植物研究 2012 32 (1): 124-128 ISSN: 1673-5102 CN: 23-1480/S

Cu^{2+}胁迫对丹参生长及有效成分积累的影响

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收稿日期 修回日期 网络版发布日期 接受日期

摘要

研究了土壤Cu^{2+}胁迫对丹参（*Salvia miltiorrhiza* Bunge）的生长和有效成分积累的影响。结果表明，与对照相比，Cu^{2+}胁迫下丹参的生长受到抑制，土壤和丹参体内Cu^{2+}残留量、膜脂过氧化程度增加，而叶绿素含量降低。此外，与对照相比，Cu^{2+}胁迫下丹参地上部分中水溶性酚酸类成分咖啡酸、丹参素和原儿茶酸含量增加，迷迭香酸、原儿茶醛和丹酚酸B含量显著降低，而根系中这6种酚酸类成分和4种脂溶性丹参酮类成分二氢丹参酮、隐丹参酮、丹参酮Ⅰ、丹参酮ⅡA的含量均降低。表明铜胁迫抑制了丹参的生长，影响了有效成分的积累。

关键词 丹参；铜胁迫；生长；膜脂过氧化；有效成分

分类号 S567

Effects of Copper Stress on Seedlings Growth and Active Ingredients of *Salvia miltiorrhiza*

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Abstract

The effects of copper stress on seedlings growth and active ingredients of *Salvia miltiorrhiza* were investigated. The results showed that copper stress inhibited seedlings growth, increased Cu^{2+} accumulation in both soil and seedlings. Moreover, a reduction in photosynthetic pigments and an increase in the levels of TBARS content of stressed seedlings showed that oxidative stress and lipid peroxidation were provoked. The effects of the treatment on active ingredients accumulations in above-ground parts and roots were different. In above-ground parts of copper stressed seedlings, the accumulations of caffeic acid, tanshinol and protocatechuic acid increased, while the contents of rosmarinic acid, protocatechuic aldehyde and salvianolic acid B decreased. However, the accumulations of both six phenolic acids and four tanshinone ingredients all decreased in stressed roots. All these results showed that copper stress had a toxic effect on both *S.miltiorrhiza* growth and 10 mainly active ingredients accumulations.

Key words *Salvia miltiorrhiza* Bunge copper stress growth lipid peroxidation active ingredients

DOI:

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