

Supplementary figures

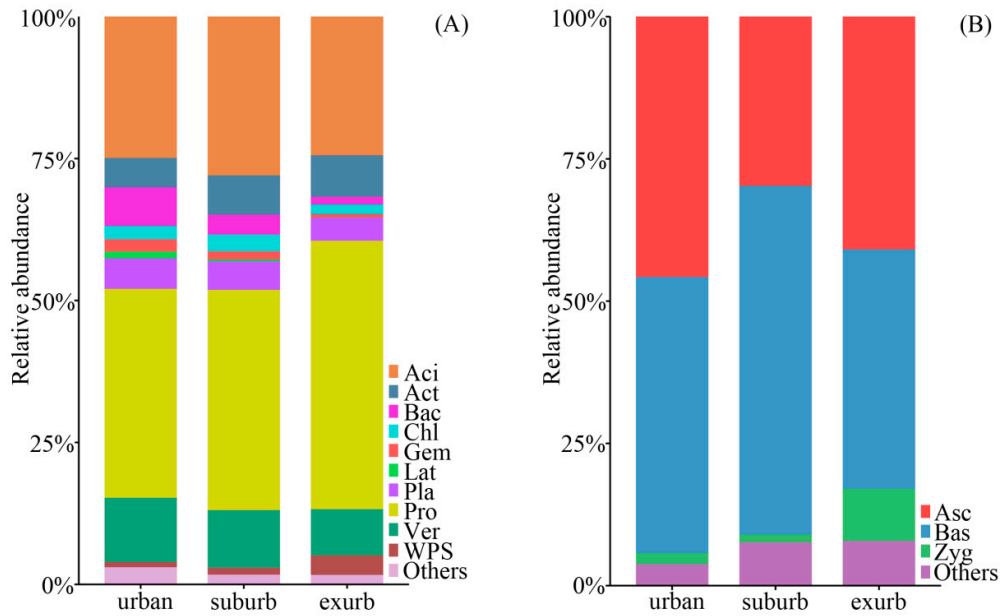


Figure S1. Relative abundance of bacterial phyla (A) and fungal phyla (B) along the urban-to-rural gradient at the Dongguan city, southern China. Abbreviations: Pro, Proteobacteria; Aci, Acidobacteria; Ver, Verrucomicrobia; Bac, Bacteroidetes; Pla, Planctomycetes; Act, Actinobacteria; Gem, Gemmatimonadetes; Chl, Chloroflexi; Lat, Latescibacteria; WPS, WPS-2; Asc, Ascomycota; Bas, Basidiomycota; Zyg, Zygomycota.

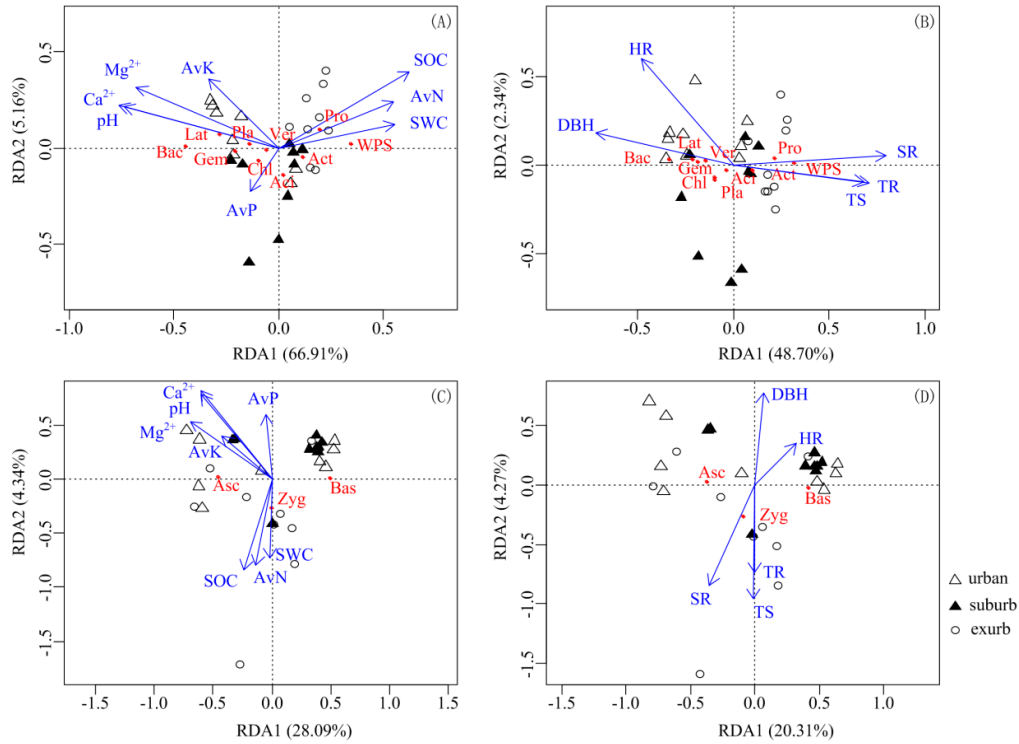


Figure S2. RDA plot showing influence of soil properties and plant traits on the distribution of main phyla in soil bacterial (A and B) and fungal (C and D) communities. Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness; Pro, Proteobacteria; Aci, Acidobacteria; Ver, Verrucomicrobia; Bac, Bacteroidetes; Pla, Planctomycetes; Act, Actinobacteria; Gem, Gemmatimonadetes; Chl, Chloroflexi; Lat, Latescibacteria; WPS, WPS-2; Asc, Ascomycota; Bas, Basidiomycota; Zyg, Zygomycota.

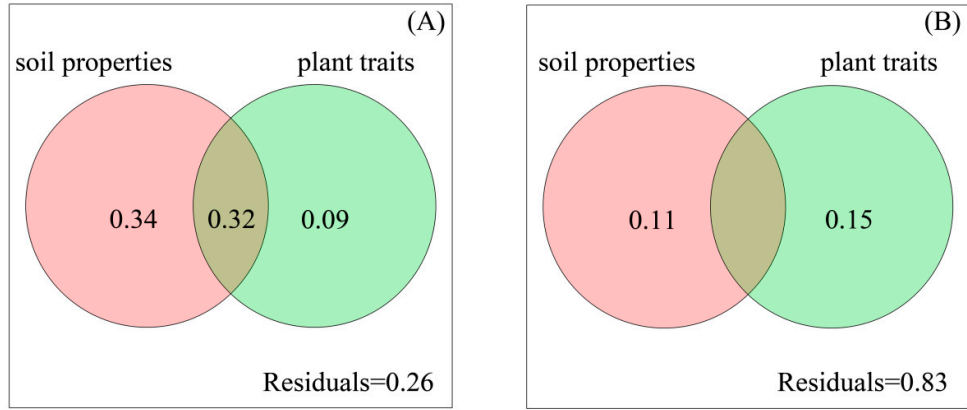


Figure S3. The proportions of variation at phylum level in composition of soil bacterial community (A) and soil fungal community (B) composition explained by soil and plant variables.

Supplementary tables

Table S1. Abbreviations and corresponding full names of plant traits and soil properties in this paper.

Abbreviations	Corresponding full names
SWC	soil water content
SOC	soil organic carbon
AvN	soil available nitrogen
AvP	soil available potassium
AvK	soil available phosphorus
Ca ²⁺	soil exchangeable calcium
Mg ²⁺	soil exchangeable magnesium
DBH	diameter at breast height of trees
TS	The number of tree stems
TR	tree richness
SR	shrub richness
HR	herb richness

Table S2. Relative abundance of bacterial composition along the urban-to-rural gradient at phylum and genus level.

phylum	genus	urban	suburb	exurb	P value
Acidobacteria		24.87±0.98	27.96±1.1	24.36±0.92	0.07
	<i>Bryobacter</i>	1.76±0.22 a	1.81±0.11 a	1.3±0.12 b	0.04
	<i>Candidatus_Koribacter</i>	0.43±0.12 b	0.39±0.05 b	1.33±0.21 a	0.00
	<i>Candidatus_Solibacter</i>	1.97±0.37 b	4.22±0.36 a	2.52±0.16 b	0.00
	<i>Granulicella</i>	0.43±0.15 b	0.68±0.15 b	1.57±0.26 a	0.00
	<i>Occallatibacter</i>	0.78±0.26	1.21±0.28	1.2±0.07	0.37
Actinobacteria		5.19±0.3 b	6.94±0.58 a	7.31±0.53 a	0.02
	<i>Acidotherrmus</i>	1.26±0.43 c	3.61±0.53 b	5.07±0.37 a	0.00
Bacteroidetes		6.83±1.35 a	3.5±0.43 a	1.36±0.31 b	0.00
Chloroflexi		2.32±0.2	2.97±0.49	1.69±0.19	0.12
Gemmatimonadetes		2.17±0.25 a	1.4±0.35 b	0.59±0.13 c	0.00
Latescibacteria		1.19±0.31 a	0.34±0.17 b	0.02±0.01 b	0.00
Planctomycetes		5.36±0.63	5.03±0.43	4.09±0.41	0.25
	<i>Singulisphaera</i>	0.28±0.07 a	0.55±0.11 b	1.15±0.16 c	0.00
Proteobacteria		36.77±0.8 b	38.75±1.82 b	47.29±0.95 a	0.00
	<i>Acidibacter</i>	2.08±0.49 c	4.26±0.72 b	8.21±0.83 a	0.00
	<i>Acidicaldus</i>	0.29±0.08 c	0.55±0.08 b	1.43±0.15 a	0.00
	<i>Bradyrhizobium</i>	1.59±0.15 c	2.5±0.17 b	3.46±0.14 a	0.00
	<i>Burkholderia-Caballeronia-Paraburkholderia</i>	1.45±0.39 b	3.27±0.46 a	2.57±0.37 a	0.02
	<i>Ellin6067</i>	1.85±0.44 a	0.58±0.12 a	0.04±0.01 b	0.00
	<i>Haliangium</i>	1.04±0.19 a	0.87±0.21 a	0.28±0.03 b	0.00
	<i>MND1</i>	1.54±0.5 a	0.33±0.16 b	0.01±0 c	0.00
	<i>Phenylobacterium</i>	0.59±0.14 b	0.72±0.11 b	1.2±0.1 a	0.00
	<i>Rhodoplanes</i>	2.26±0.4 b	4.69±0.7 a	4.28±0.36 a	0.01
	<i>Roseiarcus</i>	0.76±0.24 b	1.25±0.21 b	4.25±0.48 a	0.00
Verrucomicrobia		11.36±0.92	10.18±0.98	8.16±0.62	0.07
	<i>ADurb.Bin063-1</i>	2.63±0.5 b	4.37±1.04 a	0.98±0.1 c	0.00
	<i>Candidatus_Udaeobacter</i>	1.03±0.2 a	0.49±0.2 b	0.24±0.08 b	0.01
	<i>Candidatus_Xiphinematobacter</i>	0.26±0.03 b	1.32±0.38 a	1.38±0.37 a	0.00
	<i>r</i>				
WPS-2		0.87±0.39 b	1.19±0.26 b	3.42±0.33 a	0.00

Different lowercase letters indicate significant differences among three areas based on Kruskal-Wallis nonparametric test ($P < 0.05$).

Table S3. Relative abundance of fungal composition along the urban-to-rural gradient at phylum and genus level.

phylum	genus	urban	suburb	exurb	<i>P</i> value
Ascomycota		45.76±10.74	29.68±6.56	40.86±6.47	0.34
	<i>Aspergillus</i>	7.84±4.69 a	0.31±0.06 b	0.4±0.05 b	0.00
	<i>Cladosporium</i>	1.46±0.69	0.18±0.04	0.21±0.06	0.32
	<i>Oidiodendron</i>	0.28±0.05 b	0.38±0.1 b	18.32±5.93 a	0.00
	<i>Penicillium</i>	3.78±0.73	3.08±0.75	2.77±0.49	0.45
	<i>Staphylotrichum</i>	4.96±1.69 a	1.12±0.56 a	0.11±0.02 b	0.00
	<i>Trichocladium</i>	1.1±0.23 a	0.29±0.06 b	0.31±0.14 b	0.00
	<i>Trichoderma</i>	0.94±0.24	1.39±0.26	1±0.24	0.40
Basidiomycota		48.64±11.45	61.26±6.62	42.22±6.97	0.39
	<i>Abundisporus</i>	0.02±0.01 b	0.03±0 b	9.56±5.76 a	0.00
	<i>Agaricus</i>	0.16±0.03	12.94±8.71	0.24±0.1	0.37
	<i>Cryptococcus</i>	5.78±1.67	2.95±0.64	5.19±1.54	0.42
	<i>Entoloma</i>	0.04±0.02 b	0.03±0.01 b	1.95±1.03 a	0.00
	<i>Inocybe</i>	0.1±0.02	5.33±4.62	0.04±0.02	0.10
	<i>Micropsalliota</i>	8.64±8.28	0.13±0.03	0.09±0.03	0.23
	<i>Scleroderma</i>	0.03±0.01	4.54±3	0.68±0.58	0.12
	<i>Sebacina</i>	16.01±10.28	0.18±0.03	0.15±0.05	0.40
	<i>Tomentella</i>	5.17±4.5 a	13.16±5.96 a	0.16±0.05 b	0.01
	<i>Trichosporon</i>	1.66±0.88 a	0.61±0.41 ab	0.05±0.01 b	0.04
<i>Veluticeps</i>	0±0 b	0.01±0 ab	1.89±1.85 a	0.01	
Zygomycota		1.85±0.59 b	1.36±0.73 b	9.14±3.55 a	0.01
	<i>Mortierella</i>	1.64±0.56 ab	0.89±0.55 b	7.31±3.47 a	0.01

Different lowercase letters indicate significant differences among three areas based on Kruskal-Wallis nonparametric test ($P < 0.05$).

Table S4. The PerMANOVA analyses of bacterial and fungal OTUs along the urban-to-rural gradient.

	df	F	<i>P</i> value
Bacteria OTUs	2	6.7913	<0.001
Fungi OTUs	2	2.8997	<0.001

Table S5. The PerMANOVA analyses of bacterial and fungal functional groups along the urban-to-rural gradient.

	df	F	P value
Bacterial functional groups	2	11.366	<0.01
Fungal functional groups	2	4.5947	<0.01

Table S6. Spearman correlation of bacterial and fungal functional groups with plant and soil variables.

	DBH	TS	TR	SR	HR	pH	SOC	AvN	AvP	AcK	EvCa	EvMg	SWC
chemoheterotrophy	-0.66***	0.72***	0.76***	0.76***	-0.65***	-0.62***	0.54**	0.33	-0.31	-0.22	-0.76***	-0.64***	0.41*
aerobic_chemoheterotrophy	-0.65***	0.71***	0.75***	0.75***	-0.64***	-0.64***	0.55**	0.34	-0.33	-0.25	-0.77***	-0.65***	0.43*
cellulolysis	-0.58**	0.77***	0.74***	0.72***	-0.56**	-0.80***	0.67***	0.57**	-0.34	-0.24	-0.79***	-0.66***	0.50**
predatory_or_exoparasitic	0.66***	-0.61***	-0.70***	-0.75***	0.62***	0.89***	-0.74***	-0.61***	0.47*	0.27	0.76***	0.61***	-0.54**
animal_parasites_or_symbionts	-0.60***	0.60***	0.62***	0.63***	-0.70***	-0.52**	0.44*	0.22	-0.3	-0.33	-0.76***	-0.76***	0.49**
iron_respiration	-0.77***	0.79***	0.82***	0.79***	-0.53**	-0.76***	0.77***	0.62***	-0.51**	-0.18	-0.68***	-0.59**	0.61***
Animal Pathogen	0.19	-0.2	-0.27	-0.23	0.18	0.41*	-0.34	-0.24	0.34	0.45*	0.42*	0.55**	-0.42*
Animal Pathogen													
-Endophyte													
-Plant Saprotroph	0.33	-0.32	-0.28	-0.26	0.21	0.1	0.12	0.14	-0.19	0.3	0.41*	0.41*	0.2
-Soil Saprotroph													
Animal Pathogen													
-Undefined Saprotroph	0.31	-0.61***	-0.52**	-0.40*	0.16	0.3	-0.36	-0.29	0.18	0.05	0.35	0.31	-0.19
Arbuscular Mycorrhizal	-0.26	0.37	0.31	0.18	-0.06	-0.3	0.33	0.38	0.19	-0.06	-0.11	-0.11	0.38
Ectomycorrhizal	0.15	-0.18	-0.13	-0.13	-0.13	-0.09	-0.09	-0.22	0.15	-0.24	-0.23	-0.29	0.23
Ectomycorrhizal													
-Fungal Parasite	0.22	0.08	-0.06	-0.15	0.27	-0.04	-0.05	0.01	0.40*	0.07	0.12	0.22	0.06
Ectomycorrhizal													
-Undefined Saprotroph	-0.48*	0.68***	0.54**	0.55**	-0.40*	-0.53**	0.57**	0.57**	-0.2	-0.02	-0.32	-0.19	0.31
Epiphyte													
-Undefined Saprotroph	0.62***	-0.68***	-0.60***	-0.50**	0.41*	0.53**	-0.48*	-0.49**	0.34	-0.02	0.49**	0.39*	-0.19
Ericoid Mycorrhizal	-0.71***	0.69***	0.65***	0.75***	-0.63***	-0.73***	0.76***	0.64***	-0.50**	-0.07	-0.61***	-0.47*	0.55**
Fungal Parasite	0.40*	-0.55**	-0.57**	-0.55**	0.15	0.61***	-0.67***	-0.57**	0.55**	0.03	0.34	0.34	-0.28
Plant Pathogen	0.29	-0.44*	-0.52**	-0.33	0.1	0.47*	-0.54**	-0.53**	0.21	0.16	0.33	0.34	-0.3
Plant Saprotroph													
-Wood Saprotroph	-0.56**	0.35	0.3	0.48*	-0.40*	-0.43*	0.24	0.13	-0.11	-0.48*	-0.46*	-0.48*	0.13
Undefined Saprotroph	0.39*	-0.26	-0.40*	-0.50**	0.47*	0.52**	-0.54**	-0.32	0.36	0.22	0.57**	0.56**	-0.48*
Undefined Saprotroph													
-Wood Saprotroph	0.46*	-0.53**	-0.40*	-0.45*	0.3	0.51**	-0.38*	-0.33	0.19	0.40*	0.66***	0.70***	-0.2
Wood Saprotroph	-0.56**	0.54**	0.43*	0.63***	-0.3	-0.56**	0.48*	0.47*	-0.24	-0.22	-0.33	-0.24	0.25

Table S7. Spearman correlation of bacterial composition with plant and soil variables at phylum level.

Bacterial composition at phylum level	DBH	TS	TR	SR	HR	pH	SOC	AvN	AvP	AcK	Ca ²⁺	Mg ²⁺	SWC
Pro	-	0.70***	0.75***	0.86***	-0.50**	-0.73***	0.77***	0.54**	-0.48*	-0.18	-0.64***	-0.53**	0.52**
Aci	0.00	-0.05	-0.03	-0.07	-0.09	-0.26	-0.08	0.05	-0.03	-0.52**	-0.38	-0.46*	0.14
Ver	0.42*	-0.49**	-0.41*	-0.52**	0.42*	0.34	-0.13	-0.08	0.01	0.15	0.37	0.29	0.11
Bac	0.62***	-0.62***	-0.71***	-0.73***	0.49**	0.89***	-0.89***	-0.77***	0.56**	0.15	0.67***	0.53**	-0.71***
Pla	0.31	-0.26	-0.35	-0.49*	-0.01	0.67***	-0.52**	-0.48*	0.29	0.18	0.43*	0.35	-0.25
Act	-0.38	0.52**	0.47*	0.51**	-0.45*	-0.59**	0.33	0.20	-0.12	-0.37	-0.70***	-0.64***	0.24
Gem	0.69***	-0.69***	-0.72***	-0.74***	0.65***	0.75***	-0.67***	-0.48*	0.39*	0.29	0.80***	0.70***	-0.53**
Chl	0.47*	-0.25	-0.43*	-0.51**	0.16	0.48*	-0.46*	-0.32	0.29	0.26	0.33	0.31	-0.24
Lat	0.60***	-0.61***	-0.62***	-0.66***	0.52**	0.74***	-0.58**	-0.55**	0.35	0.47*	0.79***	0.80***	-0.57**
WPS	-	0.59**	0.68***	0.81***	-0.47*	-0.87***	0.85***	0.73***	-0.54**	-0.23	-0.67***	-0.53**	0.66***

Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness; Pro, Proteobacteria; Aci, Acidobacteria; Ver, Verrucomicrobia; Bac, Bacteroidetes; Pla, Planctomycetes; Act, Actinobacteria; Gem, Gemmatimonadetes; Chl, Chloroflexi; Lat, Latescibacteria; WPS, WPS-2.
* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table S8. Spearman correlation of bacterial composition with plant and soil variables at genus level.

Bacterial composition at genus level	DBH	TS	TR	SR	HR	pH	SOC	AvN	AvP	AcK	Ca ²⁺	Mg ²⁺	SWC
Aci	-	0.75***	0.76***	0.82***	-0.53**	-0.83 ***	0.80***	0.62***	-0.40*	-0.23	-0.77***	-0.64***	0.67***
	0.68***												
Acd	-	0.80***	0.79***	0.81***	-0.54**	-0.82 ***	0.81***	0.68***	-0.54**	-0.27	-0.73***	-0.64***	0.66***
	0.76***												
Aco	-0.59**	0.78***	0.74***	0.71***	-0.56**	-0.80 ***	0.67***	0.57**	-0.34	-0.24	-0.79***	-0.66***	0.50**
Adu	0.59**	-0.59**	-0.66***	-0.76***	0.51**	0.69 ***	-0.75***	-0.63***	0.63***	-0.23	0.40*	0.21	-0.31
Bra	-	0.79***	0.80***	0.87***	-0.59**	-0.80 ***	0.74***	0.55**	-0.34	-0.27	-0.84***	-0.69***	0.53**
	0.75***												
Bry	0.16	-0.44*	-0.29	-0.31	0.25	0.18	-0.39*	-0.34	0.1	-0.51**	-0.05	-0.18	-0.03
Bur	-0.44*	0.43*	0.27	0.31	-0.33	-0.39 *	0.29	0.13	-0.2	-0.53**	-0.54**	-0.73***	0.37
Cak	-0.53**	0.44*	0.49**	0.53**	-0.38*	-0.54**	0.59**	0.51**	-0.46*	-0.15	-0.41*	-0.34	0.44*
Cas	0.01	0.12	-0.01	-0.11	-0.04	0.05	-0.22	-0.12	0.36	-0.49**	-0.33	-0.43*	0.13
Cau	0.62***	-0.51**	-0.57**	-0.71***	0.54**	0.73***	-0.45*	-0.31	0.27	0.51**	0.84***	0.79***	-0.40*
Cax	-0.60**	0.60***	0.58**	0.62***	-0.70***	-0.54**	0.45*	0.25	-0.29	-0.37	-0.77***	-0.77***	0.52**
Eil	0.76***	-0.74***	-0.80***	-0.84***	0.60***	0.92***	-0.89***	-0.79***	0.57**	0.12	0.76***	0.59**	-0.58**
Hal	0.69***	-0.65***	-0.73***	-0.79***	0.66***	0.89***	-0.72***	-0.58**	0.48*	0.27	0.79***	0.63***	-0.51**
MND	0.67***	-0.71***	-0.69***	-0.76***	0.56**	0.81***	-0.73***	-0.65***	0.56**	0.28	0.75***	0.65***	-0.65***
Rho	-0.56**	0.41*	0.47*	0.63***	-0.41*	-0.64***	0.47*	0.27	-0.2	-0.60***	-0.76***	-0.81***	0.54**
Phe	-	0.60***	0.59**	0.67***	-0.49**	-0.76***	0.76***	0.56**	-0.60***	-0.25	-0.64***	-0.61***	0.44*
	0.62***												
Ros	-	0.75***	0.78***	0.85***	-0.53**	-0.88***	0.87***	0.73***	-0.52**	-0.19	-0.75***	-0.61***	0.56**
	0.76***												
Sin	-	0.70***	0.63***	0.69***	-0.65***	-0.77***	0.67***	0.54**	-0.60***	-0.42*	-0.79***	-0.73***	0.51**
	0.66***												
Occ	-0.44*	0.19	0.25	0.41*	-0.28	-0.51**	0.39*	0.2	-0.31	-0.58**	-0.60***	-0.72***	0.39*
Gra	-	0.58**	0.65***	0.74***	-0.57**	-0.75***	0.69***	0.52**	-0.48*	-0.36	-0.71***	-0.67***	0.51**
	0.75***												

Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness; Aci, *Acidibacter*; Acd, *Acidicaldus*; Aco, *Acidothermus*; Adu, *ADurb.Bin063-1*; Bra, *Bradyrhizobium*; Bry, *Bryobacter*; Bur, *Burkholderia-Caballeronia-Paraburkholderia*; Cak, *Candidatus_Koribacter*; Cas, *Candidatus_Solibacter*; Cau, *Candidatus_Udaeobacter*; Cax, *Candidatus_Xiphinematobacter*; Eil, *Ellin6067*; Hal, *Haliangium*; MND, *MND1*; Rho, *Rhodoplanes*; Phe, *Phenyllobacterium*; Ros, *Roseiarcus*; Sin, *Singulisphaera*; Occ, *Occallatibacter*. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table S9. Spearman correlation of fungal composition with plant and soil properties at phylum level.

Fungal composition	DBH	TS	TR	SR	HR	pH	SOC	AvN	AvP	AcK	Ca ²⁺	Mg ²⁺	SWC
at phylum level													
Asc	-0.07	-0.02	0.03	0.20	-0.23	0.10	-0.01	-0.06	0.20	0.15	0.04	0.15	0.02
Bas	0.03	0.00	-0.01	-0.22	0.19	-0.02	-0.01	0.09	-0.22	-0.01	0.00	-0.05	-0.03
Zyg	-0.40*	0.33	0.35	0.42*	-0.25	-0.43*	0.47*	0.44*	-0.30	-0.04	-0.24	-0.16	0.40*

Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness; Asc, Ascomycota; Bas, Basidiomycota; Zyg, Zygomycota. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table S10. Spearman correlation of fungal composition with plant traits and soil properties at genus level.

Fungal composition at genus level	DBH	TS	TR	SR	HR	pH	SOC	AvN	AvP	AcK	Ca ²⁺	Mg ²⁺	SWC
Abu	-	0.61***	0.63***	0.69***	-0.48*	-0.61***	0.51**	0.53**	-0.31	0.07	-0.53**	-0.31	0.19
	0.68***												
Aga	-0.01	0.06	0.12	-0.13	-0.04	0.11	-0.27	-0.17	0.39	-0.13	0.04	0.04	-0.04
Asp	0.12	-0.45*	-0.25	-0.14	0.04	0.25	-0.28	-0.22	-0.06	0.25	0.37	0.43*	-0.25
Cla	0.22	-0.3	-0.39	-0.18	0.09	0.34	-0.3	-0.25	0.21	0.23	0.32	0.36	-0.15
Cry	-0.18	-0.24	-0.17	0.08	-0.15	-0.22	0.1	0.22	-0.47*	-0.23	-0.17	-0.16	0.2
Ent	-0.45*	0.64***	0.75***	0.55**	-0.27	-0.38*	0.57**	0.45*	-0.27	0.38*	-0.24	-0.07	0.26
Ino	0.05	-0.32	-0.13	-0.12	-0.2	0.14	-0.25	-0.27	-0.06	0.08	-0.04	0.02	0.02
Mic	0.34	-0.24	-0.15	-0.34	0.29	0.29	-0.35	-0.32	0.36	0.18	0.37	0.42*	-0.22
Mor	-0.23	0.15	0.21	0.24	-0.15	-0.26	0.29	0.33	-0.17	0.09	-0.05	0.05	0.19
Oid	-	0.69***	0.65***	0.75***	-0.63***	-0.73***	0.76***	0.64***	-0.50**	-0.07	-0.61***	-0.47*	0.55**
	0.71***												
Pen	0.1	-0.33	-0.26	0.07	0.07	0.13	-0.23	-0.25	0.19	-0.21	0.07	0.05	-0.02
Scl	-0.21	0.2	0.34	0.23	-0.49**	-0.1	0.15	-0.11	0.15	0.03	-0.33	-0.34	0.38*
Seb	0.19	-0.22	-0.12	-0.11	0.26	-0.12	0.11	0.11	-0.02	-0.04	0.07	0.09	0.08
Sta	0.68***	-0.74***	-0.69***	-0.73***	0.39*	0.75***	-0.73***	-0.59*	0.58**	0.28	0.66***	0.63***	-0.47*
Tom	0.39*	-0.42*	-0.38	-0.39*	0.12	0.16	-0.32	-0.36	0.29	-0.25	-0.03	-0.16	0.03
Tri	0.44*	-0.69***	-0.67***	-0.48*	0.41*	0.55**	-0.58**	-0.44*	0.08	0.09	0.53**	0.48*	-0.44*
Trc	-0.19	-0.05	-0.1	0.08	-0.25	-0.04	-0.18	-0.13	0.08	-0.50**	-0.32	-0.33	0.05
Trh	0.59**	-0.46*	-0.51**	-0.58**	0.43*	0.70***	-0.59**	-0.43*	0.51**	0.41*	0.64***	0.69***	-0.47*
Vel	-0.46*	0.49**	0.64***	0.57**	-0.33	-0.44*	0.59**	0.46*	-0.01	0.02	-0.43	-0.35	0.65***

Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness; Gra, *Granulicella*; Abu, *Abundisporus*; Aga, *Agaricus*; Asp, *Aspergillus*; Cla, *Cladosporium*; Cry, *Cryptococcus*; Ent, *Entoloma*; Ino, *Inocybe*; Mic, *Microsalliota*; Mor, *Mortierella*; Oid, *Oidiodendron*; Pen, *Penicillium*; Scl, *Scleroderma*; Seb, *Sebacina*; Sta, *Staphylotrichum*; Tom, *Tomentella*; Tri, *Trichocladium*; Trc, *Trichoderma*; Trh, *Trichosporon*; Vel, *Veluticeps*. * $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

Table S11. The results of RDA monte carlo tests of soil bacterial and fungal community compositions.

Variables	Bacterial phylum		Bacterial genus		Fungal genus	
	r ²	P value	r ²	P value	r ²	P value
pH	0.93	< 0.001	0.93	< 0.001	0.89	< 0.001
SOC (g·kg ⁻¹)	0.69	< 0.001	0.75	< 0.001	0.84	< 0.001
AvN (mg·kg ⁻¹)	0.48	< 0.01	0.56	< 0.001	0.65	< 0.001
AvP (mg·kg ⁻¹)	0.07	0.424	0.20	0.05	0.11	0.24
AcK (mg·kg ⁻¹)	0.30	< 0.05	0.54	< 0.001	0.47	< 0.001
Ca ²⁺ (mg·kg ⁻¹)	0.87	< 0.001	0.93	< 0.001	0.87	< 0.001
Mg ²⁺ (mg·kg ⁻¹)	0.81	< 0.001	0.86	< 0.001	0.81	< 0.001
SWC (g·kg ⁻¹)	0.46	< 0.001	0.42	< 0.01	0.41	< 0.001
DBH (cm)	0.58	< 0.001	0.56	< 0.001	0.61	< 0.001
TS	0.51	< 0.001	0.64	< 0.01	0.86	< 0.001
TR	0.56	< 0.001	0.62	< 0.001	0.70	< 0.001
SR	0.70	< 0.001	0.78	< 0.001	0.80	< 0.001
HR	0.47	< 0.01	0.28	< 0.05	0.41	< 0.01

Abbreviations: SWC, soil water content; SOC, soil organic carbon; AvN, soil available nitrogen; AvK, Soil available potassium; AvP, soil available phosphorus; Ca²⁺, soil exchangeable calcium; Mg²⁺, soil exchangeable magnesium; DBH, diameter at breast height of trees; TS, the number of tree stems; TR, tree richness; SR, shrub richness; HR, herb richness.