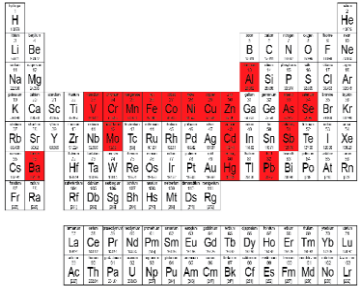
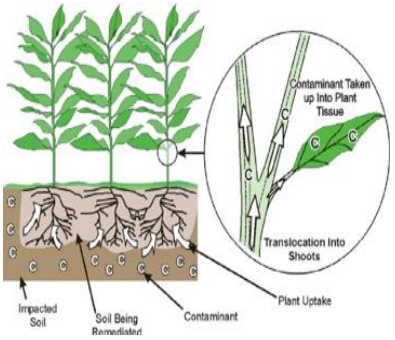
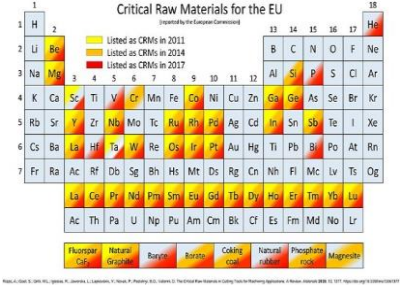
TECHNISCHE UNIVERSITÄT
BERGAKADEMIE FREIBERG
Die Ressourcenuniversität. Seit 1765.

EGU PRESENTATION

Field Studies on Effects of Bioaugmentation on Phytoextraction of Germanium, Rare Earth Elements and Potentially Toxic Elements





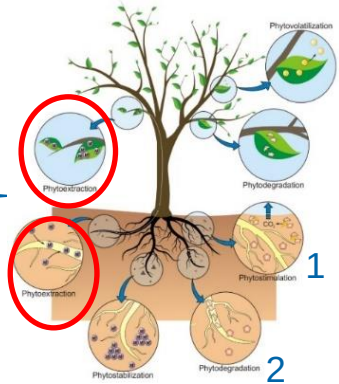


P. U Okoroafor et al. (2022)

Introduction

Contaminated Soils in Post-mining Regions

- PTEs like Pb As,Cu, Pb, Cr, Co etc
- Nutrients like Si, P, Ca, Fe etc
- CRMs like REEs, Ge etc



(Favas et al., 2014)

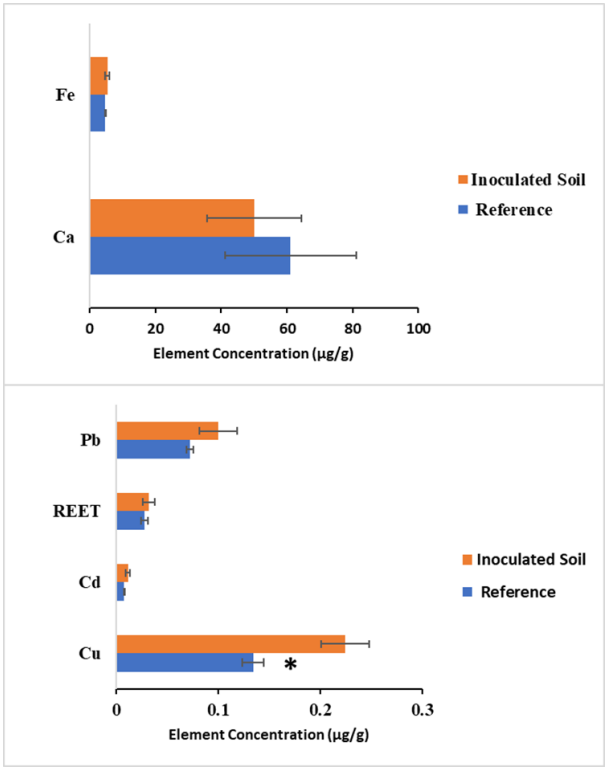
Phytoremediation

- Target element characteristics
- Rhizosphere microorganisms
- Rhizosphere chemistry
- Plant species (Fe acquisition strategy, biomass etc)
- Soil chracteristics (pH, organic matter content etc)
- Environmental conditions (temperature etc)

Phytomining

Impact of soil inoculation with *Bacillus amyloliquefaciens* FZB42 on the phytoaccumulation of target elements under field conditions

Incubation experiment



Inoculation:

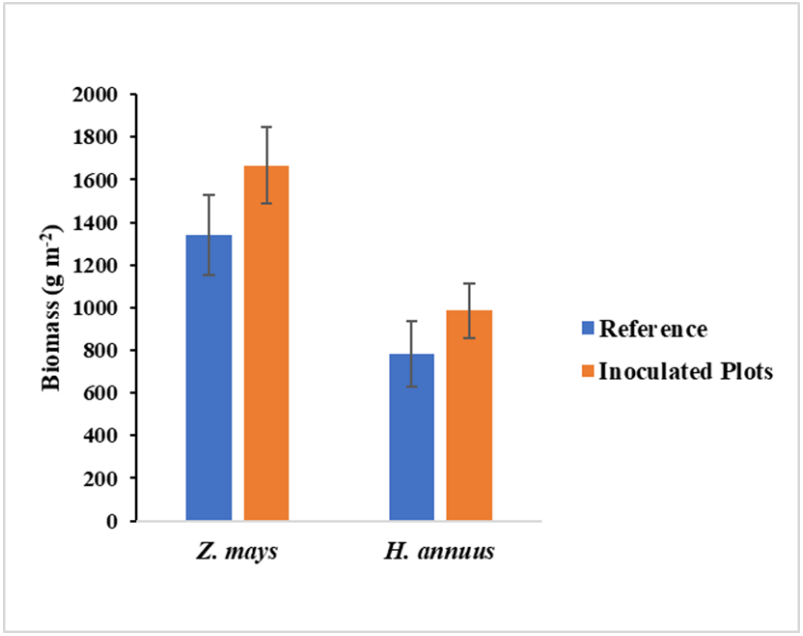
- Increased solubility of most target elements

Key questions:

- Did inoculation with commercially available PGPR enhance uptake of target elements in soil?

Impact of soil inoculation with *Bacillus amyloliquefaciens* FZB42 on the phytoaccumulation of target elements under field conditions

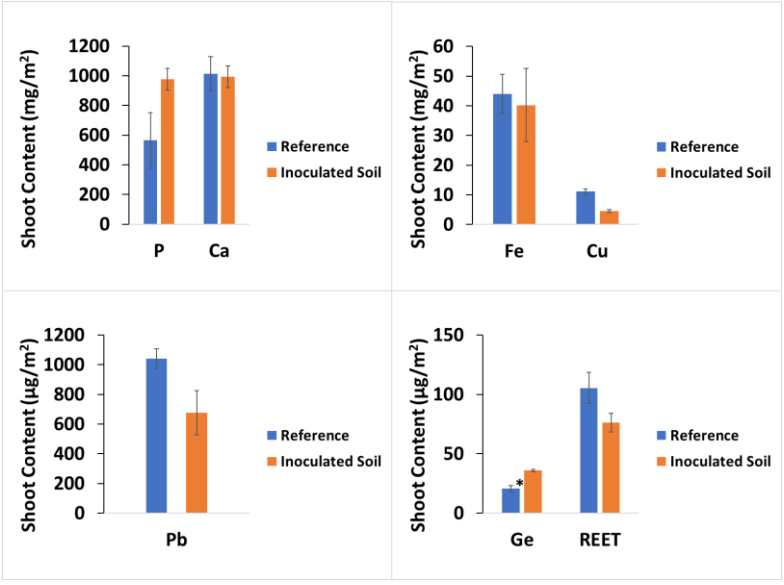
Effect on biomass production



Inoculation:

- Increased biomass of *Zea mays* and *Helianthus annuus*

Impact of soil inoculation with *Bacillus amyloliquefaciens* FZB42 on the phytoaccumulation of target elements under field conditions

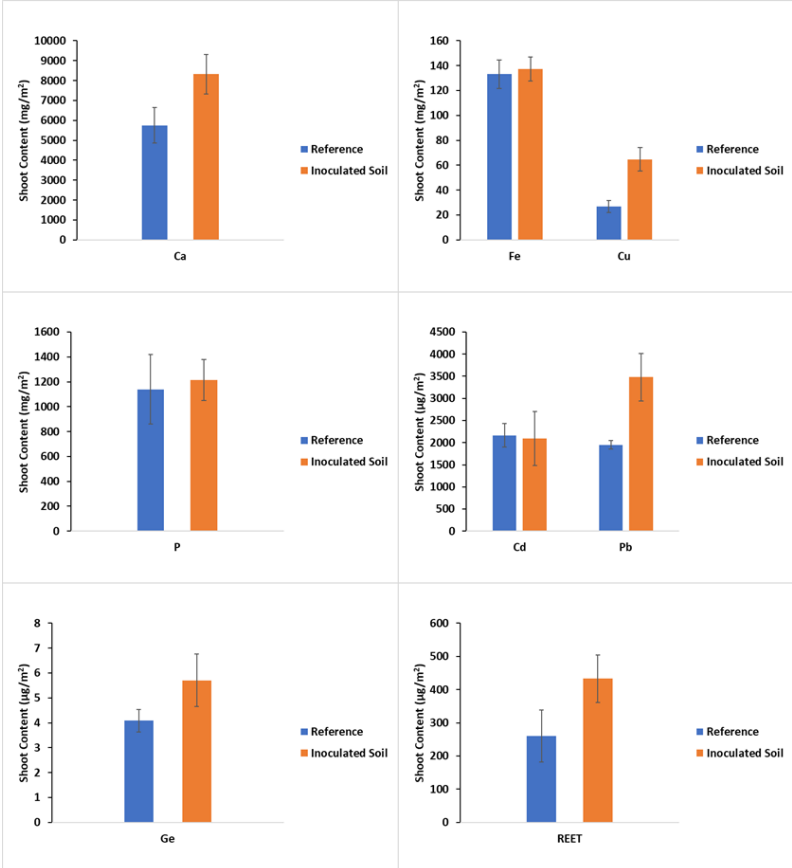


In ***Z. mays***

Inoculation:

- resulted also in slight increase in biomass.
- resulted in no effect or a decrease in accumulation of Pb, REEs, Ca and Fe (similar to laboratory studies observation)
- Significant increase in Ge accumulation

Impact of soil inoculation with *Bacillus amyloliquefaciens* FZB42 on the phytoaccumulation of target elements under field conditions



In ***H. annuus***

Inoculation:

- resulted in an increase in accumulation of most elements

Summary

- *H. annuus* show better potential for accumulation of most target elements under soil bioaugmentation growth conditions. *Z. mays* for Ge and Cr

- Plants efficient in Fe accumulation could potentially be good for accumulation of target elements

- Bioaugmentation show potential for increased plant biomass production, decreased and increased accumulation for some elements.

- Differences in effects among species could be credited to differences in plant species influence on rhizosphere processes and sometimes biomass production.


Thanks!