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THE SPERMOSPHERE EFFECT: BUILDING UP PLANT MICROBIOME ASSEMBLY

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Backgrounds

Plants have a significant influence on the diversity and activity of soil microbial communities. During imbibition and germination, plant seeds release chemically diverse exudates thereby promoting microbial activity in the zone surrounding the seed, also referred to as the spermosphere. To date, little is known about the diversity and activities of microbial communities in the spermosphere and how this short-lived plant developmental stage affects microbiome assembly.

Objectives

Here, we deciphered the magnitude of the spermosphere effect for two different food crops, i.e. tomato and bean. More specifically, we investigated if a plant genotype-dependent influence is discernible in the spermosphere and to what extent the spermosphere microbiome relates to the rhizosphere microbiome.

Methods

We selected wild and modern accessions of tomato and common bean for which strong differences in the rhizosphere microbiome were found in previous studies.

Conclusions

Community profiling of the spermosphere revealed a decrease of α-diversity of all crop accessions as compared to the bulk soil. Similarly, a significant difference in the β-diversity was observed between bean accessions and bulk soil. Bacteroidetes, Firmicutes and Proteobacteria were the bacterial phyla that consistently responded to the seed germination and were significantly more abundant in the spermosphere. Albeit small, significant differences in the β-diversity were detected between wild and modern crop accessions, suggesting a plant genotype-dependent effect already at this early developmental stage. If and how seed exudates are the main driver of the differences in spermosphere communities between the wild and modern crop accessions is currently under investigation.