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Jerusalem artichoke decreased salt content and increased diversity of bacterial communities in the rhizosphere soil in the coastal saline zone

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Soil salinity is one of the main environmental constraints that restrict plant growth and agricultural productivity; however, utilization of salt-affected land can bring substantial benefits. This study used an in-situ remediation method by planting Jerusalem artichoke in naturally occurring saline alkali soils with different salinity (high salinity (H, >4.0 g•salt kg-1 soil), moderate salinity (M, 2.0-4.0 g•salt kg-1 soil) and low salinity (L, 1.0-2.0 g•salt kg-1 soil) in the coastal saline zone in southeast China in comparison with the respective controls without Jerusalem artichoke planting (undisturbed soil). Soil pH and salinity increased sequentially from the rhizosphere to the bulk soil and the unplanted controls. The activity of neutral phosphatase and invertase decreased in the order L > M > H, whereas that of catalase was reverse. The minimum content of calcite, muscovite and quartz, and maximum content of chlorite and albite, were found in the control soils. Planting of Jerusalem artichoke enhanced bacterial microflora in saline alkali soil. Proteobacteria, Acidobacteria, Actinobacteria and Bacteroidetes were the dominant phyla in all samples, accounting for more than 80% of the reads. The number of Operational Taxonomic Units (OTU) in the rhizosphere soil was, respectively, 1.27, 1.02 and 1.25 times higher compared with the bulk soil, suggesting that Jerusalem artichoke played a significant role in increasing abundance and diversity of soil microbial populations. The study showed that Jerusalem artichoke could be used to improve saline alkali soil by enriching bacterial communities, enhancing the activity of phosphatase and invertase, and decreasing soil salinity.