**Supplementary Materials**

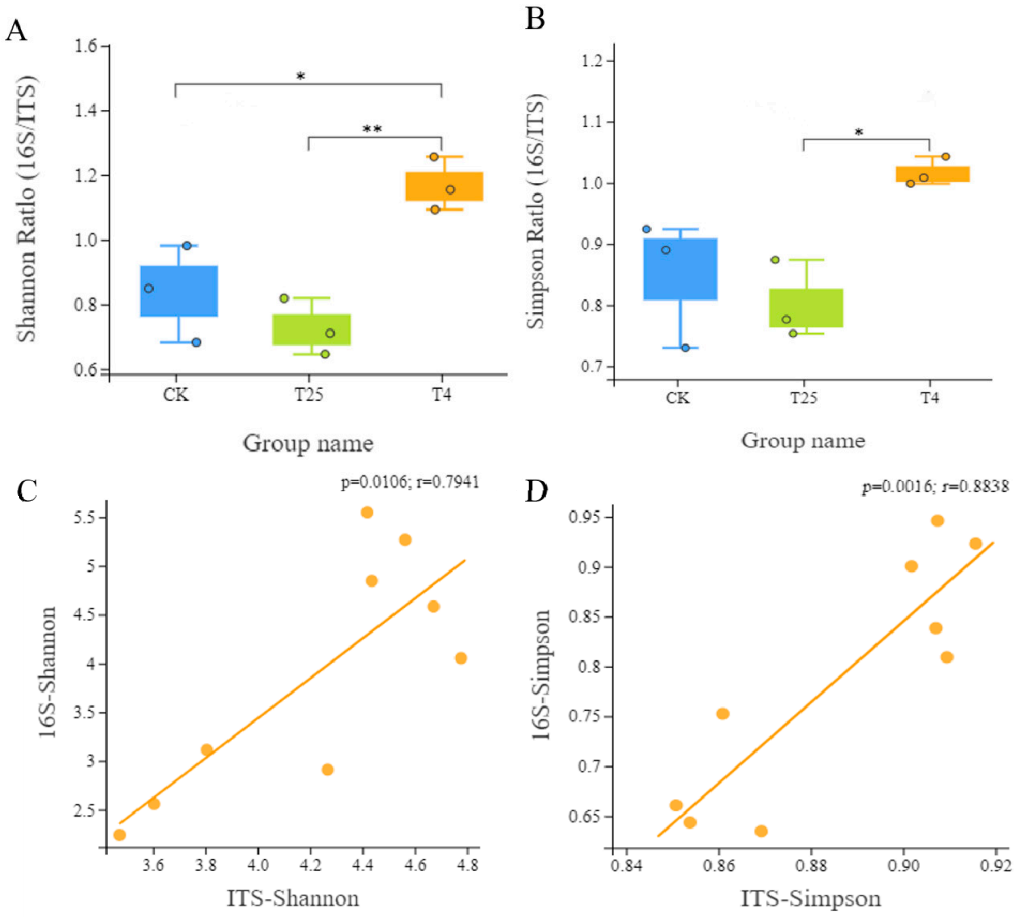


Figure S1. Scatter diagram of ratio difference between 16S and ITS Shannon and Simpson diversity indexes (*$p < 0.05$, **$p < 0.01$).

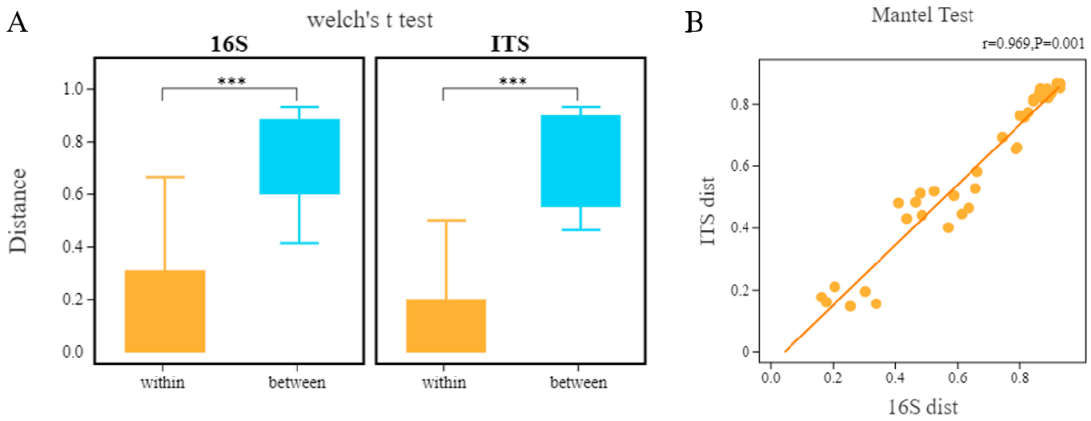


Figure S2. A and B for box plots of α-diversity index of bacterial and fungal microbial communities Shannon and Simpson index intra- and inter-group validation. C and D for scatter plot of distance between two pairs of ITS and 16S sequencing data (***$p < 0.001$).

Table S1. Statistical results of bacterial and fungal alpha diversity.

| Items | No. | Name | $CK_1$ | $CK_2$ | $CK_3$ | $T_{25-1}$ | $T_{25-2}$ | $T_{25-3}$ | $T_{4-1}$ | $T_{4-2}$ | $T_{4-3}$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 16S-Phylum | 1 | *Proteobacteria* | 42.2976 | 39.5087 | 29.6582 | 87.1559 | 89.9268 | 92.7928 | 64.3013 | 59.3711 | 68.72 |
| | 2 | *Cyanobacteria* | 45.2418 | 43.8393 | 62.6897 | 4.3805 | 4.069 | 5.6399 | 10.8337 | 20.8681 | 18.4254 |
| | 3 | *Actinobacteria* | 3.7695 | 5.9862 | 2.2106 | 7.3402 | 5.329 | 0.9596 | 13.4127 | 10.895 | 5.9214 |
| | 4 | *Bacteroidetes* | 2.3239 | 3.1058 | 2.5415 | 0.231 | 0.1876 | 0.1418 | 4.6077 | 3.1042 | 1.6206 |
| | 5 | *Firmicutes* | 0.8725 | 4.7937 | 1.232 | 0.3854 | 0.0912 | 0.1008 | 2.4311 | 1.7806 | 0.8234 |
| | 6 | *Planctomycetes* | 0.0926 | 0.3142 | 0.0784 | 0.3664 | 0.1552 | 0.0171 | 1.9241 | 1.6588 | 0.8767 |
| | 7 | *Acidobacteria* | 0.3126 | 0.0992 | 0.1817 | 0.0466 | 0.0239 | 0.0186 | 1.0109 | 0.5959 | 0.7232 |
| | 8 | *Armatimonadetes* | 0.3548 | 0.1906 | 0.0033 | 0.0086 | 0.0068 | 0.0054 | 0.4556 | 0.2879 | 0.4433 |
| | 9 | *Fusobacteria* | 0.0099 | 0.0418 | 0.1117 | 0.0043 | 0.1347 | 0.145 | 0.0684 | 0.1258 | 1.1305 |
| | 10 | *Patescibacteria* | 0.0463 | 0.5144 | 0.1375 | 0.0138 | 0.0026 | 0.0046 | 0.2505 | 0.0393 | 0.0479 |
| | 11 | *Deinococcus-Thermus* | 0.1472 | 0.0009 | 0.0992 | 0.0129 | 0.0119 | 0.0496 | 0.0684 | 0.146 | 0.1035 |
| | 12 | *Chlamydiae* | 0 | 0.0017 | 0.0008 | 0.0103 | 0 | 0.0078 | 0.179 | 0.0604 | 0.0338 |
| | 13 | *Verrucomicrobia* | 0.0504 | 0.0009 | 0.0033 | 0.0034 | 0.0009 | 0 | 0.0201 | 0.1168 | 0.1078 |
| | 14 | *Tenericutes* | 0 | 0 | 0 | 0 | 0 | 0.0023 | 0.001 | 0 | 0.1851 |
| | 15 | *Euryarchaeota* | 0 | 0.1819 | 0 | 0 | 0 | 0 | 0 | 0 | 0.0152 |
| | 16 | *Dadabacteria* | 0 | 0.1062 | 0 | 0 | 0.0009 | 0.0008 | 0 | 0 | 0.0011 |
| ITS-Phylum | 1 | *Ascomycota* | 74.5048 | 70.5032 | 73.7686 | 85.1438 | 73.1386 | 89.3429 | 56.3058 | 60.8163 | 57.4251 |
| | 2 | *Basidiomycota* | 6.6453 | 2.6904 | 2.7312 | 7.0561 | 22.1275 | 6.2362 | 2.4357 | 3.6134 | 2.6295 |
| | 3 | *Anthophyta* | 5.7861 | 8.5481 | 9.7373 | 2.5767 | 0.7604 | 0.4166 | 2.8005 | 3.0943 | 4.0097 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | 4 | *Chlorophyta* | 0.7861 | 1.2581 | 0.7471 | 0.1476 | 0.0288 | 0.0593 | 2.5753 | 0.7655 | 0.8257 |
| | 1 | *Gluconobacter* | 0.7212 | 0.7765 | 0.5251 | 57.2579 | 9.8848 | 40.5434 | 2.0207 | 4.4842 | 3.1039 |
| | 2 | *Methylobacterium* | 8.3057 | 7.3319 | 7.8755 | 2.5993 | 2.8832 | 0.8953 | 19.5391 | 19.9853 | 23.5082 |
| | 3 | *1174-901-12* | 7.9451 | 6.5198 | 7.5963 | 2.0062 | 0.9395 | 0.6488 | 15.5812 | 13.6087 | 20.6482 |
| | 4 | *Sphingomonas* | 3.1336 | 2.473 | 1.117 | 0.3707 | 0.2617 | 0.2108 | 4.3894 | 3.9729 | 3.5276 |
| | 5 | *Burkholderia-Caballeronia-Paraburkholderia* | 4.1293 | 7.9996 | 2.9808 | 0.3173 | 0.2711 | 0.2325 | 0.8821 | 0.5415 | 0.9867 |
| | 6 | *Hymenobacter* | 0.9411 | 1.4519 | 0.1209 | 0.0655 | 0.0639 | 0.0279 | 2.4029 | 1.2028 | 0.428 |
| | 7 | *Bdellovibrio* | 0.5392 | 0.4178 | 0.0834 | 0.0681 | 0.1662 | 0.0248 | 1.5369 | 1.0398 | 1.0738 |
| | 8 | *Tatumella* | 0.0686 | 0.0287 | 0.02 | 0.0379 | 0.0477 | 0.0426 | 3.7095 | 0.462 | 0.1797 |
| 16S-Genus | 9 | *Massilia* | 1.095 | 1.0332 | 0.2742 | 0.0578 | 0.0725 | 0.0659 | 3.1885 | 0.8173 | 0.7602 |
| | 10 | *Methylocella* | 0.1348 | 0.0357 | 0.1442 | 0.1638 | 0.0315 | 0.0357 | 1.6234 | 0.5365 | 1.4354 |
| | 11 | *Acidiphilium* | 1.0156 | 0.4422 | 0.8661 | 0.0974 | 0.1236 | 0.1124 | 1.0219 | 0.914 | 0.8419 |
| | 12 | *Jatrophihabitans* | 0.1232 | 0.1436 | 0.0125 | 0.0914 | 0.3708 | 0.0341 | 0.7343 | 0.7942 | 0.8582 |
| | 13 | *Kineococcus* | 0.1398 | 0.3395 | 0.135 | 0.0741 | 0.0631 | 0.0295 | 0.3209 | 0.2406 | 0.2647 |
| | 14 | *Spirosoma* | 0.8998 | 0.0157 | 0.0058 | 0.031 | 0.0435 | 0.0209 | 0.4094 | 0.459 | 0.3855 |
| | 15 | *Geodermatophilus* | 0.0157 | 0.0174 | 0.0117 | 0.0362 | 0.046 | 0.0163 | 0.2504 | 0.3291 | 0.1841 |
| | 16 | *Vibrio* | 0.1902 | 1.0411 | 0.005 | 0.0448 | 0.0094 | 0.7154 | 1.1869 | 0.0272 | 0.244 |
| | 17 | *Staphylococcus* | 0.2068 | 0.0122 | 0.2051 | 0.2845 | 0.0358 | 0.024 | 1.8598 | 0.8989 | 0.1688 |
| | 18 | *Acinetobacter* | 0.8568 | 1.747 | 0.1184 | 0.4156 | 0.0725 | 0.1318 | 0.1308 | 0.1832 | 0.2135 |
| | 19 | *Singulisphaera* | 0.0116 | 0.0044 | 0.0183 | 0.0897 | 0.0529 | 0.0085 | 0.5673 | 0.6442 | 0.4585 |
| | 20 | *Novosphingobium* | 0.0637 | 0.0165 | 0.02 | 0.025 | 0.0315 | 0.0163 | 0.1941 | 0.158 | 0.0893 |
| | 21 | *Terriglobus* | 0.0901 | 0.0514 | 0.1509 | 0.0362 | 0.0171 | 0.0109 | 0.7584 | 0.2204 | 0.5946 |
| | 22 | *Cystobacter* | 0.0157 | 0.0122 | 0.0092 | 0.0276 | 0.0153 | 0.0248 | 0.4124 | 0.9311 | 1.6304 |
| | 23 | *Streptococcus* | 0.3085 | 1.1116 | 0.496 | 0.0664 | 0.0247 | 0.0341 | 0.1237 | 0.3563 | 0.2505 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 24 | *Mucilaginibacter* | 0.0595 | 0.0061 | 0.0058 | 0.0854 | 0.0077 | 0.0062 | 1.1919 | 1.0629 | 0.1699 |
| 25 | *Actinomycetospora* | 0.0058 | 0.0113 | 0.005 | 0.1086 | 0.4186 | 0.014 | 0.4768 | 0.3312 | 0.085 |
| 26 | *Quadrisphaera* | 0.0504 | 0.497 | 0.0042 | 0.0276 | 0.0213 | 0.0085 | 0.1358 | 0.0564 | 0.0468 |
| 27 | *Labrys* | 0.0447 | 0.0052 | 0.015 | 0.031 | 0.0332 | 0.0209 | 0.0432 | 0.0584 | 0.025 |
| 28 | *Bacillus* | 0.1513 | 0.988 | 0.1734 | 0.0129 | 0.0068 | 0.0085 | 0.172 | 0.2949 | 0.1492 |
| 29 | *Cetobacterium* | 0.0091 | 0.0418 | 0.1117 | 0.0043 | 0.1347 | 0.145 | 0.0684 | 0.1117 | 1.1305 |
| 30 | *Pantoea* | 0.0835 | 0.007 | 0.1659 | 0.019 | 0.0102 | 0.0085 | 0.4627 | 0.0876 | 0.0229 |
| 31 | *Dysgonomonas* | 0.0074 | 0.0061 | 2.0539 | 0.0052 | 0.0017 | 0.0101 | 0.008 | 0.0141 | 0.0044 |
| 32 | *Brachybacterium* | 0.0579 | 0.0078 | 0.0058 | 0.0069 | 0.9224 | 0.0426 | 0.006 | 0.0262 | 0.1067 |
| 33 | *Lapillicoccus* | 0.0058 | 0.1541 | 0.0033 | 0.1828 | 0.1373 | 0.0093 | 0.0634 | 0.0262 | 0.0828 |
| 34 | *Bryocella* | 0.1447 | 0.0026 | 0 | 0.006 | 0.0043 | 0.0062 | 0.0825 | 0.156 | 0.0817 |
| 35 | *Pseudomonas* | 0.2861 | 0.4622 | 0.105 | 0.019 | 0.0196 | 0.0256 | 0.0956 | 0.1973 | 0.1939 |
| 36 | *Enhydrobacter* | 0.0033 | 0.8191 | 0.0625 | 0.119 | 0.0205 | 0.014 | 0.0573 | 0.0846 | 0.0958 |
| 37 | *Kocuria* | 0.0893 | 0.0061 | 0.1184 | 0.1121 | 0.0486 | 0.0202 | 0.0956 | 0.0936 | 0.1993 |
| 38 | *Lactobacillus* | 0.0637 | 0.3987 | 0.0308 | 0.0009 | 0.0077 | 0.0054 | 0.0372 | 0.0473 | 0.0577 |
| 39 | *Deinococcus* | 0.1472 | 0.0009 | 0.0992 | 0.0129 | 0.0119 | 0.0496 | 0.0684 | 0.1449 | 0.1035 |
| 40 | *Nocardioides* | 0.0728 | 0.2472 | 0.0392 | 0.0147 | 0.0136 | 0.0093 | 0.0563 | 0.0262 | 0.0163 |
| 41 | *Exiguobacterium* | 0.0033 | 0.726 | 0.005 | 0.0069 | 0.0026 | 0.0031 | 0.0694 | 0.0584 | 0.0316 |
| 42 | *Corynebacterium_1* | 0.005 | 0.3752 | 0.1642 | 0.0052 | 0.0077 | 0.0046 | 0.0553 | 0.0574 | 0.086 |
| 43 | *Photobacterium* | 0 | 0.7608 | 0 | 0.0052 | 0.0009 | 0.0031 | 0.0895 | 0 | 0.0098 |
| 44 | *Caedibacter* | 0.0017 | 0.0009 | 0.0375 | 0.0043 | 0.0009 | 0.0085 | 0.1116 | 0.1359 | 0.1405 |
| 45 | *Cutibacterium* | 0.0686 | 0.0157 | 0.1876 | 0.0147 | 0.006 | 0.0039 | 0.0272 | 0.0664 | 0.0272 |
| 46 | *Marmoricola* | 0.0033 | 0.0418 | 0 | 0.0957 | 0.0119 | 0.0031 | 0.2354 | 0.1047 | 0.0087 |
| 47 | *Paracoccus* | 0.1935 | 0.175 | 0.0358 | 0.0121 | 0.0102 | 0.0039 | 0.0191 | 0.0181 | 0.0773 |
| 48 | *Amnibacterium* | 0.0314 | 0.0409 | 0.0317 | 0.0466 | 0.0614 | 0.0225 | 0.0704 | 0.0533 | 0.0392 |
| 49 | *Friedmanniella* | 0.0695 | 0.0705 | 0.0025 | 0.0103 | 0.0196 | 0.0031 | 0.0785 | 0.159 | 0.0316 |
| 50 | *Tanticharoenia* | 0.0141 | 0.0157 | 0.0075 | 0.0293 | 0.0827 | 0 | 0.0352 | 0.0362 | 0.0207 |
| 51 | *Aureimonas* | 0.0017 | 0.0044 | 0.0017 | 0.1552 | 0.006 | 0.0062 | 0.008 | 0.1862 | 0.0653 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 52 | *Psychroglaciecola* | 0.0025 | 0.0026 | 0.0008 | 0.0112 | 0.0119 | 0.0078 | 0.0201 | 0.0805 | 0.0109 |
| 53 | *Geobacter_sp_enrichment_culture_clone_VanCtr1* | 0.0008 | 0 | 0 | 0.0017 | 0.0026 | 0.0047 | 0.2002 | 0.1087 | 0.0381 |
| 54 | *Aeromonas* | 0.0025 | 0.0427 | 0.0008 | 0.0034 | 0.0477 | 0.1403 | 0.1338 | 0.1067 | 0.086 |
| 55 | *Larkinella* | 0.0008 | 0 | 0.0008 | 0 | 0 | 0.0023 | 0.4637 | 0.0221 | 0.0022 |
| 56 | *Granulicella* | 0.0372 | 0 | 0 | 0.0026 | 0.0009 | 0.0008 | 0.1348 | 0.0292 | 0.0185 |
| 57 | *Thermobrachium* | 0.0521 | 0.3256 | 0.0383 | 0.0052 | 0.0009 | 0.0023 | 0.007 | 0.005 | 0.0033 |
| 58 | *Conexibacter* | 0.0008 | 0.0009 | 0.0008 | 0.0052 | 0.0017 | 0.0008 | 0.0191 | 0.0282 | 0.0566 |
| 59 | *Tepidisphaera* | 0 | 0.0026 | 0 | 0 | 0.0026 | 0 | 0.0131 | 0.1057 | 0.0142 |
| 60 | *Chryseobacterium* | 0.0984 | 0.0897 | 0 | 0.0078 | 0.006 | 0.0186 | 0.0091 | 0.0252 | 0.0392 |
| 61 | *Kytococcus* | 0.0008 | 0.2916 | 0 | 0.0009 | 0.0026 | 0.0093 | 0.005 | 0.002 | 0.0305 |
| 62 | *Rothia* | 0.0017 | 0.2873 | 0.0333 | 0 | 0.0017 | 0 | 0.0111 | 0.0493 | 0.0131 |
| 63 | *Enterococcus* | 0 | 0.1384 | 0.03 | 0.0009 | 0.0068 | 0.0008 | 0.005 | 0 | 0.0022 |
| 64 | *Brevibacterium* | 0 | 0.1219 | 0.0734 | 0.0009 | 0.0017 | 0.0333 | 0.0211 | 0.003 | 0.0087 |
| 65 | *Rhodococcus* | 0.1282 | 0.0017 | 0.0692 | 0.0043 | 0.0009 | 0.0046 | 0.008 | 0.0312 | 0.0065 |
| 66 | *Chthoniobacter* | 0 | 0.0009 | 0 | 0.0026 | 0.0009 | 0 | 0.0191 | 0.0695 | 0 |
| 67 | *Mycobacterium* | 0 | 0 | 0.0008 | 0.0086 | 0.0239 | 0 | 0.0211 | 0.1248 | 0 |
| 68 | *Stenotrophomonas* | 0.1381 | 0.0009 | 0.0017 | 0.025 | 0.0017 | 0.0202 | 0.003 | 0.0101 | 0.0011 |
| 69 | *Cytophaga* | 0 | 0.2124 | 0.0684 | 0 | 0.0034 | 0.0023 | 0.002 | 0.001 | 0.0011 |
| 70 | *Belnapia* | 0.0008 | 0.0566 | 0 | 0.0043 | 0.0026 | 0.0039 | 0.0101 | 0.0232 | 0.0044 |
| 71 | *Candidatus_Paracaedibacter* | 0 | 0 | 0 | 0.0009 | 0.0034 | 0 | 0.0111 | 0.0423 | 0 |
| 72 | *Bradyrhizobium* | 0.0017 | 0.1184 | 0.015 | 0.0052 | 0.0034 | 0.0039 | 0.007 | 0.0181 | 0.0087 |
| 73 | *Siphonobacter* | 0 | 0 | 0 | 0.0017 | 0 | 0 | 0.001 | 0.1419 | 0.0904 |
| 74 | *Symplocastrum_CPER-KK1* | 0.0008 | 0.2211 | 0.0017 | 0.0017 | 0 | 0 | 0.001 | 0.002 | 0.0011 |
| 75 | *Mycoplasma* | 0 | 0 | 0 | 0 | 0 | 0.0023 | 0.001 | 0 | 0.1851 |
| 76 | *Bryobacter* | 0 | 0 | 0 | 0 | 0 | 0.0008 | 0.004 | 0.1621 | 0.0283 |
| 77 | *Leuconostoc* | 0.0008 | 0 | 0.0767 | 0 | 0 | 0 | 0 | 0 | 0 |
| 78 | *Salinicoccus* | 0.0017 | 0.1811 | 0 | 0 | 0 | 0.0016 | 0 | 0 | 0.0022 |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| | 79 | *Asinibacterium* | 0 | 0.1819 | 0 | 0.0009 | 0.0017 | 0.0023 | 0 | 0 | 0.0011 |
| | 80 | *Aerococcus* | 0.0008 | 0.1314 | 0 | 0 | 0 | 0 | 0.008 | 0.002 | 0.0022 |
| | 81 | *Salinicola* | 0 | 0.1341 | 0.0358 | 0.0043 | 0 | 0.0023 | 0.001 | 0 | 0.0011 |
| | 82 | *Prevotella_1* | 0 | 0.0026 | 0 | 0 | 0 | 0 | 0.005 | 0 | 0.1666 |
| | 83 | *Acidovorax* | 0 | 0.1193 | 0.0008 | 0.0026 | 0.0017 | 0 | 0.0171 | 0.0151 | 0.012 |
| | 84 | *Anaerococcus* | 0 | 0.1219 | 0 | 0.0009 | 0 | 0.0008 | 0.001 | 0.0081 | 0.0272 |
| | 85 | *Carnobacterium* | 0 | 0.1436 | 0.0008 | 0 | 0 | 0.0008 | 0 | 0.001 | 0.0011 |
| | 86 | *Jeotgalibaca* | 0.0008 | 0.1462 | 0 | 0 | 0 | 0.0008 | 0 | 0 | 0 |
| | 87 | *Sungkyunkwania* | 0 | 0.1097 | 0 | 0.0009 | 0 | 0 | 0 | 0.002 | 0.0229 |
| | 88 | *Candidatus_Alysiosphaera* | 0.0017 | 0 | 0 | 0.0009 | 0.0017 | 0.0016 | 0.001 | 0.1158 | 0.0076 |
| | 89 | *Actinomyces* | 0 | 0.1088 | 0 | 0.0034 | 0 | 0 | 0.004 | 0.0121 | 0.0011 |
| | 90 | *Dietzia* | 0.1174 | 0 | 0 | 0.0009 | 0 | 0 | 0 | 0 | 0 |
| | 91 | *Catalinimonas* | 0 | 0.1149 | 0 | 0.0017 | 0 | 0 | 0 | 0 | 0 |
| | 92 | *Hanstruepera* | 0.0008 | 0.1027 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | 1 | *Zasmidium* | 4.318 | 3.6118 | 3.6054 | 20.734 | 10.0557 | 5.4232 | 17.0975 | 12.7426 | 15.4657 |
| | 2 | *Talaromyces* | 0.3911 | 0.7418 | 0.3577 | 32.6347 | 31.0375 | 23.4981 | 1.1929 | 1.2013 | 1.0631 |
| | 3 | *Aspergillus* | 1.5129 | 1.8517 | 5.356 | 9.158 | 20.873 | 47.4784 | 1.2741 | 1.5311 | 3.3888 |
| ITS-Genus | 4 | *Uwebraunia* | 25.1654 | 24.7643 | 31.8735 | 0.5276 | 0.4653 | 0.4052 | 7.3601 | 6.741 | 5.4366 |
| | 5 | *Vaccinium* | 5.6723 | 8.1027 | 9.5227 | 2.5558 | 0.7454 | 0.2424 | 2.755 | 3.0609 | 3.9715 |
| | 6 | *Alternaria* | 3.1543 | 4.1218 | 4.0177 | 0.8339 | 0.6516 | 0.4128 | 4.4211 | 7.7851 | 4.0805 |
| | 7 | *Strelitziana* | 3.1154 | 4.4577 | 3.666 | 0.6838 | 0.5728 | 0.4923 | 5.0197 | 4.0372 | 5.9159 |
| | 8 | *Colletotrichum* | 0.359 | 0.0503 | 0.6021 | 1.5755 | 2.6928 | 6.4685 | 0.0844 | 0.1452 | 0.2691 |
| | 9 | *Coniophora* | 0.0117 | 0.0763 | 0.0139 | 0.2386 | 16.8157 | 0.4279 | 0.0043 | 0.4441 | 0.0098 |

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|---|---|---|---|---|---|---|---|---|---|---|
| 10 | *Aureobasidium* | 7.2028 | 4.5978 | 4.9755 | 0.048 | 0.0513 | 0.0896 | 0.7285 | 1.0941 | 0.5436 |
| 11 | *Phaeophleospora* | 0.4583 | 0.6537 | 0.5981 | 0.4797 | 0.5891 | 0.4393 | 1.9475 | 1.7466 | 1.9705 |
| 12 | *Irpex* | 0.2413 | 0.0314 | 0.0119 | 0.1033 | 0.1088 | 5.1531 | 0.0108 | 0.006 | 0.1111 |
| 13 | *Neofusicoccum* | 0.0234 | 0.0224 | 0.3746 | 0.0074 | 0.0063 | 0.0063 | 0.0065 | 0.0131 | 0.0033 |
| 14 | *Botryosphaeria* | 0.2355 | 0.3763 | 0.0268 | 0.0283 | 0.0263 | 0.0063 | 0.0119 | 0.0155 | 0.0109 |
| 15 | *Schizophyllum* | 0.108 | 0.0054 | 0.0129 | 5.5592 | 0.5803 | 0.2133 | 0.1602 | 0.0179 | 0.0207 |
| 16 | *Passalora* | 1.2668 | 4.4424 | 2.0347 | 0.0738 | 0.0513 | 0.053 | 0.6582 | 0.9286 | 0.7189 |
| 17 | *Candida* | 0.0778 | 0.0045 | 0.0666 | 0.0713 | 0.0088 | 0.125 | 0.2587 | 0.2548 | 0.085 |
| 18 | *Erythrobasidium* | 1.7007 | 0.9321 | 0.8743 | 0.0357 | 0.0575 | 0.0467 | 0.4774 | 1.0298 | 0.7244 |
| 19 | *Neocladophialophora* | 0.1265 | 0.123 | 0.0387 | 0.0787 | 0.07 | 0.0745 | 0.6441 | 0.2191 | 0.3072 |
| 20 | *Starmerella* | 0 | 0.0018 | 0.004 | 5.7277 | 0.0163 | 0.0227 | 0.0779 | 0.0036 | 0 |
| 21 | *Ascochyta* | 0.4544 | 0.4894 | 0.4282 | 0.043 | 0.0425 | 0.0505 | 0.6636 | 0.5893 | 0.4989 |
| 22 | *Sphaerulina* | 1.5509 | 1.3335 | 0.91 | 0.0037 | 0.0088 | 0.0126 | 0.1212 | 0.1833 | 0.1492 |
| 23 | *Papiliotrema* | 0.2608 | 0.2416 | 0.1778 | 0.0726 | 0.05 | 0.0644 | 0.5759 | 0.4977 | 0.4858 |
| 24 | *Zygoascus* | 0 | 0.0009 | 0 | 4.0612 | 0.1026 | 0.0619 | 0.0639 | 0.0048 | 0.0044 |
| 25 | *Pestalotiopsis* | 0.1012 | 0.0153 | 0.0358 | 0.1181 | 0.1351 | 0.6325 | 0.053 | 0.181 | 0.1089 |
| 26 | *Camptophora* | 0.4845 | 0.5011 | 0.2623 | 0.032 | 0.0263 | 0.029 | 0.5304 | 0.0583 | 0.0839 |
| 27 | *Dioszegia* | 0.1703 | 0.0673 | 0.1262 | 0.0307 | 0.0188 | 0.0379 | 0.367 | 0.4084 | 0.5305 |
| 28 | *Paraconiothyrium* | 0.7696 | 0.3951 | 0.308 | 0.0332 | 0.0075 | 0.0101 | 0.144 | 0.1191 | 0.1133 |
| 29 | *Neopestalotiopsis* | 0.2209 | 0.0907 | 0.0179 | 0.0197 | 0.0113 | 0.0114 | 0.0292 | 0.0845 | 0.0534 |
| 30 | *Phlebiopsis* | 0 | 0.0467 | 0 | 0 | 0.0013 | 0 | 0.0011 | 0 | 0 |
| 31 | *Cryptococcus* | 1.2434 | 0.2694 | 0.1272 | 0.0049 | 0.005 | 0.005 | 0.1396 | 0.1107 | 0.0708 |
| 32 | *Pichia* | 0.0068 | 0.0009 | 0 | 0.6027 | 1.2845 | 0.0518 | 0.0097 | 0.0238 | 0.0185 |
| 33 | *Golubevia* | 0.1946 | 0.0548 | 0.1073 | 0.032 | 0.0375 | 0.0164 | 0.131 | 0.3298 | 0.1307 |
| 34 | *Peniophora* | 0.036 | 0 | 0.006 | 0.0271 | 0.0075 | 0.0076 | 0.0097 | 0 | 0.0109 |
| 35 | *Pseudocercospora* | 0.2452 | 0.1293 | 0.1917 | 0.0234 | 0.0213 | 0.0076 | 0.0498 | 0.1 | 0.0664 |
| 36 | *Rhodosporidiobolus* | 1.1627 | 0.1275 | 0.0477 | 0 | 0 | 0 | 0.0141 | 0.025 | 0.0294 |
| 37 | *Trebouxia* | 0.0681 | 0.5855 | 0.155 | 0.0123 | 0.0025 | 0.0063 | 0.2317 | 0.0512 | 0.0545 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 38 | *Zygosaccharomyces* | 0 | 0.0009 | 0.0179 | 0.0025 | 0.0063 | 0.0694 | 0.0011 | 0.0012 | 0.0044 |
| 39 | *Hanseniaspora* | 0.0146 | 0.0135 | 0.004 | 0.0086 | 0.454 | 0.0076 | 0.0314 | 0.1119 | 0.0675 |
| 40 | *Ramichloridium* | 0.0302 | 0.0314 | 0.0199 | 0.0148 | 0.0213 | 0.0177 | 0.0617 | 0.0167 | 0.0142 |
| 41 | *Ramularia* | 0.288 | 0.3538 | 0.1133 | 0.0037 | 0 | 0 | 0.0271 | 0.0167 | 0.0305 |
| 42 | *Sporobolomyces* | 0.2919 | 0.1392 | 0.304 | 0.0025 | 0.0013 | 0 | 0.0379 | 0.0441 | 0.0359 |
| 43 | *Penicillium* | 0.001 | 0 | 0.0159 | 0.3837 | 0.0113 | 0.0114 | 0.0119 | 0.0024 | 0 |
| 44 | *Periconia* | 0.0983 | 0.0952 | 0.0974 | 0.0111 | 0.0113 | 0.005 | 0.0963 | 0.1 | 0.0861 |
| 45 | *Keissleriella* | 0.0097 | 0.0153 | 0.0139 | 0.0062 | 0.0175 | 0.0114 | 0.0574 | 0.1691 | 0.1623 |
| 46 | *Phyllozyma* | 0.144 | 0.0323 | 0.4073 | 0.0037 | 0.0025 | 0 | 0.0292 | 0.0488 | 0.0229 |
| 47 | *Leptospora* | 0.0311 | 0.0314 | 0.1023 | 0.0111 | 0.0138 | 0.0088 | 0.0714 | 0.0667 | 0.0741 |
| 48 | *Taphrina* | 0.1099 | 0.0925 | 0.0318 | 0.0062 | 0.005 | 0.0076 | 0.0444 | 0.075 | 0.085 |
| 49 | *Stagonospora* | 0.0107 | 0.0144 | 0.0238 | 0.0086 | 0.0075 | 0.0063 | 0.0704 | 0.0786 | 0.1166 |
| 50 | *Agriophyllum* | 0.0107 | 0.1814 | 0.0378 | 0.0037 | 0.0063 | 0.1692 | 0.0022 | 0.0012 | 0.0163 |
| 51 | *Dissoconium* | 0.2179 | 0.1625 | 0.0318 | 0.0012 | 0 | 0.0013 | 0.0227 | 0.0226 | 0.0218 |
| 52 | *Xenoacremonium* | 0.0019 | 0 | 0.0238 | 0 | 0.0013 | 0.0025 | 0 | 0 | 0 |
| 53 | *Diaporthe* | 0.2092 | 0.0638 | 0.0278 | 0.0049 | 0.0125 | 0.0025 | 0.0162 | 0.0131 | 0.0087 |
| 54 | *Sphaceloma* | 0.0156 | 0.0539 | 0.153 | 0.0062 | 0.0013 | 0.0025 | 0.0227 | 0.0631 | 0.0185 |
| 55 | *Filobasidium* | 0.1197 | 0.0898 | 0.0646 | 0.0012 | 0.0013 | 0.0013 | 0.0097 | 0.0286 | 0.0076 |
| 56 | *Pseudoveronaea* | 0.0749 | 0.1338 | 0.0189 | 0 | 0 | 0 | 0.0087 | 0.0024 | 0.0109 |
| 57 | *Anthracocystis* | 0 | 0 | 0 | 0 | 0 | 0 | 0.0032 | 0 | 0.0044 |
| 58 | *Meira* | 0.1411 | 0.0099 | 0.0129 | 0 | 0 | 0 | 0.0011 | 0 | 0.0033 |
| 59 | *Microstroma* | 0.0068 | 0.1203 | 0.004 | 0 | 0 | 0 | 0 | 0.0095 | 0.0011 |

Table S2. Top 10 bacterial genera with the highest relative abundance in each group. Means with standard deviation are shown. Different lowercase letters (a, b, c) in the same line indicate significant difference ($p < 0.05$) of means between groups.

| Group | | CK (%) | T25 (%) | T4 (%) |
|---|---|---|---|---|
| Phylum | Proteobacteria | 37.15±3.83$^{c}$ | 89.96±1.63$^{a}$ | 64.13±2.70$^{b}$ |
| | Cyanobacteria | 50.59±6.06$^{a}$ | 4.7±0.48$^{b}$ | 16.71±3.02$^{b}$ |
| | Actinobacteria | 3.99±1.09$^{b}$ | 4.54±1.88$^{b}$ | 10.08±2.20$^{a}$ |
| | Bacteroidetes | 2.66±0.23$^{a}$ | 0.19±0.03$^{b}$ | 3.11±0.86$^{a}$ |
| | Firmicutes | 2.30±1.25$^{a}$ | 0.19±0.096$^{a}$ | 1.68±0.47$^{a}$ |
| | Planctomycetes | 0.16±0.0.08$^{b}$ | 0.18±0.0.10$^{b}$ | 0.54±0.0.31$^{a}$ |
| | Acidobacteria | 0.2±0.06$^{b}$ | 0.03±0.009$^{b}$ | 0.78±0.12$^{a}$ |
| | Armatimonadetes | 0.18±0.10$^{ab}$ | 0.0069±0.00$^{b}$ | 0.40±0.05$^{a}$ |
| | Fusobacteria | 0.055±0.03$^{a}$ | 0.095±0.045$^{a}$ | 0.445±0.34$^{a}$ |
| | Patescibacteria | 0.23±0.14$^{a}$ | 0.007±0.00$^{a}$ | 0.11±0.07$^{a}$ |
| Genus | Gluconobacter | 0.67±0.08$^{b}$ | 35.9±13.87$^{a}$ | 3.2±0.71$^{b}$ |
| | Methylobacterium | 7.84±0.28$^{b}$ | 2.13±0.62$^{c}$ | 21.01±1.26$^{a}$ |
| | 1174-901-12 | 7.35±0.43$^{b}$ | 1.2±0.41$^{c}$ | 16.61±2.10$^{a}$ |
| | Sphingomonas | 2.24±0.59$^{b}$ | 0.28±0.05$^{c}$ | 3.96±0.25$^{a}$ |
| | Burkholderia-Caballeronia-Paraburkholderia | 5.04±1.52$^{a}$ | 0.27±0.02$^{b}$ | 0.8±0.13$^{b}$ |
| | Hymenobacter | 0.84±0.39$^{a}$ | 0.05±0.012$^{a}$ | 1.34±0.57$^{a}$ |
| | Bdellovibrio | 0.35±0.14$^{b}$ | 0.086±0.04$^{b}$ | 1.22±0.16$^{a}$ |
| | Tatumella | 0.039±0.15$^{a}$ | 0.043±0.00$^{a}$ | 1.45±1.13$^{a}$ |
| | Massilia | 0.8008±0.26$^{a}$ | 0.0654±0.00$^{a}$ | 1.5887±0.8$^{a}$ |
| | Methylocella | 0.1±0.03$^{b}$ | 0.08±0.04$^{b}$ | 1.2±0.34$^{a}$ |

Table S3. Top 10 fungal genera with the highest relative abundance in each group. Means with standard deviation are shown. Different lowercase letters (a, b, c) in the same line indicate significant difference ($p < 0.05$) of means between groups.

| Group | | CK | T25 | T4 |
|---|---|---|---|---|
| Phylum | Ascomycota | 72.93±1.23$^{a}$ | 82.54±4.86$^{a}$ | 58.18±1.36$^{b}$ |
| | Basidiomycota | 4.02±1.31$^{b}$ | 11.81±5.17$^{a}$ | 2.89±0.36$^{b}$ |
| | Anthophyta | 8.02±1.17$^{a}$ | 1.25±0.67$^{b}$ | 3.3±0.36$^{b}$ |
| | Chlorophyta | 0.93±0.16$^{ab}$ | 0.08±0.04$^{b}$ | 1.39±0.59$^{a}$ |
| Genus | Zasmidium | 3.85±0.24$^{b}$ | 12.07±4.53$^{ab}$ | 15.1±1.27$^{a}$ |
| | Talaromyces | 0.5±0.12$^{b}$ | 29.06±2.82$^{a}$ | 1.15±0.05$^{b}$ |
| | Aspergillus | 2.91±1.23$^{b}$ | 25.84±11.34$^{a}$ | 2.06±0.67$^{b}$ |
| | Uwebraunia | 27.27±2.31$^{a}$ | 0.47±0.04$^{c}$ | 6.51±0.57$^{b}$ |
| | Vaccinium | 7.77±1.12$^{a}$ | 1.18±0.70$^{b}$ | 3.26±0.37$^{b}$ |
| | Alternaria | 3.76±0.31$^{a}$ | 0.63±0.12$^{b}$ | 5.43±1.18$^{a}$ |
| | Strelitziana | 3.75±0.39$^{a}$ | 0.58±0.06$^{b}$ | 5.00±0.54$^{a}$ |
| | Colletotrichum | 0.34±0.16$^{b}$ | 3.58±1.48$^{a}$ | 0.17±0.05$^{b}$ |
| | Coniophora | 0.03±0.021$^{a}$ | 5.83±0.021$^{a}$ | 0.15±0.15$^{a}$ |
| | Aureobasidium | 5.6±0.81$^{a}$ | 0.06±0.01$^{b}$ | 0.79±0.16$^{b}$ |