

## 土壤因子对甘肃、宁夏和内蒙古盐碱土中AM真菌的影响

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## Effect of soil factors on arbuscular mycorrhizal fungi in saline alkaline soils of Gansu, Inner Mongolia and Ningxia

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摘要

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**摘要** 为探明甘肃、宁夏和内蒙古盐碱土中AM真菌多样性及其与土壤因子间的关系, 2005年5月从甘肃、宁夏和内蒙古7个县(市)的盐碱土中采集主要植物的根围土壤样品, 研究了AM真菌物种多样性。在分离的4属28种AM真菌中, 球囊霉属(*Glomus*)20种, 多孢囊霉属(*Diversispora*)2种, 原囊霉属(*Archaeospora*)2种, 无梗囊霉属(*Acaulospora*)4种。其中根内球囊霉(*G. intraradices*)和薄壁原囊霉(*Ar. leptotichum*)的分离频度最高。相关分析和通径分析(path analysis)结果表明, AM真菌种的丰度与土壤有机质和速效N含量呈显著负相关;  $Cl^-$ 、 $CO_3^{2-}$ 、 $HCO_3^-$ 、 $Na^+$ 、 $Ca^{2+}$ 、有机质、速效P和速效K直接影响AM真菌种的丰度, 而 $SO_4^{2-}$ 、 $K^+$ 、水溶性全盐、 $Mg^{2+}$ 、pH和速效N则间接影响AM真菌种的丰度; 土壤有机质对AM真菌Shannon-Wiener多样性指数有显著直接负效应;  $Cl^-$ 、 $CO_3^{2-}$ 、 $K^+$ 、 $Mg^{2+}$ 、有机质、速效P和速效K直接影响Shannon-Wiener多样性指数, 而 $HCO_3^-$ 、 $Na^+$ 、 $Ca^{2+}$ 、 $SO_4^{2-}$ 、水溶性全盐、pH和速效N则间接影响Shannon-Wiener多样性指数。冗余度分析结果表明, AM真菌种的相对多度与土壤因子间有显著相关性。可见, 甘肃、宁夏和内蒙古盐碱土中AM真菌种类丰富, 其多样性与土壤养分状况、盐度以及离子含量有关。

**关键词:** 盐碱土 土壤因子 AM真菌 丰度 相对多度 Shannon-Wiener多样性指数

**Abstract:** In order to explore arbuscular mycorrhizal (AM) fungal resources and reveal the relationship between soil factors and AM fungal diversity, we collected soil samples from the rhizosphere of main plants in saline alkaline soils of Gansu, Inner Mongolia and Ningxia. A total of 28 AM fungal species were identified. Of these, 20 species belonged to the genus *Glomus*, 2 to *Diversispora*, 2 to *Archaeospora*, and 4 to *Acaulospora*. The frequencies of *G. intraradices* and *Ar. leptotichum* were the highest. Correlation analysis revealed that AM fungal species richness was significantly correlated with the contents of soil organic matter and available N, while Shannon-Wiener diversity index was significantly related with soil organic matter content. Path analysis revealed that organic matter had a significantly direct negative influence on Shannon-Wiener diversity index;  $Cl^-$ ,  $CO_3^{2-}$ ,  $K^+$ ,  $Mg^{2+}$ , organic matter, available P and available K directly impacted Shannon-Wiener diversity index, while  $HCO_3^-$ ,  $Na^+$ ,  $Ca^{2+}$ ,  $SO_4^{2-}$ , soluble salt, pH value and available N indirectly affected Shannon-Wiener diversity index;  $Cl^-$ ,  $CO_3^{2-}$ ,  $HCO_3^-$ ,  $Na^+$ ,  $Ca^{2+}$ , organic matter, available P and available K directly impacted AM fungal species richness, while  $SO_4^{2-}$ ,  $K^+$ , soluble salt,  $Mg^{2+}$ , pH value and available N indirectly affected AM fungal species richness. Redundancy analysis revealed that the relative abundance of 14 AM fungal species was significantly correlated with soil factors. Our results indicate that there are plenty of AM fungal species in the saline alkaline soils of the three regions, and AM fungal diversity is related with nutrient status and contents of soluble saline and ions in soils.

**Keywords:** saline alkaline soil soil factor arbuscular mycorrhizal fungi species richness relative abundance Shannon-Wiener diversity index

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