宁南山区干化土壤真菌群落结构与多样性

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摘 要：【目的】明确宁夏南部山区干化土壤对土壤真菌群落结构及多样性的影响。【方法】以宁夏南部山区三种干化土壤为对象，于 2022 年，对三种不同干化程度土壤进行采样，对所采样品进行土壤理化性质测定以及土壤真菌高通量测序，研究土壤真菌与干化土壤之间的响应关系，即干化环境下对土壤真菌群落建成的影响。【结果】调查共得不同土层样品 72 个，经测序后通过 Barcode 识别后获得 935865 条 CCS 序列，每个样品至少产生 8995 条 CCS 系列，平均产生 12,990 条 CCS 序列，经过过滤和优化后得到 921,947 个高质量序列。经分析不同样品间多样性指数，及土壤样品群落构成发现，干化土壤对不同海拔土壤真菌群落构成具有不同程度的影响。【结论】结果表明宁夏南部山区土壤优势真菌的分布特征为，Ascomycota，Basidiomycota 在三种干化样地中相对丰度最大，Agaricomycetes，Dothideomycetes 在三种干化样地中相对丰度最大。T1，T3 样地中 Pseudoarthrographis，Hygrocybe 相对丰度最大，而在 T2 样地中 Pseudoarthrographis，Mortierella 相对丰度最大。而干化程度较低的样地 Ace 指数 Chao1 指数水平较高。最后，根据 RDA 分析表明，土壤水分，土壤有机质，土壤全氮含量和土壤全磷含量是影响宁南山区干化土壤真菌群落结构及其丰度的主要理化因子。

关键词：土壤真菌；干化土壤；群落结构；环境因子；多样性

The structure and diversity of fungal communities of drying soil in southern Ningxia

Abstract:【Objective】To clarify the effects of drying soil on soil fungal community structure and diversity in the mountainous region of southern Ningxia.【Method】Three kinds of drying soils in the mountainous areas of southern Ningxia were sampled in 2022 with three different degrees of drying, and the samples taken were subjected to the determination of soil physical and chemical properties as well as high-throughput sequencing of soil fungi to study the response relationship between soil fungi and drying soils, i.e., the effects of drying environments on the establishment of soil fungal communities.【Result】A total of 72 samples from different soil layers were obtained from the survey, and 935,865 CCS sequences were sequenced and identified by Barcode, with each sample generating at least 8,995 CCS series, and an average of 12,990 CCS sequences, and 921,947 high-quality sequences were obtained after filtering and optimization. After analyzing the diversity indices among different samples, and the community composition of the soil samples, it was found that the drying soil had different degrees of influence on the community composition of soil fungi at different elevations.【Conclusion】The results showed that the distribution of dominant soil fungi in the mountainous areas of southern Ningxia was characterized by the relative abundance of Ascomycota, Basidiomycota in the three drying samples, Agaricomycetes, Dothideomycetes in the three drying samples, and Pseudoarthrographis, Hygrocybe in the T1 and T3 samples, and Pseudoarthrographis, Mortierella in the T2 sample. Pseudoarthrographis, Hygrocybe had the greatest relative abundance in T1, T3 samples, while Pseudoarthrographis, Mortierella had the greatest relative abundance in T2 samples. And the level of Ace index Chao1 index was higher in the samples with lower degree of drying. Finally, according to the RDA analysis, soil moisture, soil organic matter, soil total nitrogen content and Soil total phosphorus content were the main physicochemical factors affecting the structure of fungal communities and their abundance in the drying soils of the mountainous areas of southern Ningxia.

Key words: Soil fungi; Drying soil; Community structure; Environmental factors; Diversity