

Master and/or bachelor thesis project

Title: Mobilization of soil phosphorus fractions, mediated by different arbuscular mycorrhiza

Where? At the Institute for Soil Science, Leibniz Universität Hannover

Background

Phosphorus (P) fertilizer will run short in due time, and there is need to reduce the dependency on soluble fertilizers in managed ecosystems. There is need for an understanding of processes that underlie P mobilisation by the soil microbiota, by learning the strategies working in natural ecosystems.

Arbuscular mycorrhizal fungi (AMF) are a major contributor for the mobilization of P not readily available to plants. Most of the plants establishing an AM symbiosis develop in grasslands and tropical forests, where P is a limiting element.

Objectives

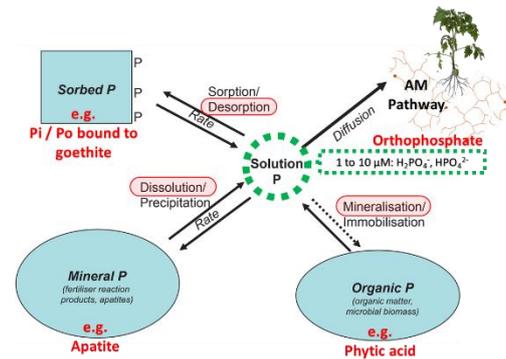
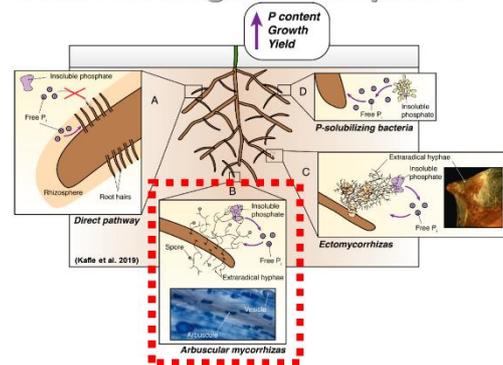
1. We want to identify whether the ability to mobilize P from sources with differing accessibility is a common characteristic of AMF with different origins and adapted to different nutrient availabilities.
2. We want to deepen the mechanisms involved in the P mobilization (e.g. release of specific enzymes, organic acids and associated microbiota). Additionally, we will investigate the cost, in terms of plant carbon investment, into the fungus to mobilize P sources with differing accessibility (e.g. primary minerals, organic P).

How?

We have established an experiment at the greenhouse to be sampled in early August 2020. We have included up to 10 AMF species, plus 9 phosphorus treatments and a C4 grass as host plant (*Sorghum bicolor x sudanese*).

The potential candidate(s) will learn protocols for the analysis of organic acids, enzymatic activities (e.g. phytase), as well as techniques for estimating growth and metabolic status of the fungus, such as phospholipids (PLFA) and neutral lipids (NLFA), respectively. At the plant level, we will measure photosynthetic activity, as well as the most usual plant traits (e.g. biomass, leaf area, nutrient contents in the leaves-shoots-roots, mycorrhization rates).

Plant strategies to acquire P



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