



Università degli Studi di Napoli Federico II

PhD in Biotechnology - 34th cycle

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***Application of Plant-Growth-Promoting
Rhizobacteria Microorganisms for the
improvement of agricultural productivity***

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Plant growth-promoting rhizobacteria (PGPR) are a group of microorganisms that colonize the rhizosphere and roots of many plant species. They confer beneficial effects to plants by a variety of mechanisms, including synthesis of phytohormones, solubilization of minerals, production of siderophores, releasing soluble and volatile compounds, which are implicated in antibiosis, cell signalling, induction of resistance and tolerance in plants against biotic and abiotic stresses. These microorganisms are able to enhance the recycling of plant nutrients and decrease the use of chemical fertilization (Çakmakci et al., 2007). Hence these bacteria can be used as promising biofertilizers in organic farming and sustainable agriculture ecosystems. Indeed, due to public concerns about the potential environmental hazards of chemical use in agriculture, exploration of PGPR for alternative antimicrobials is picking up momentum.

This PhD proposal aims to develop an innovative, spore-forming microorganisms-based bio-fertilizer, belonging to *Bacillus* and *Myxococcus* genera. Spore-based bio-fertilizers provide several advantages compared to similar products based on the use of bacterial cells: easy storage of the product and simple and cheap production processes. The aim of the project is to identify new probiotic strains beneficial to plants and to develop innovative bacterial formulations of interest to the bio-fertilizer industry. This project proposes the isolation of halophilic spore-forming rhizobacteria acting as Plant Growth (PG) -promoters from salt flats; bacterial characterization for important PG-Promoting activity parameters. The most promising PGPR will be tested in greenhouses at Agriges srl.

References

- 1- Plant Growth-Promoting Microbial Enzymes Adriana C. Flores-Gallegos, Erika Nava-Reyna, in *Enzymes in Food Biotechnology*, 2019.
- 2- Soybean (*Glycine max* [L.] Merr.) Production Under Organic and Traditional Farming F. Zaefarian, M. Rezvani, in *Environmental Stresses in Soybean Production*, 2016.
- 3- Plant Microbe Interactions Gul Shad Ali, Ashraf S. El-Sayed, in *Advances in Botanical Research*, 2015.
- 4- Çakmakçı, Ramazan & DÖNMEZ, Mesude & ERDO, Ümmügülsüm. (2007). The Effect of Plant Growth Promoting Rhizobacteria on Barley Seedling Growth, Nutrient Uptake, Some Soil Properties, and Bacterial Counts. *Turkish Journal of Agriculture and Forestry*. 31.