

Plants select arbuscular mycorrhizal fungi that functionally complement their root traits

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Abstract

The criteria by which plants select symbiotic partners are largely unknown, but functional complementarity of partner traits could be important to symbioses such as arbuscular mycorrhizas. Specifically, coarse-rooted plants are more likely to be limited by nutrient diffusion compared with fine-rooted plants, and therefore more reliant on fungi that can compensate with traits that maximize soil exploration. However there remains no evidence directly linking plant root traits and fungal functional traits. We transplanted the root microbiome of 30 native and exotic plant species ranging in root diameter, onto an unrelated host plant species in multi-compartment pots. We then quantified fungal hyphal exploration and characterized the fungal community near and far from roots. We found that arbuscular mycorrhizal fungi from coarse-rooted plants produced more hyphal biomass and explored further away from the plant roots. This study provides the first evidence of functional complementarity between plant roots and arbuscular mycorrhizal fungi.

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