Plastiphily and its link to generic virulence in fungal human pathogens makes microplastics a global health factor

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Abstract

Microplastics are emerging as a selective microhabitat for soil fungi with yet elusive implications for humans and nature. To elucidate the role of microplastic in the ecological and epidemiological dynamics of fungi in terrestrial systems, the architecture and assembly mechanisms of soil (micro)plastisphere mycobiomes need to be disentangled. Therefore, neutral community models and co-occurrence network analysis were applied to ITS sequence data derived from metabarcoding of soil fungal epiplastic communities from hotspots of plastic pollution in the municipality of Siaya, Kenya. The community model revealed an interplay of deterministic and stochastic processes structuring a diverse plastisphere metacommunity, while estimated networks indicated biotic interactions and key players (keystone taxa) prevalent in the plastisphere mycobiome. By linking a newly implemented model-derived selection index to annotated trait data, including generic virulence scores of fungal taxa considered, we were able to infer correlations and postulate adaptations to a plastiphilic lifestyle for different phylogenetic and ecological fungal groups. Ultimately, insight is provided into the role of MPs as an ecological niche of pathogens and evolutionary driver of virulence. The implications of these environmental phenomena in an increasingly MP-polluted world are discussed.

Keywords: microplastics, plastiphily, fungal human pathogens, plastisphere, ITS metabarcoding, co, occurrence networks, community assembly

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