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研究报告

芦竹对不同重金属耐性的研究

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摘要

研究芦竹（*Arundo donax*）在不同重金属污染湿地中的耐毒性能，测定了不同生长时段芦竹的生物性状和叶绿素含量，以及土壤中重金属含量的变化.结果表明，芦竹分别在浓度为100 mg·kg^{-1}左右的Cu^{2+}、Pb^{2+}、Cd^{2+}、Zn^{2+} 、Ni^{2+}、Hg^{2+}和50 mg·kg^{-1}以下的Cr^{6+} 污染环境中能正常成活，在40 d的生长期内，植物体内叶绿素有不同程度降低，下降比率在20%～56%，植物出现叶片软化，叶尖枯黄等症状，但植株仍呈现增长趋势.与对照植物相比较，在重金属胁迫下，植株细长，茎、叶呈黄绿色，除Cr^{6+} 、Hg^{2+}外，植物高度基本不受重金属胁迫的影响.芦竹在高浓度（100 mg·kg^{-1} ）Cr^{6+} 污染环境中耐性较弱，表现出生长缓慢，部分地下茎腐烂，叶片短时间内出现枯萎等症状.结果还表明，土壤中重金属浓度随植物生长期长而降低，除被植物吸收，植物挥发外，还存在着重金属向根际圈环境迁移的趋势，根周边湿土中重金属含量，明显高于试验缸外围湿土中重金属含量.可以认为，芦竹具有生物量大，根系发达，适应性强等特点，对修复湿地重金属污染蕴藏着巨大潜力，研究芦竹在植物修复技术中的应用，具有一定的现实意义.

关键词 芦竹；重金属污染；植物修复；耐性

分类号

Tolerance of *Arundo donax* to heavy metals

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Abstract

This paper studied the tolerance of *Arundo donax* grown in a simulated heavy metals polluted wetland,and determined the biological characters and chlorophyll contents of the plant at its different growth stages as well as the changes of soil heavy metals contents.The results showed that Arundo donax could survive in the wetland when the concentrations of Cu^{2+}、Pb^{2+}、Cd^{2+}、Zn^{2+} 、Ni^{2+}、$Hg^{2+}$and Hg^{2+} were 100 mg·kg^{-1} and Cr^{6+} concentration was 50 mg·kg^{-1} .During 40 days growth period, the chlorophyll content decreased by 20%～56% and the leaf became soft with its tip withered,but the plant still grew.Compared with control, *Arundo donax* in the polluted wetland was slight and yellow-green,but the impact on plant height was inconspicuous. *Arundo donax* treated with 100 mg·kg^{-1} Cr^{6+} grew slowly with its root stock rotted,and its leaves withered in a short time,indicating that the plant could not tolerate the pollution of high concentration Cr^{6+}.The concentrations of soil heavy metals declined with the growth of the plant,probably due to the translocation of heavy metals from peripheral soil to rhizosphere and the phytoextraction and phytovolatilization, because the heavy metals contents in rhizosphere were much higher than those in the bulk soil in the test jar.The characters of large biomass,exuberant root and good adaptability of *Arundo donax* suggested its great potential in remediation of polluted soils.The study on the application of *Arundo donax*

to phytoremediation is of realistic significance.

Key words *Arundo donax* Heavy metal pollution Phytoremediation Tolerance

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