Table S1 Primers used for PCR amplification for real-time quantification Application

|  |  |  |
| --- | --- | --- |
| Target gene and primer | 5′-3′ | Reference |
| AOA-F | STAATGGTCTGGCTTAGACG | Francis et al. 2005 |
| AOA-R | GCGGCCATCCATCTGTATGT |
| AOB-1F | GGGGTTTCTACTGGTGGT | Cytryn et al. 2012 |
| AOB-2R | CCCCTCKGSAAAGCCTTCTTC |
| Archaeal-519F | CAGCMGCCGCGGTAA | Park et al. 2010 |
| Archaeal-727R | GCTTTCRTCCCTCACCGT |
| Bacterial-518F | CCAGCAGCCGCGGTAAT | Jung et al. 2011 |
| Bacterial-786R | CTACCAGGGTATCTAATC |

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Park, B. J., et al. 2010. Cultivation of autotrophic ammonia-oxidizing ar- chaea from marine sediments in co-culture with sulfur-oxidizing bacteria. Appl. Environ. Microbiol. 76:7575–7587.

Table S2 Real-time Quantitative PCR reaction solution

|  |  |  |
| --- | --- | --- |
| Reagents | Amount | Final concentration |
| TB Green Premix Ex Taq II（Tli RNaseH Plus）（2X） | 10 μl | 1X |
| Forward Primer（10 μM） | 0.8 μl | 0.4 μM\*1 |
| Reverse Primer（10 μM） | 0.8 μl | 0.4 μM\*1 |
| ROX Reference Dye（50X） | 0.4 μl | 1X |
| DNA template \*3 | 2 μl |  |
| Sterile water | 6 μl |  |
| Total | 20 μl |  |

Table S3 Procedures of soil microbe analyze in real-time PCR

|  |  |
| --- | --- |
| Target microbes | PCR procedure |
| AOA | An initial cycle of 30 sec at 95 ℃; 40 cycles of 10sec at 95℃, 30 sec at 55 ℃, and 30 sec at 72 ℃; 15 sec at 95 ℃, 60 sec at 60 ℃, and 15 sec at 95 ℃ for melt curve. |
| AOB | An initial cycle of 30 sec at 95 ℃; 40 cycles of 10sec at 95℃, 30 sec at 55 ℃, and 30 sec at 72 ℃; 15 sec at 95 ℃, 60 sec at 60 ℃, and 15 sec at 95 ℃ for melt curve. |
| Archaeal | An initial cycle of 30 sec at 95 ℃; 40 cycles of 10sec at 95℃, 30 sec at 55 ℃, and 30 sec at 72 ℃; 15 sec at 95 ℃, 60 sec at 60 ℃, and 15 sec at 95 ℃ for melt curve. |
| Bacterial | An initial cycle of 30 sec at 95 ℃; 40 cycles of 10sec at 95℃, 30 sec at 55 ℃, and 30 sec at 72 ℃; 15 sec at 95 ℃, 60 sec at 60 ℃, and 15 sec at 95 ℃ for melt curve. |

Table S4 The specific percentage of dominant phylum in the bacterial community for each treatment

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment (%) | Control | Mulched | Flooded |
| Proteobacteria | 26.20 | 27.60 | 34.78 |
| Actinobacteriota | 18.96 | 18.63 | 17.88 |
| Acidobacteriota | 23.02 | 17.67 | 7.38 |
| Chloroflexi | 11.79 | 16.69 | 8.85 |
| Firmicutes | 3.92 | 5.87 | 17.28 |
| Bacteroidota | 3.45 | 2.14 | 2.21 |
| Myxococcota | 2.84 | 2.18 | 1.12 |

Table S5 The specific percentage of dominant class in the bacterial community for each treatment

|  |  |  |  |
| --- | --- | --- | --- |
| Treatment (%) | Control | Mulched | Flooded |
| Ammoniphilus | 0.02 | 0.05 | 14.57 |
| Acidothermus | 3.35 | 3.54 | 3.22 |
| Vicinamibacterales | 4.36 | 4.19 | 0.08 |
| AD3 | 0.04 | 3.91 | 2.93 |
| JG30-KF-AS9 | 2.57 | 3.43 | 1.24 |
| Subgroup\_2 | 2.24 | 3.00 | 0.29 |
| Bradyrhizobium | 2.77 | 2.02 | 1.52 |