**Table S1.** Two-way ANOVA of the different measured soil parameters in spring.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Orchard** | | **Status** | | **Orchard×Status** | |
|  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| pH | 54*.*042 | *P*<0.001 | 10*.*362 | *P*<0.01 | 18*.*464 | *P*<0.01 |
| EC | 0*.*043 | · | 6*.*032 | *P*<0.05 | 49*.*154 | *P*<0.001 |
| WSC | 18*.*670 | *P*<0.001 | 5*.*199 | *P*<0.05 | 0*.*253 | · |
| WSN | 1*.*161 | · | 0*.*073 | · | 135*.*264 | *P*<0.001 |
| NH4+ | 1*.*100 | · | 2*.*454 | · | 6*.*454 | *P*<0.05 |
| N total | 52*.*427 | *P*<0.001 | 3*.*279 | · | 2*.*094 | · |
| C total | 64*.*236 | *P*<0.001 | 8*.*087 | *P*<0.05 | 33*.*319 | *P*<0.001 |
| SOC | 27*.*215 | *P*<0.001 | 4*.*704 | · | 4*.*341 | · |
| CaCO3 | 0*.*235 | · | 0*.*476 | · | 0*.*466 | · |
| C/N | 3*.*748 | · | 5*.*233 | *P*<0.05 | 7*.*527 | *P*<0.05 |
| β-Glucosidase | 6*.*781 | *P*<0.05 | 4*.*795 | *P*<0.05 | 21*.*782 | *P*<0.001 |
| Phosphatase | 3*.*741 | · | 26*.*074 | *P*<0.001 | 8*.*164 | *P*<0.05 |
| Urease | 13*.*554 | *P*<0.01 | 2*.*597 | · | 0*.*067 | · |
| BSR | 7*.*015 | *P*<0.05 | 81*.*636 | *P*<0.001 | 24*.*643 | *P*<0.001 |
| Gram+ | 53*.*879 | *P*<0.001 | 24*.*018 | *P*<0.001 | 5*.*224 | *P*<0.05 |
| Gram- | 13*.*181 | *P*<0.01 | 13*.*312 | *P*<0.01 | 28*.*172 | *P*<0.001 |
| Fungi | 5*.*845 | *P*<0.05 | 41*.*383 | *P*<0.001 | 1*.*208 | · |
| Bacteria | 42*.*139 | *P*<0.001 | 20*.*708 | *P*<0.001 | 22*.*805 | *P*<0.001 |
| Actinobacteria | 6*.*515 | *P*<0.05 | 14*.*772 | *P*<0.01 | 3*.*614 | · |
| Total PLFAs | 12*.*918 | *P*<0.01 | 11*.*254 | *P*<0.01 | 6*.*316 | *P*<0.05 |
| G+/G- | 11*.*342 | *P*<0.01 | 2*.*155 | · | 6*.*367 | *P*<0.05 |
| F/B | 0*.*169 | · | 42*.*316 | *P*<0.001 | 0*.*617 | · |

**Table S2.** Two-way ANOVA of the different measured soil parameters in autumn.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Orchard** | | **Status** | | **Orchard×Status** | |
|  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| pH | 26*.*949 | *P<*0.001 | 11*.*452 | *P<*0.01 | 21*.*057 | *P<*0.001 |
| EC | 21*.*598 | *P<*0.001 | 3*.*646 | · | 0*.*907 | · |
| WSC | 88*.*570 | *P<*0.001 | 0*.*000 | · | 60*.*875 | *P<*0.001 |
| WSN | 63*.*884 | *P<*0.001 | 3*.*733 | · | 0*.*250 | · |
| NH4+ | 14*.*981 | *P<*0.01 | 3*.*247 | · | 2*.*955 | · |
| N total | 37*.*518 | *P<*0.001 | 10*.*037 | *P<*0.01 | 1*.*285 | · |
| C total | 32*.*671 | *P<*0.001 | 9*.*708 | *P<*0.01 | 0*.*309 | · |
| SOC | 33*.*007 | *P<*0.001 | 11*.*482 | *P<*0.01 | 0*.*074 | · |
| CaCO3 | 0*.*987 | · | 1*.*442 | · | 0*.*931 | · |
| C/N | 1*.*706 | · | 4*.*733 | · | 2*.*180 | · |
| β-Glucosidase | 10*.*311 | *P<*0.01 | 6*.*975 | *P<*0.05 | 0*.*000 | · |
| Phosphatase | 58*.*307 | *P<*0.001 | 3*.*318 | · | 3*.*628 | · |
| Urease | 14*.*291 | *P<*0.01 | 1*.*221 | · | 9*.*427 | *P<*0.01 |
| BSR | 58*.*143 | *P<*0.001 | 17*.*396 | *P<*0.01 | 14*.*698 | *P<*0.01 |
| Gram+ | 17*.*689 | *P<*0.01 | 2*.*908 | · | 4*.*892 | *P<*0.05 |
| Gram- | 5*.*139 | *P<*0.05 | 4*.*625 | · | 6*.*143 | *P<*0.05 |
| Fungi | 0*.*476 | · | 0*.*058 | · | 3*.*593 | · |
| Bacteria | 13*.*887 | *P<*0.01 | 5*.*115 | *P<*0.05 | 5*.*653 | *P<*0.05 |
| Actinobacteria | 0*.*014 | · | 0*.*554 | · | 5*.*639 | *P<*0.05 |
| Total PLFAs | 3*.*519 | · | 0*.*906 | · | 0*.*539 | · |
| G+/G- | 3*.*563 | · | 0*.*734 | · | 0*.*099 | · |
| F/B | 4*.*180 | · | 0*.*001 | · | 0*.*189 | · |

**Table S3.** Three-way ANOVA of the soil parameters.

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Orchard (O)** | | **Status (S)** | | **Season (t)** | | **O×S** | | **O×t** | | **S×t** | | **O×S×t** | |
|  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| pH | 80.382 | *P*<0.001 | 21.557 | *P*<0.001 | 13.559 | *P*<0.01 | 38.986 | *P*<0.001 | 5.127 | *P*<0.05 | 0.075 | · | 0.103 | · |
| EC | 6.594 | *P*<0.05 | 9.538 | *P*<0.01 | 103.286 | *P*<0.001 | 42.280 | *P*<0.001 | 4.899 | *P*<0.05 | 1.263 | · | 30.495 | *P*<0.001 |
| WSC | 34.258 | *P*<0.001 | 1.388 | · | 1648.290 | *P*<0.001 | 41.409 | *P*<0.001 | 105.965 | *P*<0.001 | 1.358 | · | 48.323 | *P*<0.001 |
| WSN | 53.570 | *P*<0.001 | 2.202 | · | 36.186 | *P*<0.001 | 33.982 | *P*<0.001 | 37.957 | *P*<0.001 | 3.149 | · | 44.531 | *P*<0.001 |
| NH4+ | 0.087 | · | 0.774 | · | 0.436 | · | 3.334 | · | 5.172 | *P*<0.05 | 4.309 | *P*<0.05 | 8.804 | *P*<0.01 |
| N total | 83.130 | *P*<0.001 | 13.250 | *P*<0.01 | 11.063 | *P*<0.01 | 0.019 | · | 1.130 | · | 2.643 | · | 3.052 | · |
| C total | 73.529 | *P*<0.001 | 16.222 | *P*<0.001 | 43.336 | *P*<0.001 | 3.778 | · | 3.163 | · | 2.612 | · | 8.709 | *P*<0.01 |
| SOC | 60.011 | *P*<0.001 | 15.995 | *P*<0.001 | 11.840 | *P*<0.01 | 1.200 | · | 1.447 | · | 1.636 | · | 2.304 | · |
| CaCO3 | 1.129 | · | 1.833 | · | 10.310 | *P*<0.01 | 0.068 | · | 0.172 | · | 0.186 | · | 1.378 | · |
| C/N | 5.387 | *P*<0.05 | 9.936 | *P*<0.01 | 18.347 | *P*<0.001 | 9.279 | *P*<0.01 | 0.394 | · | 0.110 | · | 1.281 | · |
| b-Glucosidase | 16.254 | *P*<0.001 | 11.137 | *P*<0.01 | 14.367 | *P*<0.001 | 4.235 | · | 2.987 | · | 1.960 | · | 4.287 | *P*<0.05 |
| Phosphatase | 60.345 | *P*<0.001 | 13.866 | *P*<0.01 | 66.447 | *P*<0.001 | 0.351 | · | 38.566 | *P*<0.001 | 0.152 | · | 8.376 | *P*<0.01 |
| Urease | 27.841 | *P*<0.001 | 3.687 | · | 42.923 | *P*<0.001 | 3.972 | · | 0.006 | · | 0.126 | · | 5.557 | *P*<0.05 |
| BSR | 29.074 | *P*<0.001 | 64.342 | *P*<0.001 | 88.161 | *P*<0.001 | 0.909 | · | 63.278 | *P*<0.001 | 0.520 | · | 33.141 | *P*<0.001 |
| Gram+ | 63.666 | *P*<0.001 | 20.180 | *P*<0.001 | 1.559 | · | 0.033 | · | 2.591 | · | 3.648 | · | 10.034 | *P*<0.01 |
| Gram- | 16.713 | *P*<0.001 | 16.093 | *P*<0.001 | 6.947 | *P*<0.05 | 2.530 | · | 0.429 | · | 0.570 | · | 28.556 | *P*<0.001 |
| Fungi | 1.653 | · | 20.383 | *P*<0.001 | 10.143 | *P*<0.01 | 0.251 | · | 4.984 | *P*<0.05 | 23.488 | *P*<0.001 | 4.410 | *P*<0.05 |
| Bacteria | 47.836 | *P*<0.001 | 20.892 | *P*<0.001 | 6.968 | *P*<0.05 | 1.072 | · | 1.033 | · | 0.980 | · | 23.040 | *P*<0.001 |
| Actinobacteria | 3.606 | · | 10.598 | *P*<0.01 | 34.851 | *P*<0.001 | 0.102 | · | 2.992 | · | 4.878 | *P*<0.05 | 9.129 | *P*<0.01 |
| Total PLFAs | 14.234 | *P*<0.001 | 8.515 | *P*<0.01 | 0.005 | · | 1.195 | · | 0.883 | · | 2.191 | · | 4.848 | *P*<0.05 |
| G+/G- | 14.814 | *P*<0.001 | 0.948 | · | 0.322 | · | 4.661 | *P*<0.05 | 5.137 | *P*<0.05 | 2.863 | · | 5.871 | *P*<0.05 |
| F/B | 3.167 | · | 19.729 | *P*<0.001 | 33.351 | *P*<0.001 | 0.727 | · | 1.492 | · | 19.316 | *P*<0.001 | 0.046 | · |

**Table S4.** Two-way ANOVA of the alpha diversity (Richness and Shannon indexes) for fungal and bacterial communities in soils in both sampling times (spring and autumn).

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  |  | **Orchard (O)** | | **Status (S)** | | **Orchard×Status** | |
|  |  |  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| **Spring** | ***Fungi*** | Richness | 5.316 | *P*<0.05 | 0.079 | · | 1.090 | · |
| Shannon | 7.765 | *P*<0.05 | 1.104 | · | 0.629 | · |
| ***Bacteria*** | Richness | 3.391 | · | 24.537 | *P*<0.001 | 0.002 | · |
| Shannon | 0.009 | · | 29.218 | *P*<0.001 | 1.196 | · |
| **Autumn** | ***Fungi*** | Richness | 11.576 | *P*<0.01 | 0.086 | · | 0.707 | · |
| Shannon | 6.499 | *P*<0.05 | 0.903 | · | 0.625 | · |
| ***Bacteria*** | Richness | 2.942 | · | 0.288 | · | 0.476 | · |
| Shannon | 3.062 | · | 0.008 | · | 1.315 | · |

**Table S5.** Three-way ANOVA of the alpha diversity (Richness and Shannon indexes) for fungal and bacterial communities in soils.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  | **Fungi** | | **Bacteria** | |
|  |  | **Richness** | **Shannon** | **Richness** | **Shannon** |
| **Orchard (O)** | **F** | 15*.*380 | 14*.*151 | 5*.*902 | 2*.*614 |
| **Sig.** | *P*<0.001 | *P*<0.001 | *P*<0.05 | · |
| **Status (S)** | **F** | 0*.*001 | 0*.*067 | 4*.*678 | 5*.*913 |
| **Sig.** | · | · | *P*<0.05 | *P*<0.05 |
| **Season (t)** | **F** | 6*.*138 | 6*.*416 | 1*.*385 | 3*.*880 |
| **Sig.** | *P*<0.05 | *P*<0.05 | · | · |
| **Orchard×Status** | **F** | 1*.*797 | 1*.*233 | 0*.*317 | 0*.*310 |
| **Sig.** | · | · | · | · |
| **Orchard×Season** | **F** | 0*.*097 | 0*.*447 | 0*.*233 | 2*.*357 |
| **Sig.** | · | · | · | · |
| **Status×Season** | **F** | 0*.*162 | 1*.*994 | 9*.*445 | 5*.*147 |
| **Sig.** | · | · | *P*<0.01 | *P*<0.05 |
| **Orchard×Status×Season** | **F** | 0*.*087 | 0*.*023 | 0*.*370 | 2*.*274 |
| **Sig.** | · | · | · | · |

**Table S6.** One-way ANOVA for the relative abundance of fungal communities at the phylum level.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Spring** | | | | **Autumn** | | | |
|  | **Orchard 1** | | **Orchard 2** | | **Orchard 1** | | **Orchard 2** | |
|  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| ***Ascomycota*** | 10*.*234 | *P ≤* 0.05 | 0*.*211 | · | 10*.*005 | *P ≤* 0.05 | 0*.*264 | · |
| ***Basidiomycota*** | 9*.*090 | *P* ≤ 0.05 | 0*.*824 | · | 1*.*047 | · | 5*.*794 | · |
| ***Rozellomycota*** | 1*.*167 | · | 0*.*314 | · | 3*.*301 | · | 0*.*176 | · |
| ***Chytridiomycota*** | 0*.*118 | · | 0*.*791 | · | 0*.*231 | · | 2*.*154 | · |
| ***Mortierellomycota*** | 0*.*777 | · | 2*.*214 | · | 0*.*481 | · | 0*.*130 | · |
| ***Glomeromycota*** | 3*.*097 | · | 0*.*000 | · | 1*.*406 | · | 0*.*429 | · |
| ***Mucoromycota*** | 6*.*241 | *P* ≤ 0.05 | 0*.*256 | · | 1*.*000 | · | 6*.*311 | *P* ≤ 0.05 |
| ***Aphelidiomycota*** | 0*.*821 | · | 3*.*694 | · | 0*.*342 | · | 0*.*020 | · |
| ***Kickxellomycota*** | 0*.*054 | · | 0*.*048 | · | 0*.*047 | · | 0*.*591 | · |
| ***Olpidiomycota*** | 0*.*982 | · | 0*.*541 | · | 1*.*923 | · | 6*.*593 | *P* ≤ 0.05 |
| **Other** | 0*.*626 | · | 0*.*002 | · | 0*.*038 | · | 0*.*436 | · |
| **Unassigned** | 6*.*676 | *P* ≤ 0.05 | 0*.*281 | · | 4*.*225 | · | 0*.*437 | · |

**Table S7.** One-way ANOVA for the relative abundance of bacterial communities at the phylum level.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Spring** | | | | **Autumn** | | | |
|  | **Orchard 1** | | **Orchard 2** | | **Orchard 1** | | **Orchard 2** | |
|  | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** | **F** | **Sig.** |
| ***Proteobacteria*** | 86*.*323 | *P* ≤ 0.001 | 0*.*527 | · | 1*.*193 | · | 0*.*024 | · |
| ***Planctomycetes*** | 9*.*720 | *P* ≤ 0.05 | 0*.*686 | · | 0*.*001 | *P* ≤ 0.001 | 0*.*028 | · |
| ***Actinobacteria*** | 16*.*661 | *P* ≤ 0.01 | 1*.*808 | · | 0*.*001 | *P* ≤ 0.001 | 13*.*897 | *P* ≤ 0.01 |
| ***Firmicutes*** | 22*.*222 | *P* ≤ 0.01 | 4*.*506 | · | 0*.*015 | *P* ≤ 0.05 | 8*.*694 | *P* ≤ 0.05 |
| ***Acidobacteria*** | 48*.*948 | *P* ≤ 0.001 | 0*.*587 | · | 0*.*277 | · | 3*.*036 | · |
| ***Bacteroidetes*** | 29*.*009 | *P* ≤ 0.01 | 3*.*687 | · | 2*.*013 | · | 3*.*045 | · |
| ***Verrucomicrobia*** | 23*.*942 | *P* ≤ 0.01 | 0*.*004 | · | 48*.*112 | · | 6*.*486 | *P* ≤ 0.05 |
| ***Chloroflexi*** | 0*.*079 | · | 0*.*319 | · | 1*.*005 | · | 0*.*710 | · |
| ***Armatimonadetes*** | 34*.*041 | *P* ≤ 0.01 | 0*.*001 | · | 6*.*141 | · | 0*.*753 | · |
| ***Gemmatimonadetes*** | 0*.*255 | · | 0*.*661 | · | 2*.*428 | · | 0*.*538 | · |
| ***candidate\_division\_WPS-1*** | 0*.*547 | · | 0*.*547 | · | 0*.*270 | · | 0*.*194 | · |
| ***Thaumarchaeota*** | 0*.*584 | · | 2*.*792 | · | 0*.*714 | · | 0*.*174 | · |
| ***Nitrospirae*** | 0*.*869 | · | 0*.*006 | · | 0*.*783 | · | 3*.*858 | · |
| **Other** | 4*.*162 | · | 2*.*246 | · | 14*.*862 | · | 0*.*585 | · |
| **Unassigned** | 2*.*743 | · | 8*.*793 | *P* ≤ 0.05 | 15*.*057 | · | 2*.*589 | · |