

研究报告

土壤铅和镉胁迫对空心菜生长及抗氧化酶系统的影响

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摘要:

研究了不同浓度水平的土壤铅(Pb)和镉(Cd)胁迫对空心菜生长及抗氧化酶系统的影响。结果表明:低浓度的Pb胁迫会提高空心菜的生物量,但高浓度胁迫下空心菜的生长受到抑制,在900 mg/kg Pb处理下空心菜生物量仅为对照的32.4%。土壤Cd胁迫下,空心菜的生长受到一定程度的抑制,在7 mg/kg Cd处理下植株生物量为对照的83.6%。空心菜叶片中丙二醛(MDA)含量随着Pb和Cd浓度的增加而增加,在最高浓度Pb和Cd胁迫下,MDA含量分别比对照提高了12.9%和29.5%,说明Cd对空心菜生长的胁迫作用大于Pb。空心菜叶片中超氧化物歧化酶(SOD)、过氧化物酶(POD)和过氧化氢酶(CAT)活性均随Pb浓度的增加先上升后下降,说明在低浓度下三种抗氧化酶有较好的协同效应,空心菜表现出较强的自我调节能力。Cd胁迫下,随着处理浓度的增加,空心菜叶片中SOD和CAT的活性也是先上升后下降,而POD的活性变化不明显。

关键词: 空心菜; 土壤重金属; Pb; Cd; 生物量; 抗氧化酶

Effects of Soil Pb and Cd Stresses on the Growth and Antioxidative Enzyme System of Swamp Cabbage (*Ipomoea Aquatica* Forsk.)

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Abstract:

The effects of single lead (Pb) and cadmium (Cd) stresses on the growth, lipid peroxidation and antioxidant enzyme system of swamp cabbage (*Ipomoea aquatica* Forsk.) were investigated by pot experiment. The results showed that low Pb concentrations stress could slightly increase the biomass of swamp cabbage, whereas its growth would be significantly inhibited under high concentrations. The biomass in 900 mg/kg Pb treatment was only 32.4% of that in the control. Its growth was also inhibited under Cd stress. The biomass in 7 mg/kg Cd treatment was 83.6% of that in the control. The leaf content of malondialdehyde (MDA) increased with increasing Pb and Cd concentrations. The MDA contents under the highest concentrations of Pb and Cd increased by 12.9% and 29.5%, respectively compared to the control, indicating that swamp cabbage was more resistant to Pb than Cd. The activities of superoxide dismutase (SOD), peroxidase (POD), and catalase (CAT) in its leaves increased initially and then declined with the increasing of Pb concentration. The results indicated that the three anti-oxidative enzymes had remarkably synergistic effects under low concentrations of Pb than Cd, and could increase swamp cabbage adaptation to heavy metal stresses.

Keywords: swamp cabbage (*Ipomoea aquatica* Forsk.) soil heavy metal plumbum cadmium biomass anti-oxidative enzyme

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