

Article

Soil Bacterial Community Shifts Are Driven by Soil Nutrient Availability along a Teak Plantation Chronosequence in Tropical Forests in China

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Table S1. Chemical, enzyme activities characteristics of the rhizosphere and bulk soil.

Soil properties	Soil	CK	22-y	35-y	45-y	55-y
pH	R	6.56±0.02b	6.77±0.01a	6.52±0.06b	6.54±0.02b	6.56±0.02b
	B	-	6.61±0.03a	6.38±0.03a	6.51±0.03a	6.18±0.53a
SOC (g/kg)	R	29.16±3.14b	26.07±1.95b	46.98±6.86a	34.71±1.94b	35.42±1.96b
	B	-	22.50±3.88b	36.02±7.04a	23.17±2.22b	26.26±3.95ab
TN (g/kg)	R	1.71±0.091bc	1.45±0.07c	2.70±0.33a	1.93±0.18bc	2.09±0.17b
	B	-	1.38±0.31a	2.22±0.58a	1.71±0.08a	1.59±0.30a
TP (g/kg)	R	0.28±0.01ab	0.25±0.04b	0.36±0.07a	0.32±0.01ab	0.33±0.03ab
	B	-	0.22±0.01a	0.32±0.05a	0.31±0.01a	0.36±0.13a
TK (g/kg)	R	32.24±1.53ab	38.60±0.30a	21.00±0.58b	31.89±4.51ab	31.45±9.35ab
	B	-	36.71±1.76a	21.69±0.82b	31.05±0.23ab	31.71±9.27ab
AP (mg/kg)	R	2.30±0.10a	3.31±0.87a	1.99±0.57a	3.56±0.86a	3.44±1.40a
	B	-	2.80±0.40a	1.48±0.48a	2.17±0.32a	2.87±1.47a
AK (mg/kg)	R	151.32±16.95b	78.80±13.57c	308.64±34.54a	129.18±30.41bc	134.22±17.84bc
	B	-	64.53±9.19c	231.28±13.03a	131.89±24.47b	117.92±37.71bc
NO ₃ ⁻ -H (mg/kg)	R	15.71±2.09a	13.98±2.74a	15.19±0.59a	16.57±2.59a	19.16±3.73a
	B	-	10.53±0.29c	13.12±3.04bc	17.09±1.04ab	20.71±2.26a
NH ₄ ⁺ -H (mg/kg)	R	11.22±0.79a	9.49±6.18a	22.44±2.34a	13.98±6.30a	10.87±6.46a
	B	-	3.97±0.30a	16.57±4.75a	8.46±4.67a	13.12±7.40a
Catalase (ml/g)	R	14.19±1.10bc	8.43±0.47c	20.67±2.95a	17.54±3.12ab	13.17±2.87bc
	B	-	7.43±2.31b	22.45±2.15a	19.49±0.95a	9.93±3.61b
Acid phosphatase (mg/g)	R	0.53±0.02c	0.43±0.04d	0.99±0.12a	0.70±0.08bc	0.74±0.09b
	B	-	0.35±0.08a	0.61±0.14a	0.39±0.07a	0.54±0.14a
Urease (mg/g)	R	1.56±0.07b	1.13±0.27b	8.46±2.38a	3.76±1.39b	2.61±1.50b
	B	-	0.77±0.12a	2.98±2.59a	1.31±0.57a	1.49±1.03a

Values are represented as the mean (n=3) ± the standard deviation. Different lowercase letters indicate statistical differences ($P < 0.05$) among different stand ages based on a one-way ANOVA followed by a Tukey's HSD test. TOC: soil total organic carbon; TN: total nitrogen; TP: total phosphorous; TK: total potassium; AP: available phosphorous; AK: available potassium; NO₃⁻-H: nitrate nitrogen; NH₄⁺-H: ammonium nitrogen. R: rhizosphere soil; B: bulk soil.

Table S2. Relative abundances of bacterial dominant phyla in both rhizosphere and bulk soils along a chronosequence of stand age gradients.

Phyla	Soil	CK	22-y	35-y	45-y	55-y
<i>Acti</i>	R	40.11	47.60	38.70	26.68	24.57
	B	-	21.61	29.381	26.16	32.08
<i>Prot</i>	R	25.13	21.35	24.49	42.00	30.99
	B	-	32.19	30.58	34.11	43.56
<i>Acid</i>	R	12.50	11.63	15.25	11.03	12.71
	B	-	18.97	16.57	9.47	4.56
<i>Chlo</i>	R	7.16	5.48	7.65	5.80	9.55
	B	-	9.39	5.447	7.35	5.59
<i>Roku</i>	R	5.21	4.81	5.87	6.42	4.71
	B	-	5.61	7.12	6.75	5.04
<i>Firm</i>	R	3.12	2.11	1.30	1.96	10.33
	B	-	4.29	2.82	8.73	3.03
<i>Verr</i>	R	1.42	1.85	1.27	0.81	1.66
	B	-	2.27	2.04	1.41	0.86
<i>Bact</i>	R	1.76	1.54	1.12	1.04	1.40
	B	-	1.41	0.76	0.76	1.73
<i>Gemm</i>	R	0.98	0.83	1.42	1.50	1.03
	B	-	1.15	1.21	2.08	1.09
<i>Plan</i>	R	1.01	0.92	1.14	0.89	1.08
	B	-	1.47	2.07	1.10	0.58

Values are mean (n=3). R: rhizosphere; B: bulk. Acti: Actinobacteria, Prot: Proteobacteria, Acid: Acidobacteria, Chlo: Chloroflexi, Roku: Rokubacteria, Firm: Firmicutes, Verr: Verrucomicrobia, Bact: Bacteroidetes, Gemm: Gemmatimonadetes, Plan: Planctomycetes.

Table S3. Analysis of similarities (ANOSIM) and PERMANOVA (permutation multivariate analysis of variance) based on the Bray-Curtis distance showing the differences in bacterial community compositions in the rhizosphere and bulk soils along a chronosequence.

Type	df	PERMANOVA		ANOSIM	
		R ²	P	R	P
Rhizosphere soil	4	0.740	0.001	0.935	0.001
Bulk soil	3	0.633	0.002	0.633	0.002

Table S4. Spearman's correlation between bacterial alpha diversity and soil properties.

Soil properties	Rhizosphere				Bulk			
	Sobs	Shannon	Simpson	Chao	Sobs	Shannon	Simpson	Chao
pH	0.15	0.47	-0.54*	0.19	0.22	0.47	-0.55	-0.21
SOC	0.16	0.05	0.34	0.04	-0.31	-0.41	0.46	-0.15
TN	0.17	-0.06	0.44	0.07	-0.35	-0.50	0.56	-0.30
TP	0.22	-0.06	0.42	0.26	-0.64*	-0.50	0.67*	-0.10
TK	-0.13	-0.05	-0.18	-0.07	0.25	0.21	-0.57	-0.41
AP	0.23	0.21	-0.07	0.36	0.00	-0.01	-0.39	-0.41
AK	0.04	-0.43	0.63*	-0.08	-0.21	-0.65*	0.63*	-0.01
NO ₃ ⁻ -H	0.46	0.11	0.38	0.69**	-0.47	-0.56	0.38	-0.10
NH ₄ ⁺ -H	-0.05	-0.19	0.41	-0.10	-0.26	-0.77**	0.71*	-0.13
Catalase	0.07	-0.21	0.57*	0.04	-0.18	-0.48	0.62*	-0.03
Acid phosphatase	0.30	0.09	0.36	0.22	-0.37	-0.48	0.48	-0.16
Urease	0.04	-0.23	0.55*	-0.04	-0.23	-0.76**	0.50	-0.36

SOC: soil organic carbon; TN: total nitrogen; TP: total phosphorous; TK: total potassium; AP: available phosphorous; AK: available potassium; NO₃⁻-H: nitrate nitrogen; NH₄⁺-H: ammonium nitrogen. * $P < 0.05$; ** $P < 0.01$.

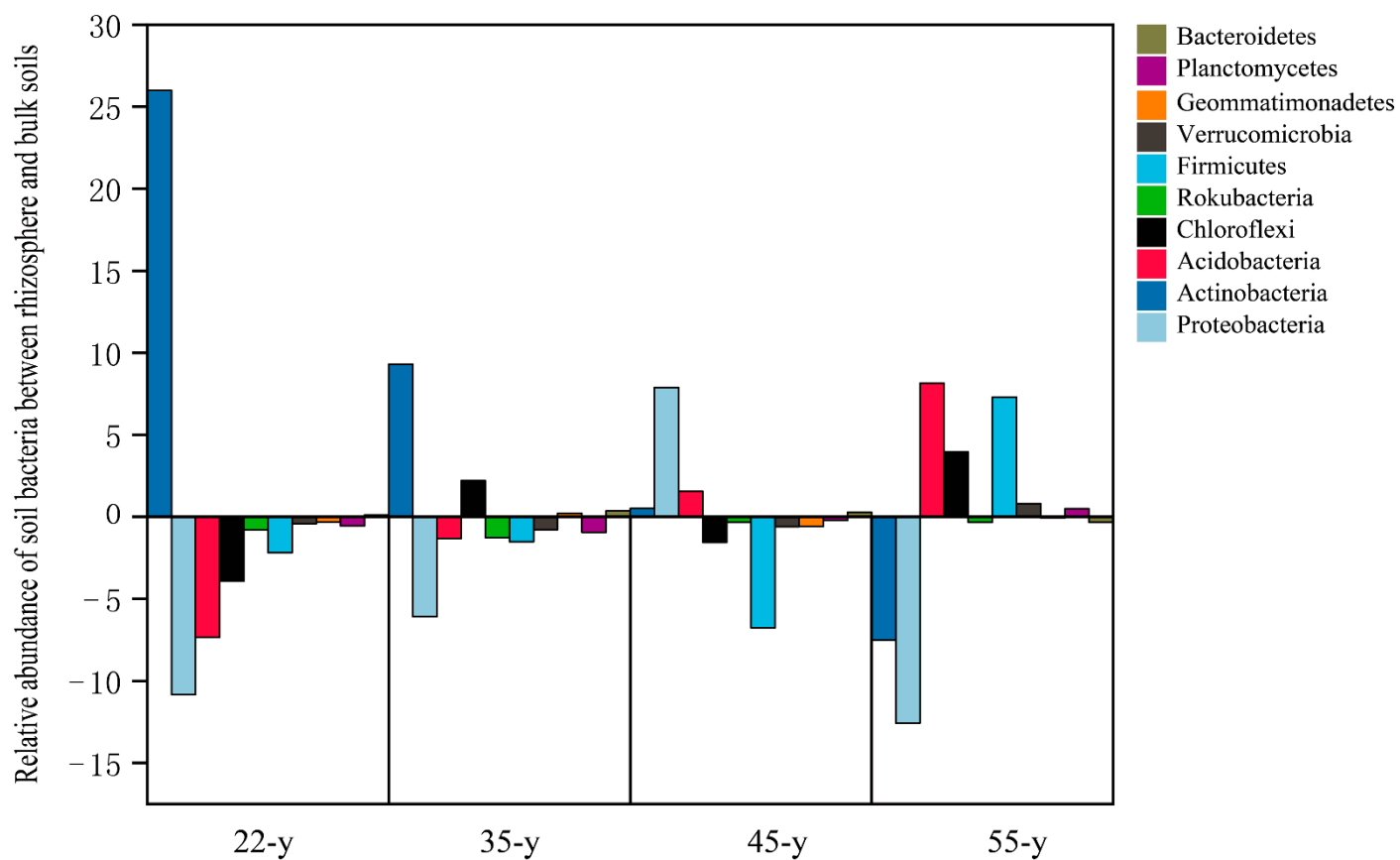


Figure S1. Differences in soil bacterial dominant phyla between the rhizosphere and bulk soil of the teak plantations.