



Amelioration of Saline Stress on Chia (*Salvia hispanica* L.) Seedlings Inoculated With Halotolerant Plant Growth-Promoting Bacteria Isolated From Hypersaline Environments

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*Correspondence:

Verónica Patricia Irazusta
irazustaveronica@gmail.com

†ORCID:

María Florencia Yañez-Yazlle
orcid.org/0000-0002-1623-5715
Neli Romano-Armada
orcid.org/0000-0003-3148-2041
Verónica Beatriz Rajal
orcid.org/0000-0002-2290-8920
Verónica Patricia Irazusta
orcid.org/0000-0001-7436-8543

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María Florencia Yañez-Yazlle^{1,2†}, Neli Romano-Armada^{1,3†}, Verónica Beatriz Rajal^{1,3,4†} and Verónica Patricia Irazusta^{1,2*†}

¹ Instituto de Investigaciones para la Industria Química (INIQUI), Universidad Nacional de Salta (UNSa), Consejo Nacional de Investigaciones Científicas y Técnicas (CONICET), Salta, Argentina, ² Facultad de Ciencias Naturales, Universidad Nacional de Salta (UNSa), Salta, Argentina, ³ Facultad de Ingeniería, Universidad Nacional de Salta (UNSa), Salta, Argentina,

⁴ Singapore Centre for Environmental Life Sciences Engineering (SCELS), School of Biological Sciences, Nanyang Technological University (NTU), Singapore, Singapore

The rhizosphere and microbiome of halotolerant plants could be crucial for alleviating salinity stress during plant growth. The aims of this work were (1) to isolate bacteria from rhizosphere and bulk soil samples from the Salar del Hombre Muerto (Catamarca, Argentina), (2) to characterize different plant growth-promoting (PGP) activities produced by these bacterial isolates, and (3) to evaluate their effect on the initial growth of chia (*Salvia hispanica* L.) under saline stress. A total of 667 microorganisms were isolated, using different culture media with NaCl, and their abilities for nitrogen fixation, phosphate solubilization, siderophores production, and indole-3-acetic acid production were evaluated. Thirteen strains were selected for showing all the tested PGP activities; they belonged to the genera *Kushneria*, *Halomonas*, *Pseudomonas*, *Planomicrobium*, and *Pseudarthrobacter*. The strains *Kushneria* sp. and *Halomonas* sp. showed the highest salinity tolerance (from 50 to 2,000 mM NaCl) and biomass and biofilm production. Chia seeds were treated with six of the first 13 selected strains to evaluate their plant growth-promoting effect under saline stress (without and with 50 and 100 mM NaCl). *Halomonas* sp. 3R.12 and *Kushneria* sp. T3.7 produced heavier seedlings with a balanced shoot/root length ratio, while *Pseudomonas* sp. AN23 showed the best effect upon chia seedlings, with a morphological response similar to non-stressed seedlings. On the other hand, seedlings displayed no responses when inoculated with *Planomicrobium* sp. 3S.31 and *Pseudarthrobacter* sp. ER25. This study contributes to the knowledge on microorganisms from hypersaline environments as plant growth promoters for their use in the production of salt-sensitive crops, among other potential uses.

Keywords: halotolerant bacteria, nitrogen fixation, phosphate solubilization, siderophores production, indole-3-acetic acid production, biofilms production, *Kushneria*, *Halomonas*

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Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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