Investigation of the Common Mycorrhizal Network Concept: Plant Growth Responses in Simulated Intercropping of a Legume and Grass under Water Stress

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It is widely claimed that the common mycorrhizal network (CMN) plays a significant role in facilitated transfer of nutrients between plants. This experiment investigated the role of a common mycorrhizal network between a C3 legume and a C4 grass under nutrient and water-limited conditions. Shoot mass of *Trifolium subterraneum* increased by almost 150% when grown in close proximity to *Panicum clandestinum* when the only possible connection between roots was via a common mycorrhizal network. Inter-species competition between *T. subterraneum* and *P. clandestinum* in low nutrient soil was observed. The soil bacterial community was similar for both *T. subterraneum* and *P. clandestinum*. Water-stress increased the relative abundance of Firmicutes and Actinobacteria and decreased the relative abundance of Proteobacteria especially when they were most likely to share a mycorrhizal connection. Water-stress decreased the putative abundance of N-cycling genes under *P. clandestinum*, but not under *T. subterraneum*. The competitiveness of *T. subterraneum* when grown adjacent to *P. clandestinum* corresponded with enhanced P acquisition and depletion of soil P under *P. clandestinum*. It was concluded that the most likely explanation for competitiveness of *T. subterraneum* was enhanced P acquisition via mycorrhizal hyphae from soil in the *P. clandestinum* soil chamber rather than direct P transfer from *P. clandestinum* via a common mycorrhizal network