

Speaker Abstracts - Tuesday 4 December

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The root microbiota coordinates trade-offs between shade and immune responses in Arabidopsis

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Light is one of the fundamental environmental factors underlying plant growth and development, and can also influence plant immune responses. Besides the impact of abiotic factors, plant growth in nature is also regulated by diverse microbial assemblages collectively called the plant microbiota. The microbiota is thought to help plants overcome specific environmental constraints, likely promoting plant adaptation in their natural habitats. However, the role of the root microbiota in plant growth and plant immune responses under shade stress remains unclear. We used synthetic microbial culture collections (bacteria, fungi, and oomycetes) and gnotobiotic plant systems to reconstitute the root microbiota under strictly controlled laboratory conditions. Together with amplicon-based high-throughput microbial profiling, these experiments indicated that the root microbiota augments host shade tolerance and revealed shade-dependent microbial community shifts in Arabidopsis roots. Moreover, RNAseq data identified microbiota-dependent shade-responsive genes in both roots and shoots, indicating a functional link between the microbiota and shade responses in Arabidopsis. Notably, immune responses in roots and systemic defense responses in shoots are induced in the presence of the root microbiota under normal light conditions but are largely shut down under shade, implying that the induction of plant defense by the root microbiota is light-dependent. Ongoing analysis of Arabidopsis mutants impaired in immunity and light signaling pathways will shed new light onto the underlying mechanisms coordinating microbiota-dependent trade-offs between growth and defense under shade. These findings may facilitate efforts to define and deploy useful microbes that enhance plant performance under suboptimal light conditions.