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Relationship between rhizosphere soil properties and blossom-end rot of tomatoes in coastal saline-alkali land

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Blossom-end rot (BER), one of the common physiological disorders in tomato production, decreases fruit crop yields and quality, resulting in economic losses. The main causes of BER have not been determined conclusively so far, but inadequate Ca nutrition is one of important reasons. In this study, five cultivars of tomatoes were studied in saline soil and the elemental contents in the rhizosphere and bulk soil were characterized. The microbial diversity and richness in the rhizosphere and bulk soil were compared in diseased and heathy plants. The salt content was generally lower in the rhizosphere compared with bulk soil. There was a significant positive correlation between salinity and BER incidence. In the rhizosphere soil, salinity had little effect on catalase and invertase activity, but had a significant positive correlation with phosphatase activity, which was also positively correlated with the incidence of BER. In both rhizosphere and bulk soil samples, Proteobacteria, Acidobacteria, Bacteroidetes, and Chloroflexi were the four most dominant phyla, accounting for [U+FE65]80% of the reads. Among all the samples, the highest relative abundance of Proteobacteria was in soil in which cultivar Meng Yu grew; this cultivar was healthiest (lowest BER) among the five cultivars tested, probably because of improved nitrogen uptake and utilization associated with Proteobacteria abundance. The incidence rate of tomato blossom-end rot had a significant negative correlation with the relative abundance of soil microorganisms, but was positively correlated with abundance of Bacteroidetes. The result suggested that the occurrence of tomato blossom-end rot was influenced by soil chemical (salinity), biochemical (phosphatase activity) and biological properties (relative abundance of specific bacterial phyla).