

Salt-enhanced IAA production in *Vreelandella titanicae*: a stress-responsive for sustainable agriculture in saline soils

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Plant Growth-Promoting Rhizobacteria (PGPR) can play a crucial role in promoting plant growth under stressful conditions, such as in degraded soils. Soil salinization is becoming a rapidly expanding phenomenon, especially in Mediterranean countries, and represents a global threat to agricultural productivity. In this context, the isolation of halotolerant/halophilic PGPR and their characterization are the basis of a biotechnological and sustainable approach to addressing these problems.

We isolated the halotolerant bacterium *Vreelandella titanicae* from quinoa rhizosphere and characterized it for its PGP traits. The strain showed high indole-3-acetic acid (IAA) production, a key phytohormone involved in plant growth and development. Several studies on salt-tolerant bacteria reported the effects of different chemical-physical parameters on IAA production, however, the role of salt remains unclear. To address this gap, we characterized *V. titanicae* at genomic, metabolic and physiologic level and investigated NaCl-regulation of hormone production. Growth kinetic studies were performed under increasing salt concentrations, and IAA was quantified over time. Gene expression analysis was conducted focusing on the key genes involved in tryptophan-dependent IAA biosynthetic pathway. Increasing salinity reduced biomass but enhanced IAA production, reaching the greatest levels at 1.0 M NaCl. Expression analyses highlighted that salt positively regulated genes involved in the indole-3-acetaldehyde (IAAld) pathway, suggesting that osmotic stress activates specific metabolic ways of IAA production.

Our results demonstrate that IAA production in *V. titanicae* is a stress-responsive trait and provides further insights into its biosynthetic pathway and regulation, while, also identifying this bacterium as a promising PGPR candidate for salinized soils.