

Table S1. Main characteristics of sample sites with different elevation gradients

Forest Stand Type	Sample plot ID	Number of plot	Coordinates	Altitude(m, a. s. l.)	Stand average tree height (m)	Stand average diameter at breast height (cm)	Dominant taxa
Pure stands	EleA1	2	N37°51'17" E111°32'41"	1720	21.7	35.3	<i>L. principis-rupprechtii</i> , <i>Rosa</i> sp., <i>Daphne giraldii</i> Nitsche, <i>Spiraea salicifolia</i> L., <i>Potentilla glabra</i> Lodd., <i>Fragaria orientalis</i> Losinsk., <i>Geranium wilfordii</i> Maxim., <i>nemone rivularis</i> Buch.-Ham. var. <i>flore-minore</i> Maxim.
	EleA2	3	N37°52'34" E111°33'15"	1850	19.1	31.9	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Betula platyphylla</i> , <i>Rosa</i> sp., <i>Berberis amurensis</i> Rupr., <i>Acer tataricum</i> subsp.ginnala, <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Fragaria orientalis</i> Losinsk., <i>Chrysanthemum chanetii</i> , <i>Viola philippica</i> , <i>Anemone rivularis</i> Buch.-Ham. var. <i>flore-minore</i> Maxim.
	EleA3	3	N37°53'20" E111°33'37"	1950	19.4	32.5	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Rosa</i> sp., <i>Spiraea salicifolia</i> L., <i>Lonicera japonica</i> Thunb., <i>Fragaria orientalis</i> Losinsk., <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Chrysanthemum chanetii</i> , <i>Anemone rivularis</i> Buch.-Ham. var. <i>flore-minore</i> Maxim., <i>Taraxacum mongolicum</i> Hand. Mazz., <i>Veratrum nigrum</i> L., <i>Anemone vitifolia</i> Buch.Ham.
	EleA4	3	N37°53'46" E111°34'11"	2050	20.7	30.5	<i>L. principis-rupprechtii</i> , <i>Pinus tabulaeformis</i> , <i>Rosa</i> sp., <i>Ribes alpestre</i> var. <i>Giganteum</i> , <i>Acer tataricum</i> subsp.ginnala, <i>Rosa xanthina</i> Lindl, <i>Fragaria orientalis</i> Losinsk., <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Ranunculus japonicus</i> Thunb.
	EleA5	5	N37°54'25" E111°35'01"	2150	22.2	29.9	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Rosa</i> sp., <i>Daphne giraldii</i> Nitsche, <i>Spiraea salicifolia</i> L., <i>Ribes alpestre</i> var. <i>Giganteum</i> , <i>Cotoneaster acutifolius</i> Turcz., <i>Fragaria orientalis</i> Losinsk., <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Chrysanthemum chanetii</i> , <i>Lathyrus humilis</i> (Ser.) Spreng.
	EleA6	5	N37°55'02" E111°35'53"	2250	17.9	25.7	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Rosa</i> sp., <i>Ribes alpestre</i> var. <i>Giganteum</i> , <i>Daphne giraldii</i> Nitsche, <i>Fragaria orientalis</i> Losinsk., <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Pedicularis resupinata</i> L.

Table S1. Main characteristics of sample sites with different elevation gradients (continuation sheet)

Forest Stand Type	Sample plot ID	Number of plot	Coordinates	Altitude (m, a.s. l.)	Stand average tree height (m)	Stand average diameter at breast height (cm)	Dominant taxa
Mixed stands	EleB1	3	N37°51'16" E111°32'52"	1720	14.6	22.5	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Betula platyphylla</i> , <i>Rosa</i> sp., <i>Acer tataricum</i> subsp.ginnala, <i>Spiraea salicifolia</i> L., <i>Ribes alpestrevar.</i> <i>Giganteum</i> , <i>Fragaria orientalis</i> Losinsk., <i>Geranium wilfordii</i> Maxim., <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Adenocaulon himalaicum</i> Edgew.
	EleB2	3	N37°52'30" E111°33'31"	1850	14.6	21.6	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Betula platyphylla</i> , <i>Pinus tabulaeformis</i> , <i>Rosa</i> sp., <i>Ribes alpestrevar.</i> <i>Giganteum</i> , <i>Fragaria orientalis</i> Losinsk., <i>Lathyrus humilis</i> (Ser.) Spreng., <i>Plantago depressa</i> Willd., <i>Anemone rivularis</i> Buch.-Ham. var. <i>flore-minore</i> Maxim.
	EleB3	3	N37°53'12" E111°33'28"	1950	16.5	25.8	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Betula platyphylla</i> , <i>Betula albosinensis</i> Burk., <i>Pinus tabulaeformis</i> , <i>Spiraea salicifolia</i> L., <i>Rosa</i> sp., <i>Ribes alpestrevar.</i> <i>Giganteum</i> , <i>Potentilla glabra</i> Lodd., <i>Rosa xanthina</i> Lindl, <i>Carex duriuscula</i> subsp. <i>Stenophylloides</i> , <i>Stellera chamaejasme</i> Linn., <i>Taraxacum mongolicum</i> Hand. Mazz., <i>Astragalus membranaceus</i> (Fisch.) Bunge, <i>Chrysanthemum chanetii</i> , <i>Plantago depressa</i> Willd.
	EleB4	3	N37°53'53" E111°34'07"	2050	18.9	30.5	<i>L. principis-rupprechtii</i> , <i>Picea asperata</i> Mast., <i>Betula platyphylla</i> , <i>Rosa</i> sp., <i>Ribes alpestrevar.</i> <i>Giganteum</i> , <i>Fragaria orientalis</i> Losinsk., <i>Anemone rivularis</i> Buch.-Ham. var. <i>flore-minore</i> Maxim., <i>Taraxacum mongolicum</i> Hand. Mazz., <i>Ranunculus japonicus</i> Thunb.
	EleB5	1	N37°54'35" E111°34'48"	2150	20.5	28.7	<i>L. principis-rupprechtii</i> , <i>Betula platyphylla</i> , <i>Populus</i> L., <i>Spiraea salicifolia</i> L., <i>Rosa</i> sp., <i>Acer tataricum</i> subsp.ginnala, <i>Fragaria orientalis</i> Losinsk., <i>Geranium wilfordii</i> Maxim.

Table S2. Variation of soil physicochemical factors under different altitudes and forest types in the 0-10 cm soil layer

	Altitude	SW (%)	ST(°C)	SMaxW(g)	SMinW (g)	SP(%)	BD(g/cm ³)	SOC(g/kg)	SOM(g/kg)	AN(mg/kg)	TN(g/kg)	AP(mg/kg)	TP(g/kg)	AK (mg/kg)	INV (mg)	URE (mg)	PHO (mg)
Pure stands	EleA1	10.75±2.91a	19.34±1.02a	34.59±3.92a	24.45±2.53ab	48.95±2.18a	1.42±0.07a	7.755±0.31a	11.12±0.56a	134.55±10.13abc	1.9±0.05a	8.87±1.41a	0.38±0.01a	219.59±19.61b	6.04±0.63c	211.67±13.05ab	48.79±6.72b
	EleA2	11.33±2.38a	18.62±0.81a	32.21±3.2a	25.47±2.06abc	46.92±1.78ab	1.49±0.06ab	8.71±0.53ab	15.02±0.45ab	66.27±4.61a	1.08±0.07a	8.33±0.92a	0.42±0.02a	116.46±12.34a	2.64±0.32a	128.71±11.14a	31.23±4.51ab
	EleA3	18.08±2.38a	18.37±0.62a	34.73±3.2a	20.15±2.01a	49.23±1.23ab	1.43±0.06abc	9.84±0.91abc	16.97±0.51ab	131.13±14.62abc	2.31±0.04a	7.90±0.81a	0.69±0.05a	125.17±10.14ab	1.27±0.22a	118.79±10.89a	19.36±4.52a
	EleA4	16.91±2.34a	17.35±0.61a	35.33±3.1a	26.77±2.12abc	47.87±1.37ab	1.36±0.04bc	9.708±0.72abc	16.74±0.62ab	87.5±11.54ab	1.39±0.04a	10.01±1.03a	0.37±0.01a	164.98±11.35ab	2.05±0.27a	168.25±12.21ab	53.25±6.57b
	EleA5	12.99±1.84a	18.59±0.42a	40.35±2.48ab	31.02±1.59bc	51.34±1.12ab	1.28±0.03bc	15.88±0.96bc	27.38±0.54b	146.7±13.17bc	1.03±0.01a	12.26±1.01a	0.38±0.01a	179.11±13.05ab	1.68±0.14a	198.04±17.22ab	45.91±4.41ab
	EleA6	14.86±1.81a	18.58±0.71a	45.49±2.47b	33.66±1.62c	53.37±0.98b	1.23±0.04c	19.869±0.92c	34.29±0.73b	164.64±19.06c	2.09±0.05a	6.64±0.06a	0.33±0.02a	139.64±9.06ab	4.32±0.18b	198.98±16.69b	90.38±4.53c
Mixed stands	EleB1	13.87±1.32a	18.45±0.67a	35.60±1.09b	28.17±0.69b	48.78±1.21a	1.37±0.01a	9.51±1.67a	16.39±2.86a	59.5±3.18a	2.79±0.06a	6.54±1.15a	0.33±0.02a	162.54±16.87a	3.18±0.52ab	68.73±5.43a	33.61±6.43b
	EleB2	14.03±1.01a	17.03±0.52a	34.65±1.07ab	27.48±0.61b	48.01±1.09a	1.39±0.02a	9.53±1.72a	16.42±2.91a	76.53±7.16a	1.91±0.03a	9.79±1.21a	0.31±0.01a	142.04±13.32a	3.83±0.53b	176.02±15.46ab	45.99±3.45b
	EleB3	13.44±1.18a	17.78±0.53a	30.61±1.89a	24.78±0.53a	45.29±1.15a	1.48±0.02b	12.63±1.69ab	21.78±3.81ab	63.17±8.29a	1.42±0.07a	6.75±1.32a	0.30±0.01a	245.36±15.76a	2.92±0.31ab	147.66±12.48ab	35.11±3.12b
	EleB4	11.17±1.31a	17.24±0.41a	31.26±1.37a	24.15±1.12a	46.75±1.31a	1.49±0.03b	16.23±1.31b	27.97±2.89b	88.2±13.18a	2.41±0.07a	7.83±1.02a	0.34±0.03a	165.72±13.57a	2.69±0.34ab	230.27±16.36b	41.69±4.17b
	EleB5	13.87±2.21a	17.18±0.54a	32.75±1.92ab	24.93±1.37a	47.36±2.09a	1.45±0.05ab	29.53±2.89c	50.905±4.89c	52.50±6.89a	1.3±0.08a	6.07±1.17a	0.42±0.05a	187.27±12.76a	1.51±0.26a	64.31±4.65a	7.68±1.82a

Note: SW: soil water content; ST: soil temperature; SMaxW: maximum soil water holding capacity; SMinW: minimum soil water holding capacity; SP: soil porosity; BD: soil bulk weight; SOC: soil organic carbon; SOM: soil organic matter; AN: alkaline nitrogen; TN: total nitrogen; AP: fast-acting phosphorus; TP: total phosphorus; AK: fast-acting potassium; INV: sucrase; URE: urease; PHO: alkaline phosphatase; different letters represent differences between elevations of the same stand type reaching significance level (P<0.05)

Table S3. Variation of soil physicochemical factors under different altitudes and forest types in the 10-20 cm soil layer

	Altitude	SW(%)	ST(℃)	SMaxW (g)	SMinW (g)	SP(%)	BD (g/cm³)	SOC (g/kg)	SOM(g/kg)	AN(mg/kg)	TN(g/kg)	AP(mg/kg)	TP(g/kg)	AK(mg/kg)	INV (mg)	URE (mg)	PHO (mg)
Pure stands	EleA1	8.95±2.13a	18.32±0.91a	37.05±6.03ab	24.32±1.55ab	47.16±3.06a	1.28±0.018ab	13.96±1.81a	24.08±2.57a	124.25±11.35a	3.23±0.02b	5.59±1.01a	0.4±0.01ab	133.29±16.15a	6.88±0.86b	195.80±17.88c	51.29±5.42bc
	EleA2	10.34±2.75a	17.76±0.73a	29.28±4.93a	20.32±1.72a	45.47±2.49a	1.56±0.034c	11.37±1.25a	19.60±1.93a	99.4±9.33a	1.39±0.01a	6.54±0.91a	0.52±0.02ab	137.58±15.52a	2.68±0.63a	91.22±9.76a	47.38±3.32ab
	EleA3	16.56±3.37a	17.84±0.69a	30.85±4.65a	22.72±1.28a	46.04±2.36a	1.5±0.032c	13.69±1.57a	23.62±2.18a	111.3±9.82a	1.42±0.03a	19.13±2.07a	0.81±0.01b	132.72±13.25a	3.11±0.32a	117.79±10.12ab	36.78±3.61a
	EleA4	16.61±2.12a	16.68±0.71a	34.36±4.37ab	28.32±2.81ab	46.85±2.51a	1.38±0.037bc	15.16±1.08a	26.14±2.09a	92.5±8.25a	1.58±0.01a	7.40±1.41a	0.32±0.03a	102.79±16.24a	2.93±0.31a	161.25±12.47bc	39.43±4.17abc
	EleA5	17.50±2.33a	17.63±0.64a	46.53±3.81b	35.34±1.93b	52.70±1.94a	1.24±0.019ab	11.85±1.29a	20.43±2.17a	103.72±7.29a	1.07±0.03a	25.28±3.72a	0.29±0.01a	150.81±12.32a	2.54±0.51a	139.36±9.63abc	53.86±5.22bc
	EleA6	13.05±2.09a	17.81±0.77a	41.92±4.23ab	28.26±2.04ab	48.59±2.19a	1.172±0.039a	13.73±1.05a	23.66±2.05a	103.95±7.53a	1.73±0.02a	6.01±1.18a	0.25±0.03a	82.63±11.89a	4.43±0.62ab	201.18±12.79c	61.83±5.73c
Mixed stands	EleB1	13.5±1.14b	17.00±0.91a	35.53±1.56b	25.42±0.92ab	48.75±1.51a	1.37±0.029a	11.31±1.21a	19.48±2.11a	86.78±15.68a	1.31±0.01ab	6.29±1.27a	0.45±0.03a	106.71±12.76	4.49±0.39a	160.42±9.36a	30.95±3.34b
	EleB2	13.91±1.13b	16.34±0.93a	32.86±1.41ab	27.48±0.87b	45.33±1.63a	1.38±0.039a	10.77±1.09a	18.57±2.05a	110±12.57a	3.40±0.17a	10.12±0.87a	0.443±0.04a	83.66±10.82	3.64±0.46a	165.01±11.34b	35.95±3.21b
	EleB3	13.20±1.09b	16.08±0.91a	29.39±1.51a	23.09±0.82a	44.81±1.58a	1.53±0.034b	12.03±1.15a	20.75±2.01a	66.5±9.82a	1.33±0.07ab	8.22±0.93a	0.32±0.01a	185.02±12.53	2.61±0.31a	139.14±10.19b	27.38±3.31b
	EleB4	13.98±0.87a	16.12±0.87a	32.14±2.14ab	23.68±0.91a	47.43±1.17a	1.49±0.027b	14.29±2.11a	24.64±1.95a	58.8±6.27a	0.97±0.03a	7.04±1.19a	0.42±0.05a	127.77±11.98	3.56±0.45a	216.85±12.22a	39.48±3.15a
	EleB5	13.28±1.91b	15.93±1.19a	33.43±2.71ab	22.07±1.59a	46.14±2.62a	1.38±0.037a	12.77±1.23a	22.01±3.63a	49.70±4.21a	0.97±0.04a	6.18±1.05a	0.42±0.04a	87.84±9.13	1.80±0.19a	49.23±6.96b	4.12±0.85b
ANONA																	
	A	1.249ns	1.876ns	4.403***	3.704**	2.116ns	11.16***	7.801***	7.802***	0.944ns	1.718ns	0.427ns	1.891ns	1.538ns	5.621***	6.291***	12.926***
	F	1.025ns	11.10***	2.613ns	0.401ns	2.162ns	2.700ns	1.499ns	1.497ns	12.236***	0.286ns	0.974ns	1.843ns	0.035ns	0.848ns	2.162ns	4.551*
	S	0.339ns	5.542*	0.114ns	1.127ns	2.628ns	0.235ns	6.251*	6.259*	0.485ns	0.337ns	0.137ns	0.284ns	9.757**	0.941ns	2.466ns	3.387ns
	A×F	4.081**	1.914ns	1.471ns	4.075**	1.203ns	4.364**	4.743***	4.744***	2.027ns	1.980ns	0.435ns	2.640*	2.013ns	4.943***	8.643***	5.986***
	F×S	0.106ns	0.070ns	0.020ns	0.826ns	0.063ns	0.009ns	5.494*	5.493*	0.368ns	1.087ns	0.181ns	0.157ns	0.958ns	1.325ns	0.193ns	0.168ns
	A×S	0.283ns	0.007ns	0.479ns	1.059ns	0.615ns	0.945ns	6.224***	6.226***	1.338ns	1.079ns	0.261ns	0.254ns	0.399ns	0.349ns	0.220ns	1.514ns
	A×F×S	0.287ns	0.024ns	0.182ns	0.746ns	0.266ns	0.567ns	2.675*	2.675*	0.417ns	2.075ns	0.197ns	0.134ns	0.577ns	0.317ns	0.106ns	0.255ns

Note: A is for Altitude, F is for Stand Type, S is for Soil depth; different letters represent differences between elevations of the same stand type reaching significance level (P<0.05); * represents P<0.05, ** represents P<0.01, *** represents

P<0.001

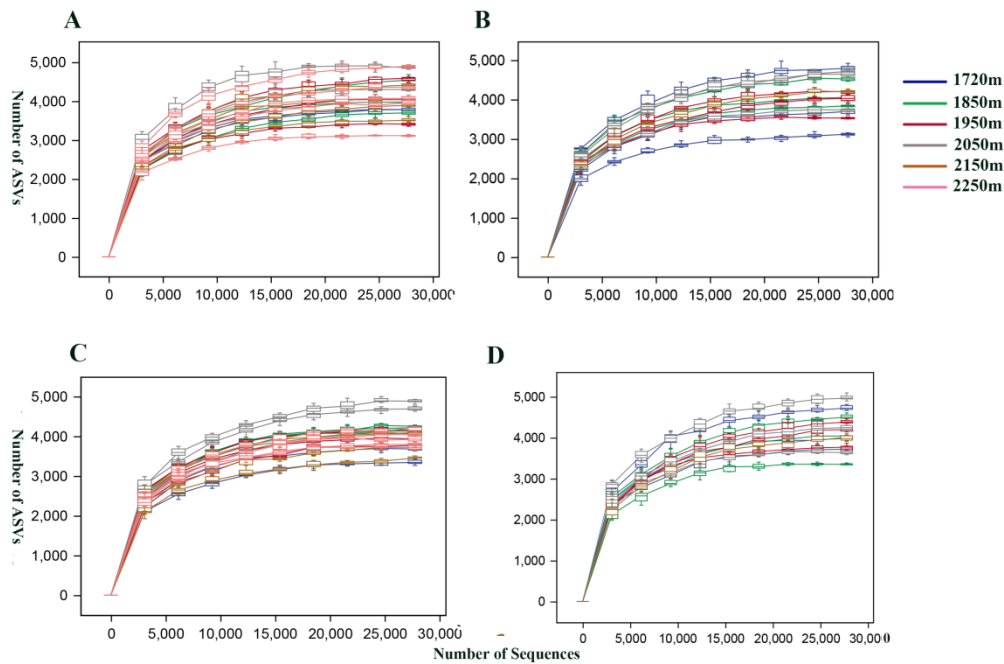


Figure S1. Dilution curves of amplicon sequence variants (ASVs) of soil bacterial communities from two stand types and soil depths at different elevations.

Note: Each sample contains a random subsample of 27,767 16S rRNA genes to generate dilution curves. All ASVs are described at 100% sequence similarity. Figure A and B represent soil bacteria in the 0-10 cm layer in a pure larch forest and a mixed larch-birch forest in northern China, respectively, and Figure C and D represent soil bacteria in the 10-20cm layer in a pure larch forest and a mixed larch-birch forest in northern China, respectively

Table S4. Mantel test results for the correlation between soil bacterial community and soil variables

Soil variables	Pure stands		Mixed stands	
	R ²	P	R ²	P
SW	0.142	0.093	0.019	0.453
SMaxW	0.131	0.131	0.094	0.224
SMinW	0.065	0.233	0.058	0.266
SP	0.126	0.121	0.047	0.341
BD	0.163	0.059	0.023	0.384
ST	0.078	0.796	0.363	0.008**
SOC	0.131	0.11	0.006	0.361
SOM	0.138	0.101	0.006	0.361
AN	0.320	0.005**	0.142	0.799
TN	0.006	0.415	0.064	0.292
AP	0.035	0.539	0.046	0.361
TP	0.008	0.39	0.293	0.046*
AK	0.202	0.017*	0.150	0.805
INV	0.189	0.052	0.037	0.293
URE	0.008	0.445	0.094	0.758
PHO	0.097	0.884	0.120	0.798

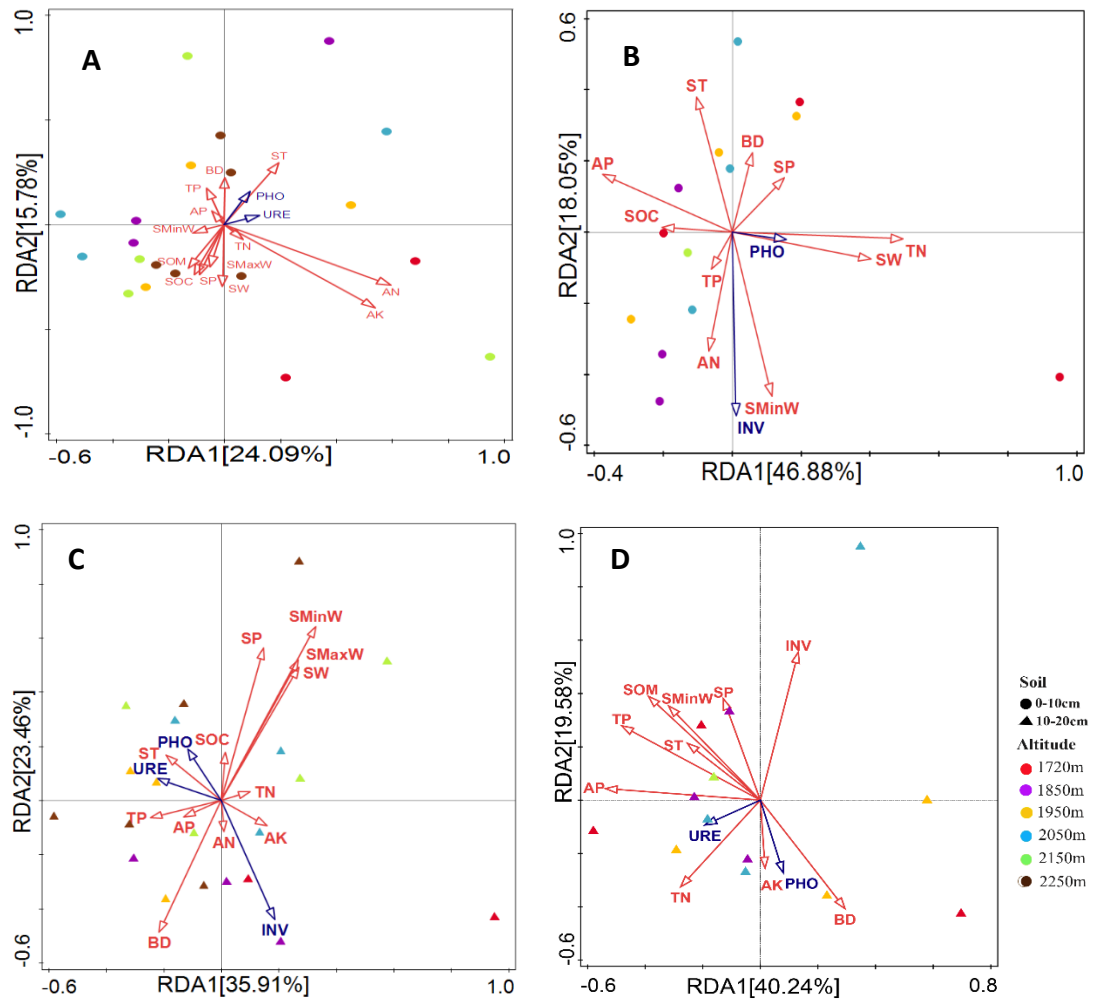


Figure S2. Redundancy analysis based on pure stands (A, C) and mixed stands (B, D) at the genus level and soil factors (red and blue arrows).

Note: Direction of arrow indicates the soil factors associated with changes in the community structure, and the length of the arrow indicates the magnitude of the association. The percentage of variation explained by RDA 1 and 2 is shown. SW: soil water content; SMaxW: maximum soil water holding capacity; SminW: minimum soil water holding capacity; BD: soil bulk density; ST: soil temperature; SOC: soil organic carbon; SOM: soil organic matter; TN: total nitrogen; TP: total phosphorus; AP: fast-acting phosphorus; AN: alkaline dissolved nitrogen; AK: fast-acting Potassium; PHO: alkaline phosphatase; INV: sucrose; URE: urease.

Table S5. Spearman analysis of relative abundance of soil bacterial communities and environmental factors in pure stands

Phylum	Altitude	SW	SMaxW	SMinW	SP	BD	ST	SOC	SOM	AN	TN	AP	TP	AK	INV	URE	PHO
<i>Euryarchaeota</i>	-0.122	-0.157	(-0.326)*	-0.051	-0.287	0.283	-0.103	0.039	0.039	0.006	-0.176	-0.015	-0.034	-0.078	0.122	-0.168	-0.18
<i>Acidobacteria</i>	0.321*	-0.057	0.025	-0.064	0.038	-0.023	0.149	0.198	0.194	0.137	-0.03	-0.034	0.092	-0.069	0.128	0.117	0.036
<i>Actinobacteria</i>	(-0.434)**	-0.205	-0.181	-0.054	-0.123	0.197	-0.038	-0.082	-0.083	-0.002	-0.003	-0.117	0.084	0.022	0.148	-0.157	0.019
<i>Armatimonadetes</i>	-0.024	-0.302	0.179	0.019	0.211	-0.154	0.272	0.147	0.14	-0.069	-0.194	0.119	-0.051	0.21	0.142	0.31*	0.05
<i>BRC1</i>	0.082	-0.078	0.104	0.038	0.129	-0.09	0.127	0.03	0.027	-0.078	-0.194	-0.021	-0.014	0.095	0.033	0.072	-0.043
<i>Bacteroidetes</i>	-0.035	0.076	-0.038	-0.09	-0.119	-0.032	-0.082	-0.018	-0.015	0.166	0.088	-0.059	-0.193	0.25	0.075	0.029	-0.039
<i>Chlamydiae</i>	0.074	0.105	-0.194	-0.164	-0.098	0.21	-0.077	-0.118	-0.12	-0.101	-0.187	0.071	0.187	-0.001	(-0.312)*	-0.141	(-0.31)*
<i>Chloroflexi</i>	0.271	0.025	0.241	0.273	0.292	-0.148	0.292	-0.162	-0.156	-0.089	0.011	0.264	0.075	-0.128	-0.243	0.12	0.11
<i>Cyanobacteria</i>	-0.061	0.072	-0.289	-0.091	-0.192	0.282	-0.11	-0.231	-0.229	-0.146	-0.194	-0.036	0.037	-0.206	-0.005	-0.087	-0.34
<i>Dadabacteria</i>	-0.142	0.058	-0.282	-0.197	-0.24	0.289	-0.091	0.051	0.051	-0.029	-0.071	-0.128	0.136	0.004	0.184	-0.137	(-0.327)*
<i>Deinococcus_Thermus</i>	0.051	-0.111	0.155	-0.075	-0.053	-0.257	-0.072	-0.005	-0.005	0.041	0.102	-0.36	-0.108	0.085	0.038	-0.074	0.218
<i>Dependentiae</i>	-0.019	0.1	-0.248	-0.237	-0.33	0.155	-0.276	-0.151	-0.143	-0.103	-0.078	0.183	0.201	-0.049	(-0.35)*	-0.235	(-0.313)*
<i>Elusimicrobia</i>	-0.094	-0.207	-0.047	-0.091	0	0.093	0.285	-0.183	-0.175	-0.145	-0.092	0.043	0.22	-0.152	-0.091	0.013	-0.133
<i>Entotheonellaeota</i>	-0.057	-0.027	-0.124	-0.126	-0.052	0.176	-0.004	0.154	0.148	0.037	0.047	0.192	0.337*	0.023	-0.004	0.02	-0.025
<i>Epsilonbacteraeota</i>	-0.02	0.258	0.082	0.19	0.046	-0.058	-0.155	0.149	0.149	-0.164	0.049	-0.067	-0.007	-0.011	0.06	0.13	0.045
<i>FBP</i>	0.21	-0.2	0.257	0.297	0.318*	-0.201	0.153	0.03	0.03	-0.201	-0.129	0.018	-0.011	-0.266	-0.038	0.245	-0.035
<i>FCPU426</i>	-0.192	0.215	-0.183	-0.038	-0.034	0.3	-0.057	0.001	0.006	-0.228	-0.022	0.268	0.43**	-0.087	(-0.327)*	-0.13	-0.467
<i>Fibrobacteres</i>	(-0.381)*	-0.169	(-0.462)**	(-0.386)*	(-0.341)*	0.455**	-0.176	-0.291	-0.285	-0.208	-0.214	0.187	0.233	-0.243	-0.107	(-0.515)***	-0.458
<i>Firmicutes</i>	(-0.471)**	0.207	-0.087	-0.169	-0.01	0.075	-0.107	-0.276	-0.28	-0.237	-0.089	0.163	0.15	0.243	-0.279	-0.074	-0.293
<i>Fusobacteria</i>	-0.2	0.135	-0.198	-0.174	-0.093	0.257	-0.201	-0.282	-0.275	-0.16	-0.097	0.174	0.036	0.137	-0.17	-0.109	-0.269
<i>GAL15</i>	0.236	0.515***	0.29	0.382*	0.313*	-0.226	0.19	0.157	0.163	0.244	0.307	-0.247	-0.04	-0.038	-0.208	0.137	-0.058
<i>Gemmatimonadetes</i>	-0.126	-0.188	-0.018	-0.056	0.148	0.139	0.225	-0.24	-0.233	-0.279	-0.059	0.399*	0.428**	-0.183	-0.271	-0.096	-0.107
<i>Hydrogenedentes</i>	0.159	0.035	-0.1	-0.019	-0.084	0.113	-0.059	0.186	0.186	0.079	-0.087	-0.259	0.002	0.293	-0.097	-0.132	0.045

<i>Kiritimatiellaeota</i>	-0.014	0.201	-0.007	0.09	0	0.056	-0.229	0.236	0.236	-0.243	-0.09	-0.111	-0.09	0.021	0.021	0.062	-0.118
<i>Latescibacteria</i>	0.028	0.017	0.08	0.039	0.202	0.016	0.324*	-0.121	-0.112	-0.105	0.054	0.196	0.244	-0.114	-0.276	0.076	-0.103
<i>Margulisbacteria</i>	-0.183	0.132	0.076	0.104	0.16	-0.076	0.229	-0.215	-0.215	-0.187	-0.104	-0.007	0.118	0.062	-0.076	0.208	-0.132
<i>Nitrospirae</i>	0.301	0.433**	0.314*	0.199	0.312*	-0.269	0.268	0.18	0.186	0.331*	0.266	0.037	0.129	0.178	(-0.315)*	0.226	-0.037
<i>Omnitrophicaeota</i>	0.149	0.225	0.232	0.083	0.193	-0.197	0.17	0.179	0.183	0.059	0.169	-0.248	0.013	0.027	0.114	0.169	-0.069
<i>Patescibacteria</i>	-0.042	-0.334	-0.145	-0.179	-0.228	0.031	-0.062	-0.129	-0.133	-0.028	-0.044	-0.062	-0.182	0.016	0.245	-0.061	-0.016
<i>Planctomycetes</i>	0.144	0.095	0.051	0.094	0.185	0.058	0.242	0.05	0.057	0.043	0.203	0.16	0.076	0.064	-0.108	0.181	-0.056
<i>Proteobacteria</i>	0.017	0.11	-0.062	-0.074	-0.183	-0.037	(-0.327)*	0.018	0.017	-0.127	-0.015	-0.2	-0.341	0.051	0.128	-0.046	-0.076
<i>Rokubacteria</i>	0.38*	0.3	0.314*	0.28	0.351*	-0.256	0.418**	0.153	0.155	0.376*	0.296	0.017	0.014	0.008	-0.207	0.222	0.14
<i>Spirochaetes</i>	0.133	0.247	0.112	0.062	0.144	-0.08	0.253	-0.107	-0.095	0.086	0.391*	0.22	0.062	0.052	-0.32	0.075	-0.001
<i>Tenericutes</i>	-0.127	-0.134	-0.079	0.071	0.015	0.093	0.046	-0.272	-0.283	-0.084	-0.294	0.191	0.116	-0.088	-0.037	0.104	-0.072
<i>Verrucomicrobia</i>	0.089	-0.083	-0.218	-0.04	-0.031	0.312*	-0.13	0.111	0.105	-0.162	-0.242	0.255	0.08	-0.035	0.004	-0.061	-0.094
WPS_2	-0.162	-0.296	-0.093	-0.057	-0.08	0.107	0.063	-0.081	-0.087	0.158	-0.132	-0.128	0.189	-0.23	0.269	-0.052	-0.027
WS2	0.113	-0.223	-0.05	-0.037	-0.04	0.027	-0.095	0.035	0.034	-0.037	0.075	0.09	-0.092	-0.234	0.283	0.078	0.334*
<i>Zixibacteria</i>	0.05	0.095	0.175	0.048	0.178	-0.179	0.32*	-0.094	-0.096	0.041	0.231	-0.031	0.096	-0.074	-0.023	0.098	0.149

Note: SW: soil water content; SMaxW: maximum soil water holding capacity; SminW: minimum soil water holding capacity; BD: soil bulk density; ST: soil temperature; SOC: soil organic carbon; SOM: soil organic matter; TN: total nitrogen; TP: total phosphorus; AP: fast-acting phosphorus; AN: alkaline dissolved nitrogen; AK: fast-acting Potassium; PHO: alkaline phosphatase; INV: sucrase; URE: urease; * represents P<0.05, ** represents P<0.01; *** represents P<0.001

Table S6. Spearman analysis of relative abundance of soil bacterial communities and environmental factors in mixed stands

Phylum	Altitude	SW	SMaxW	SMinW	SP	BD	ST	SOC	SOM	AN	TN	AP	TP	AK	INV	URE	PHO
<i>Euryarchaeota</i>	-0.109	-0.04	0.227	0.307	0.2	-0.16	-0.253	-0.307	-0.307	0.093	0.227	0.334	0.308	-0.333	-0.253	0.147	-0.12
<i>Acidobacteria</i>	0.335	-0.287	0.003	-0.068	0.034	-0.079	0.035	0.554**	0.554**	-0.046	-0.355	0.488*	0.199	-0.134	0.247	0.204	-0.139
<i>Actinobacteria</i>	-0.241	0.262	0.344	0.13	0.205	-0.237	0.027	(-0.644)***	(-0.644)***	-0.098	0.24	(-0.468)*	0.126	0.173	-0.09	(-0.395)*	-0.145
<i>Armatimonadetes</i>	0.013	0.262	0.036	0.058	0.204	-0.015	0.121	-0.227	-0.227	-0.187	-0.036	-0.159	-0.054	-0.135	-0.121	-0.228	-0.145
<i>BRC1</i>	-0.097	-0.185	0.221	0.266	0.306	-0.083	0.269	-0.22	-0.22	0.014	-0.049	0.233	-0.048	-0.24	-0.2	-0.028	-0.148
<i>Bacteroidetes</i>	0.062	0.198	-0.179	-0.125	-0.225	-0.009	0.113	0.188	0.188	-0.131	0.014	-0.138	0.014	-0.066	-0.045	-0.26	-0.097
<i>Chlamydiae</i>	-0.237	0.142	-0.002	0.186	0.01	-0.158	0.135	0.04	0.04	-0.163	-0.004	0.145	0.136	-0.158	0.396*	-0.247	-0.187
<i>Chloroflexi</i>	0.385	0.214	-0.275	(-0.414)*	-0.091	0.353	-0.07	0.169	0.169	0.21	0.244	0.357	0.029	0.168	-0.263	0.341	0.05
<i>Cyanobacteria</i>	0.139	-0.08	0.132	0.175	0.107	-0.134	0.436*	0.108	0.108	-0.126	-0.211	-0.437	0.408*	-0.078	0.027	-0.387	-0.372
<i>Dadabacteria</i>	0.055	-0.107	-0.253	0.067	-0.307	0.133	0.28	-0.027	-0.027	-0.067	-0.147	-0.254	-0.227	-0.067	0.12	-0.307	0.067
<i>Deinococcus_Thermus</i>	-0.109	0.333	0.2	-0.04	0.227	-0.04	0.173	-0.267	-0.267	-0.173	-0.253	0.12	-0.294	-0.2	0.173	-0.013	0.173
<i>Dependentiae</i>	0.129	0.281	-0.368	-0.138	-0.095	0.447*	-0.305	0.335	0.335	0.178	0.193	0.348	-0.151	0.268	-0.096	0.395*	0.188
<i>Elusimicrobia</i>	0.078	-0.054	0.047	-0.084	0.103	-0.021	0.183	0.091	0.091	-0.179	-0.316	0.3	0.198	(-0.422)*	-0.052	0.152	-0.297
<i>Entotheonellaeota</i>	-0.17	-0.135	0.319	0.348	0.223	-0.298	0.218	-0.195	-0.195	-0.114	0.149	0.212	0.195	-0.091	-0.344	-0.082	-0.284
<i>FCPU426</i>	-0.058	0.247	0.269	0.022	0.413*	-0.078	0.081	-0.161	-0.161	-0.247	0.302	0.243	-0.012	0.326	-0.304	0.161	0.128
<i>Fibrobacteres</i>	-0.069	0.218	0.078	-0.087	0.129	-0.066	-0.12	-0.251	-0.251	0.022	-0.122	0.458	-0.039	-0.351	-0.104	-0.019	-0.296
<i>Firmicutes</i>	0.021	-0.071	-0.244	-0.015	0.005	0.431*	-0.175	0.114	0.114	0.408*	0.359	-0.055	0.083	0.225	-0.138	0.272	0.397*
<i>Fusobacteria</i>	0.212	-0.367	-0.058	-0.001	-0.053	0.092	-0.068	-0.014	-0.014	0.136	-0.091	-0.06	-0.049	0.019	-0.085	0.24	-0.025
<i>GAL15</i>	-0.292	-0.167	0.284	0.488*	0.29	-0.266	-0.439	-0.053	-0.053	0.503**	0.446*	0.518**	0.029	0.074	0.203	0.27	0.09
<i>Gemmatimonadetes</i>	0.184	-0.101	0.126	-0.08	0.186	-0.089	-0.004	0.182	0.182	-0.146	0.127	0.427*	0.435*	-0.063	-0.164	0.36	0.027
<i>Hydrogenedentes</i>	-0.273	-0.2	0.173	0.173	0.12	-0.12	-0.093	0.08	0.08	0.307	-0.307	0.214	0.04	-0.307	-0.04	-0.04	-0.253
<i>Kiritimatiellaeota</i>	0.055	0.093	-0.067	-0.093	-0.08	0.053	-0.227	0.04	0.04	0.013	0.093	0.294	-0.04	0.307	0.307	0.173	0.013

<i>Latescibacteria</i>	-0.006	0.018	0.124	0.048	0.094	-0.159	-0.142	0.052	0.052	-0.014	0.24	0.667***	0.005	-0.094	-0.087	0.359	0.08
<i>Nitrospirae</i>	-0.014	0.254	-0.113	-0.248	0.055	0.137	0.119	0.311	0.311	-0.054	0.097	0.428*	-0.129	-0.027	-0.013	0.17	0.296
<i>Omnitrophicaeota</i>	-0.242	-0.174	0.341	0.268	0.147	-0.389	0.135	-0.212	-0.212	-0.116	0.083	-0.019	0.459*	-0.303	0	-0.13	-0.184
<i>Patescibacteria</i>	0.066	0.1	-0.039	0.092	-0.169	-0.011	0.082	-0.178	-0.178	-0.091	-0.001	-0.315	0.109	-0.028	-0.195	-0.134	-0.117
<i>Planctomycetes</i>	(-0.399)*	-0.003	0.508**	0.422*	0.451*	(-0.501)**	0.089	-0.245	-0.245	-0.035	-0.137	0.054	0.072	(-0.51)**	0.042	-0.212	-0.289
<i>Proteobacteria</i>	-0.1	0.007	-0.269	-0.063	-0.301	0.232	-0.105	0.025	0.025	0.104	-0.249	(-0.398)*	(-0.431)*	0.054	0.239	0.01	0.263
<i>Rokubacteria</i>	0.172	-0.145	0.091	0.084	0.121	-0.116	-0.257	0.281	0.281	0.131	-0.109	0.723***	-0.119	0.021	0.116	0.298	-0.171
<i>Spirochaetes</i>	0.201	-0.025	-0.06	0.025	0.01	0.06	(-0.391)*	0.082	0.082	0.043	0.296	0.509**	-0.01	0.322	-0.091	0.485	0.058
<i>Synergistetes</i>	0.263	0.142	-0.136	-0.344	-0.234	0.097	-0.051	-0.001	-0.001	-0.117	-0.164	0.06	0.064	0.086	-0.181	0.054	-0.182
<i>Tenericutes</i>	-0.106	-0.156	0.113	0.247	0.013	-0.092	-0.281	(-0.494)*	(-0.494)*	0.265	0.208	-0.14	0.096	-0.082	-0.313	0.162	-0.131
<i>Verrucomicrobia</i>	-0.02	0.012	0.203	0.179	0.222	-0.234	0.166	-0.177	-0.177	-0.108	-0.371	-0.154	0.005	-0.308	-0.116	-0.383	-0.644
WPS_2	0.178	-0.072	0.008	-0.059	0.162	0.158	0.146	-0.184	-0.184	0.035	-0.027	-0.115	0.107	-0.19	-0.313	0.065	-0.032
WS2	0.03	-0.244	-0.283	-0.237	(-0.414)*	0.056	-0.362	0.149	0.149	0.21	-0.196	0.048	-0.068	-0.152	-0.005	0.152	-0.015
<i>Zixibacteria</i>	-0.039	0.315	0.035	0.065	0.078	-0.081	0.203	0.261	0.261	-0.344	0.002	0.226	-0.187	-0.057	0.145	0.02	0.133

Note: SW: soil water content; SMaxW: maximum soil water holding capacity; SminW: minimum soil water holding capacity; BD: soil bulk density; ST: soil temperature; SOC: soil organic carbon; SOM: soil organic matter; TN: total nitrogen; TP: total phosphorus; AP: fast-acting phosphorus; AN: alkaline dissolved nitrogen; AK: fast-acting Potassium; PHO: alkaline phosphatase; INV: sucrase; URE: urease; * represents P<0.05, ** represents P<0.01; *** represents P<0.001