Plenary Speech II

Thermal sensitivity of mangrove leaf endospheric microbiome: niche plasticity of generalist and specialist bacteria

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Abstract

Leaf endospheres harbor diverse bacterial communities, comprising generalists and specialists, that profoundly affect ecosystem functions. However, the ecological dynamics of generalist and specialist leaf-endophytic bacteria and their responses to climate change remain poorly understood. We investigated the diversity and environmental responses of generalist and specialist bacteria within the leaf endosphere of mangroves across China. Our findings revealed a predominance of specialists, whereas generalists exhibited broader niche breadth. Temperature was the key factor driving community dissimilarity in both groups, yet it negatively influenced the alpha diversity. Interestingly, temperature had a limited impact on functional profiles, while soil nutritional factors were critical in shaping the functional profiles. Stochastic processes governed community assembly in both bacterial groups, altering the β-nearest taxon indices as temperatures increased. Our findings indicate that the halophytic leaf endosphere favors microbial niche specialization, due to its unique microenvironment and discrete niches, showing thermal sensitivity in terms of the microbial community profile. This study provides novel insights into niche differentiation and environmental adaptation mechanisms of leaf endophytic microbes in woody halophytes in response to environmental perturbations.

Keywords
Generalist–specialist, leaf endosphere, mangrove, climate change, environmental perturbation

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