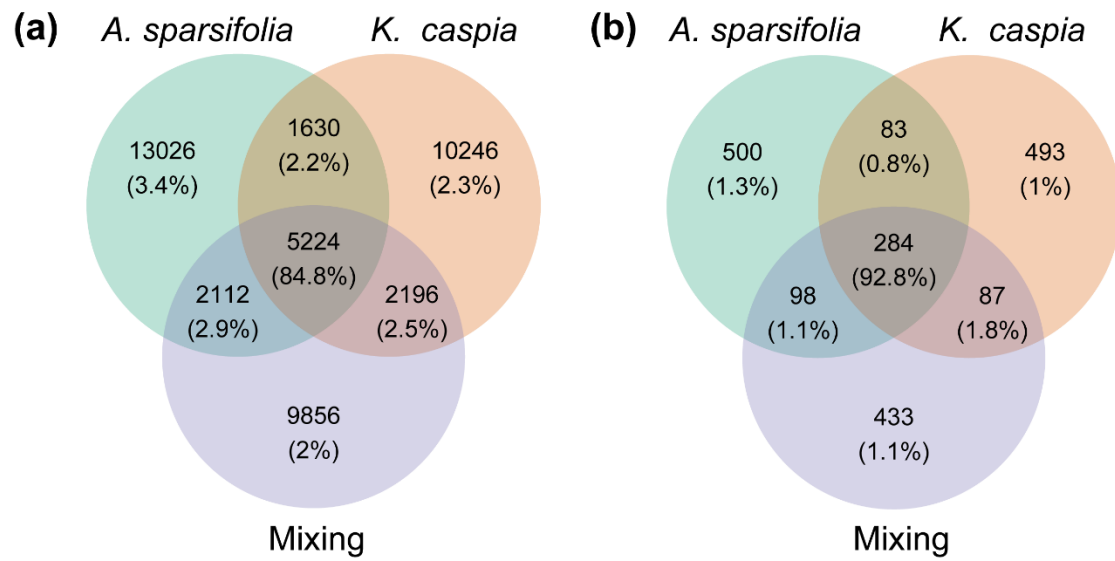


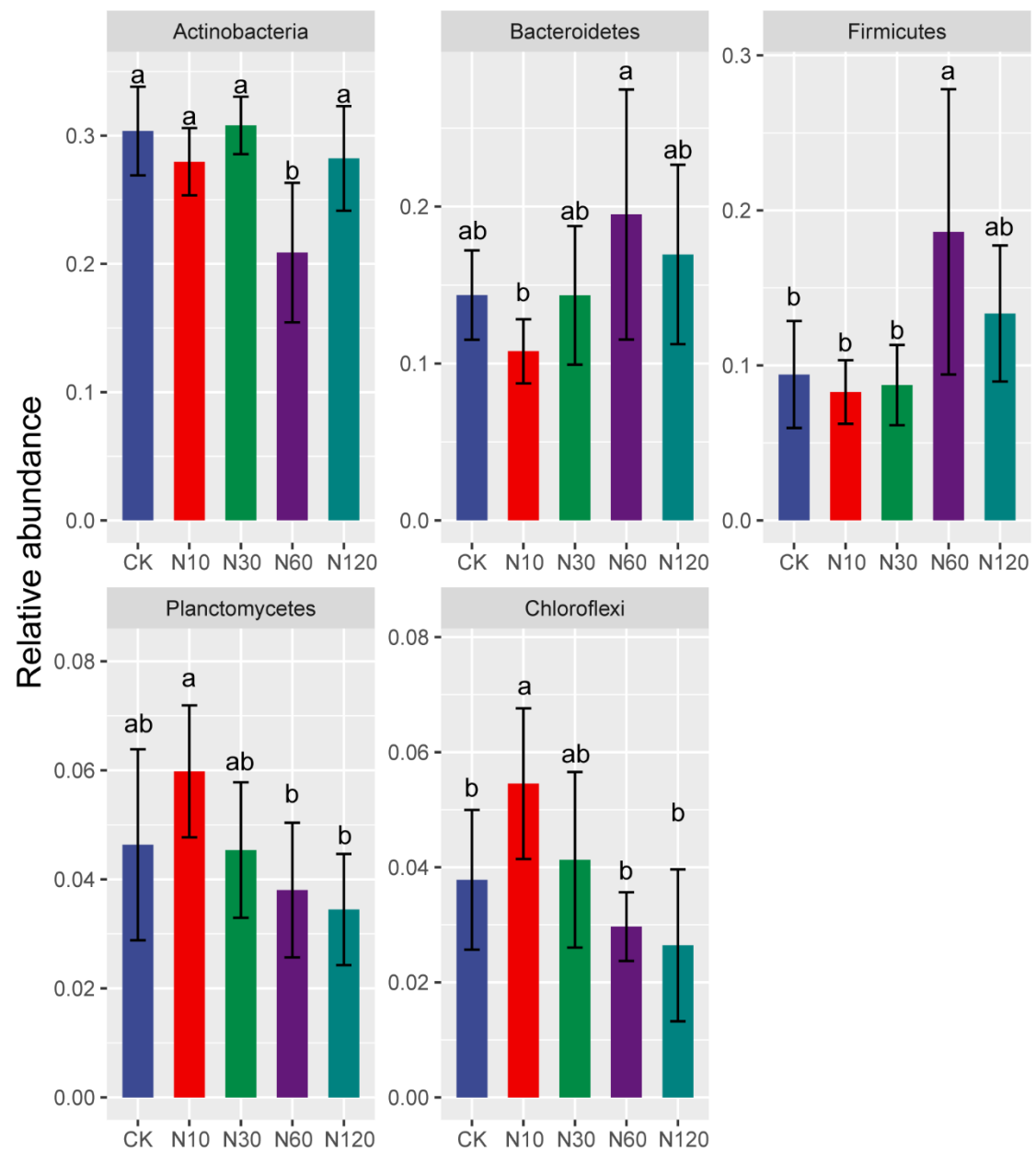
**Table S1** Mantel test analysis between community composition of soil bacteria and fungi and soil physicochemical properties in three plant communities.

	Variable	<i>A. sparsifolia</i>		<i>K. caspia</i>		Mixing	
		Statistic	Signif	Statistic	Signif	Statistic	Signif
Bacteria	SOC	−0.092	0.695	−0.079	0.701	0.136	0.168
	pH	−0.226	0.964	−0.117	0.802	<b>0.308</b>	<b>0.011</b>
	AP	−0.086	0.712	−0.154	0.863	0.212	0.095
	AK	0.172	0.108	−0.074	0.629	<b>0.329</b>	<b>0.024</b>
	TN	−0.120	0.751	0.271	0.072	−0.104	0.721
	NO <sub>3</sub> <sup>−</sup> –N	0.271	0.071	−0.119	0.710	<b>0.331</b>	<b>0.014</b>
	NH <sub>4</sub> <sup>+</sup> –N	0.147	0.234	0.038	0.315	0.171	0.117
	AN	0.067	0.378	−0.072	0.591	0.184	0.061
Fungi	SOC	−0.082	0.687	0.057	0.301	−0.028	0.558
	pH	−0.088	0.715	0.154	0.138	0.082	0.247
	AP	0.182	0.092	−0.014	0.485	0.145	0.201
	AK	0.134	0.181	−0.151	0.815	0.205	0.140
	TN	0.078	0.297	<b>0.254</b>	<b>0.047</b>	−0.302	0.944
	NO <sub>3</sub> <sup>−</sup> –N	0.260	0.090	−0.119	0.740	−0.010	0.528
	NH <sub>4</sub> <sup>+</sup> –N	<b>0.497</b>	<b>0.009</b>	0.136	0.211	0.109	0.251
	AN	0.078	0.321	−0.074	0.645	−0.001	0.500

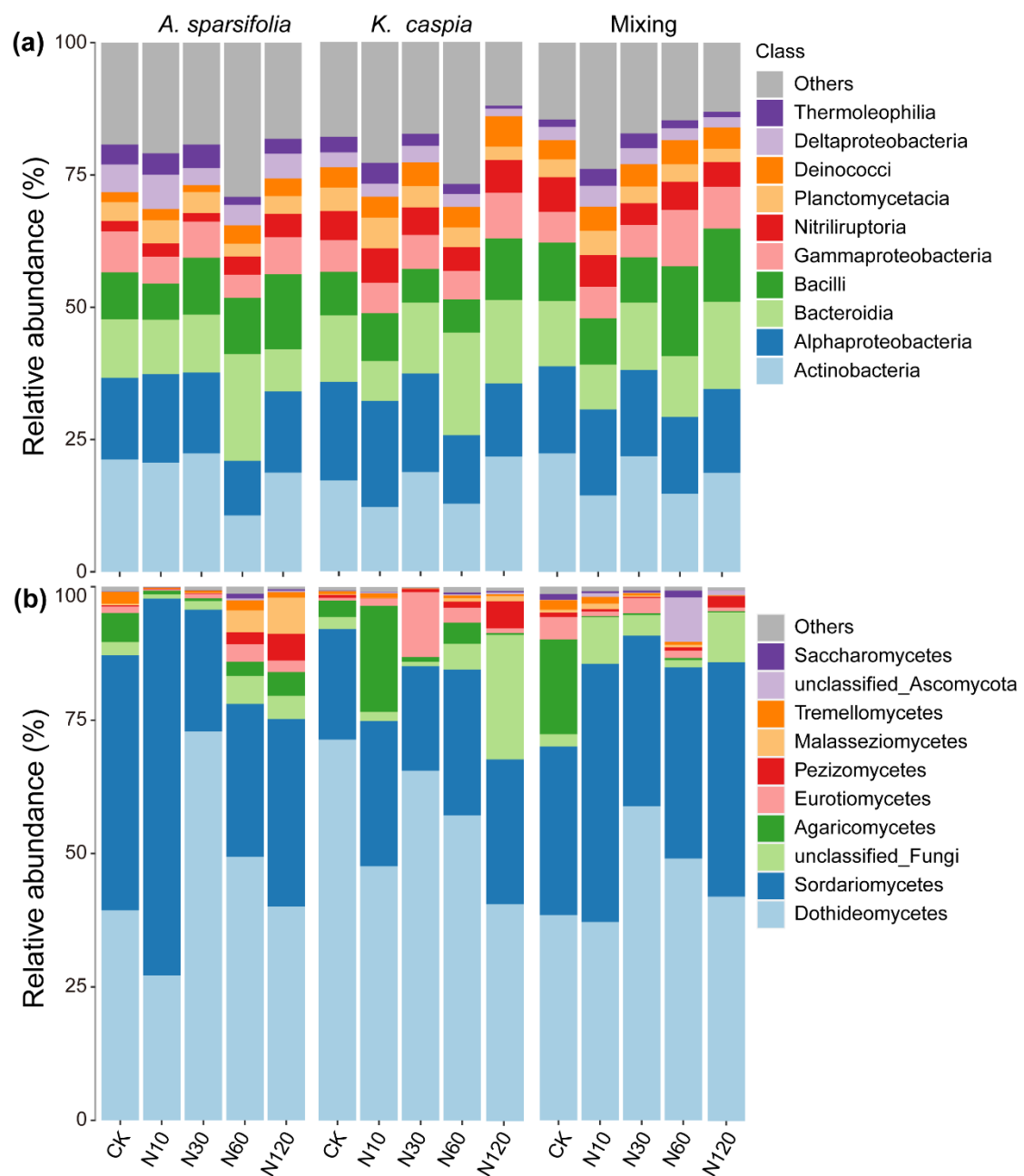
**Note:** SOC, soil organic carbon; AP, available phosphorous; AK, available potassium; TN, total nitrogen;  $\text{NO}_3^-$ -N, nitrate;  $\text{NH}_4^+$ -N, ammonium; AN, available nitrogen. This result was conducted with 999 permutations.



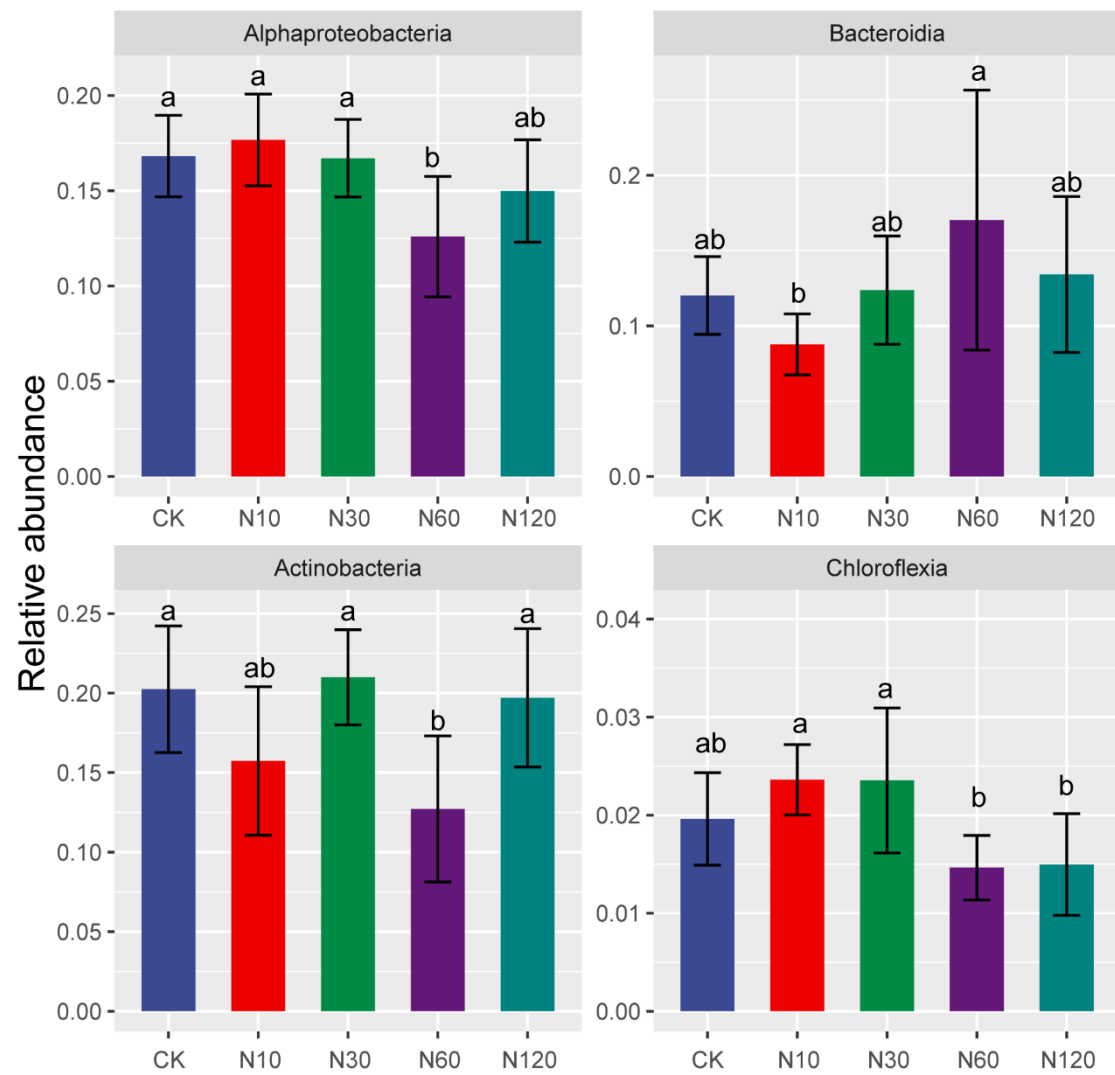
**Fig. S1** Venn diagram shows the number (percentage) bacterial **(a)** and fungal **(b)** ASVs specific to and common to the three plant community types.



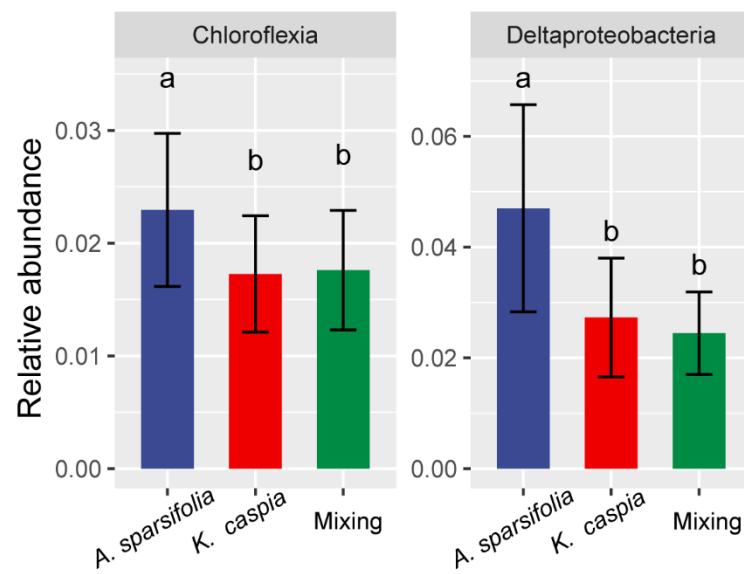
**Fig. S2** Phyla significantly affected by N treatment ( $P < 0.05$ ). Different lowercase letters indicate a significant difference among different N addition treatments.



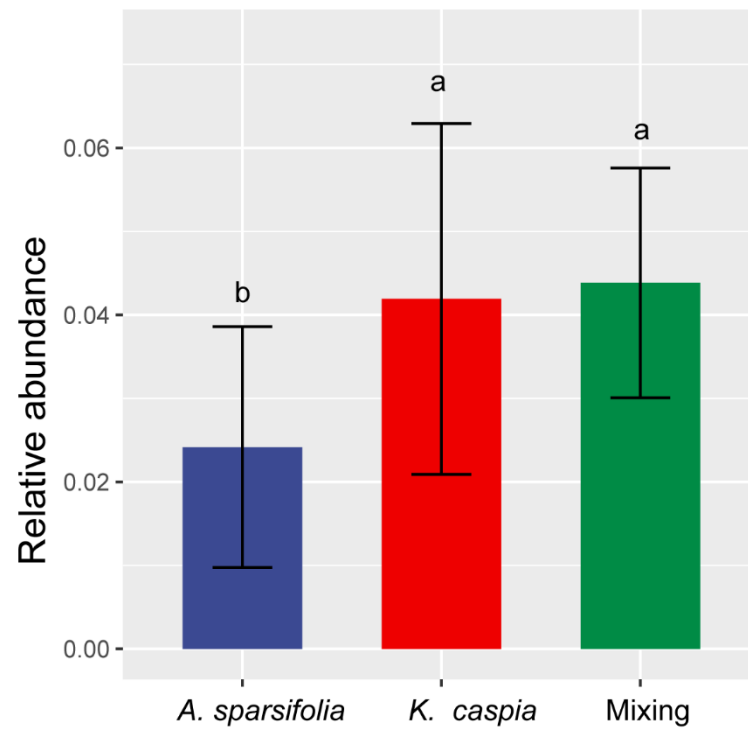
**Fig. S3** Community composition of bacteria **(a)** and fungi **(b)** at class level (top 10).



**Fig. S4** The classes significantly affected by N treatment ( $P < 0.05$ ). Different lowercase letters indicate a significant difference among different N addition treatments.

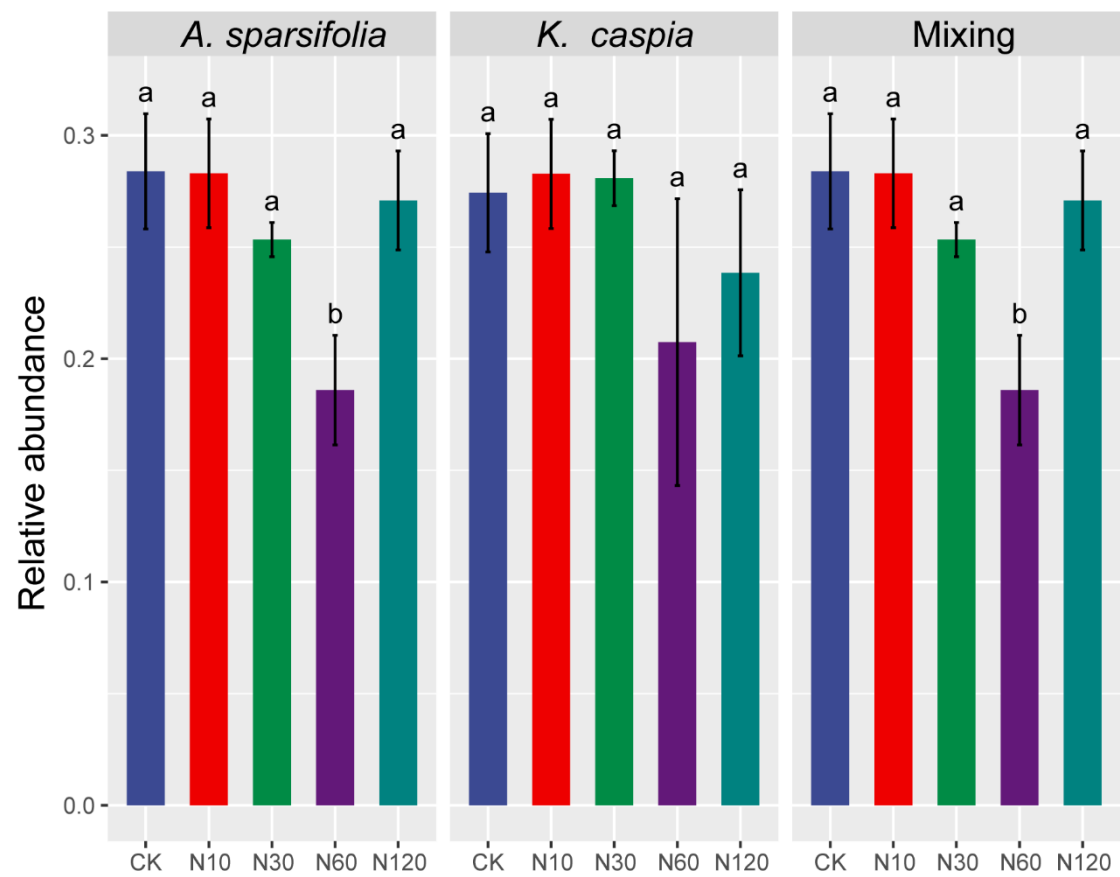


**Fig. S5** The classes significantly affected by plant community type ( $P < 0.05$ ). Different lowercase letters indicate a significant difference among different N addition treatments.

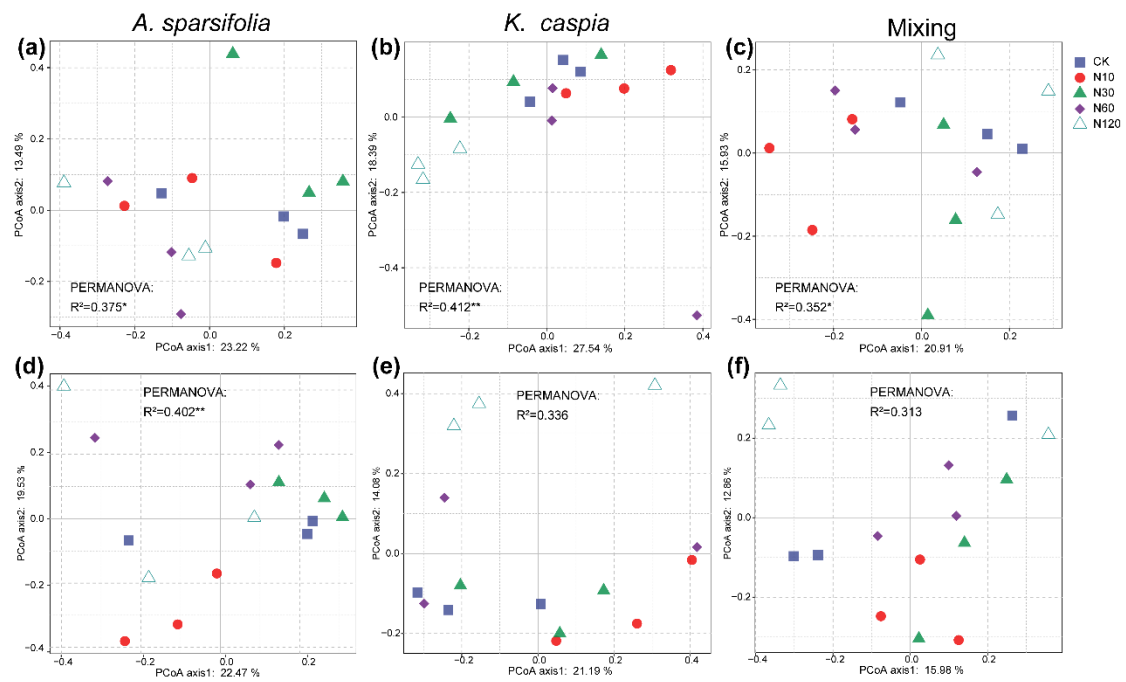


**Fig. S6** The relative abundance of Deinococcus-Thermus. Different lowercase letters indicate a significant difference among different plant communities.

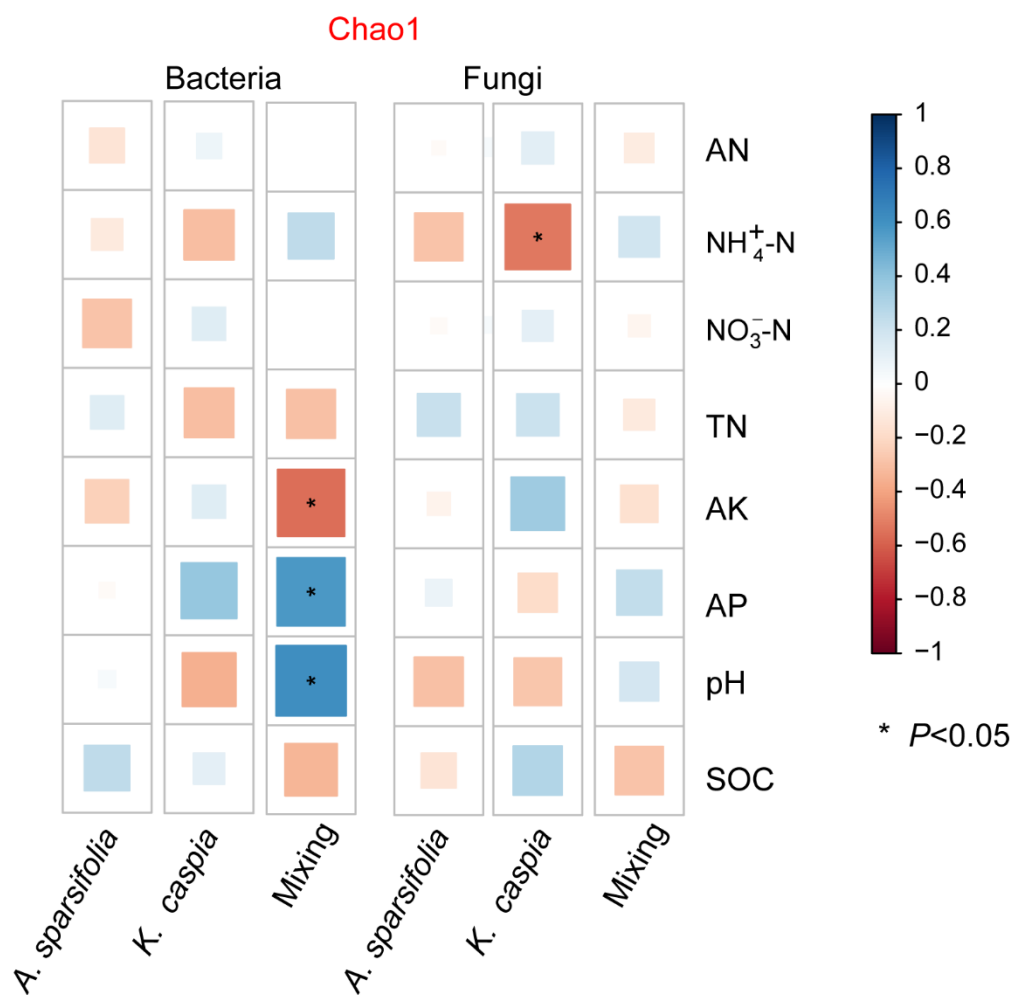




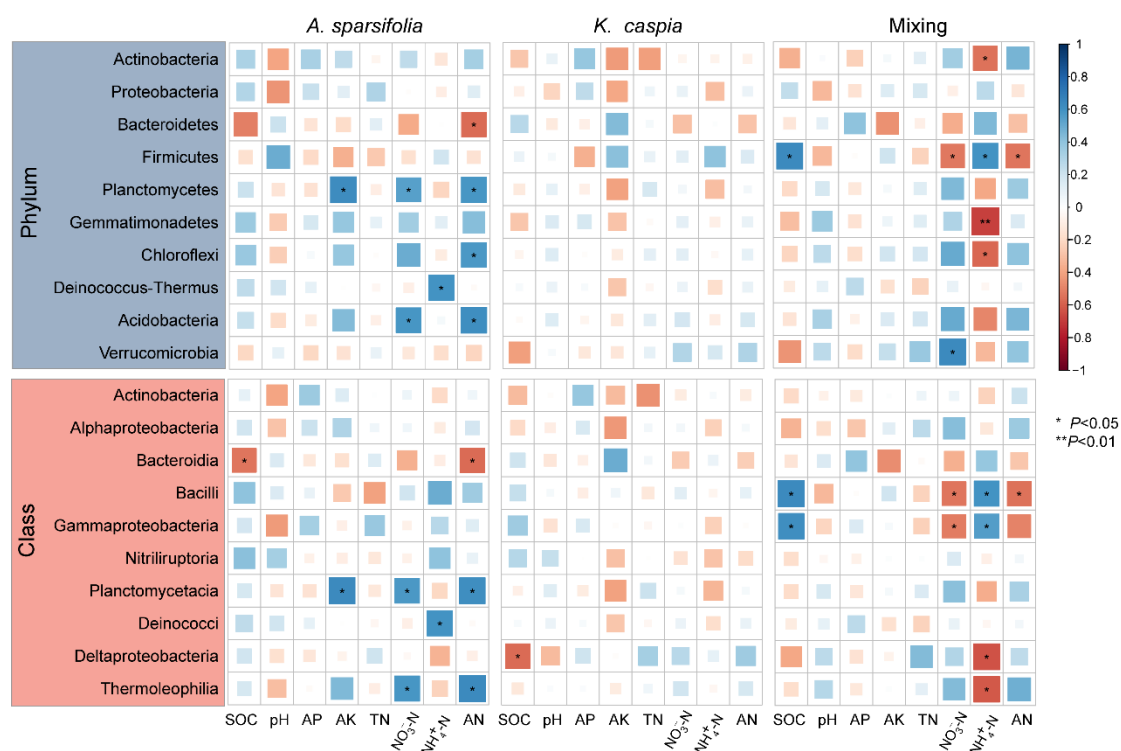
**Fig. S7** The relative abundance of Proteobacteria. Different lowercase letters indicate a significant difference among different plant communities.



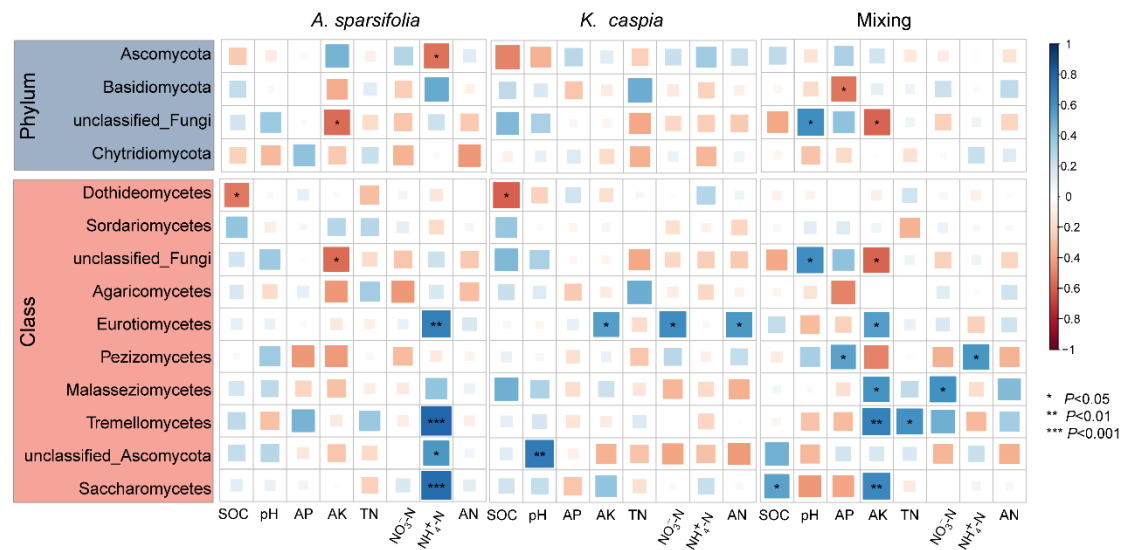
**Figure S8** Principal coordinate analysis (PCoA) of the bacterial (a, b, c) and fungal (d, e, f) communities based on the Bray-Curtis distance of ASV. Permutational analysis of variance (PERMANOVA) shows the effects of N addition treatment on the Bray-Curtis distance of ASVs.



**Figure S9** Pearson correlation between  $\alpha$ -diversity (Chao1) of bacterial **(a)** and fungal **(b)** communities and soil properties. Asterisks indicate significant relationships ( $P < 0.05$ ). SOC, soil organic carbon; AP, available phosphorus; AK, available potassium; TN, total nitrogen; NO<sub>3</sub><sup>-</sup>-N, nitrate; NH<sub>4</sub><sup>+</sup>-N, ammonium; AN, available nitrogen.



**Fig. S10** Pearson correlation between the relative abundance of bacterial dominant phyla and classes and soil properties. Asterisks indicate significant relationships. SOC, soil organic carbon; AP, available phosphorus; AK, available potassium; TN, total nitrogen; NO<sub>3</sub><sup>-</sup>-N, nitrate; NH<sub>4</sub><sup>+</sup>-N, ammonium; AN, available nitrogen.



**Figure S11** Pearson correlation between the relative abundance of fungal dominant phyla and classes and soil properties. Asterisks indicate significant relationships. SOC, soil organic carbon; AP, available phosphorus; AK, available potassium; TN, total nitrogen;  $\text{NO}_3^- \text{--N}$ , nitrate;  $\text{NH}_4^+ \text{--N}$ , ammonium; AN, available nitrogen.