# Survival trade-offs in plant roots during colonization by closely related beneficial and pathogenic fungi

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**POSTER SESSION ABSTRACTS**
**Session CS2 Pathogenesis and symbiosis**
**CS2M94**

***Monday 4th April***
***14:00 - 16:00***

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## Survival trade-offs in plant roots during colonization by closely related beneficial and pathogenic fungi

Although most characterized species of the fungal genus *Colletotrichum* are destructive pathogens, we found recently that *C. tofieldiae* (*Ct*) is an endemic endophyte in natural *A. thaliana* populations in Central Spain. Colonization by *Ct* initiates in roots, but can also spread systemically into shoots. *Ct* transfers the macronutrient phosphorus to shoots, promotes plant growth and increases fertility only under phosphorus-deficient conditions, a nutrient status that might have facilitated the transition from pathogenic to beneficial lifestyles. Comparative genome and transcriptome analyses between *Ct* and its closely related pathogenic species *C. incanum* (*Ci*) identified genomic signatures reflecting this recent transition from pathogenic to beneficial lifestyles, including a narrowed repertoire of secreted effector proteins, expanded families of secondary metabolism-related proteins, and limited activation of pathogenicity-related genes *in planta*. Analysis of the *Arabidopsis* transcriptome during root colonization by *Ct* revealed that beneficial responses are prioritized under phosphorus-deficient conditions whereas defense responses, involving ethylene and glucosinolate pathways, were activated under phosphorus-sufficient conditions. These data, together with the analysis of *Arabidopsis* mutants that are impaired in indole glucosinolate metabolism and the phosphate starvation response (PSR), provide evidence for a specific coordination between the PSR, the plant immune system and invasive fungal growth during beneficial interaction with *Ct*. Importantly, *Arabidopsis* immune responses were retained in phosphate-starved roots colonized by pathogenic *Ci*, illustrating the extraordinary ability of plants to maximize survival in response to conflicting stresses.