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EDITORIAL NOTE

Utilization of organic nitrogen by arbuscular mycorrhizal fungi—is there a specific role for protists and ammonia oxidizers?

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Abstract Arbuscular mycorrhizal (AM) fungi can significantly contribute to plant nitrogen (N) uptake from complex organic sources, most likely in concert with activity of soil saprotrophs and other microbes releasing and transforming the N bound in organic forms. Here, we tested whether AM fungus (*Rhizophagus irregularis*) extraradical hyphal networks showed any preferences towards certain forms of organic N (chitin of fungal or crustacean origin, DNA, clover biomass, or albumin) administered in spatially discrete patches, and how the presence of AM fungal hyphae affected other microbes. By direct ^{15}N labeling, we also quantified the flux of N to the plants (*Andropogon gerardii*) through the AM fungal hyphae from fungal chitin and from clover biomass. The AM fungal hyphae colonized patches supplemented with organic N sources significantly more than those receiving only mineral nutrients, organic carbon in form of cellulose, or nothing. Mycorrhizal plants grew 6.4-fold larger and accumulated, on average, 20.3-fold more ^{15}N originating from the labeled organic sources than their nonmycorrhizal counterparts. Whereas the abundance of microbes (bacteria, fungi, or *Acanthamoeba* sp.) in the different patches was primarily driven by patch quality, we noted a consistent suppression of the microbial abundances by the presence of AM fungal hyphae. This suppression was particularly strong for ammonia oxidizing bacteria. Our results indicate that AM fungi successfully competed with the other microbes for free ammonium ions and suggest an important role for the notoriously understudied soil protists to play in recycling organic N from soil to plants via AM fungal hyphae.

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