

Evaluation of the microbiota associated with a salt-tolerant rice variety as a treatment to induce resistance in sensitive varieties



Why rice?...Let me explain

Rice (*Oryza sativa* L.) is one of the most important crops worldwide, feeding almost half of the global population. However, as a result of climate change crops are highly submitted to **abiotic stress** conditions. Among them, **soil salinity** is considered as one of the major problems for agriculture, impacting not only the plant itself but also the soil and living organisms surrounding.

Rice is considered **salt sensitive** by nature and when subjected to salt stress, it suffers an enormous negative impact in metabolic mechanisms, growth and productivity. Plant growth-promoting bacteria (**PGPB**) are able to promote **plant vigor** and improve **adaptation** in stress conditions, by producing phytohormones, secondary compounds, osmolytes and antioxidant enzymes.

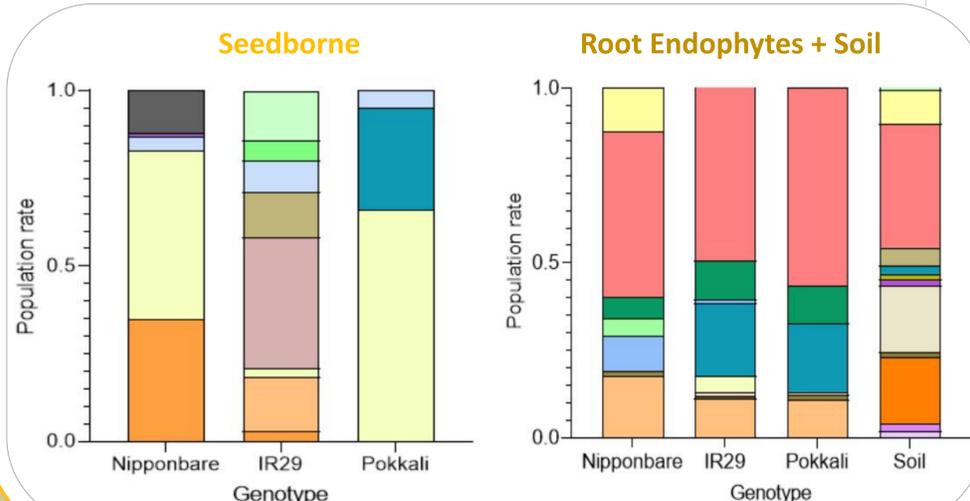
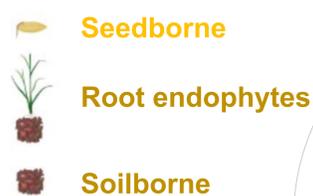
Our goal

Study the effect of ST-PGPB (Salt Tolerant-PGPB) candidates selected from Pokkali (salt-tolerant rice variety) associated microbiota (seedborne and root recruited) in the level of salt stress resistance and response of Nipponbare (salt sensitive variety).

Phase 1: Population study

Approach:

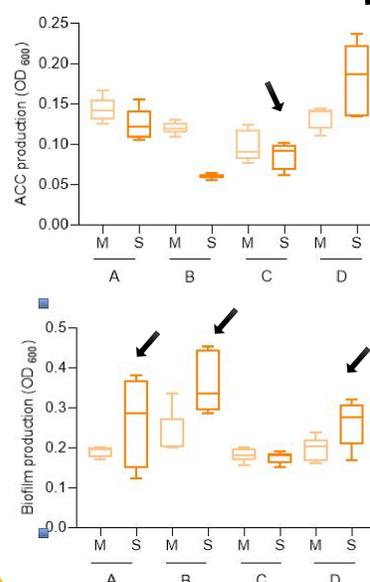
- Bacteria isolation
- DNA extraction
- PCR:16SrRNA
- Sanger sequencing (GENEWIZ)
- BLAST



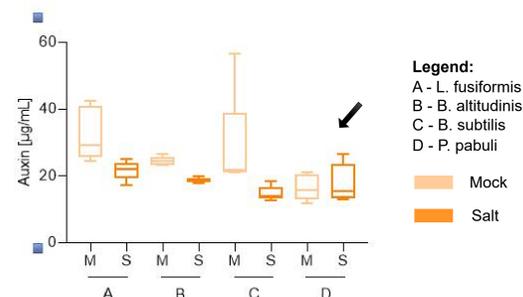
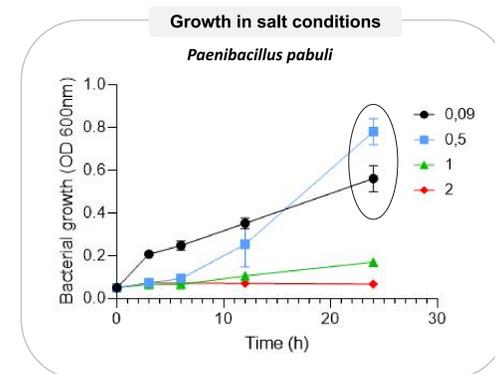
Phase 2: ST-PGPB Screening

Selected candidates present in Pokkali

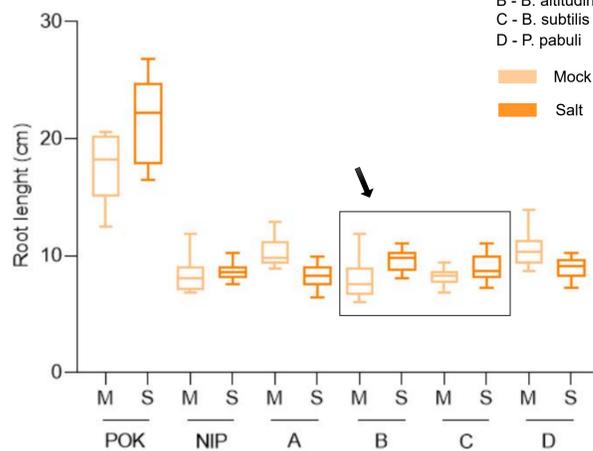
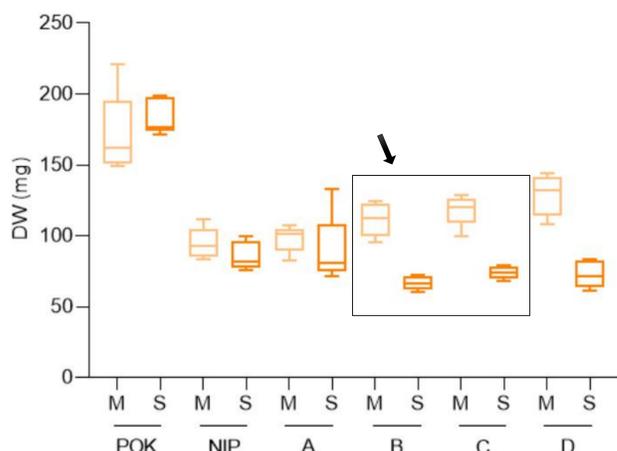
Screening for ST-PGPB



Growth in salt conditions

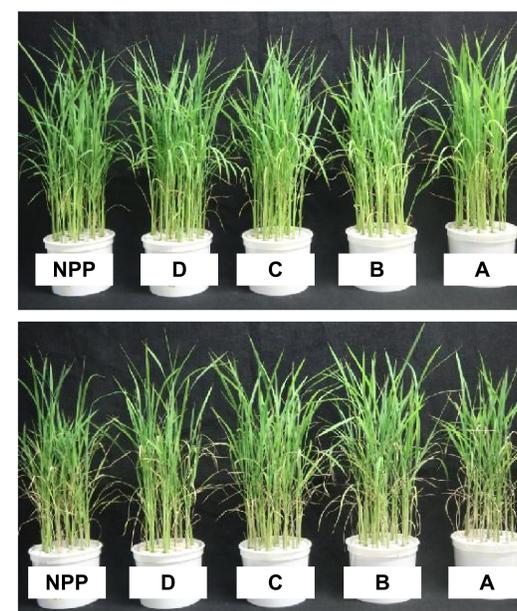


Phase 3: Plant inoculation in hydroponics



Legend:
A - *L. fusiformis*
B - *B. altitudinis*
C - *B. subtilis*
D - *P. pabuli*

Mock
Salt



Futre directions

These candidates have the potential to be used as bioinoculant treatment to amend the rice performance (particularly salt-sensitive varieties) under saline stress conditions, improving survival rates and production levels under such conditions.

Acknowledgments

We the authors want to recognize the labour of FCT—Fundação para a Ciência e a Tecnologia, I.P., through the R&D Unit "GREEN-IT—Bioresources for Sustainability" (UIDB/04551/2020 and UIDP/04551/2020).

References

- Etesami, H. and Glick, B.R. (2020). Halotolerant plant growth-promoting bacteria: Prospects for alleviating salinity stress in plant. *Environmental and Experimental Botany*, 178, 1-27. <https://doi.org/10.1016/j.envexpbot.2020.104124>
- Zhang, S, Fan,C., Wang,Y., Xia, Y., Xiao, Wei., Cui, X. (2018). Salt-tolerant and plant growth-promoting bacteria isolated from high-yield paddy soil. *Canadian journal of microbiology*, 64, 12,968-978.