**Uncovering the seed microbiota diversity and its role for plant health using synthetic ecology**

**Louna Colaert – Sentenac**

PhD Student at the Laboratory of the Research Institute of Horticulture and Seeds (IRHS), France

**Abstract**

The microbial communities associated with seeds, known as seed microbiota, are involved in seed germination, seedling emergence, and seedling health. Understanding the assembly, composition, and function of seed microbiota is therefore essential for optimizing agricultural practices and increasing crop productivity.

The development of sequencing and -omics techniques has improved our understanding of plant-microbiota associations. However, how they interact, when and where this occurs, remains poorly understood. Recent advances in seed microbiota engineering allow to manipulate seed microbiota so as to better understand the role of selected strains and representative microbiota on seed germination, seedling emergence and seedling phenotype.

Seed microbiota assembly begins during seed development and is influenced by several factors, including plant genotype, environmental conditions, and microbiota-microbiota interactions. The seed microbiota is a low-diversity community with dominant strains found across multiple species and agricultural conditions. Here, we evidence the role of seed microbiota in seed germination and seedling emergence ability. Using synthetic communities inoculations, we confirm the environmental-dependent effect of seed inoculation on seedling phenotype. We show associations between seed or seedling microbiota and metabolism at different early developmental stages.
Ultimately, these techniques could be used to design and inoculate synthetic microbiota based on desired plant phenotype traits, such as resistance against phytopathogens.