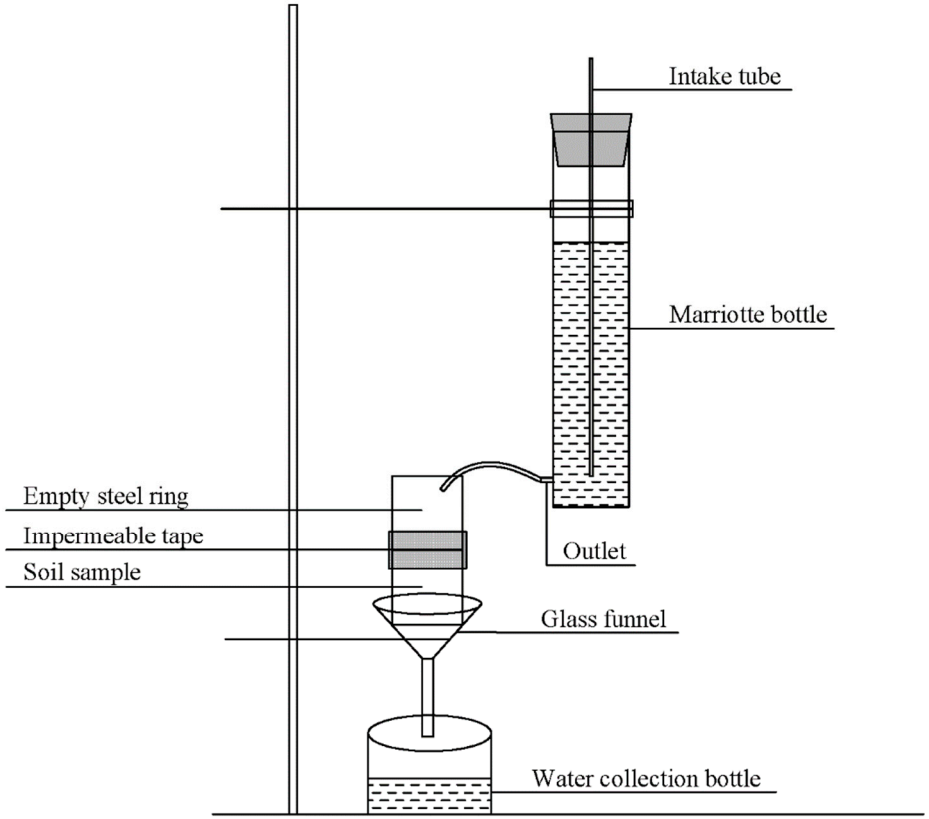


Figure S1 The diagram of the apparatus used for stable soil infiltration rate.

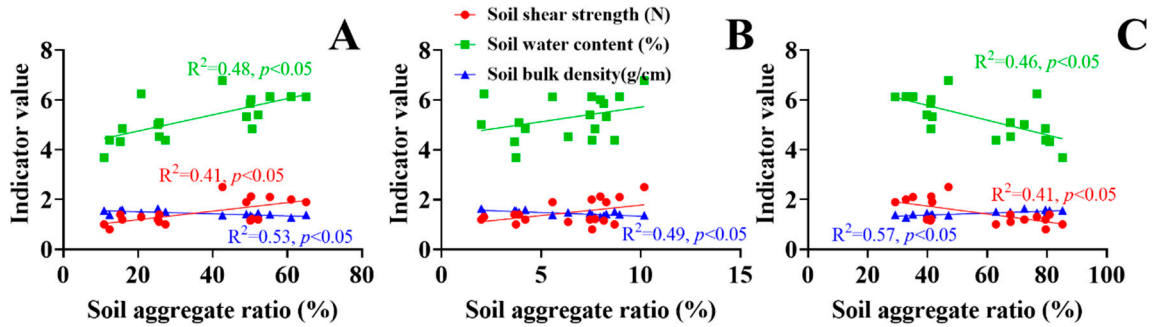


Figure S2 Correlation between soil shear strength, soil water content and soil bulk density and large macroaggregate (A), small macroaggregate (B) and microaggregate(C) (n=18).

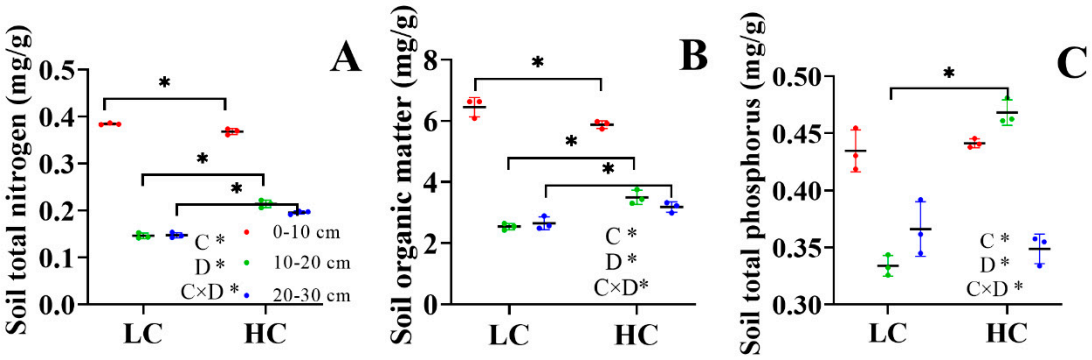


Figure S3 Response of total nitrogen, total phosphorus, soil organic matter to soil depth and land coverage. The C, D and C×D indicates the influence of coverage, depth and interaction of them, respectively. * indicated the significant difference at 0.05 level.

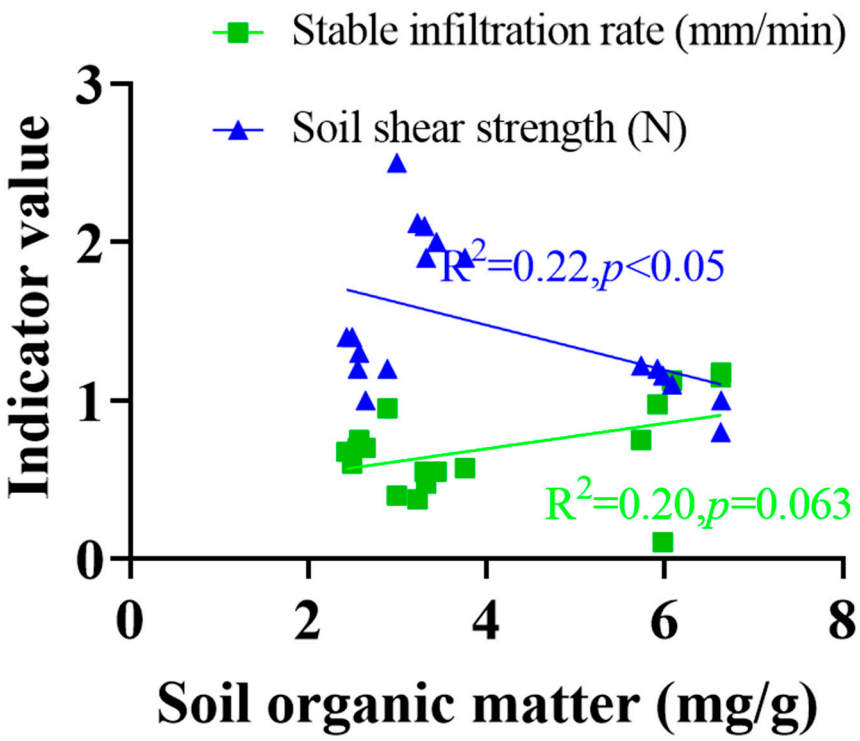


Figure S4 Correlation between soil organic matter content and soil stable infiltration rate and soil shear strength, n=18.

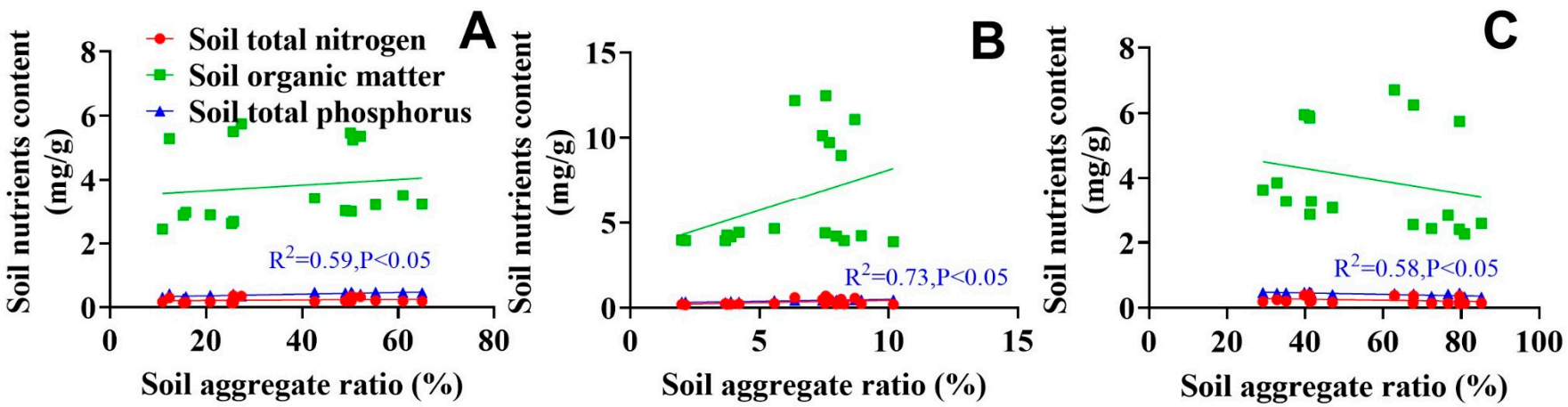


Figure S5 Correlation between soil organic matter content, total nitrogen and total phosphorus and aggregate (A, large macroaggregate; B, small macroaggregate; C, microaggregate, n=18)

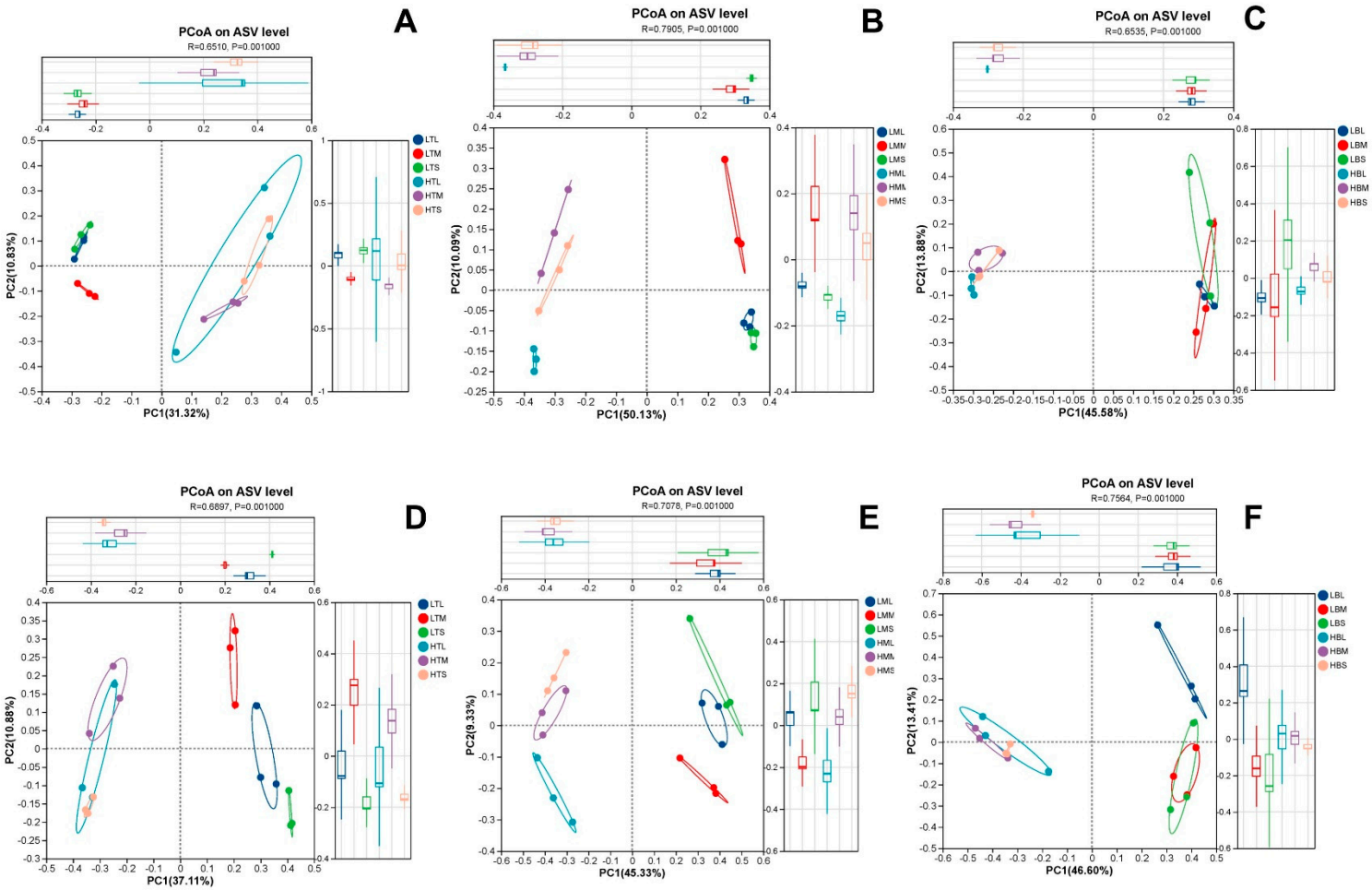


Figure S6 PCoA results of 16S (A, top soils 0-10cm; B 10-20 cm; and C 20-30 cm) and ITS (D, top soils 0-10cm; E 10-20 cm; and F 20-30 cm). LTS….and HBL, the third letter S, M and L indicates microaggregate, small macroaggregate and large macroaggregate, respectively. The second letter T, M and B indicates 0-10, 10-20 and 20-30 cm soil depth. And the first letter L and H indicate low land coverage and high land coverage.

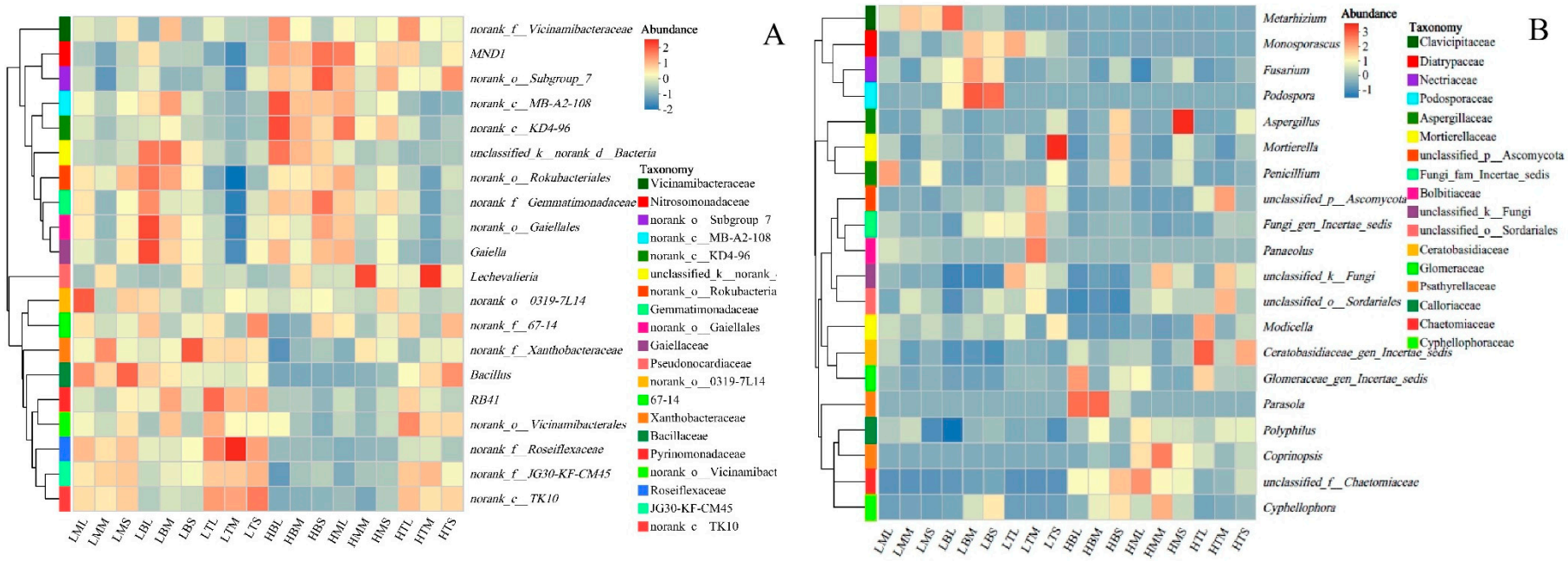


Figure S7 A dendrogram showing main microbes in different soils (A, 16S; B, ITS). LTS….and HBL, the third letter S, M and L indicates microaggregate, small macroaggregate and large macroaggregate, respectively. The second letter T, M and B indicates 0-10, 10-20 and 20-30 cm soil depth. And the first letter L and H indicate low land coverage and high land coverage. The data were standardized using the z-score by Row method, and the z-score was calculated based on the abundance of each species in all samples.

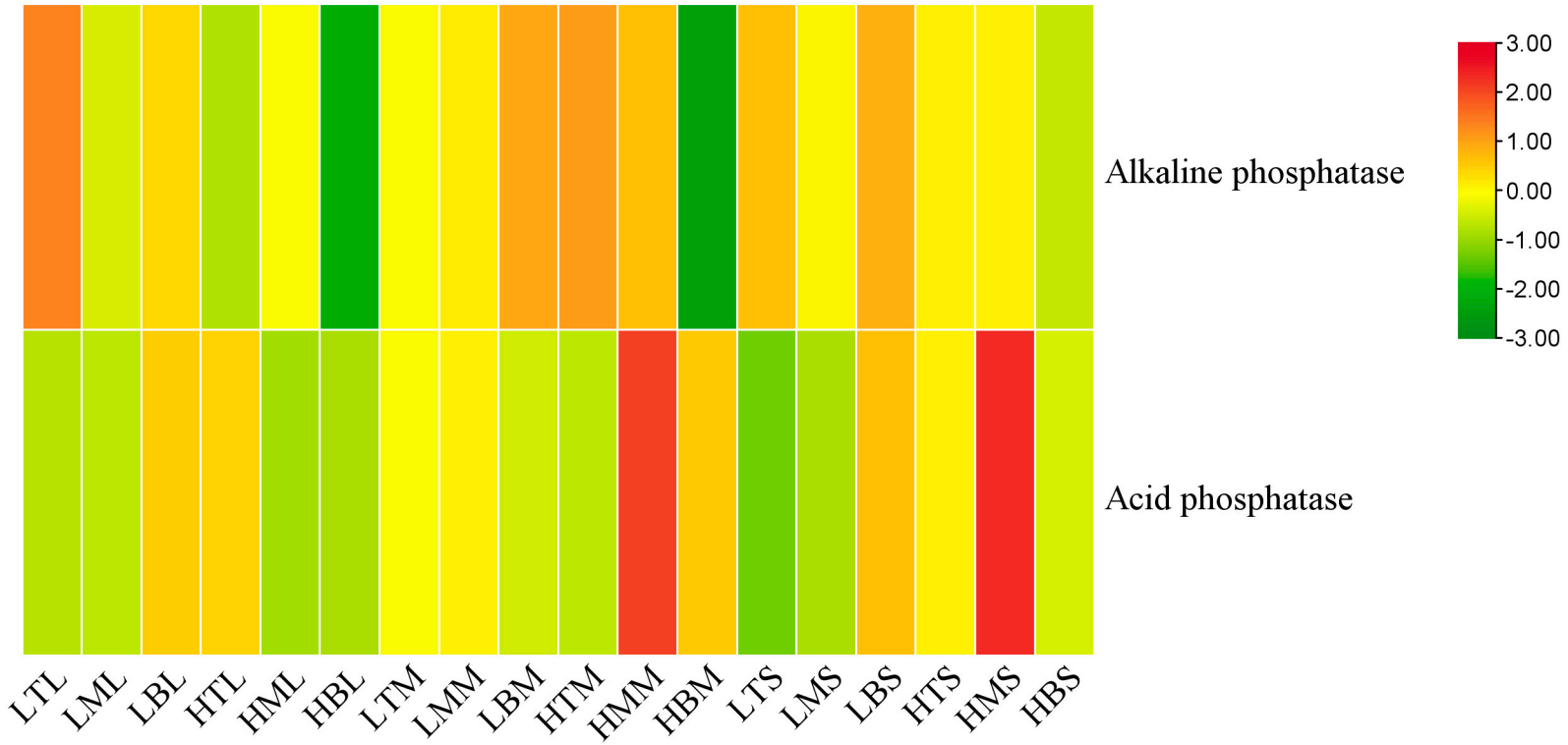


Figure S8 PICRUSt2 results of ITS. LTS….and HBL, the third letter S, M and L indicates microaggregate, small macroaggregate and large macroaggregate, respectively. The second letter T, M and B indicates 0-10, 10-20 and 20-30 cm soil depth. And the first letter L and H indicate low land coverage and high land coverage.

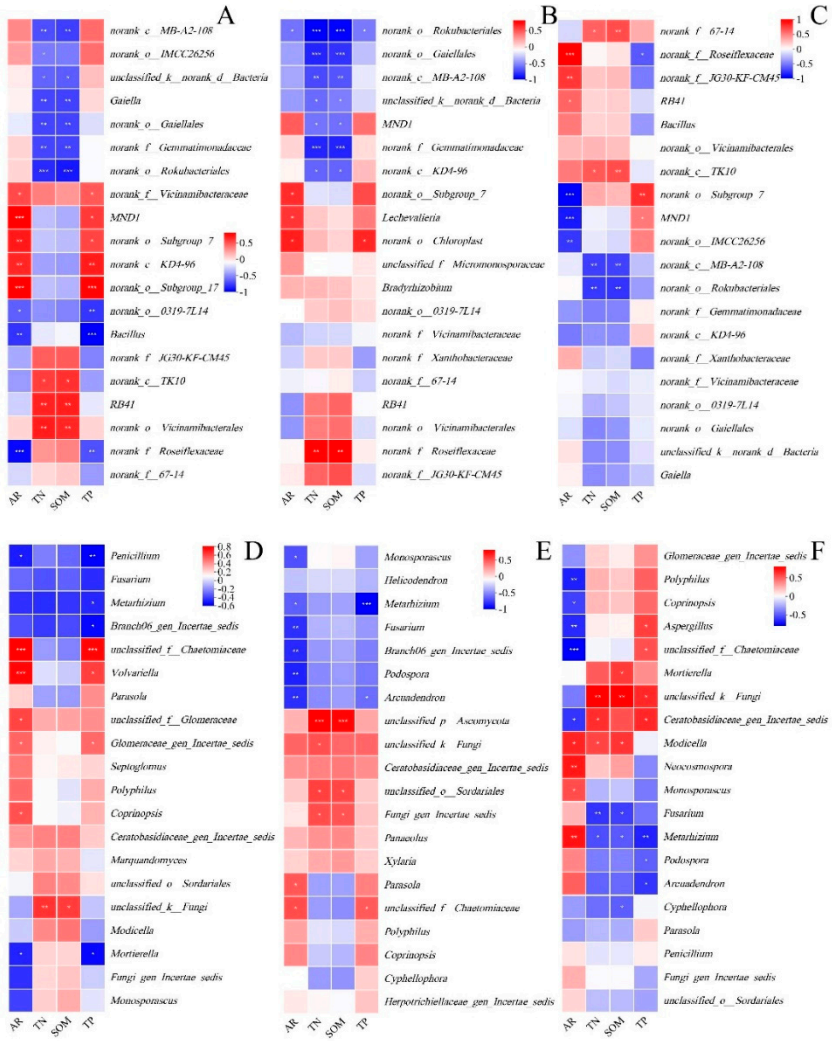


Figure S9 Correlation between soil properties and main microbes (Top 20 of abundance, n=18). A-C showed 16S and D-F showed ITS results. A to C and D to F

showed >2 mm, 0.25- 2 mm and<0.25 mm. AR, large macroaggregate ratio; TP, total phosphorus; SOM, soil organic matter; TN, total nitrogen. * and **indicated the significant difference at 0.05 amd 0.01level, respectively.

Table S1 Pearson correlation matrix of soil properties

	SSS	SIR	SWC	SBD	Macro	MWD	GMD	TN	SOM	TP	ChaoL	ChaoM	ChaoX	IChaoL	IChaoM	IChaoX
SSS	1	-.788**	.777**	-.495*	.643**	.646**	.641**	-.410	-.437	.652**	-.726**	-.427	-.481*	-.690**	-.511*	-.504*
SIR		1	-.607**	.269	-.472*	-.459	-.470*	.589*	.640**	-.379	.839**	.294	.656**	.767**	.582*	.701**
SWC			1	-.568*	.694**	.689**	.671**	-.191	-.181	.704**	-.504*	-.301	-.371	-.663**	-.501*	-.450
SBD				1	-.732**	-.750**	-.749**	-.327	-.305	-.805**	.187	.138	.108	.277	-.015	-.204
Macro					1	.998**	.994**	.180	.131	.769**	-.442	.046	-.256	-.508*	-.239	-.121
MWD						1	.995**	.209	.161	.786**	-.421	.050	-.256	-.481*	-.220	-.087
GMD							1	.177	.130	.776**	-.431	.024	-.266	-.473*	-.214	-.102
TN								1	.973**	.227	.673**	.621**	.290	.591**	.614**	.866**
SOM									1	.175	.701**	.572*	.311	.629**	.616**	.873**
TP										1	-.158	-.178	-.246	-.290	-.094	.062
ChaoL											1	.447	.562*	.871**	.777**	.753**
ChaoM												1	.386	.350	.553*	.404
ChaoX													1	.305	.551*	.332
IChaoL														1	.680**	.737**
IChaoM															1	.774**
IChaoX																1

**.difference at 0.01 level,*. difference at 0.05 level. SBD, soil bulk density; SOM, soil organic matter; SWC, soil water content; Macro, large macroaggregate; SSS, soil shear strength; TP, total phosphorus. ChaoL, M and X indicates the 0-10, 10-20 and 20-30 cm soil depth data. SOMS, soil organic matter storage.