

Journal of Plant Genetics and Breeding

Arbuscular Mycorrhizal Fungal Mediation of Plant-Plant Interactions in a Marshland Plant Community

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Abstract

Obligate aerobic AMF taxa have high species richness under waterlogged conditions, but their ecological role remains unclear. Here we focused on AM fungal mediation of plant interactions in a marshland plant community. Five cooccurring plant species were chosen for a neighbor removal experiment in which benomyl was used to suppress AMF colonization. A Phragmites australis removal experiment was also performed to study its role in promoting AMF colonization by increasing rhizosphere oxygen concentration. Mycorrhizal fungal effects on plant interactions were different for dominant and subdominant plant species. AMF colonization has driven positive neighbor effects for three subdominant plant species including Kummerowia striata, Leonurus artemisia, and Ixeris polycephala. In contrast, AMF colonization enhanced the negative effects of neighbors on the dominant Conyza canadensis and had no significant impact on the neighbor interaction to the dominant Polygonum pubescens. AM colonization was positively related to oxygen concentration. P. australis increased oxygen concentration, enhanced AMF colonization, and was thus indirectly capable of influencing plant interactions. Aerobic AM fungi appear to be ecologically relevant in this wetland ecosystem. They drive positive neighbor interactions for subdominant plant species, effectively increasing plant diversity. We suggest, therefore, that AM fungi may be ecologically important even under waterlogged conditions.