

Influence cadmium ions on the synthesis of thiol compounds for flax

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Abstract

Evaluation of the effectiveness of phytoremediation technologies is very difficult. One way to quickly and inexpensively identify phytoremediation potential of plants is found easily detectable marker. In our study, we examined the content of thiol compounds in plants, of Flax effects of various concentrations of cadmium ions.

Keywords: Flax, heavy metals, thiols, cadmium

Introduction

Phytoremediation is the direct use of living green plants to degrade, contain, or tender harmless various environmental contaminants, including recalcitrant organic compounds or heavy metals. The methods involved include phytoextraction, direct phytodegradation and rhizofiltration. Plants can remove organic and also inorganic compounds including heavy metals like mercury, cadmium, copper, lead, zinc etc. Organic compounds can be degraded or transformed by different enzymic systems like cytochromes P450, peroxidases, glutathione-transferases. Plants can also interact with rhizosphere degradation microorganisms by excreting of the root exudates. (Macek et al. 2008; Macek et al. 2007; Zehnalek et al. 2004). Electrochemical techniques are highly sensitized tool for the detection of peptides and proteins rich in thiol group applying to the response of the organism in the presence of heavy metals. Is certainly possible to argue, that these techniques do not have their place alongside modern analytic tools, such as mass spectrometry, electrophoresis with laser-induced fluorescence, but the concentration of these techniques, instead of their rivalry seems to be the most appropriate solution.

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Materials and Methods

In our work, we focused our attention on different varieties of flax and their ability to uptake cadmium ions in different concentration and thus provide its use in phytoremediation technologies. Level of thiol compounds (glutathione and phytochelatin₂) and the total content of sulfur-rich compounds is one of the metabolomic indicators allowing the assessment of phytoremediation potential of flax. High-performance liquid chromatography with electrochemical detection was used for total content of thiol determination.

Results and Discussion

Analysis showed that Flax plants exposed to 80 μM concentration of cadmium ions, compared with control synthesize up to 40x more thiol compounds (Fig.1). Since thiol compounds play an important role in the detoxification of heavy metals in plants, based on the data obtained is attributable to the variety with the highest content of thiol compounds the highest phytoremediation potential.

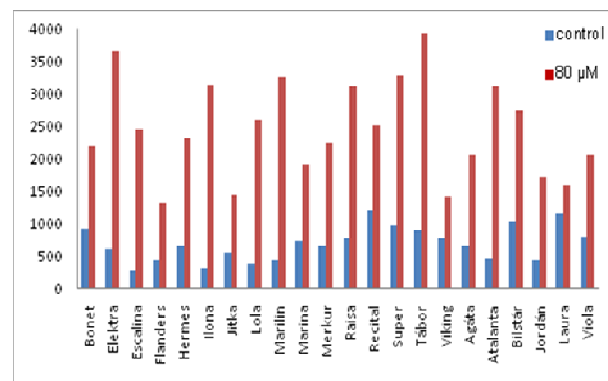


Figure 1: The total content of thiol compounds in different varieties of Flax exposed to cadmium ions exposure compared with control

Conclusion

Know the phytoremediation potential of plants is an important criterion for further experimental work and for their effective realization in practice. Content of thiol compounds could be one major marker, but also a marker of the degree of contamination of the site.

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