

## Supplementary

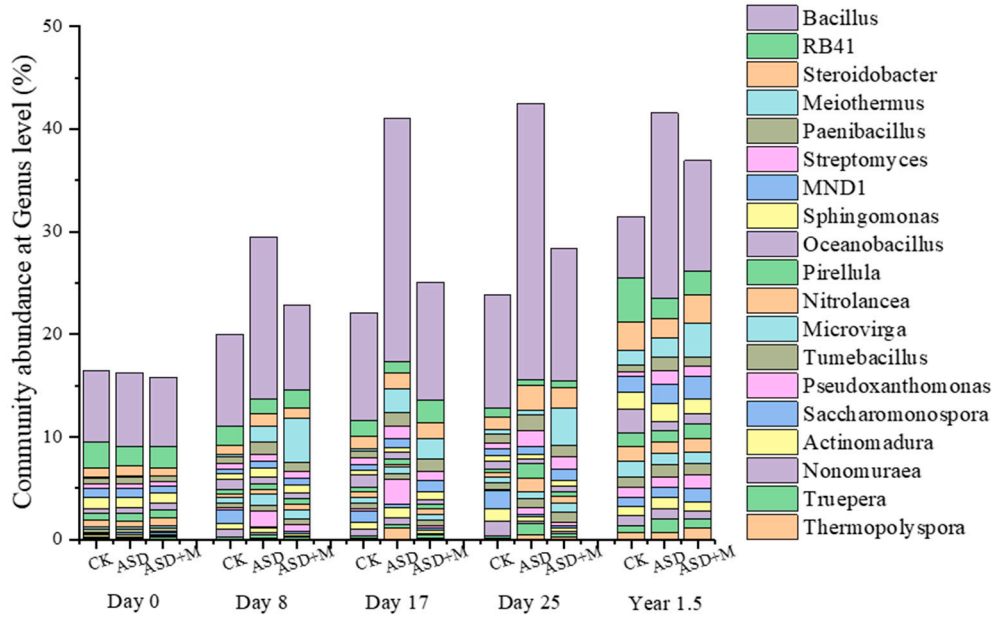
Table S1 The characteristics of empirical bacterial network structure constructed in studies

<b>Network Indexes</b>	<b>CK</b>	<b>ASD</b>	<b>ASD+M</b>
Total nodes	195	623	607
Total links	172	832	814
R square of power-law	0.992	0.949	0.964
Average degree (avgK)	1.764	2.671	2.682
Average clustering coefficient (avgCC)	0.103	0.115	0.119
Average path distance (GD)	4.105	7.659	7.997
Geodesic efficiency (E)	0.35	0.167	0.164
Harmonic geodesic distance (HD)	2.853	6.006	6.107
Maximal degree	11	21	21
Nodes with max degree	OTU5814	OTU16268	OTU15120
Centralization of degree (CD)	0.048	0.03	0.03
Maximal betweenness	718.017	21860.89	27827.898
Nodes with max betweenness	OTU5814	OTU5656	OTU5052
Centralization of betweenness (CB)	0.037	0.109	0.147
Maximal stress centrality	1635	142980	148429
Nodes with max stress centrality	OTU5814	OTU12289	OTU5052
Centralization of stress centrality (CS)	0.085	0.712	0.786
Maximal eigenvector centrality	0.396	0.358	0.374
Nodes with max eigenvector centrality	OTU11645	OTU16268	OTU15120
Centralization of eigenvector centrality (CE)	0.373	0.347	0.364
Density (D)	0.009	0.004	0.004
Reciprocity	1	1	1
Transitivity (Trans)	0.271	0.244	0.218
Connectedness (Con)	0.084	0.442	0.47
Efficiency	0.931	0.993	0.994
Hierarchy	0	0	0
Lubness	1	1	1

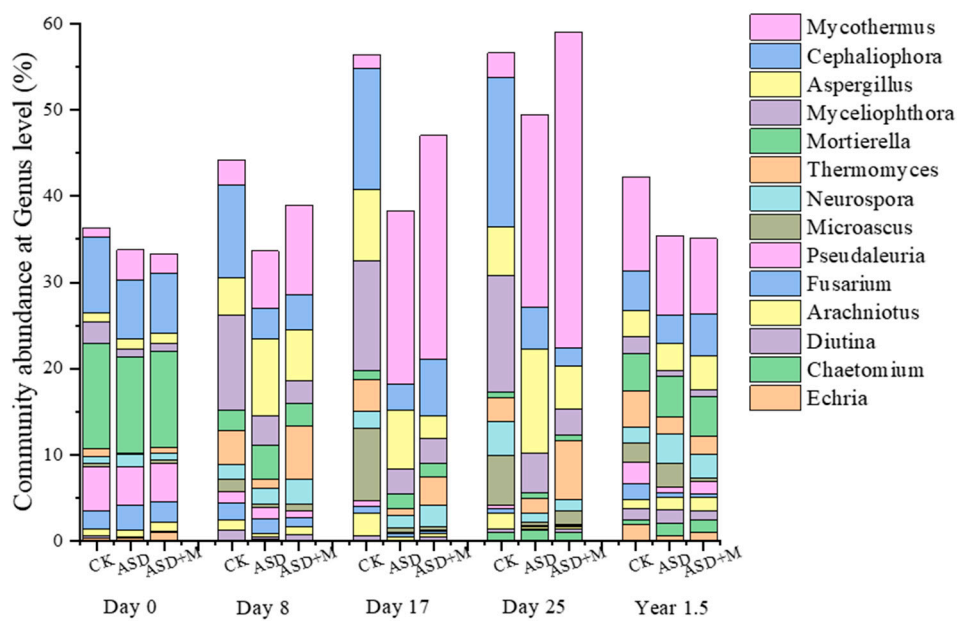
Table S2 The characteristics of empirical fungal network structure constructed in studies

<b>Network Indexes</b>	<b>CK</b>	<b>ASD</b>	<b>ASD+M</b>
Total nodes	106	109	114
Total links	195	194	203
R square of power-law	0.72	0.738	0.839
Average degree (avgK)	3.679	3.56	3.561
Average clustering coefficient (avgCC)	0.232	0.234	0.243
Average path distance (GD)	4.973	4.732	4.692
Geodesic efficiency (E)	0.267	0.278	0.271
Harmonic geodesic distance (HD)	3.751	3.602	3.684
Maximal degree	14	14	14
Nodes with max degree	OTU791	OTU333	OTU791
Centralization of degree (CD)	0.1	0.098	0.094
Maximal betweenness	2212.997	1198.191	1335.314
Nodes with max betweenness	OTU3338	OTU1691	OTU1492
Centralization of betweenness (CB)	0.373	0.18	0.182
Maximal stress centrality	6713	2445	4997
Nodes with max stress centrality	OTU3338	OTU2005	OTU1492
Centralization of stress centrality (CS)	1.127	0.357	0.675
Maximal eigenvector centrality	0.308	0.361	0.369
Nodes with max eigenvector centrality	OTU1412	OTU493	OTU791
Centralization of eigenvector centrality (CE)	0.257	0.31	0.322
Density (D)	0.035	0.033	0.032
Reciprocity	1	1	1
Transitivity (Trans)	0.335	0.325	0.256
Connectedness (Con)	0.926	0.825	0.931
Efficiency	0.972	0.97	0.975
Hierarchy	0	0	0
Lubness	1	1	1

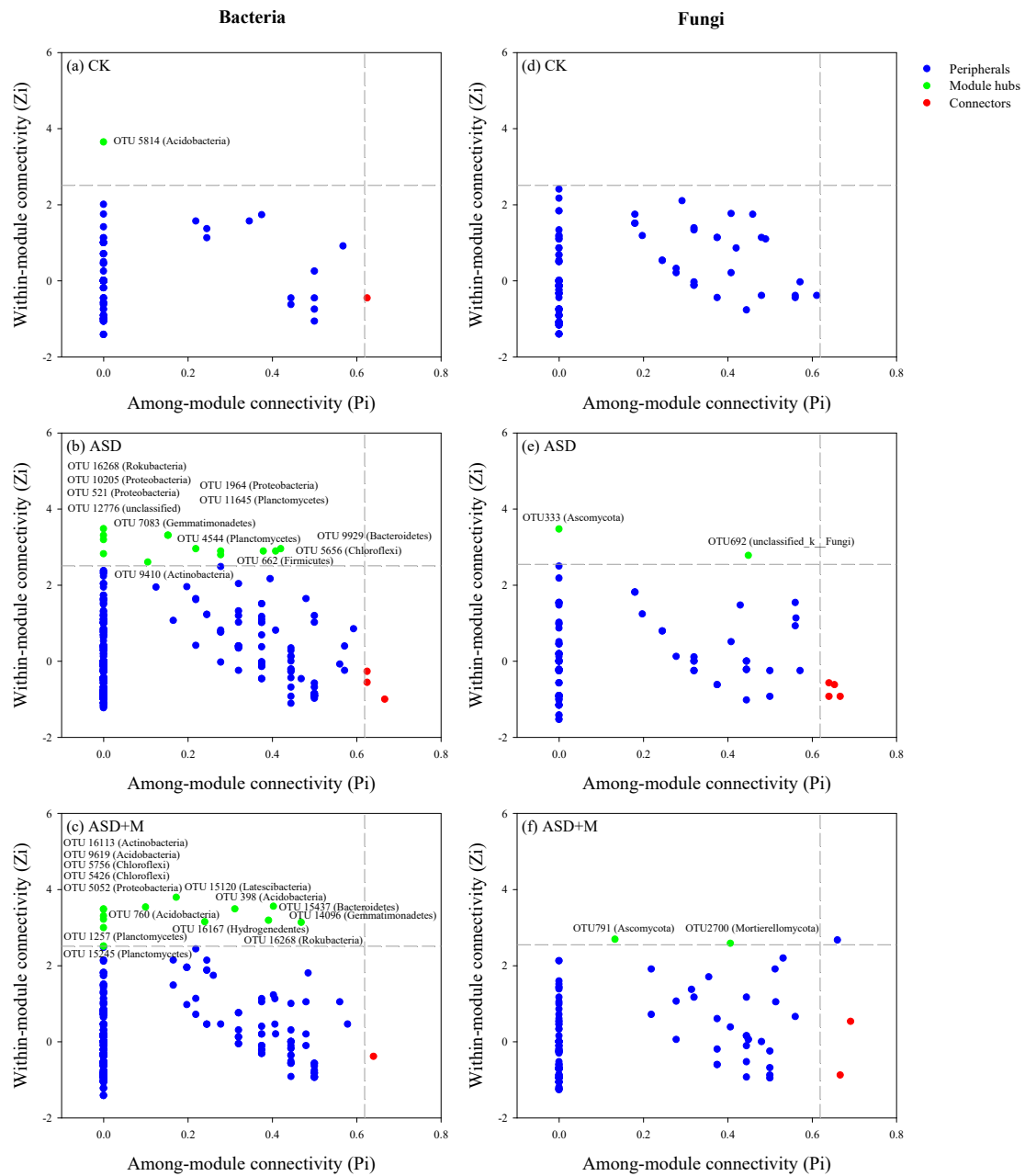
(a) Bacteria



(b) Fungi



**Figure. S1** Soil bacterial (a) and fungal (b) community bar plot analysis under different treatments at the genus level (n = 6).



**Figure. S2** Z-P plot exhibiting the distribution of OTUs based on the topological roles (a-c:bacteria; d-f:fungi). Each point represents an OTU. The location of each OTUs determined according to the within-module connectivity ( $Z_i$ ) and among-module connectivity ( $P_i$ ). The module hub is defined according to  $Z_i$  and  $P_i$  values ( $Z_i > 2.5$ ,  $P_i \leq 0.62$ ). The four identified module hubs were marked with OTU numbers and its phylum.