

不同磷肥水平下丛枝菌根菌对玉米修复芘污染土壤的影响

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Effects of arbuscular mycorrhizal fungus on remediation of pyrene contaminated soil by corn with different phosphorus concentration

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摘要 盆栽试验研究了不同磷肥水平下接种丛枝菌根菌 (Arbuscular mycorrhizal fungi, AMF) 对玉米修复芘污染土壤的影响。结果表明, 在施磷水平为20和80 mg/kg条件下, 50 mg/kg芘处理土壤中丛枝菌根菌能够正常侵染玉米根系, 侵染率没有显著变化; 土壤芘污染对玉米的生长有抑制作用, 缺磷土壤中施磷能够缓解土壤芘对玉米生长的抑制作用。培养60 d后, 高磷 (80 mg/kg) 和低磷 (20 mg/kg) 条件下, 玉米接种AMF处理土壤芘残留浓度分别比相应的不接种处理降低了38%和35%, 比相应无玉米的对照处理降低了53%和58%。表明玉米接种混合AMF能够显著降低土壤芘残留浓度, 促进土壤芘的去除。与P 20 mg/kg处理相比, P 80 mg/kg处理玉米接种及不接种AMF的土壤芘残留浓度分别降低了16%和19%, 表明缺磷土壤中施磷对玉米及菌根玉米去除土壤芘均有一定促进作用。土壤微生物碳量与土壤芘的去除率显著正相关, 接种AMF和P 80 mg/kg处理均能够显著增加土壤微生物碳量, 因此土壤微生物数量的增加可能是其促进土壤芘的去除的重要原因。

关键词: 丛枝菌根菌 玉米 芘 磷 土壤 丛枝菌根菌 玉米 芘 磷 土壤

Abstract:

Pot experiments were conducted to investigate the effects of arbuscular mycorrhiza fungus (AMF) on the removal of pyrene in soil by corn (*Zea Mays* L.) with different phosphorus concentration treatments. Results showed that AMF community successfully inoculated corn in the soil with 50 mg/kg pyrene plus 80 and 20 mg/kg phosphorus treatment. After 60 days of 80 and 20 mg/kg phosphorus treatment, pyrene residue decreased 38% and 35% comparing with AMF inoculated corn treatment, and 53% and 58% comparing with control, respectively. Results indicated that AMF inoculation significantly reduced pyrene residue in soil, increased the capacity of pyrene removal. Comparing with 20 mg/kg treatment, pyrene residue decreased 16% and 19%, respectively, with inoculation and control treatment under 80 mg/kg phosphorus application. It suggested that phosphorus had positive effect on the removal of pyrene in low phosphorus soil with corn AMF inoculation. Results also showed that C in soil microbial biomass had a significant positive relationship with pyrene removal rate in soil. Both corn inoculation by AM and 80 mg/kg phosphorus treatment significantly increased C in soil microbial biomass, thus, the increase of microbial number was most likely the reason to reduce the pyrene residue in soil.

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