

# Composition and Potential Functions of Rhizobacterial Communities in a Pioneer Plant from Andean Altiplano

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## Abstract

Plant microbiota that associate with pioneer plants are essential to their growth and adaptation to harsh conditions found in the Central Volcanic Zone of the Andes. In this sense, the rhizosphere of pioneer species represents a unique opportunity to examine how bacterial communities are recruited and support the growth of plants under abiotic stress conditions, such low nutrient availability, high solar irradiation, water scarcity, soil salinity, etc. In this study, we explored the community composition and potential functions of rhizobacteria obtained from specimens of *Parastrephia quadrangularis* (Meyen) Cabrera, commonly called Tola, grown on the slopes of the Guallatiri, Isluga, and Lascar volcanoes in the Atacama Desert of Chile by using 16S rRNA amplicon sequencing. Sequence analysis showed that the Actinobacteria, Proteobacteria, Acidobacteria, and Bacteroidetes were the most abundant phyla of the rhizobacterial communities examined. A similar diversity, richness, and abundance of OTUs were also observed in rhizosphere samples obtained from different plants. However, most of OTUs were not shared, suggesting that each plant recruits a specific rhizobacterial communities independently of volcanoes slope. Analyses of predicted functional activity indicated that the functions were mostly attributed to chemoheterotrophy and aerobic chemoheterotrophy, followed by nitrogen cycling (nitrate reduction and denitrification), and animal parasites or sym-bionts. In addition, co-occurrence analysis revealed that complex rhizobacterial interactions occur in *P. quadrangularis* rhizosphere and that members of the Patulibacteraceae comprise a keystone taxon. This study extends our understanding on the composition and functions of the rhizobiome, which is pivotal for the adaptability and colonization of pioneer plant to harsh conditions of the Atacama Desert, widely recognized as the driest place on planet Earth. © 2021 by the authors. Licensee MDPI, Basel, Switzerland.

## Author keywords

Andean Altiplano; Bacterial community; Rhizosphere; Volcanoes