The influential factors affecting fungal diversity in forests

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Purpose: Fungi play a fundamental role on plant physiology and nutrient cycles in forest ecosystems. To understand their function in ecosystems, it is prerequisite to know how many and what kind of fungal species exist in the forest. Fungal diversity can be affected by various environmental and geographical factors. Recent advancement of sequencing technology has accelerated the discovery of the fungi; however, the research of the influential factors affecting the fungal diversity and communities has progressed rather slowly. The main objective of this study is to investigate fungal diversity in the local forests and factors that affect the diversity and communities.

Methods: We attempted to detect guild pattern from ten different tree species for five years (2014-2018) in Mt. Jeombong National Park. Bulk soil samples were collected seasonally for each tree species with three replicates. DNA extracted from bulk soils was sequenced with Illumina MiSeq using ITS region to determine fungal community; we also measured soil chemical properties.

Results: Our results were compared with environmental factors, geographical factors, and source factors. Those factors significantly influenced both symbiotrophic and saprotrophic fungal communities while the type of factors and the degree of influence varied between these communities. Within the same tree species, the symbiotrophic communities were more influenced by geographical distance, whereas the saprotrophic communities were more affected by sources. Finally, we evaluated the effect of survey methods on the fungal diversity and found that only small proportion of species was shared between different methods.

Conclusion: The results show that symbiotrophic and saprotrophic fungal communities show different responses to abiotic and biotic factors. Therefore, different ecological drivers and investigation methods should be considered to uncover fungal diversity in forests.