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Root Habitat Is the Key Factor to Differentiate the Distribution of Amf of *Pueraria phaseoloides*

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Abstract

Arbuscular mycorrhizal fungi (AMF) represent one of the key determinants of plant performance and tolerance by providing a plethora of functional capacities such as access to immobile nutrients, suppression of pathogens, and resistance biotic and abiotic stress. Given these benefits, application of AMF has great potential to promote plant growth in ecosystem restoration as well as to improve soil health and ecosystem quality. Also, AMF establishment is considered to be a critical factor in the success of ecosystem restoration and for sustainable agriculture. However, A robust understanding of the structural composition of AMF in different microenvironments and the factors which shape these communities is still poor. Therefore, we conducted a study to analyse the variability and niche differentiation of AMF communities in the rhizosphere soils and the roots of *Pueraria phaseoloides* in Ghana. As study sites, we selected sites which were disturbed by mining activities and are characterised by spontaneous growth of Pueraria. We applied AMF-specific primer amplicon sequencing via Illumina MiSeq platform. The root habitat showed significantly smaller numbers of Amplicon sequence Variants (ASVs), a lower community richness, and lower within-sample diversity (-diversity) compared to the rhizosphere soils of the plants. Non-parametric multidimensional scaling (NMDS) of weighted and unweighted UniFrac distance were performed to investigate patterns of separation between AMF communities. We found that the structural AMF composition of the rhizosphere is significantly different from the root. This is largely explained by the dominance of different AMF genera in these compartments, which is Rhizophagus in the roots and Acaulospora in rhizosphere. These results contribute to a better understanding of the complex host-AMF interactions of Pueraria as an important requirement for developing management options for ecosystem restoration (nutrient efficiency) and agriculture production by using specific AMF strains.

Keywords: Arbuscular mycorrhizal fungi, ecosystem restoration, plant-AMF interaction, sustainable method

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