Impact of Rock Phosphate on Microbial Community Associated with Arbuscular Mycorrhizal Fungi

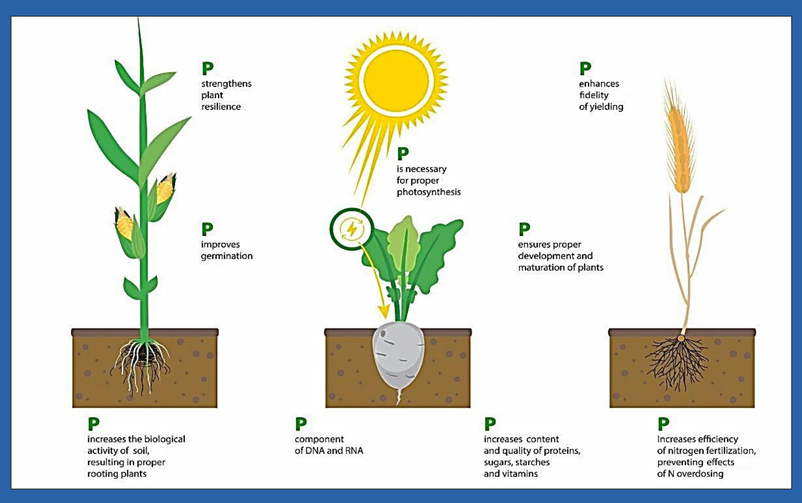
Zakaria Laharach[1,2,3], Bulbul Ahmed[1,2], Faouzi Bekkaoui[3] and Mohamed Hijri[1,2]

[1]Centre for Biodiversity, Institut de Recherche en Biologie Vegetale (IRBV), University of Montreal, QC, CANADA

[2]Jardin Botanique Montreal, QC, CANADA; [3]Mohammed VI Polytecnic University, Ben Guerir, Morocco

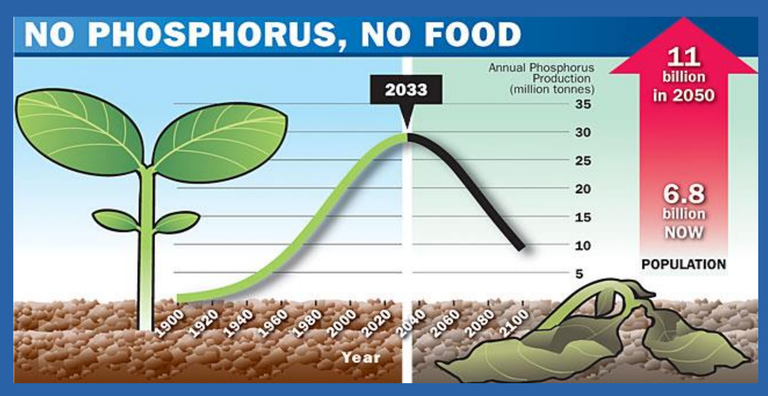
BACKGROUND

Role of Phosphorus (P):

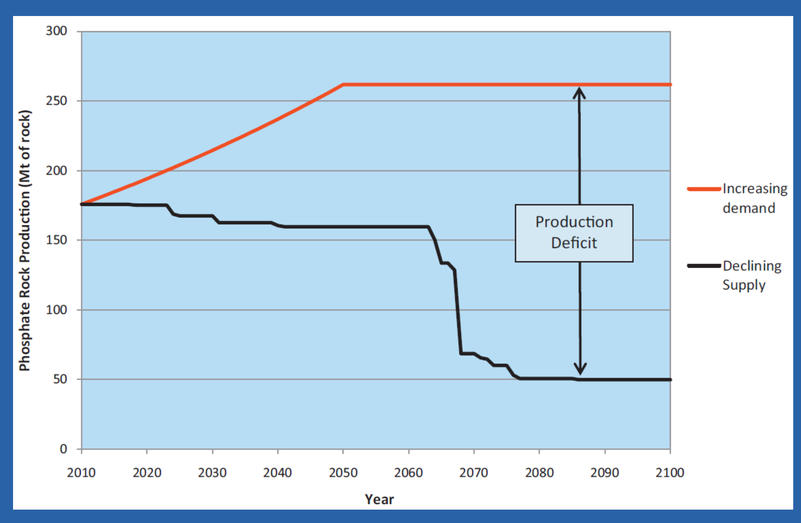


P for Food to Feed Human:

- One of the essential fertilizer for growing plant
- There is no substitute for it in agriculture
- Supply of available phosphorus limits the size of the population possible in an ecosystem

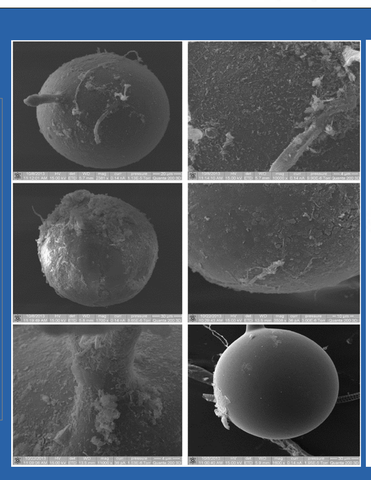


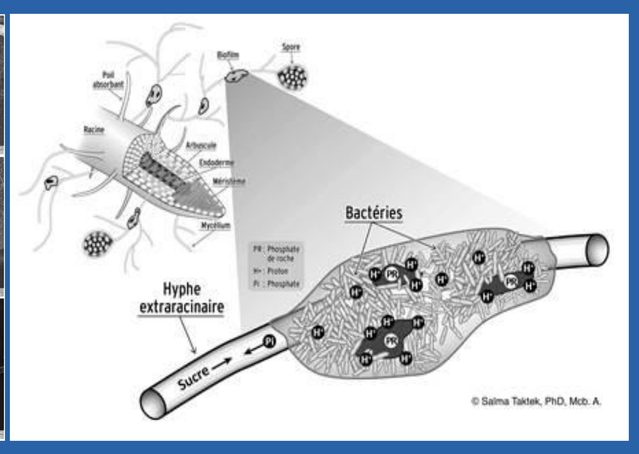
Rock phosphate production and deficit:



Microbe-plant interactions

* AMF and microbes in the soil collaborate to solubilize the rock phosphate RP.
* Phosphate solubilization mechanisms by microbes





Objectives

- Study microbial community structure associated with AMF *Rhizophagus irrigularis* in response to Rock Phosphate application.
- Identify hub microbial communication network for phosphate dissolution.

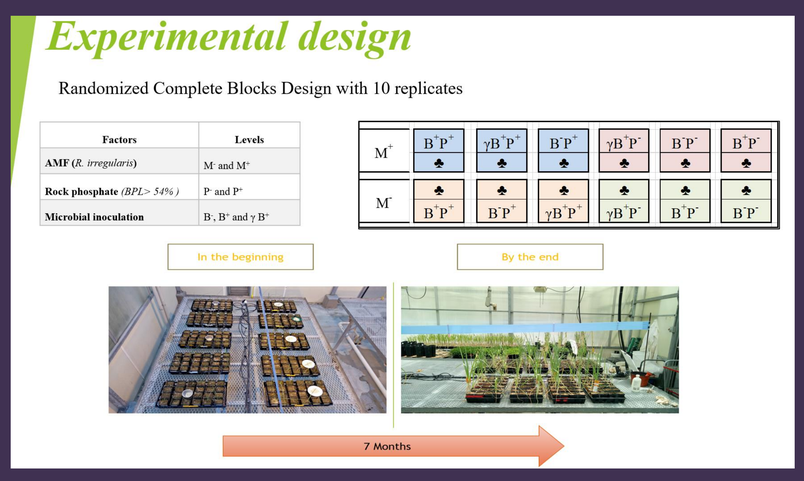
Hypothesis

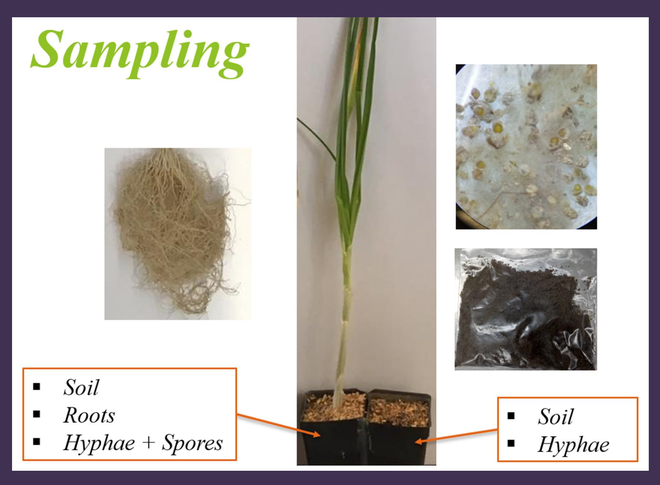
- Microbial community associated with AMF varies in response to RP
- Hub microbes could be used as bioinoculant that might balance ecosystem

METHODOLOGIES

Substrate preparation 1:1 (sand/sandy-loam)

Microbe rich Soil from Montreal Botanical Garden → Microbial suspension





Steps for Bioinformatic Analysis

Samples → DNA extraction → Polymerase Chain Reaction → Sequencing (Illumina MiSeq) → Raw Sequence Reads → Clean Reads → OTUs clustering Analysis → Alpha Diversity Analysis / Taxonomic Composition Analysis → Microbial Diversity/Similarity Analysis → Multivariate Statistical Analysis (PCoA, Networks Analysis) → Functional Gene Patterns Prediction

Impact

- Findings will lead to better understanding of AMF, microbes and plants interactions within the context of phosphate dissolution.
- Improve the use efficiency of fertilizers in agriculture,
- Extend the rock phosphate use out of acidic soils and
- Satisfy the demand of the emergent market of organic crops in the world
- Will address the fundamental logic of biological and bioinformatics knowledge applied to a timely research question.

MOHAMMED VI POLYTECHNIC UNIVERSITY
Université de Montréal
Institut de recherche en biologie végétale
Université de Montréal Biodiversity Centre