

## 麻疯树对铅胁迫的生理耐性研究

李清飞

信阳师范学院城市与环境科学学院

Physiological Tolerance of *Jatropha curcas* to Lead Stress

LI Qing-Fei

Department of Urban and Environmental Science, Xinyang Normal University

摘要

参考文献

相关文章

Download: [PDF \(840KB\)](#) [HTML 1KB](#) Export: [BibTeX](#) or [EndNote \(RIS\)](#) [Supporting Info](#)

摘要 通过盆栽试验研究土壤中不同浓度 (0、200、400、800、1600和3200 mg·kg<sup>-1</sup>)Pb胁迫对麻疯树生长、Pb吸收及相关生理指标的影响。结果表明,当土壤w(Pb)≥800 mg·kg<sup>-1</sup>时,麻疯树生长受到明显抑制;麻疯树植株不同部位Pb含量随土壤Pb浓度的升高而增加,且各部位Pb含量从高到低依次为根、叶和茎;当土壤w(Pb)≥800 mg·kg<sup>-1</sup>时,麻疯树叶中超氧化物歧化酶(SOD)、过氧化物酶(POD)和过氧化氢酶(CAT)活性,以及可溶性糖、脯氨酸和酸溶性(SH)含量均显著提高,而谷胱甘肽(GSH)含量仅在土壤w(Pb)为3200 mg·kg<sup>-1</sup>时才显著增加;可溶性蛋白质含量随Pb浓度的增加呈倒“W”型变化,当土壤w(Pb)为400 mg·kg<sup>-1</sup>时,其含量最大;上述生理指标的变化可缓解重金属Pb对麻疯树的毒害。主成分分析结果表明Pb胁迫处理的聚类结果与各处理麻疯树生物量及生理指标的变化规律相吻合,POD活性和可溶性糖含量对缓解重金属Pb毒害的贡献较大。可见,麻疯树在Pb污染土壤修复中具有一定的应用前景。

关键词: 麻疯树 铅胁迫 生理耐性 土壤修复 植物修复 主成分分析

Abstract: To study the effect of lead stress on growth, lead absorption and related physiological indexes in *Jatropha curcas*, a pot experiment was conducted with soils treated with the Pb concentration of 0, 200, 400, 800, 1600, and 3200 mg·kg<sup>-1</sup>, separately. Results show that growth of *J. curcas* was significantly inhibited when soil w(Pb) ≥ 800 mg·kg<sup>-1</sup>. With increasing Pb concentration in the soil, the Pb contents in various parts of the plant increased, showing a decreasing order of root, leaf, and stem. And when soil w(Pb) was ≥ 800 mg·kg<sup>-1</sup>, the antioxidant enzymes, i.e. superoxide dismutase (SOD), peroxidase (POD) and catalase (CAT), and the contents of proline, soluble sugar, and acid thiol (SH) in the plant leaves were all increased significantly, however, the content of glutathione (GSH) would show a sharp rise only when soil w(Pb) reached up to 3200 mg·kg<sup>-1</sup>. With increasing Pb concentration in the soil, the content of soluble protein rose first and then declined, and peaked when soil w(Pb) was at 400 mg·kg<sup>-1</sup>. The above-described changes in physiology of *J. curcas* reduced Pb toxicity to the plant to a certain extent. Principal component analysis (PCA) revealed that the result of clustering of the treatment of Pb stress accorded with the law of the changes in biomass and physiological indices of *J. curcas*. Among the physiological indices of *J. curcas*, POD activity and soluble sugar content were major contributors to alleviating Pb toxicity to the plant. The findings of the research suggest that *J. curcas* has great potential for phytoremediating lead polluted soils.

Keywords: *Jatropha curcas* lead stress physiological tolerance soil remediation plant rehabilitation principle components analysis

Received 2011-09-26; published 2012-01-25

Fund:

国家高技术研究发展计划重点项目(2007AA061001); NFSC-广东联合基金(U0833004); 河南省科技厅项目(112102310431); 信阳师范学院博士科研启动基金

About author: 李清飞 (1980-), 男, 河南封丘人, 讲师, 博士, 主要从事环境保护方面的教学与研究工作。E-mail: liqingfei@yahoo.cn

引用本文:

李清飞. 麻疯树对铅胁迫的生理耐性研究[J]. 生态与农村环境学报, 2012, V28(1): 72-76

LI Qing-Fei. Physiological Tolerance of *Jatropha curcas* to Lead Stress[J]. Journal of Ecology and Rural Environment, 2012, V28(1): 72-76

## Service

- ▶ 把本文推荐给朋友
- ▶ 加入我的书架
- ▶ 加入引用管理器
- ▶ Email Alert
- ▶ RSS

## 作者相关文章

- ▶ 李清飞