

硫对超积累东南景天镉累积、亚细胞分布和化学形态的影响

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Effects of sulfur on accumulation, subcellular distribution and chemical forms of cadmium in hyperaccumulator-*Sedum alfredii* HanceLI Hui-he^{1,2}, YANG Xiao-e^{1*}

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摘要

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摘要 采用差速离心技术和化学试剂逐步提取法研究了硫对超积累东南景天镉累积、亚细胞分布和化学形态的影响。结果表明, 增硫处理(S2和S3)显著提高超积累东南景天根、茎和叶的镉含量、累积量及整株累积总量。镉在超积累东南景天根、茎和叶中的含量和分配比例为F1(细胞壁) > F3(可溶性部分) >> F2(细胞器与膜), 细胞壁(F1)是Cd在超积累东南景天细胞内的主要结合位点; 超积累东南景天根、茎和叶F1、F2、F3组分中的镉含量随着硫水平的增加而增加, 但分配比例变化不一致; 超积累东南景天植物体内镉形态以氯化钠提取态(F_{NaCl})、醋酸提取态(F_{HAc})和水提取态(F_W)占优势。增施硫处理, 提高超积累东南景天根 F_{NaCl} 、 F_{HAc} 和 F_W 提取态镉含量和分配比例, 降低 F_E 和 F_{HCl} 提取态镉含量和分配比例; 茎 F_{NaCl} 和 F_{HAc} 提取态镉含量和分配比例增加, F_W 、 F_E 和 F_{HCl} 提取态镉分配比例降低; 叶 F_{NaCl} 、 F_{HAc} 和 F_W 提取态镉的含量增加, 但对其分配比例影响不大。

关键词: 超积累植物东南景天 硫 镉 亚细胞分布 化学形态 超积累植物东南景天 硫 镉 亚细胞分布 化学形态

Abstract:

Differential centrifugation techniques and sequential chemical extraction method were used to study the effects of sulfur on accumulation, subcellular distribution and chemical forms of cadmium in hyperaccumulator-*Sedum alfredii* Hance. The results showed that Cd contents and amounts of Cd accumulated in leaves, stems and roots of *Sedum alfredii* Hance increased significantly with increasing S supplies from 1.5 to 2.25 mmol/L. The contents and percentage of Cd in roots, stems and leaves of hyperaccumulator-*Sedum alfredii* Hance decreased in the following pattern: cell wall (F1) > soluble fraction (F3) >> cell organ and membrane (F2) and most of Cd was bound to the cell wall of hyperaccumulator-*Sedum alfredii* Hance. The contents of Cd in F1, F2, F3 fraction of root, stem and leaf of hyperaccumulator-*Sedum alfredii* Hance were increased and the change of percentage of Cd were different with increasing S supplies. As to Cd chemical forms, NaCl-, acetic acid- and water-extractable Cd forms were dominant. With increasing S supplies, contents and percentages of NaCl-, acetic acid- and water-extractable Cd forms in root, NaCl- and acetic acid- extractable Cd forms in stem were increased, but ethanol- and HCL- extractable Cd forms in root and water-, ethanol- and HCL- extractable Cd forms in stem were decreased. Increasing S supplies enhanced contents of NaCl- and acetic acid- water- extractable Cd forms in leaf, but little effect on their percentages.

Keywords:

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