rhodoferax | 0.00 | 0.02 | 0.01 | 0.04 | 0.00 |
| Rhodoferax | 0.02 | 0.27 | 0.00 | 0.02 | 0.00 |
| Rhodospirillum | 0.03 | 0.04 | 0.22 | 0.55 | 1.13 |
| Ruegeria | 0.00 | 0.00 | 0.00 | 0.07 | 0.02 |
| Sulfitobacter | 0.03 | 0.01 | 0.01 | 0.01 | 0.00 |
| Sulfuritalea | 0.01 | 0.02 | 0.03 | 0.24 | 0.01 |

Table S4 Forward Selection Results from redundancy analysis (RDA)

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Name | Explains % | Contribution % | pseudo-F | P value |
| Total N | 18.1 | 38.8 | 6.2 | 0.002 |
| Avail P | 7.7 | 16.6 | 2.8 | 0.002 |
| NO3- | 6.1 | 13 | 2.3 | 0.004 |
| NH4+ | 4.8 | 10.4 | 2.0 | 0.01 |
| Avail K | 4.5 | 9.7 | 1.8 | 0.022 |
| OM | 2.8 | 6 | 1.2 | 0.228 |
| pH | 2.6 | 5.6 | 1.1 | 0.38 |