

TypeSeeds

Project title: Impact of intermicrobial competitions via T6SS on the dynamics of seed microbiota assemblages

Acronym: **TypeSeeds**

Project duration: 25 months - Start date: 01/09/2020 End date: 30/09/2022

Key-words: microbiota, seed, intermicrobial competition, plant pathogens, transmission, germination, vigour

Coordinators: Alain SARNIGUET / IRHS - Emersys
alain.sarniquet@inrae.fr

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Summary:

Plant seeds harbor a diversified microbiota that contributes to plant health. To take advantage of beneficial seed-microbiota associations in agriculture, further knowledge is needed to understand the assembly of the seed microbiota and its dynamics during early plant developmental stages. The seed habitat is quite limited in space and resource and consequently induces a strong population bottleneck. Accordingly seed microbiota diversity is quite limited in comparison to other plant habitats with few dominant microbial taxa. Nevertheless some important diversity is maintained in seed microbial assemblage and is prone to changes after variation of environmental conditions and of plant genotype. The occurrence of diversified but shared metabolism abilities partially explains the composition and functions of microbial assemblages. Microbial interactions can also be regulated by intermicrobial competition through specific antimicrobial weapons. Some seed dominant bacterial phyla have such weapons like bacterial targeting secretions systems of antimicrobial effectors (or T6SS). To date the contribution of such secretion system in the assembly of the seed microbiota and ultimately seed performance is not yet understood. The aim of the project is to explore the role of T6SS in microbial assemblage dynamics in Brassicaceae seeds and their direct or indirect impact on pathogen transmission by seeds and on seed germination.

Objectives:

The aim of the project is to explore the role of T6SS in microbial assemblage dynamics in Brassicaceae seeds and their direct or indirect impact on pathogen transmission by seeds and on seed germination.

Context and Scientific / Socio-economic issues:

Plant seeds are colonized by diversified microbiota that contribute to plant growth and health. To harness beneficial seed-microbiota associations, it is necessary to understand the mechanisms of microbiota assembly and their dynamics during the early stages of plant development.

Seed health quality and particularly the absence of controlled (i.e. quarantine) pathogens is a major standard for seed marketing. The microbiota can interfere with pathogen transmission and seed vigour and therefore facilitates crop growth start. Thus the microbiota is a key target to improve seed quality in the context of drastic reduction of pesticide application as seed coating (see the successive Ecophyto programs). Seed microbiota harnessing provides new and alternative solutions.