Pseudomonas koreensis strain 69RS promotes rice growth and P bioavailability: results from *in vivo* experiments

C. Valli, A. Melzi, S. Zecchin, L. Cavalca
Department of Food, Environmental and Nutritional Sciences (DeFENS),
Università degli Studi di Milano, Italy
Contacts: lucia.cavalca@unimi.it; https://sites.unimi.it/lcavalca/

INTRODUCTION

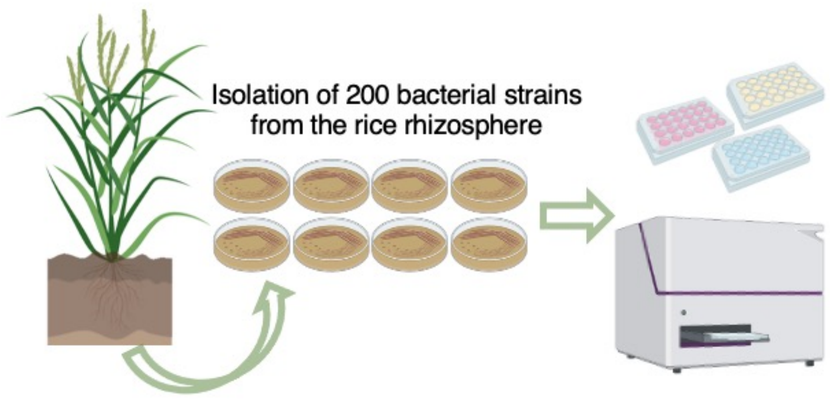
The demand of rice production is impaired by water scarcity and cultivation under more aerobic management affects phosphate fertilizers bioavailability. Plant growth-promoting rhizobacteria (PGPR) can improve soil quality and availability of different phosphate forms present in the soil but not available for plant uptake.

AIM

Isolation of PGPR suitable as bioinoculant to promote plant growth and solubilize inorganic P.

WORKFLOW

Isolation of PGPR

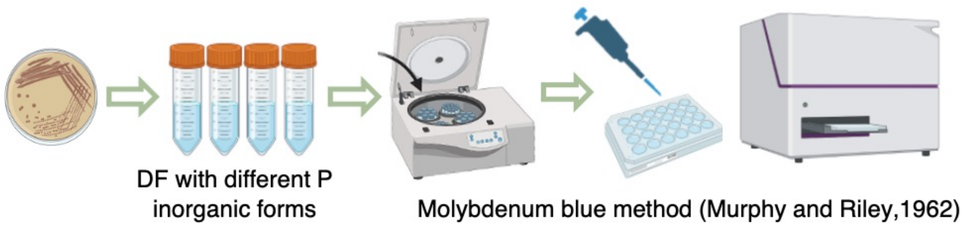


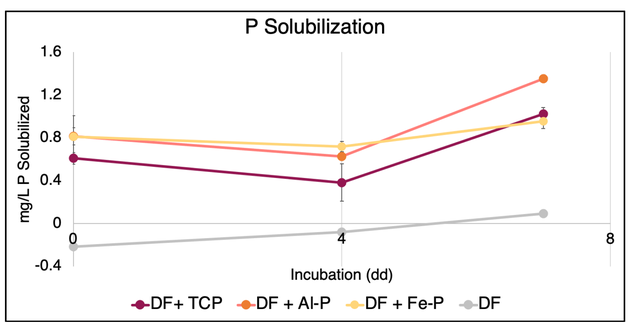
Characterization for different PGP activities:

- Solubilization of three inorganic phosphate forms
- Mineralization of phytate
- Nitrogen fixation
- IAA production
- ACC deaminase activity
- Siderophore production
- EPS production

➢ The most performing bacterial strain belongs to the species ***Pseudomonas koreensis.***

Phosphate solubilization activity of *Pseudomonas koreensis* strain 69RS

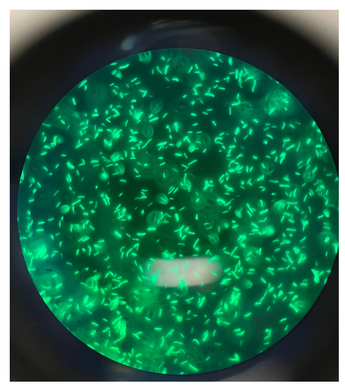




➢ The strain presented a major solubilization activity for aluminium phosphate (Al-P) followed by tricalcium phosphate (TCP) and iron phosphate (Fe-P).

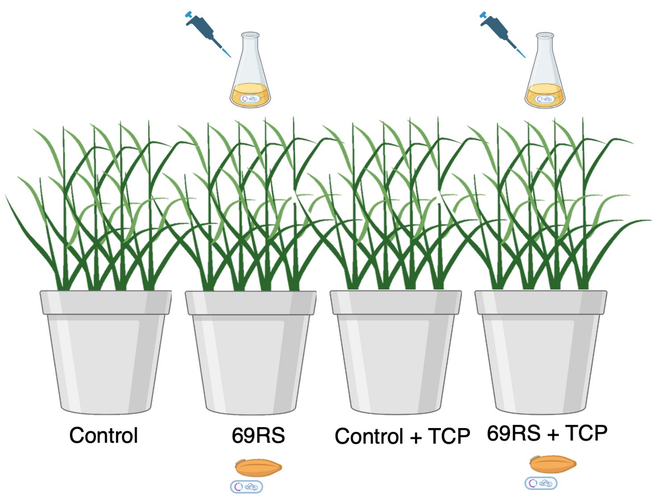
In vivo experiments

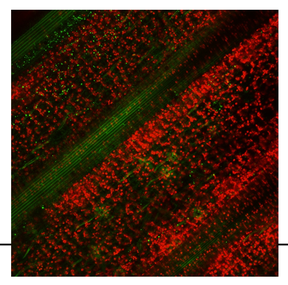
❖ Green Fluorescent Protein (GFP) transformants of strain were used to follow rice seedling colonization in growth pouches and pot experiments.



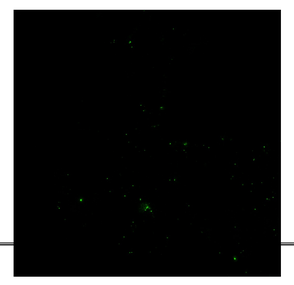
P. koreensis strain 69 RS transformed with plasmid pHM2-GFP and visualized under epifluorescence microscope.

Pot experiment

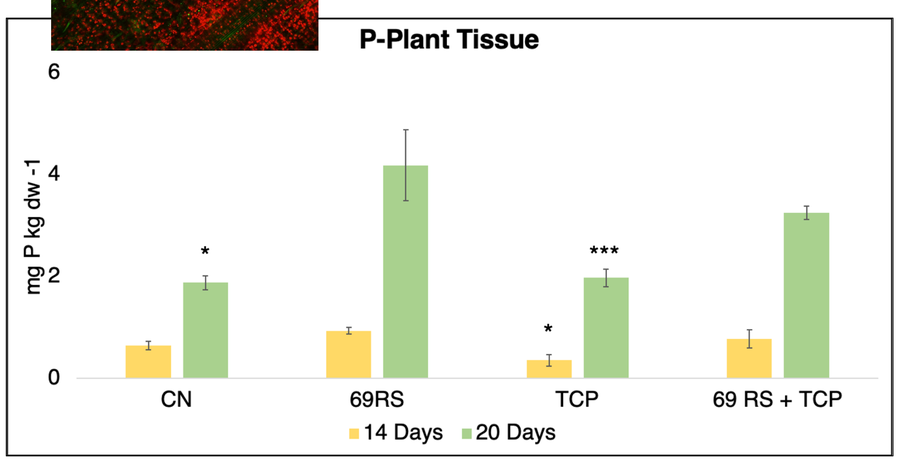


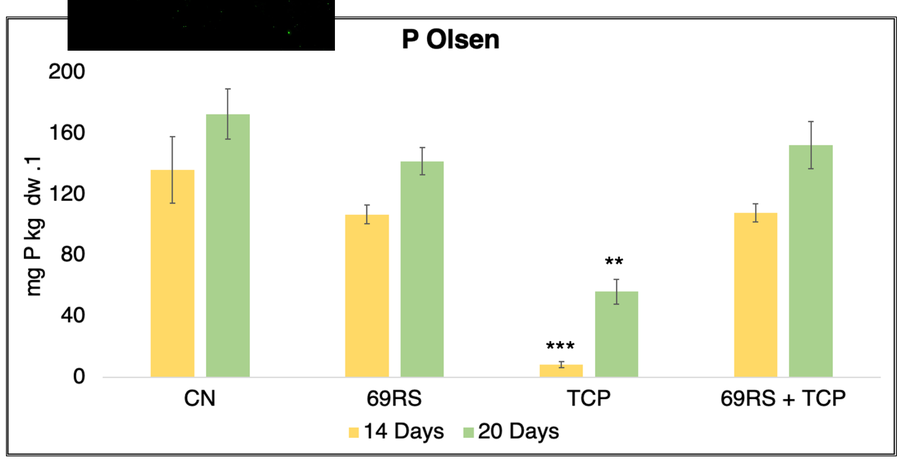


P. koreensis 69RS strain located in rice stem and visualize under confocal microscopy analysis.

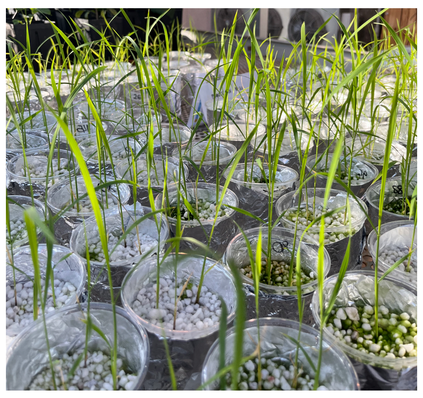


P. koreensis 69RS strain located in the growth substrates and visualize under confocal microscopy analysis.





t-student, *p-value* *<0.05; **<0.01; ***<0.001



Rice pots of the different theses in the greenhouse.

The strain 69RS was able to:

- colonize rice plants and growth substrates,
- increase rice phosphate availability in the plant tissue
- increase available P (P Olsen) in the growth substrates in the presence of insoluble P (TCP).

CONCLUSIONS

Pseudomonas koreensis strain 69RS colonizes and persists into the rice rhizosphere system, possess all principal PGP activities and is able to increment phosphate bioavailability thus encouraging rice growth.

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