**Supplementary materials**

Table S1 Spearman's correlations based on Bray-Curtis distance between Fusarium wilt disease incidence and microbial community composition determined by Mantel test

|  |  |  |
| --- | --- | --- |
|  | rho | *P* |
| Bacteria | 0.30 | 0.002 |
| Fungi | 0.52 | 0.001 |

The dissimilarity matrices of disease incidence, bacterial and fungal community composition were based on Bray-Curtis distance.

Table S2 Topological properties of the empirical phylogenetic molecular ecological networks (pMENs) among different treatments in comparison to the random networks

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Treatment | Community Empirical networks | | | | | | | | | Random netwoks | | |
| Similarity  threshold  (*St*) | Total  links | Total  nodes | R2 of  power  law | Avg  connect  (avgK) | Harmonic  geodesic  distance  (HD) | Avg  clustering  coefficient  (avgCC) | Modularity  (No. of  modules) |  | Harmonic  geodesic  distance  (HD) | Avg  clustering  coefficient  (avgCC) | Modularity |
| OF | 0.92 | 1857 | 1118 | 0.92 | 3.322 | 7.829 | 0.157 | 0.859(78) |  | 4.338±0.028 | 0.011±0.003 | 0.593±0.003 |
| FOF | 0.92 | 286 | 339 | 0.95 | 1.687 | 2.572 | 0.100 | 0.958(78) |  | 6.222±0.754 | 0.004±0.003 | 0.910±0.008 |
| FBOF | 0.92 | 1241 | 603 | 0.84 | 4.116 | 3.366 | 0.199 | 0.706(67) |  | 3.503±0.030 | 0.034±0.004 | 0.479±0.004 |

OF: Organic fertilizer, FOF: Dazomet fumigation coupled with organic fertilizer, FBOF: Dazomet fumigation coupled with bio-organic fertilizer.

Table S3 Phylogenetic relationships of special OTUs in Zi-Pi plot of bulk and rhizosphere soil

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Treatment | ID | Generalists | Kingdom | Family | Genus |
| OF | bac96903 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac809485 | Module hub | Bacteria | *Cytophagaceae* | *Unclassified* |
| bac984280 | Module hub | Bacteria | *Nitrospiraceae* | *Nitrospira* |
| bac678259 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac249472 | Module hub | Bacteria | *A4b* | *Unclassified* |
| bac673969 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac576136 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac583206 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac50639 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac331521 | Module hub | Bacteria | *0319-6A21* | *Unclassified* |
| bac68830 | Module hub | Bacteria | *Methylophilaceae* | *Unclassified* |
| bac691349 | Module hub | Bacteria | *Sinobacteraceae* | *Unclassified* |
| bac87557 | Module hub | Bacteria | *0319-6A21* | *Unclassified* |
| bac128310 | Module hub | Bacteria | *SJA-101* | *Unclassified* |
| bac3435 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac252274 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac4430089 | Module hub | Bacteria | *Xanthomonadaceae* | *Unclassified* |
| bac860929 | Module hub | Bacteria | *Erythrobacteraceae* | *Unclassified* |
| bac1109964 | Module hub | Bacteria | *Sphingomonadaceae* | *Kaistobacter* |
| bac1084157 | Module hub | Bacteria | *Intrasporangiaceae* | *Unclassified* |
| bac187187 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac556903 | Module hub | Bacteria | *Nannocystaceae* | *Plesiocystis* |
| bac968336 | Module hub | Bacteria | *Alicyclobacillaceae* | *Alicyclobacillus* |
| bac512378 | Module hub | Bacteria | *Nocardioidaceae* | *Unclassified* |
| bac91318 | Module hub | Bacteria | *SJA-101* | *Unclassified* |
| bac1108483 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac3498923 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac120201 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac606989 | Module hub | Bacteria | *Xanthomonadaceae* | *Unclassified* |
| bac320782 | Module hub | Bacteria | *Sinobacteraceae* | *Steroidobacter* |
| bac827089 | Module hub | Bacteria | *Bacillaceae* | *Bacillus* |
| bac105606 | Module hub | Bacteria | *Micromonosporaceae* | *Pilimelia* |
| fun116136 | Module hub | Fungi | *Unclassified* | *Unclassified* |
| fun128596 | Module hub | Fungi | *Incertae sedis* | *Cephaliophora* |
| fun41686 | Module hub | Fungi | *Unclassified* | *Unclassified* |
| fun61187 | Module hub | Fungi | *Pleosporaceae* | *Alternaria* |
| fun127932 | Module hub | Fungi | *Unclassified* | *Unclassified* |
| fun70929 | Module hub | Fungi | *Unclassified* | *Unclassified* |
| fun127811 | Module hub | Fungi | *Unclassified* | *Unclassified* |
| fun68385 | Module hub | Fungi | *Hypocreaceae* | *Hypocrea* |
| fun128510 | Module hub | Fungi | *Incertae sedis* | *Acremonium* |
| fun50632 | Module hub | Fungi | *Hypocreaceae* | *Hypocrea* |
| fun17327 | Module hub | Fungi | *Nectriaceae* | *Fusarium* |
| FOF | bac336578 | Module hub | Bacteria | *A4b* | *Unclassified* |
| bac109242 | Module hub | Bacteria | *Sphingomonadaceae* | *Unclassified* |
| bac547097 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac215375 | Module hub | Bacteria | *Hyphomicrobiaceae* | *Unclassified* |
| bac778196 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac798097 | Module hub | Bacteria | *Hyphomicrobiaceae* | *Devosia* |
| FBOF | bac336578 | Module hub | Bacteria | *A4b* | *Unclassified* |
| bac238281 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac113486 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac552687 | Module hub | Bacteria | *Sphingomonadaceae* | *Unclassified* |
| bac13733 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac919491 | Module hub | Bacteria | *Bacillaceae* | *Bacillus* |
| bac2885855 | Module hub | Bacteria | *Bacillaceae* | *Bacillus* |
| bac111733 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac113224 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac591647 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| fun58209 | Module hub | Fungi | *Hypocreaceae* | *Trichoderma* |
| bac128235 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac83047 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac77336 | Module hub | Bacteria | *Comamonadaceae* | *Ramlibacter* |
| bac722895 | Module hub | Bacteria | *Sphingomonadaceae* | *Sphingopyxis* |
| fun3928 | Module hub | Fungi | *Hypocreaceae* | *unidentified* |
| fun11782 | Module hub | Fungi | *Hypocreaceae* | *Trichoderma* |
| bac141276 | Module hub | Bacteria | *Piscirickettsiaceae* | *Unclassified* |
| bac767888 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac250298 | Module hub | Bacteria | *Micromonosporaceae* | *Catellatospora* |
| bac163965 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac519510 | Module hub | Bacteria | *Erythrobacteraceae* | *Unclassified* |
| bac112996 | Module hub | Bacteria | *Unclassified* | *Unclassified* |
| bac510591 | Connector | Bacteria | *Chitinophagaceae* | *Unclassified* |

OF: Organic fertilizer, FOF: Dazomet fumigation coupled with organic fertilizer, FBOF: Dazomet fumigation coupled with bio-organic fertilizer.

**Figure legend**

**Fig. S1** The relative abundance of bacterial phyla (A) and fungal genus (B) in the three treatments.

OF: Organic fertilizer, FOF: Dazomet fumigation coupled with organic fertilizer, FBOF: Dazomet fumigation coupled with bio-organic fertilizer.

**Fig. S2** Manhattan plots showing soil-enriched OTUs in bacterial (A) and fungal (B) microbial communities between FBOF and OF treatment.

OF: Organic fertilizer, FBOF: Dazomet fumigation coupled with bio-organic fertilizer. The dashed line corresponds to the false discovery rate-corrected P value threshold of significance (α = 0.05). The color of each dot represents the different taxonomic affiliation of the OTUs (phyla level), and the size corresponds to their RAs in the respective samples.

**Fig. S3** Zi-Pi plot showing the distribution of OTUs based on their topological roles.

OF: Organic fertilizer, FOF: Dazomet fumigation coupled with organic fertilizer, FBOF: Dazomet fumigation coupled with bio-organic fertilizer. Each symbol represents an OTU in network. The threshold values of Zi and Pi for categorizing OTUs were 2.5 and 0.62, respectively.