SUPPLEMENTARY FILES

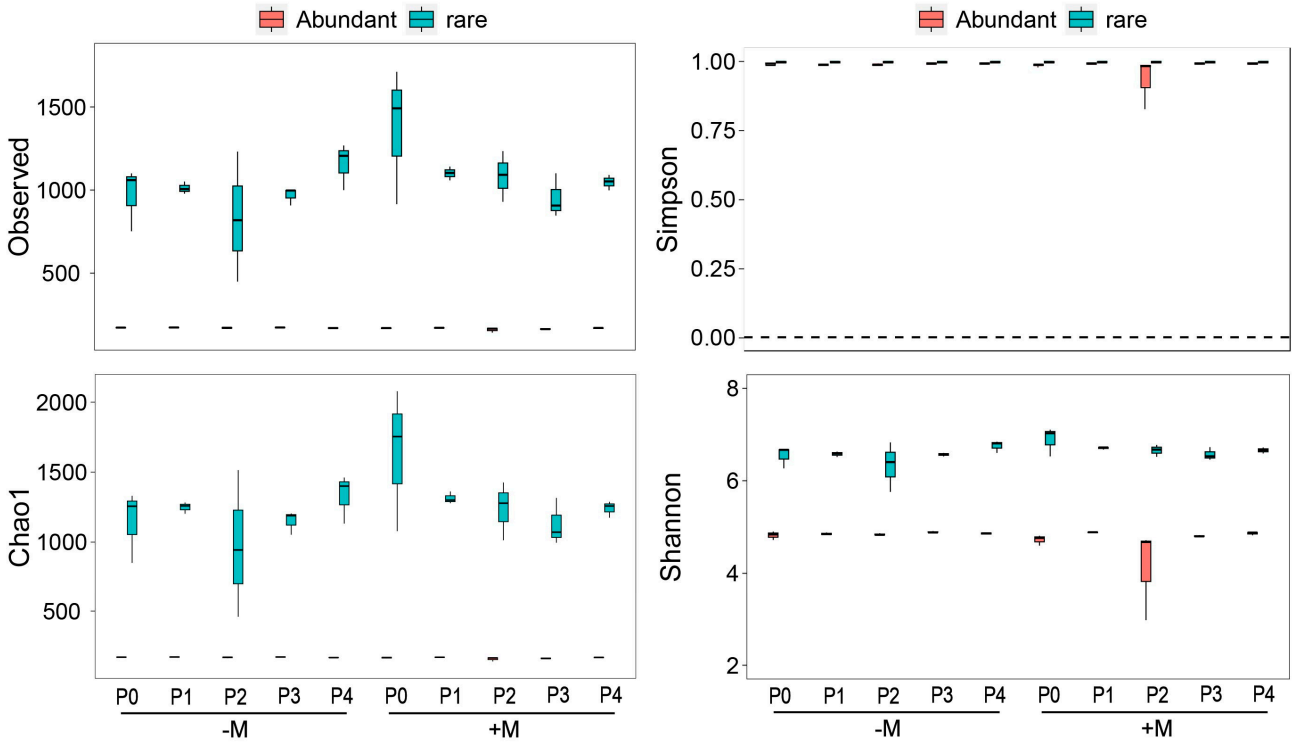


Figure S1. Comparison of α-diversity between abundant and rare bacterial communities under different P fertilization and *Trichoderma* treatments. P0, P1, P2, P3, and P4 represent different phosphate fertilizer levels (0, 5, 10, 15, and 20 g/m^2, respectively); +M and -M indicate whether *Trichoderma* is inoculated in the treatment.

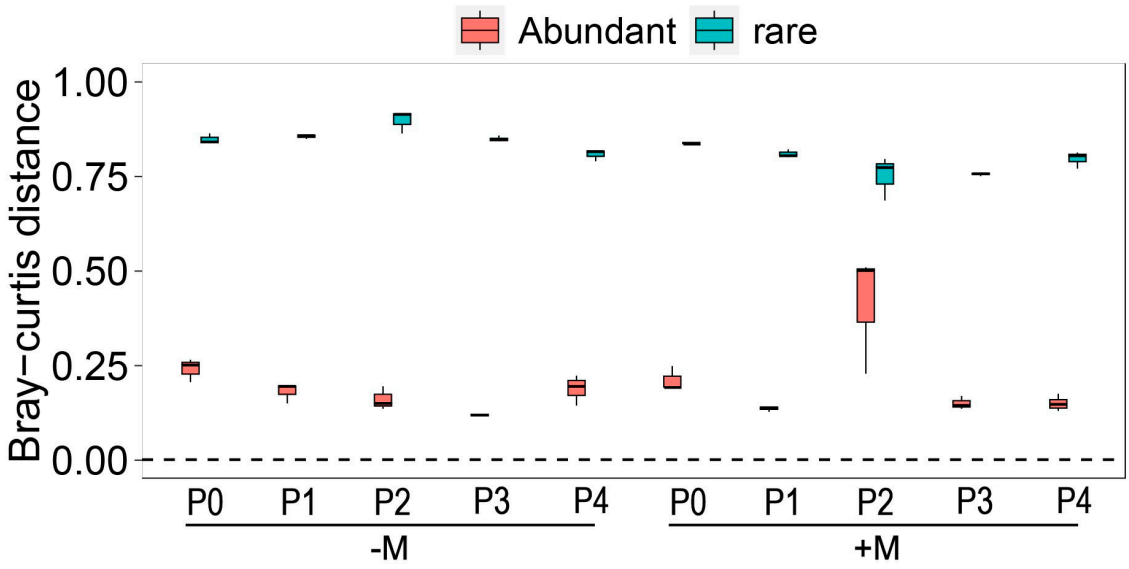


Figure S2. Comparison of β-diversity between abundant and rare bacterial communities under different P fertilization and *Trichoderma* treatments. P0, P1, P2, P3, and P4 represent different phosphate fertilizer levels (0, 5, 10, 15, and 20 g/m^2, respectively); +M and -M indicate whether *Trichoderma* is inoculated in the treatment.

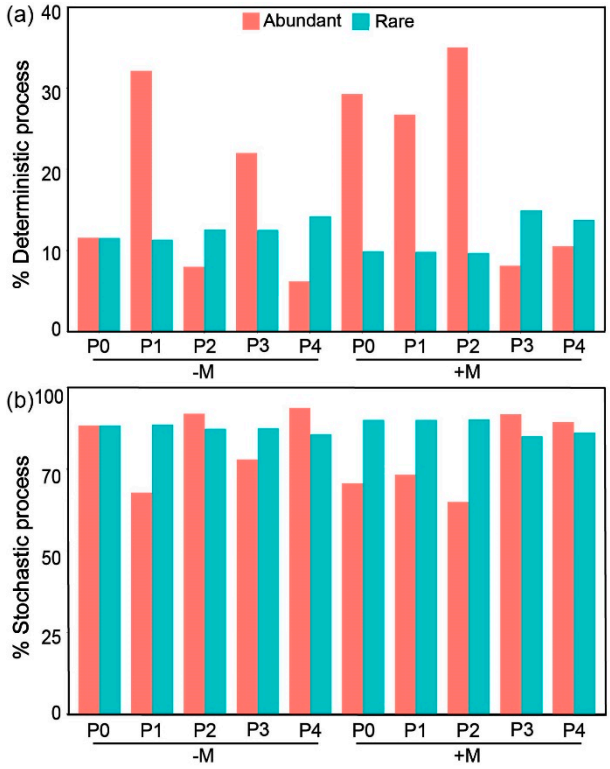


Figure S3. Sum of relative contributions of ecological processes to the assemblies of abundant (a) and rare (b) soil bacterial communities under different P fertilization and *Trichoderma* treatments. P0, P1, P2, P3, and P4 represent different phosphate fertilizer levels (0, 5, 10, 15, and 20 g/m^2, respectively); +M and -M indicate whether *Trichoderma* is inoculated in the treatment.

Table S1. Scoring function values and weights assigned to selected soil fertility parameters.

		pH (H_2O)	EC (μS/cm)	SOM (g/kg)	AN (mg/kg)	AP (mg/kg)	AK (mg/kg)
Scoring curve		A	a	b	b	b	b
Turning point	**U**	8.6	1500	30	120	20	320
	L	6	100	10	60	5	80
	O1	6.5	300				
	O2	7.5	400				
weight		0.135	0.131	0.164	0.192	0.183	0.155

Notes: EC, soil conductivity; SOM, soil organic matter; AN: alkali-hydrolyzable nitrogen; AP: soil available phosphorus; AK: soil available potassium. The equation for the scoring curve is as follows:

(a)

$$f(x)=\begin{cases}0.1 & x\leqslant L, x\geqslant U\\ 0.1+0.9(x-L)/(O_1-L) & L<x<O_1\\ 1.0 & O_1\leqslant x\leqslant O_2\\ 1.0-0.9(x-O_2)/(U-O_2) & O_2<x<U\end{cases}$$

(b)

$$f(x)=\begin{cases}1.0 & x\geqslant U\\ 0.1+0.9(x-L)/(U-L) & L<x<U\\ 0.1 & x\leqslant L\end{cases}$$

where x is the monitoring value of the parameter; f(x) is the score of the parameters ranging between 0.1 and 1.0; U and L are the upper and the lower threshold values of the parameters, respectively. O1 and O2 are the best values of the variables.

Table S2. Comparison of soil physicochemical properties under different P fertilization and *Trichoderma* treatments.

Trichoderma	P-fertilizer	pH (H_2O)	EC (μS/cm)	AN (mg/kg)	AP (mg/kg)	SOM (g/kg)	AK (mg/kg)
-M	P0	7.96	34.13	65.96	9.46	11	96.91
		(0.02)	(1.58)	(2.26)	(0.28)	(0.1)	(0.55)
		a	d	bcd	f	bcd	a
	P1	7.82	32.53	57.91	10.24	10.18	88.89
		(0.01)	(2.67)	(0.61)	(0.19)	(0.74)	(1.28)
		b	d	de	ef	cde	bc
	P2	7.58	40.1	73.09	12.72	10.96	91.71
		(0.03)	(0.17)	(2.84)	(0.27)	(0.12)	(0.71)
		d	cd	ab	cd	bcd	b
	P3	7.62	39.47	79.41	16.56	12.97	84.35
		(0.01)	(0.41)	(5.6)	(0.54)	(0.15)	(2.46)
		d	cd	a	b	a	cde
	P4	7.31	84.53	60.15	20.78	9.42	72.5
		(0.03)	(5.48)	(3.28)	(1.23)	(0.79)	(2.34)
		e	a	de	a	de	f
+M	P0	7.90	39.83	61.44	10.73	11.19	86.28
		(0.02)	(1.33)	(1.45)	(0.26)	(0.81)	(2.69)
		a	cd	Cde	ef	bc	cd
	P1	7.71	40.13	55.95	9.91	9.7	80.08
		(0.01)	(2.24)	(1.71)	(0.49)	(0.16)	(0.7)
		c	cd	E	ef	cde	e
	P2	7.74	44.87	60.28	11.5	10.82	82.97
		(0.04)	(1.81)	(0.84)	(0.03)	(0.08)	(1.61)
		c	c	De	de	bcde	de
	P3	7.70	44.7	68.89	14.15	12.3	92.51
		(0.01)	(6.4)	(1.49)	(0.66)	(0.34)	(1.37)
		c	c	Bc	c	ab	ab
	P4	7.26	63.77	64.81	15.91	9.23	80.85
		(0.03)	(1.07)	(0.82)	(0.17)	(0.76)	(1.33)
		e	b	Cd	b	e	e
Two-way analysis of variance							
T		200.18^{***}	54^{***}	12.4^{***}	92.96^{***}	12.29^{***}	22.87^{***}
P		0.13^{ns}	0.07^{ns}	9.84^{**}	20.49^{***}	0.63^{ns}	4.88^{*}
T x P		11.66^{***}	7.75^{**}	3.78^{*}	9.56^{***}	0.21^{ns}	16.81^{***}

Notes: P0, P1, P1, P2, and P3 represent different phosphate fertilizer levels (0, 5, 10, 15, 20 g/m^2), respectively; +M and -M represents whether there is *Trichoderma* inoculated in the treatment. T represents the main effect of *Trichoderma*-inoculation, P represents the main effect of phosphate fertilizer levels, T x P represents the interaction effect of between two treatments. ns represents no significance, * $p < 0.05$, ** $p < 0.01$,*** $p < 0.001$. Besides, different lowercase letters (a, b, c) indicate significant differences among different treatments (p <0.05, multiple comparisons with Tukey HSD test). The values in the table represent the average (standard error). EC, soil conductivity; SOM, soil organic matter; AN: alkali-hydrolyzable nitrogen;

AP: soil available phosphorus; AK: soil available potassium; phosphatase, alkaline phosphomonoesterase activity; invertase, saccharase activity. Abbreviations are the same below.

Table S3. Comparison of soil α-diversity under different P fertilization and *Trichoderma* treatments.

Types		Treatments	Observed	Chao1	Simpson	Shannon
Abundant	**-M**	**P0**	172.33(0.67)a	172.33(0.67)a	0.989(0.001)a	4.82(0.05)a
		P1	171.00(2.65)a	171.00(2.65)a	0.989(0.001)a	4.84(0.01)a
		P2	170.33(0.33)a	170.33(0.33)a	0.989(0.001)a	4.86(0.01)a
		P3	171.33(0.67)a	171.33(0.67)a	0.991(0.001)a	4.88(0.01)a
		P4	164.33(2.60)b	164.33(2.60)b	0.99(0.001)a	4.80(0.01)a
	+M	**P0**	173.67(0.88)a	173.67(0.88)a	0.99(0.001)a	4.85(0.02)a
		P1	173.67(0.88)a	173.67(0.88)a	0.985(0.001)a	4.89(0.01)a
		P2	169.00(2.08)a	169.00(2.08)a	0.991(0.001)a	4.72(0.06)a
		P3	160.00(8.54)a	160.00(8.54)a	0.933(0.052)a	4.12(0.58)a
		P4	169.67(1.33)a	169.67(1.33)a	0.99(0.001)a	4.86(0.02)a
	Two-way analysis of variance					
		T	2.16^{ns}	2.16^{ns}	1.09^{ns}	1.33^{ns}
		P	0.12^{ns}	0.12^{ns}	1.30^{ns}	1.71^{ns}
		T x P	2.17^{ns}	2.17^{ns}	1.21^{ns}	1.82^{ns}
Rare	**-M**	**P0**	971.00(109.61)a	1145.97(148.72)a	0.998(0.001)a	6.54(0.13)a
		P1	833.33(225.57)a	972.43(304.56)a	0.997(0.001)a	6.33(0.31)a
		P2	1158.00(81.00)a	1331.22(100.94)a	0.998(0.001)a	6.75(0.07)a
		P3	1101.00(23.69)a	1313.34(25.04)a	0.998(0.001)a	6.71(0.02)a
		P4	951.67(76.65)a	1126.96(96.49)a	0.998(0.001)a	6.57(0.08)a
	+M	**P0**	1012.00(21.00)ab	1248.00(23.42)a	0.998(0.001)a	6.58(0.03)b
		P1	968.00(30.00)b	1148.39(48.00)a	0.998(0.001)a	6.57(0.02)b
		P2	1373.00(237.08)a	1636.66(294.28)a	0.999(0.001)a	6.89(0.18)a
		P3	1085.33(87.82)ab	1239.19(120.59)a	0.998(0.001)a	6.66(0.07)ab
		P4	1047.33(26.66)	1239.71(33.91)a	0.998(0.001)a	6.66(0.04)ab
	Two-way analysis of variance					
		T	2.70^{ns}	2.04^{ns}	1.91^{ns}	2.28^{ns}
		P	1.56^{ns}	1.61^{ns}	0.74^{ns}	1.21^{ns}
		T x P	0.27^{ns}	0.39^{ns}	0.57^{ns}	0.34^{ns}

Notes: P0, P1, P1, P2, and P3 represent different phosphate fertilizer levels (0, 5, 10, 15, 20 g/m^2), respectively; +M and -M represents whether there is *Trichoderma* inoculated in the treatment. T represents the main effect of *Trichoderma*-inoculation, P represents the main effect of phosphate fertilizer levels, T x P represents the interaction effect of between two treatments. ns represents no significance, * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$. Besides, different lowercase letters (a, b, c) indicate significant differences among different treatments (p <0.05, multiple comparisons with Tukey HSD test). The values in the table represent the average (standard error).