RÉPUBLIQUE FRANÇAISE
Liberté Égalité Fraternité

INRAE

Exploratory project
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Keywords
Endophytic microorganisms, growth, phytopathogens, plants

INRAE unit
AMAP
INTERACTIONS
ECOFOG
Axe Patrons et Assemblages des Communautés

Partner
UMR LRSV & Metabohub, Metatoul
UMR IBENS
Univ São Paulo (Brésil)
Austrian Institute of Technology (Autriche)

HOLOBROM

Maternal effects and environmental filtering on microbial flux from mother plants to their offspring

The HOLOBROM project studies the acquisition and transmission of microbial endophytes (which live inside a plant) on plant development and growth. Studies on cultivated species suggest maternal effects, but little is known about these effects in natural ecosystems, which are also subject to strong environmental gradients.

All living plants interact with endophytic microorganisms that live within plant tissues without inducing symptoms in the plant. Colonisation by the microbiota can provide significant benefits to their host plants by producing various metabolites that promote plant growth, improve water and nutrient acquisition, enhance resistance to abiotic and biotic stresses, and provide protection against plant pathogens, insects and herbivores. Therefore, the endophytic microbiota can affect various aspects of plant physiology, metabolism and ecological interaction, and is therefore an important part of the plant phenotype. These microbiota can be transmitted horizontally (acquired from the surrounding environment) and vertically (acquired directly from the parent via seeds). Seed-borne endophytes are therefore particularly important as they are transmitted between successive generations of plants by vertical transmission (microbial flux), thus providing the next generation of seedlings with valuable endosymbionts. However, the relative importance of horizontal and vertical transmission of microbial endophytes is not yet clear.

Objectives

The main objective of the HOLOBROM project is to understand how much of the microbial community is inherited from the mother plant via seeds, to what extent microbial fluxes are influenced by local environmental conditions, and how these microorganisms regulate seedling germination and growth.

Partners

INRAE division	INRAE unit	Expertise
ECODIV Ecology and Biodiversity	AMAP INTERACTIONS	Functional ecology and plant ecophysiology. Experimentation and contribution to the measurement of plant functional traits.
	ECOFOG Axe Patrons et Assemblages des Communautés	Microbial community ecology, metabarcoding, analyses and measurements of microbial functional activities, modelling of microbial fluxes, plant ecophysiology, phenotyping, monitoring and measurements of seedlings in nurseries, applied mathematics and analysis of metagenomic data, bioinformatics and statistics
Partner		**Expertise**
LRSV – Symbiose mycorhizienne & Metabohub, Metatoul		Integrative analysis of 'omics' data. Advice on the use of the R package Mixomics. Global and targeted metabolomics, biochemistry, mass spectrometry.
IBENS Écologie et biologie de l'évolution		Microbial community ecology and metabarcoding. Advice on bioinformatics (OBITOOLs) and statistical analysis.
Physiology and Development of Plants Univ São Paulo		Plant physiology and biochemistry.
Health and bioresources Austrian Institute of Technology (AIT)		Plant-microorganism interaction, microbial ecology, confocal microscopy.

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