

Serendipita Fungi Modulate the Switchgrass Root Transcriptome to Circumvent Host Defenses and Establish a Symbiotic Relationship

Background

- *Serendipita* fungi interact with plant roots through mycorrhizal associations and as well as asymptomatic endophytes.
- Inoculation with *Serendipita* has been shown to increase drought tolerance and yield in switchgrass and other plant species.
- Very little is known regarding signaling between the partners, especially at different stages of symbiosis.

Approach

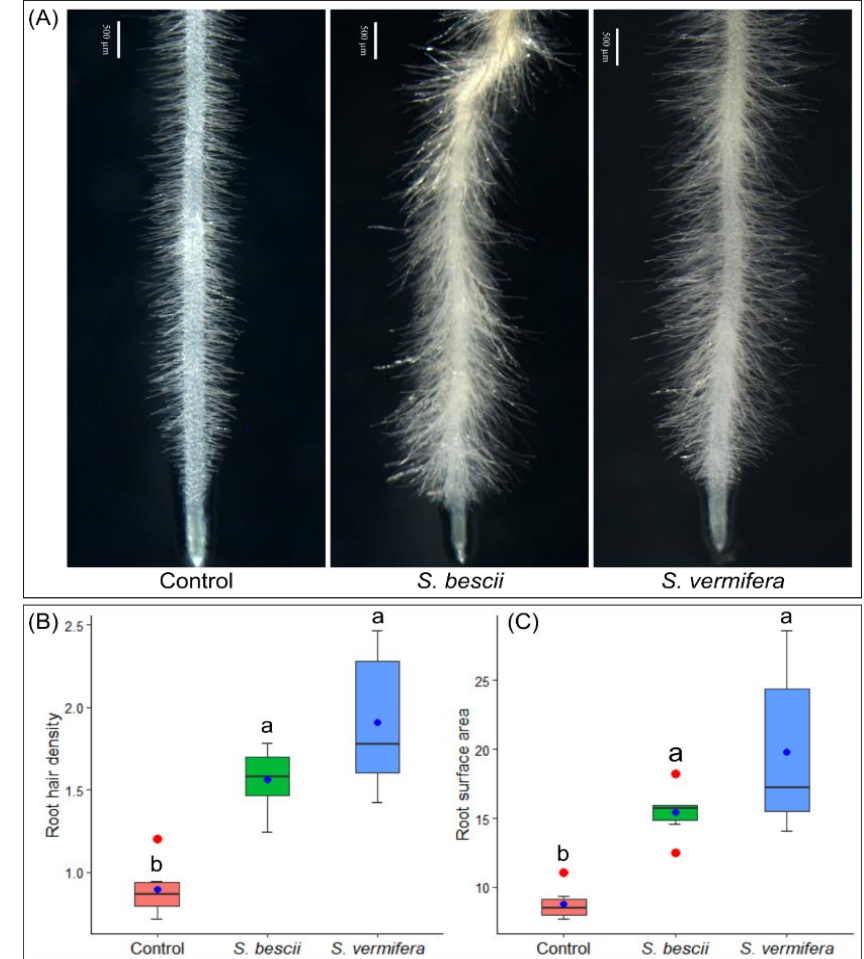
- The aim of this study was to investigate the host plant responses to *Serendipita bescii* and *Serendipita vermifera* colonization by characterizing the switchgrass root transcriptome during different stages of symbiosis.

Outcome

- Switchgrass may perceive fungi prior to physical contact, leading to the activation of chemical and structural defense responses and putative host disease resistance genes. Prior to contact, switchgrass exhibited significant increases in root hair density and root surface area.
- After contact, the host defense system is quenched, and carbohydrate metabolism is adjusted. This potentially is to accommodate colonization by either fungal symbiont. Phytohormones genes are activated.

Significance

- Understanding plant responsiveness to *Serendipita* will inform our efforts to optimize beneficial plant-microbe functions in perennials, forages, and row crops for efficient low-input, sustainable agricultural practices.



(A) Switchgrass root tip prior to *S. bescii* and *S. vermifera* colonization. Root hair density (B) and root surface area (C) increased significantly with respect to un-inoculated plants. Scale bar = 500 μm