The effect of *Pseudomonas* sp. RU47 and phosphorus fertilization on gene abundances and activities of phosphomonoesterase in the rhizosphere of tomato

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INTRODUCTION

Low availability of phosphorus (P) in soils might be compensated by inoculation with PGPB that produce extracellular enzymes, such as acid and alkaline phosphomonoesterases.

Hypotheses

- Acid and alkaline phosphomonoesterase activities and phosphatase-encoding gene abundances are expected to be higher in rhizosphere than in bulk soil.
- Microbial inoculation with *Pseudomonas* sp. RU47 and P fertilization positively affects acid and alkaline phosphomonoesterase activities and gene abundances.

MATERIALS AND METHODS

Experimental Design

*Plant* Tomato (*Solanum lycopersicum* L. var. Mobil)

*Duration* 50 days

*Conditions*

- rhizoboxes (2.08 L) Luvisol (1) : sand (1)
- N, K, Mg, and Ca- fertilization
- greenhouse (o 20.1 °C, o 52.9 % humidity)

*Replicates* 5 (Σ 40 rhizoboxes)

*Treatments*

- P fertilization
- PGPB inoculation
- Bacterial mix unselectively cultivated microorganisms from soil
- Dead RU47 heat killed *Pseudomonas* sp. RU47 cells
- Viable RU47 living *Pseudomonas* sp. RU47 cells

Analyses

*Enzyme assay (MUF)* Marx et al. 2001

*Quantitative PCR* (16S, *phoD*, *phoN*, and *appA*) Bergkemper et al. 2016

RESULTS

**ACID PHOSPHATASE ACTIVITY**

**ALKALINE PHOSPHATASE ACTIVITY**

**ALKALINE PHOSPHATASE GENE (**phoD**)**

**GENE RATIO – phoD: BACTERIAL 16S RNA**

CONCLUSION and OUTLOOK

P availability in soil might influence RU47’s efficiency in P mineralization. The addition of dead or viable RU47 cells increased phosphatase activity in the rhizosphere. While the addition of dead RU47 cells might stimulate indigenous microbial activity (priming effect), increased PA by the addition of viable RU47 cells might cause by RU47 or interacting indigenous soil microbes. Since RU47 is mainly producing acid phosphatases in pure culture, we will extend our functional gene analyses to *phoN* and *appA* (acid phosphatases).


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