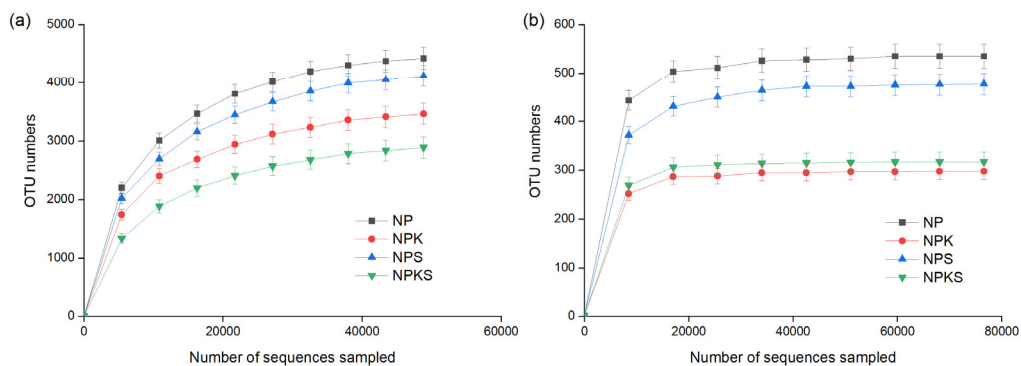## Supplementary Material

Table S1. Detailed sequencing depth results of soil samples under different treatments.

Microbe	Treatment	Input	Filtered	Denoised	Merged	Non-chimeric	Non-singleton
Bacteria	NP	90,913	86,267	79,193	62,673	54,535	51,418
	NPK	98,554	93,126	88,857	79,279	71,675	70,275
	NPS	98,665	93,361	87,822	74,242	65,125	62,517
	NPKS	97,986	91,833	87,776	79,026	66,621	64,931
Fungi	NP	89,428	82,249	82,060	81,822	81,597	81,597
	NPK	96,330	86,170	86,082	86,018	85,855	85,855
	NPS	94,351	86,401	86,227	85,725	85,341	85,340
	NPKS	92,924	81,490	81,369	80,796	80,640	80,639

Figure S1. Rarefaction curves for (**a**) bacteria and (**b**) fungi in the four treatments.

Table S2. The correction of soil properties with bacterial community structures.

Correlation	Chao1	Species	Simpson	Shannon
pH	−0.746	−0.788	−0.731	−0.799
SOM	0.808	0.814	0.934	0.901
Available N	0.046	0.041	0.350	0.146
Olsen-P	−0.054	−0.115	−0.202	−0.176
Available K	−0.773	−0.769	−0.948	−0.880
Slowly available K	0.956*	0.978*	0.815	0.939
EOOC	0.545	0.528	0.851	0.696
DOC	0.638	0.644	0.861	0.771

Table S3. The correction of soil properties with fungal community structures.

Correlation	Chao1	Species	Simpson	Shannon
pH	−0.711	−0.711	−0.720	0.556
SOM	0.575	0.575	0.840	−0.136
Available N	0.334	0.334	0.039	0.185
Olsen-P	−0.058	−0.058	0.045	−0.513
Available K	−0.486	−0.486	0.823	−0.001
Slowly available K	0.935	0.935	−0.920	0.457
EOOC	−0.170	−0.170	0.632	0.245
DOC	−0.359	−0.359	0.691	−0.040