Electronic Supplementary Material (ESI) for Environmental Science: Nano

Rapid synthesis of MXenes and their potential risk to bacterial communities in the tomato rhizosphere

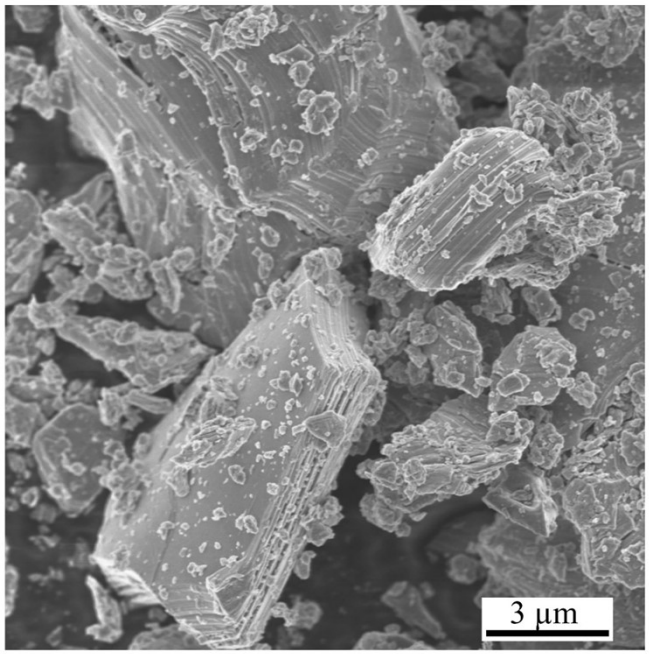

Fig. S1 SEM image of the pristine Ti_3AlC_2 MAX phase.

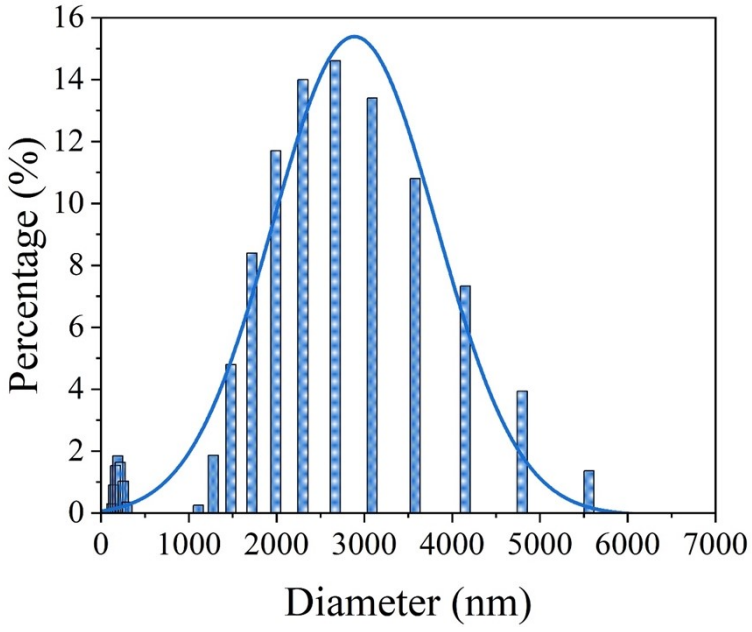

Fig. S2 Size distribution of E-Ti_3C_2 nanosheets fabricated by the ECO-ME process.

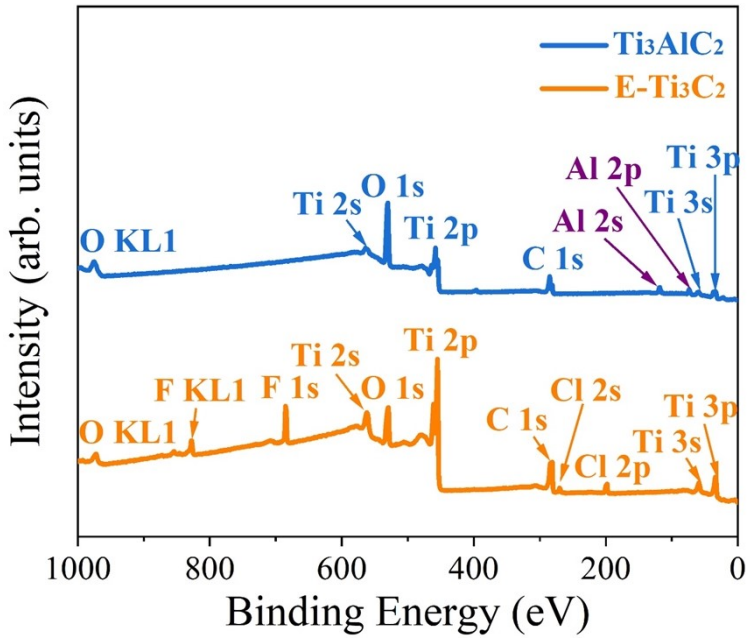

Fig. S3 The XPS survey spectra of the Ti_3AlC_2 MAX precursor and the produced E-Ti_3C_2 nanosheets.

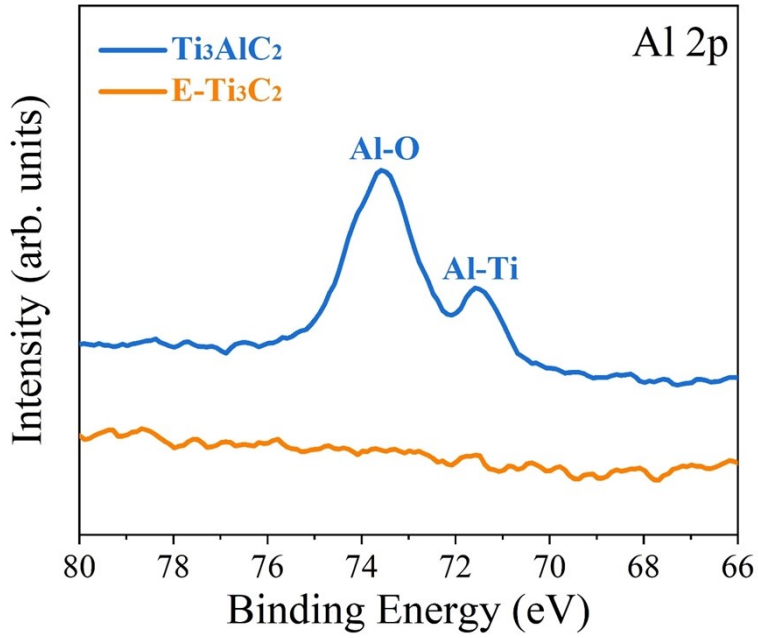

Fig. S4 High-resolution XPS spectra of Ti_3AlC_2 MAX precursor and E-Ti_3C_2 in the aluminium region.

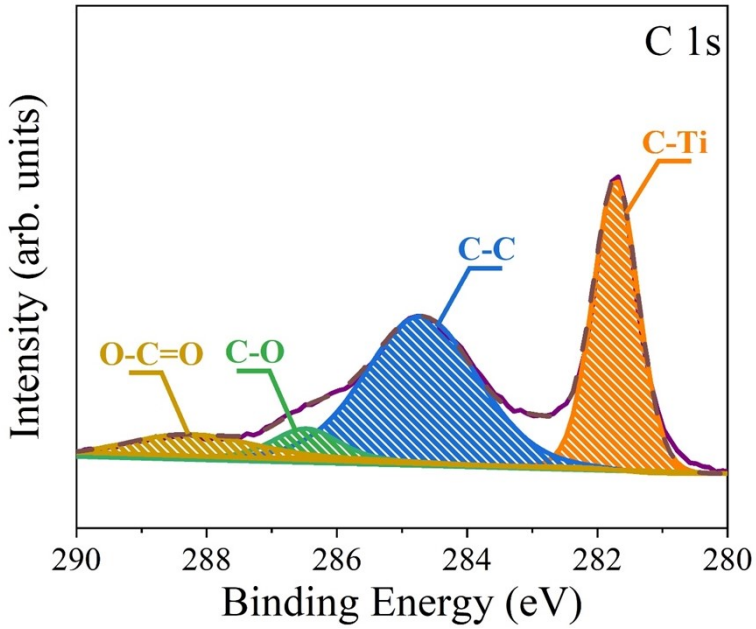

Fig. S5 High-resolution XPS spectra of E-Ti_3C_2 in the carbon region.

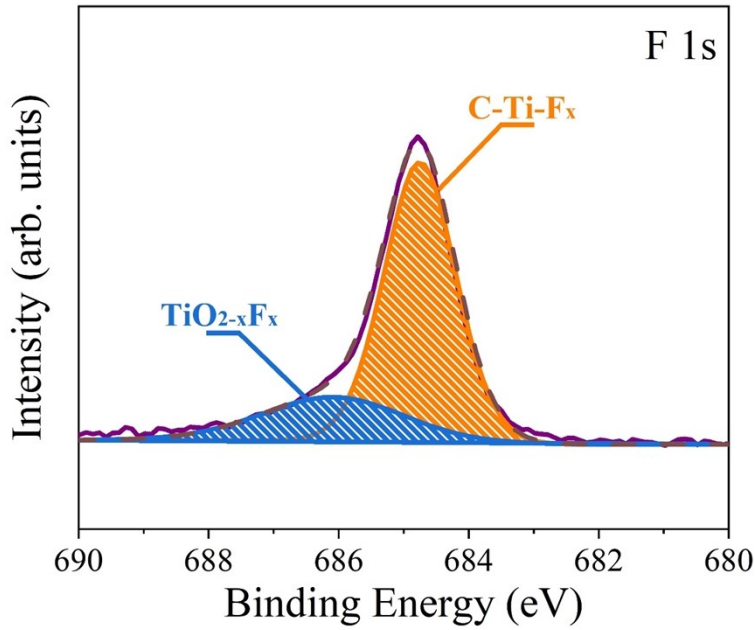

Fig. S6 High-resolution XPS spectra of E-Ti_3C_2 in the fluorine region.

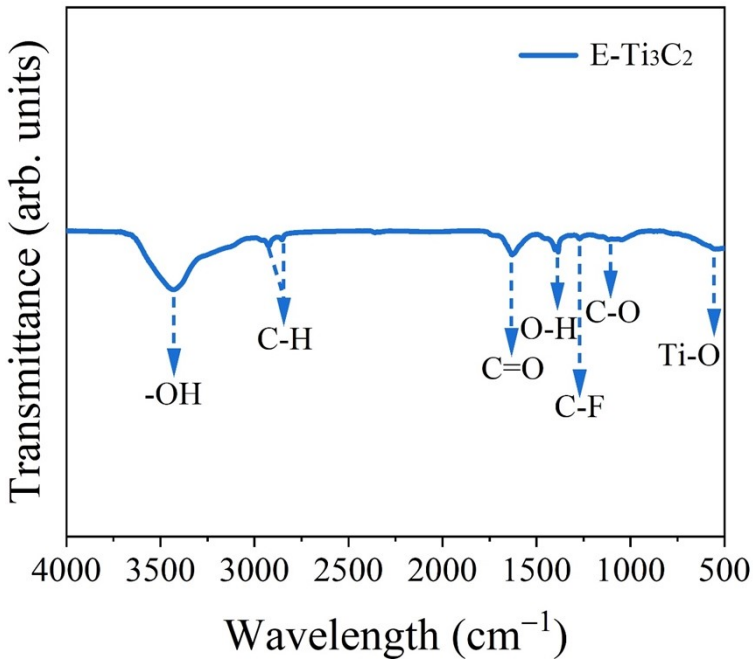

Fig. S7 Fourier transform infrared spectra of the E-Ti_3C_2 nanosheets.

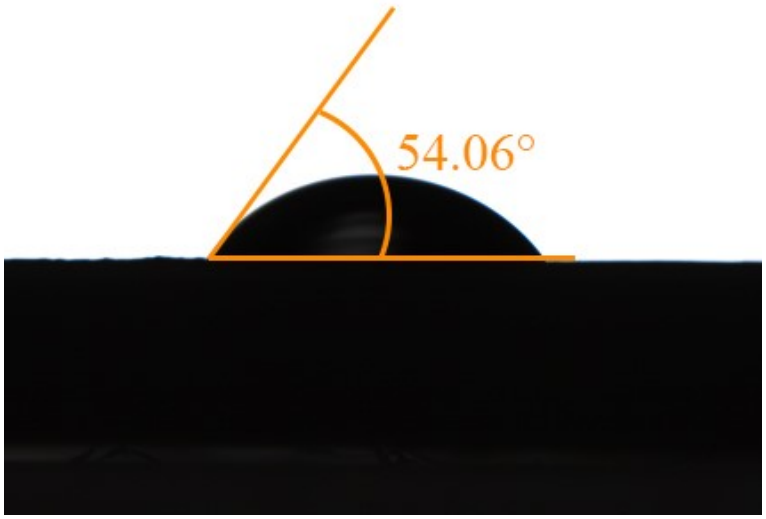

Fig. S8 Contact angle measured by vacuum filtration of E-Ti_3C_2 onto a nylon substrate.

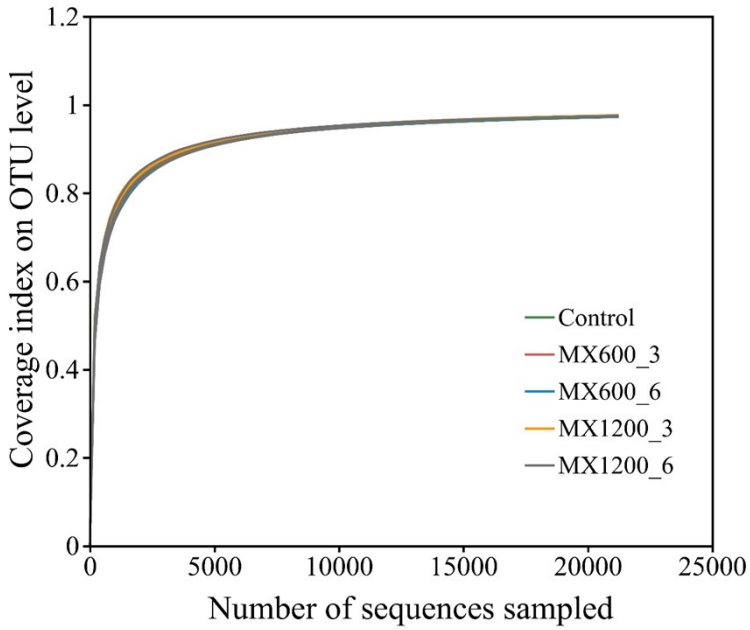

Fig. S9 Good's coverage plots for each rhizosphere soil sample.

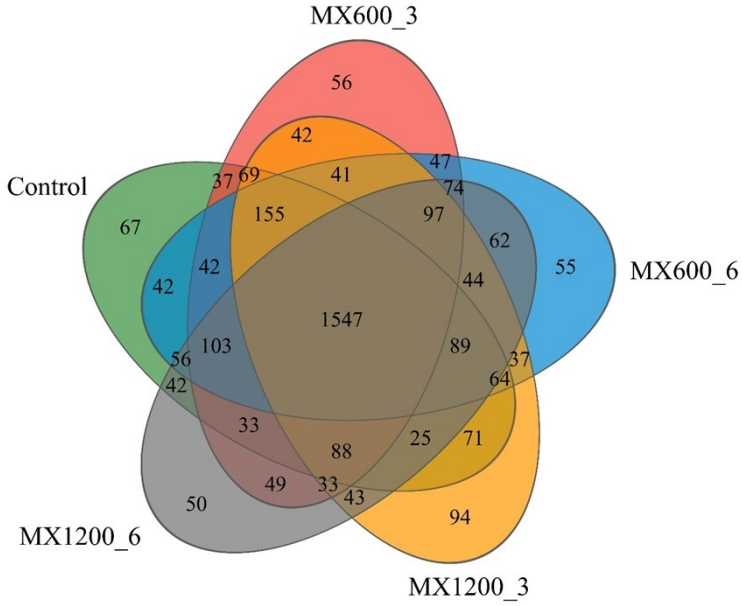

Fig. S10 Venn diagram of unique and shared OTUs of rhizosphere bacteria for each sample.

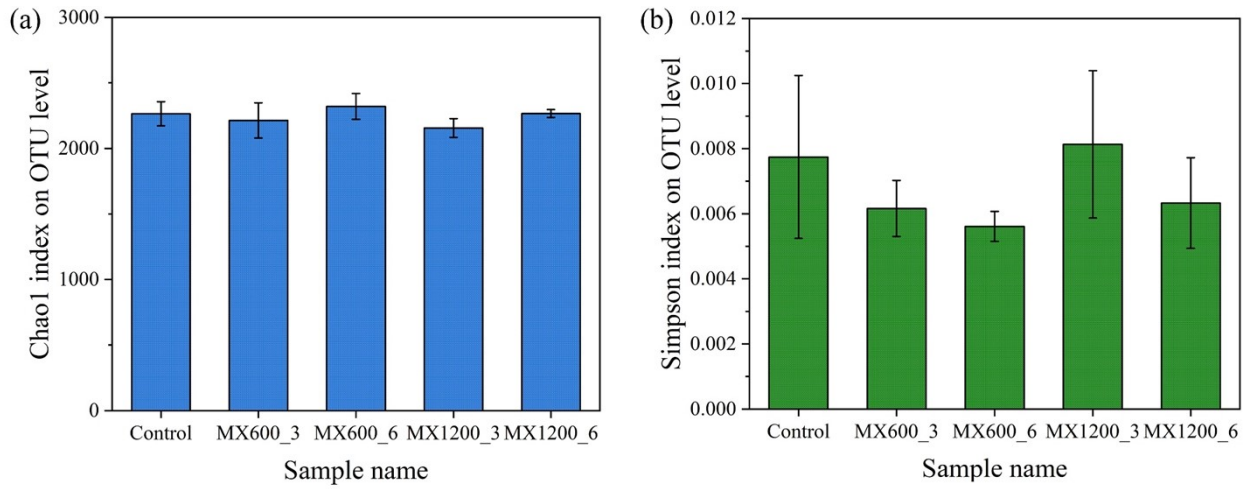

Fig. S11 Variation of Chao1 and Simpson indexes at the OTU level for the rhizosphere bacteria after application of the E-Ti_3C_2 dispersion.

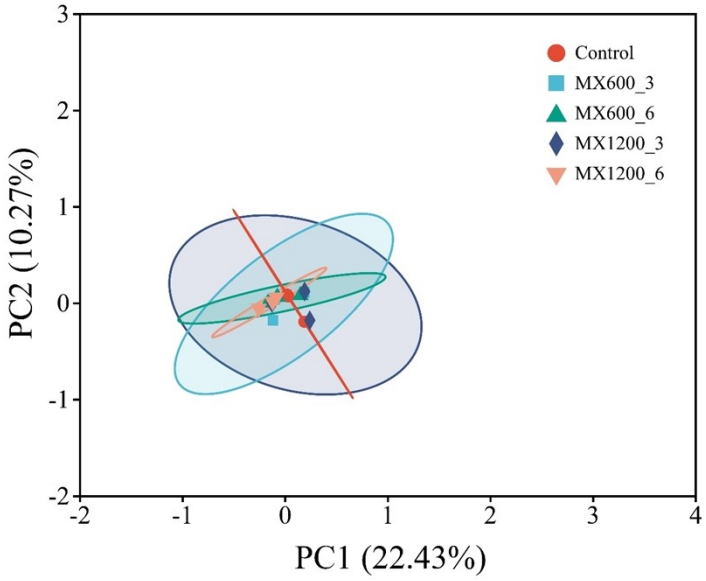

Fig. S12 Principal coordinate analysis (PCoA) of rhizosphere bacterial communities.

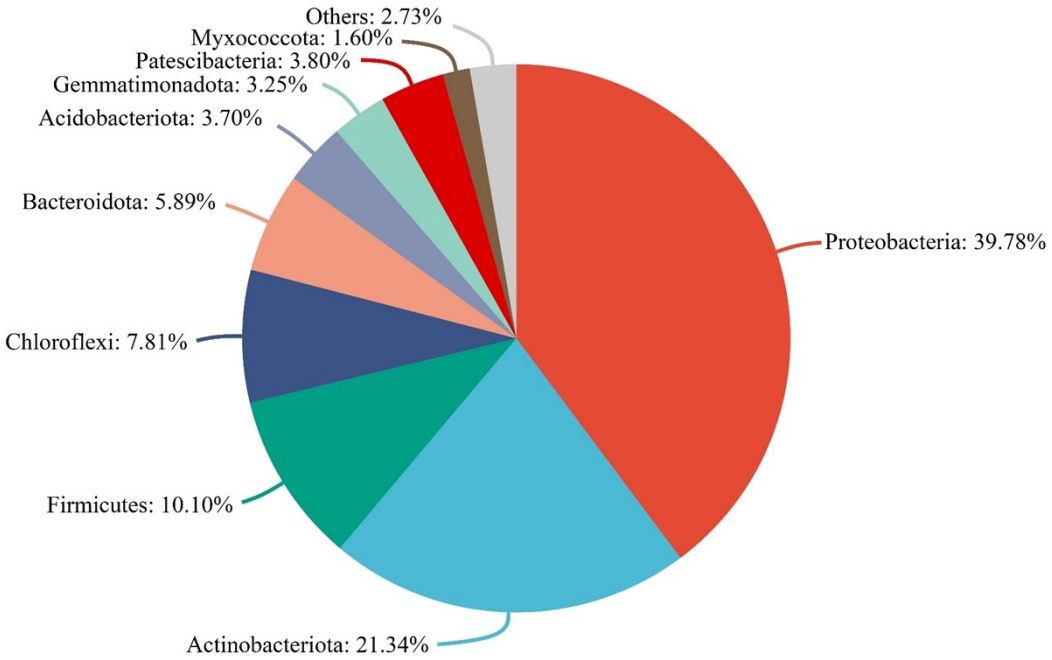

Fig. S13 Pie chart of the phylum-level composition in the control sample.

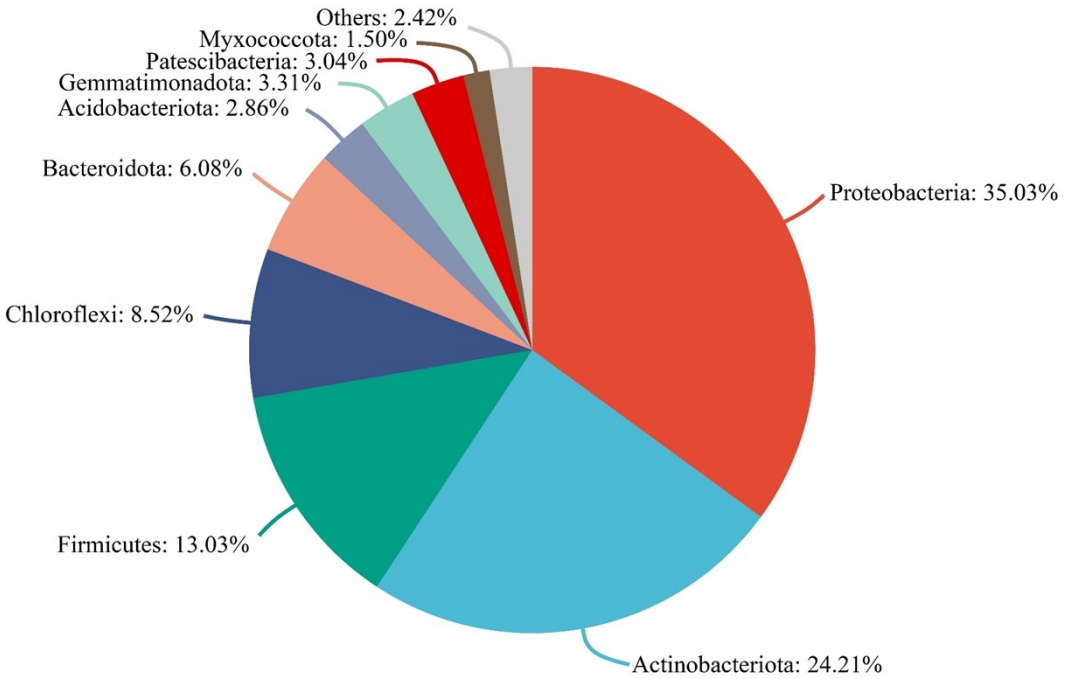

Fig. S14 Pie chart of the phylum-level composition in the MX600_3 sample.

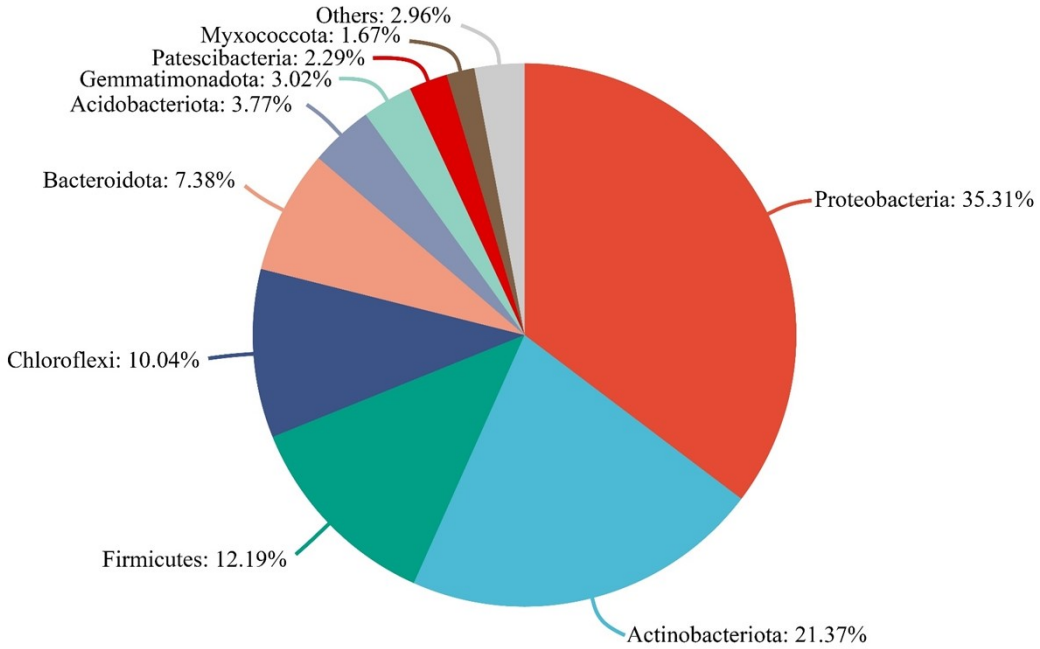

Fig. S15 Pie chart of the phylum-level composition in the MX600_6 sample.

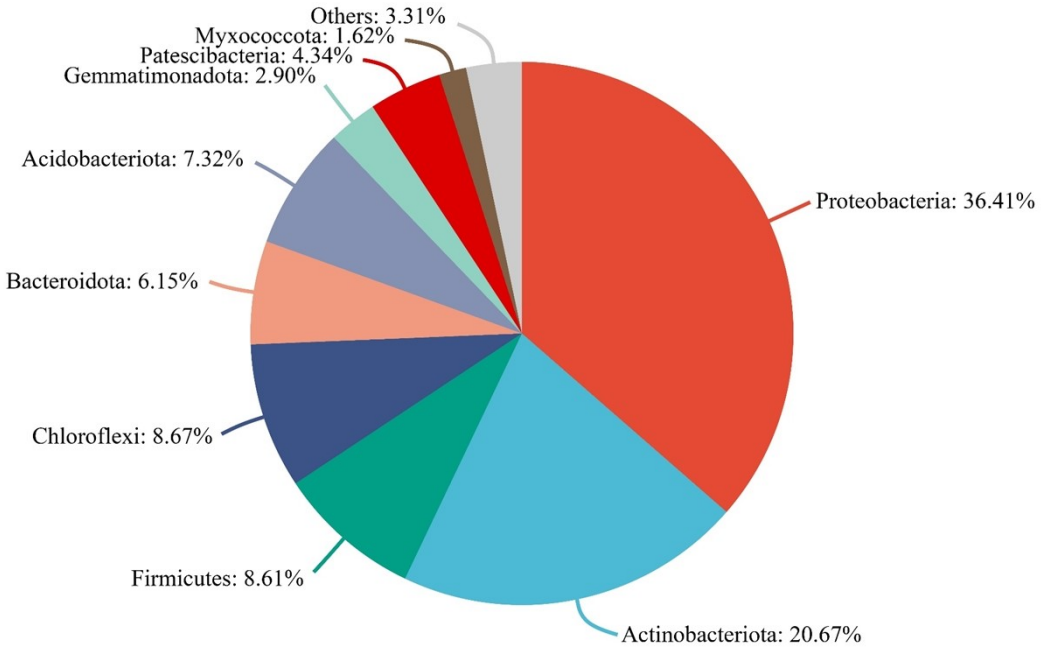

Fig. S16 Pie chart of the phylum-level composition in the MX1200_3 sample.

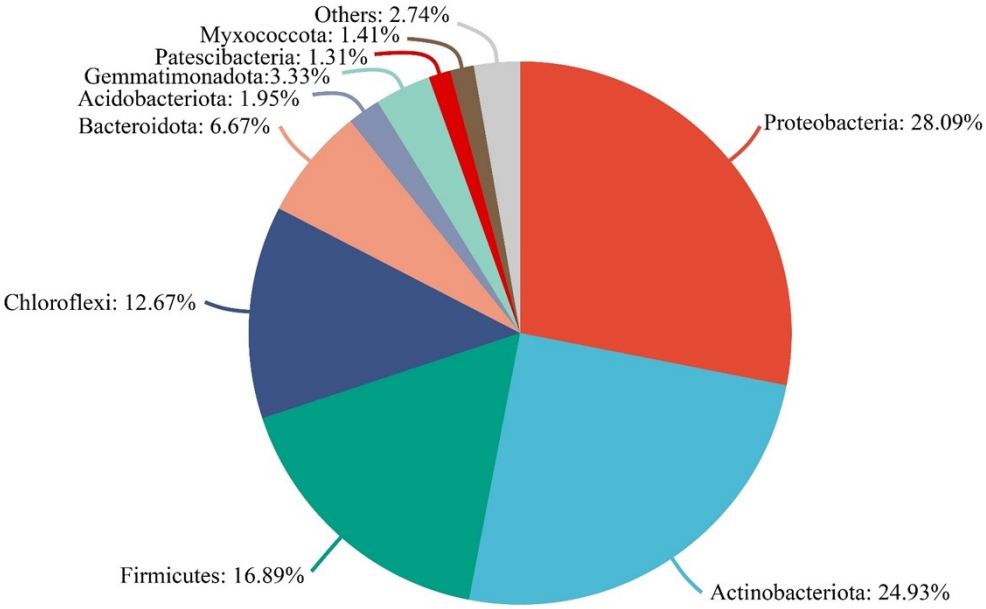

Fig. S17 Pie chart of the phylum-level composition in the MX1200_6 sample.

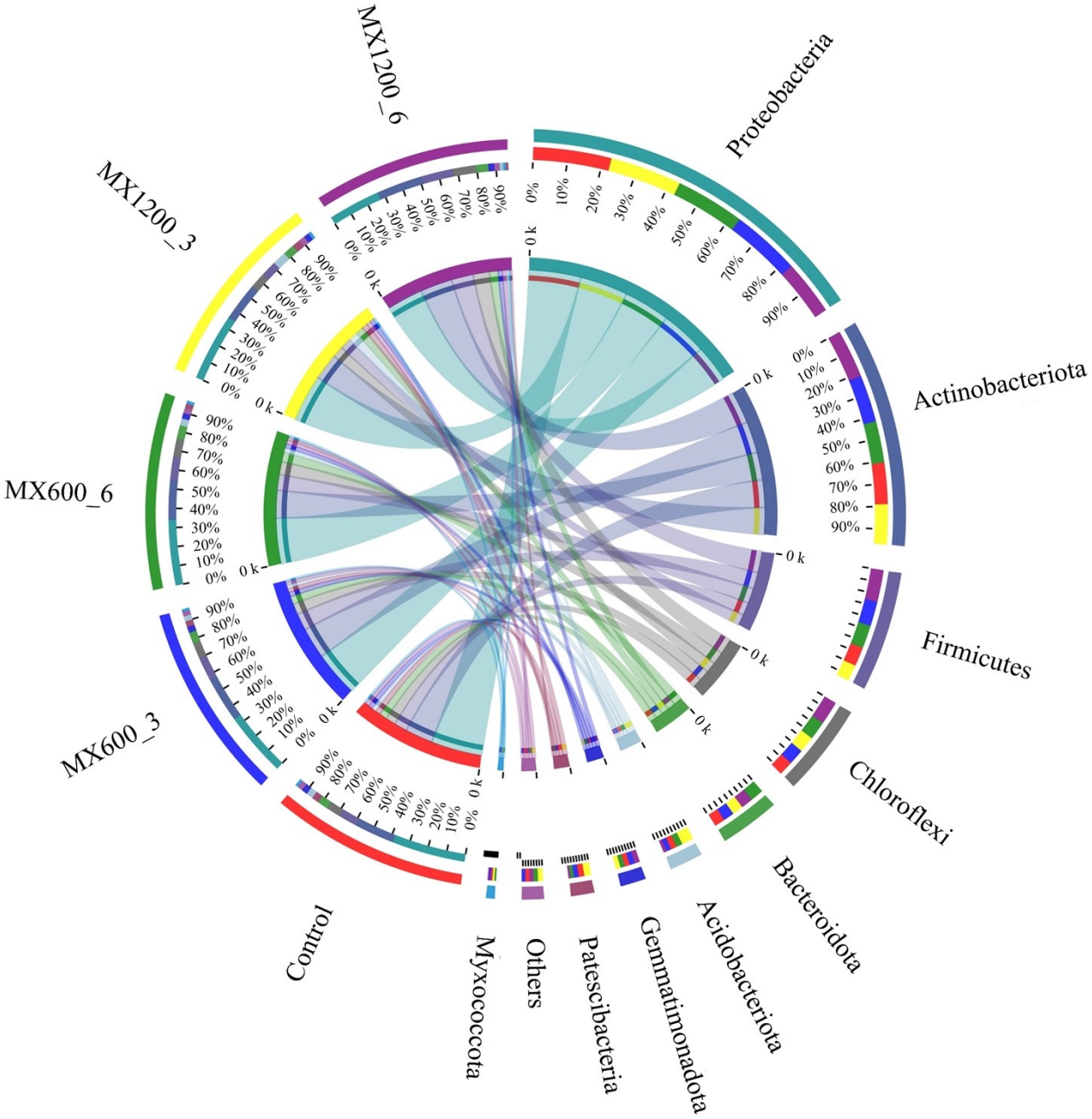

Fig. S18 Phylum-level distribution of the bacterial community in each sample.

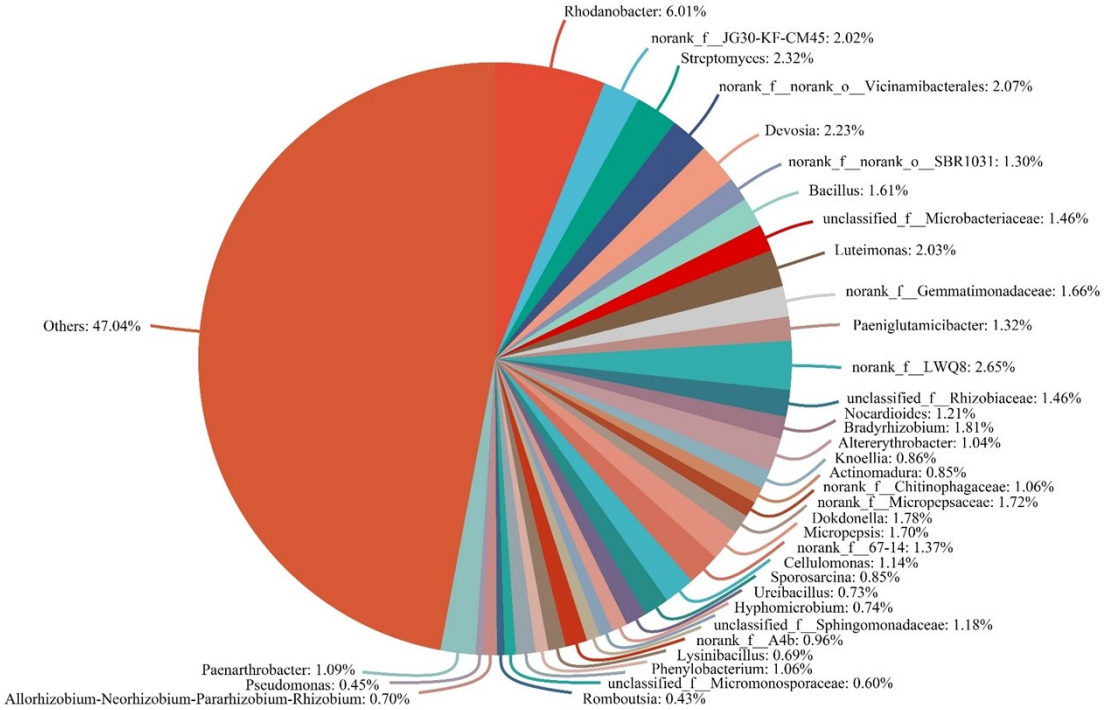

Fig. S19 Pie chart of the genus-level composition in the control sample.

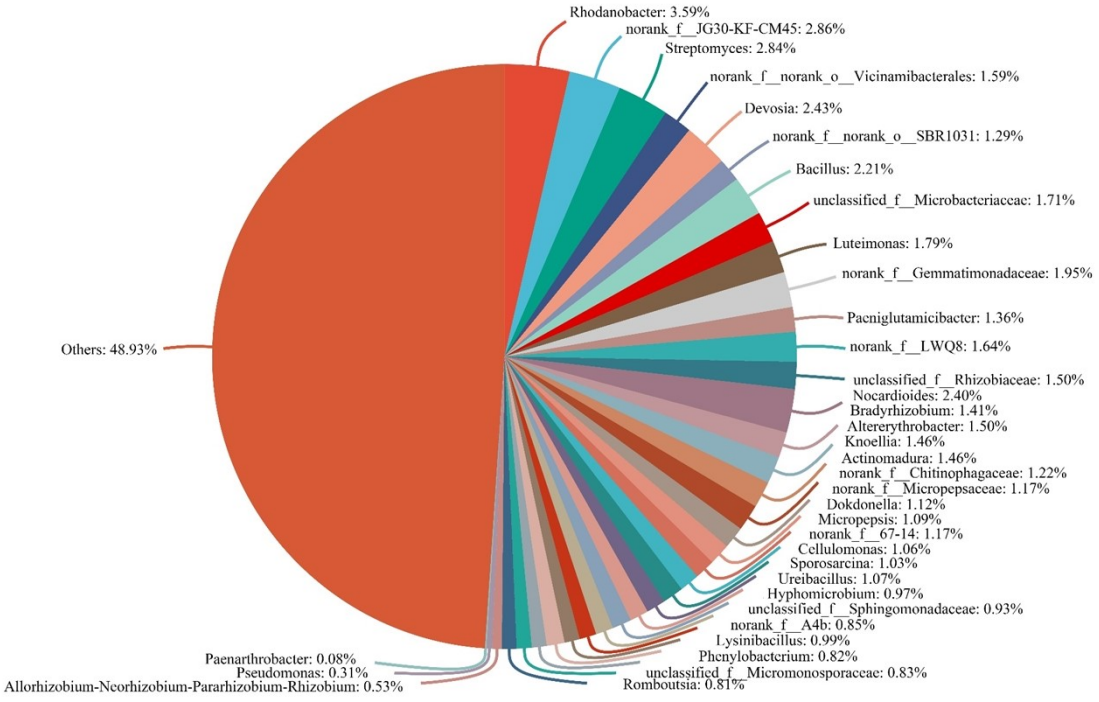

Fig. S20 Pie chart of the genus-level composition in the MX600_3 sample.

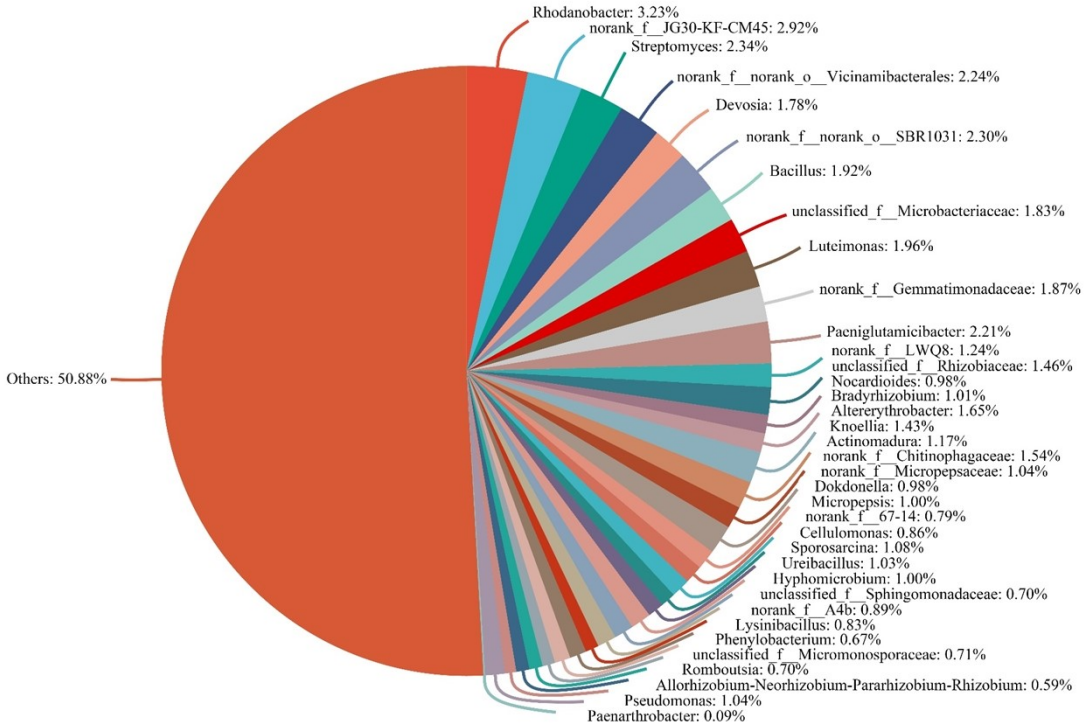

Fig. S21 Pie chart of the genus-level composition in the MX600_6 sample.

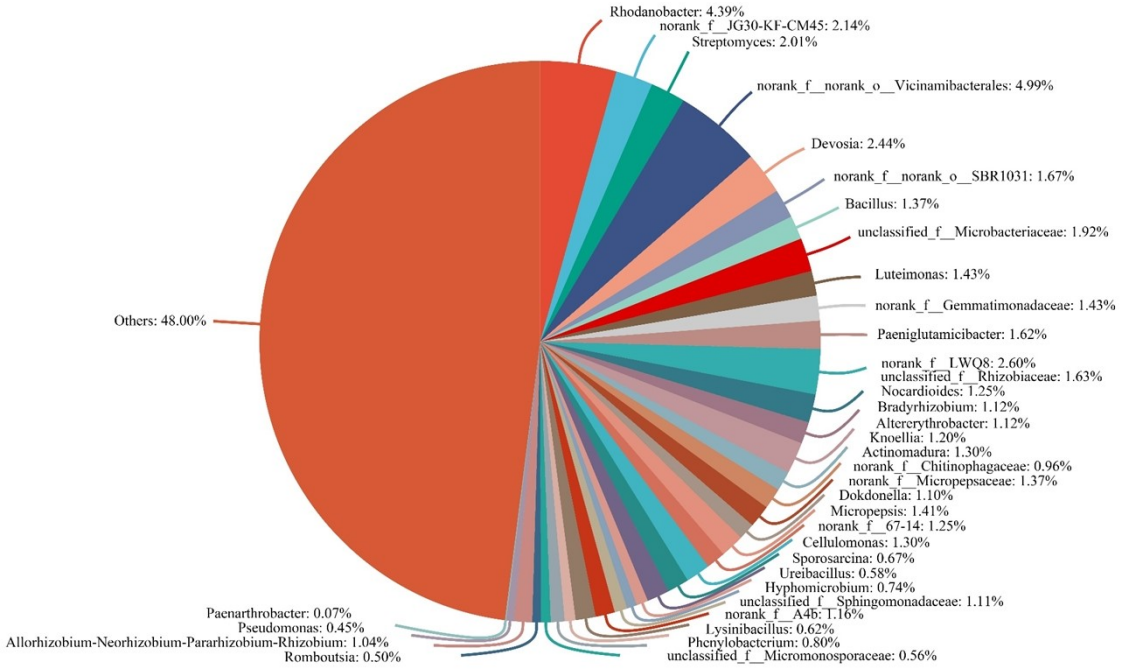

Fig. S22 Pie chart of the genus-level composition in the MX1200_3 sample.

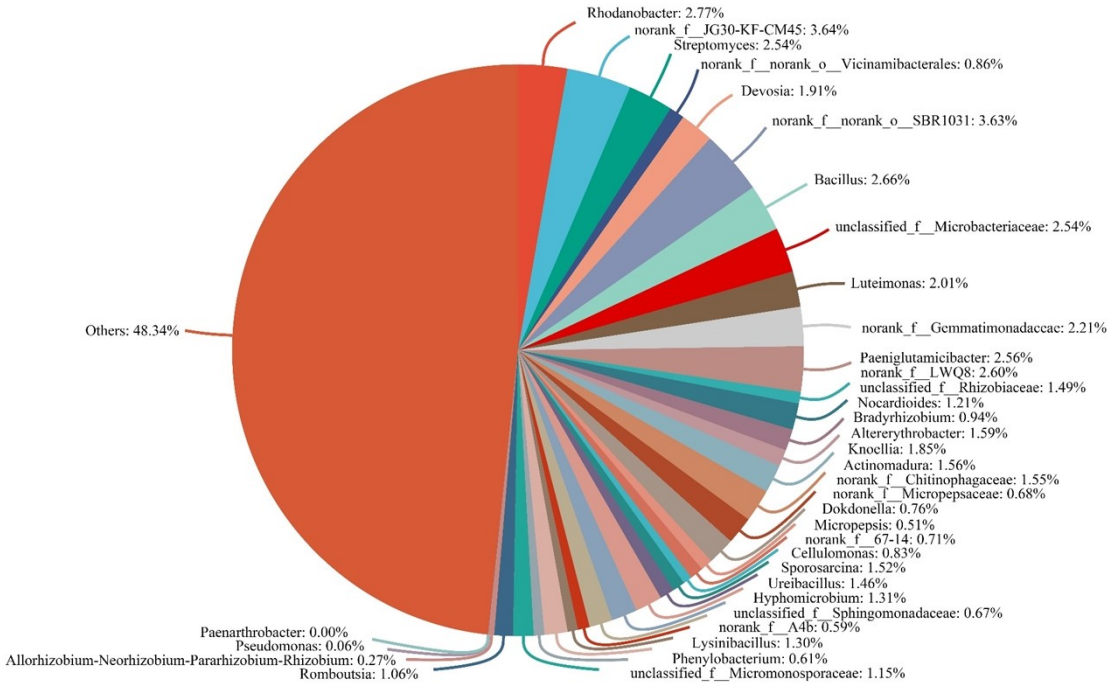

Fig. S23 Pie chart of the genus-level composition in the MX1200_6 sample.

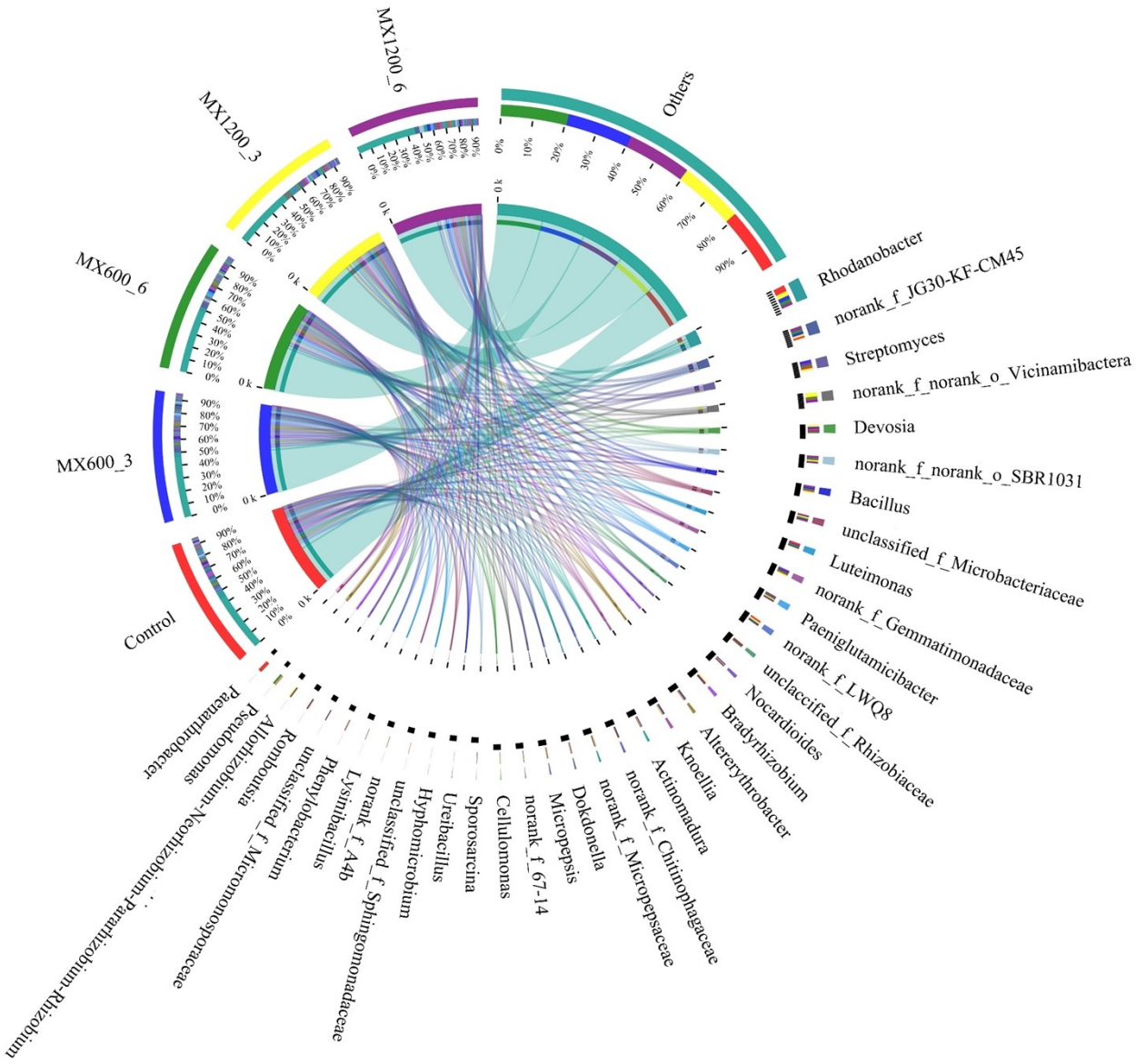

Fig. S24 Genus-level distribution of the bacterial community in each sample.

Table S1. Energy consumption of the ECO-ME method and the conventional wet-chemical etching method.

Preparation methods	Working hours (h)	Equipment-rated power (kW)	Electricity consumption (kW*h)
Wet-chemical etching method	30	0.8	24
ECO-ME method	2	0.55	1.1

Table S2. Atomic percentages of the MAX precursor and produced E-Ti_3C_2 were measured by XPS.

Sample	Element (atomic%)				
	C	**O**	**Ti**	**Al**	**F**
MAX precursor	30.17	42.88	16.50	10.45	-
E-Ti_3C_2	42.45	20.38	26.83	-	10.34

Table S3. Tag number and length of the rhizosphere samples with and without E-Ti_3C_2 application.

Sample name	Seq_num	Base_num (bp)	Mean_length (bp)	Min_length (bp)	Max_length (bp)
Control 1#	40598	16849676	415.037095	217	452
Control 2#	41920	17383057	414.672161	246	519
Control 3#	46968	19492610	415.018949	292	492
MX600_3 1#	43715	18117821	414.453185	247	509
MX600_3 2#	47573	19705811	414.222584	244	452
MX600_3 3#	44083	18269834	414.441712	232	460
MX600_6 1#	40013	16613542	415.203609	246	487
MX600_6 2#	44398	18404256	414.528943	246	478
MX600_6 3#	46936	19485603	415.152612	203	479
MX1200_3 1#	57329	23847186	415.97073	246	497
MX1200_3 2#	39069	16176978	414.061737	210	470
MX1200_3 3#	33561	13904011	414.290724	302	452
MX1200_6 1#	45312	18762268	414.068415	235	452
MX1200_6 2#	50827	21085826	414.854821	245	484
MX1200_6 3#	52052	21568454	414.363598	240	504