

接种AMF对贺兰山蒙古扁桃-短花针茅群落的促生作用及其影响因子

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摘要: 贺兰山低山灌丛对于资源缺乏的干旱半干旱区荒漠生态系统稳定性具有重要生态作用, 而灌丛的灌木和草本植物间的相互作用和共存机制一直是生态学研究的核心问题之一。其中, 由丛枝菌根真菌 (Arbuscular mycorrhizal fungi, AMF) 组成的菌根网络又是植物间养分转移分配和影响地上植物高效吸收养分的重要途径和关键性因素。本研究以贺兰山低山区主要优势灌丛群落蒙古扁桃-短花针茅为研究对象, 设置灭菌与未灭菌两种对照处理, 利用高通量测序技术, 探明该地区灌木、草丛和灌草三种植被类型接种 AMF 后产生的有利影响及策略, 并揭示根际土壤 AMF 群落多样性及其影响因子。结果表明: 与灭菌处理相比, 未灭菌的蒙古扁桃和短花针茅的球囊霉素相关土壤蛋白 (Glomalin-related soil protein, GRSP)、根系浸染率、根系土壤孢子密度及根际土壤养分均有不同程度的提高, 这些结果表明 AMF 通过和植物形成互利共生体使植物更高效的吸收利用营养元素从而提高生长发育能力。同时, 通过高通量测序得出宁夏贺兰山低海拔地区蒙古扁桃灌丛的优势属为球囊霉属, 平均占比达 99%, 根际土壤 AMF 群落结构和多样性主要受根际土壤养分和生物因素影响, 其中土壤有机质和氮为主要因子, 水分、磷和速效钾次之。该研究旨在为贺兰山干旱半干旱区生态系统功能的养护和稳定以及植被的修复提供理论参考。

Growth promotion effect and influencing factors of AMF inoculation on *Prunur mongolica*-*Stipa breviflora* Communities

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Abstract: The low shrublands of Helan Mountain play an important ecological role in the stability of arid and semi-arid desert ecosystem, and the interaction and coexistence mechanism between shrublands and herbaceous plants has always been one of the core issues in ecological research. Mycorrhizal networks composed of Arbuscular mycorrhizal fungi (AMF) are important ways and key factors that affect nutrient transfer and distribution among plants and the efficient absorption of nutrients by above-ground plants. In this

study, *Prunus Mongolica* (Maxim.) Ricker-*Stipa breviflora* Griseb, the dominant shrub community in the lower mountain area of Helan Mountain, was selected as the research object, and two control treatments were set up: sterilization and non-sterilization. High-throughput sequencing technology was used to explore the beneficial effects and strategies of AMF inoculation on bush, grass, herbaceous plant types in this area, and to reveal the diversity of rhizosphere soil AMF community and its influencing factors. The results showed that Glomalin-related soil protein (GRSP), root infiltration rate, root soil spore density and rhizosphere soil nutrients of unsterilized *P.mongolica* and *S.breviflora* were increased to varying degrees compared with sterilization treatment. These results suggest that AMF improves plant growth and development by forming mutually-beneficial symbionts that enable plants to absorb and utilize nutrients more efficiently. Meanwhile, high-throughput sequencing showed that *Glomus* was the dominant genus of *P.mongolica*-*S.breviflora* communities almond shrub in low altitude area of Helan Mountain, Ningxia, with an average proportion of 99%. The AMF community structure and diversity of rhizosphere soil were mainly affected by rhizosphere soil nutrients and biological factors, in which soil organic matter and nitrogen were the main factors, followed by water, phosphorus and available potassium. The purpose of this study is to provide theoretical reference for the conservation and stability of ecosystem function and the restoration of vegetation in arid and semi-arid region of Helan Mountain. The purpose of this study is to provide a theoretical reference for the conservation and stability of ecosystem functions and the restoration of vegetation in Helan Mountain region.