



## Phytoremediation using hyperaccumulator plants and cultivation of medicinal plants in heavy metal-contaminated soils.

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### Background

Pollution resulting from human activities has dramatically increased the presence of heavy metals in the environment. Heavy metals are stable and non-degradable, meaning they cannot be naturally eliminated from the environment. Approximately 137,000 km<sup>2</sup> of agricultural soils within the European Union surpass the threshold values for heavy metals and require remediation. It is crucial to find new methods to prevent heavy metal pollution and remediate those lands that are already unusable due to heavy metal contamination. Phytoremediation is an emerging technology that involves using plants to accumulate heavy metals in order to eliminate or reduce heavy metal levels in the environment. In this context, heavy metal hyperaccumulator plants stand out. These plants are not only able to tolerate high concentrations of metals, but also absorb them from the soil and store them in their roots and aerial parts.

### Objectives

The goals of my PhD project are to develop a standardized method for phytoremediation of soils contaminated with heavy metals using hyperaccumulator plants, to identify the most suitable plant species for the removal of different heavy metals present in the soil, and to cultivate medicinal plants in soils with controlled doses of heavy metals to study the variations in their metabolites.

### Methodologies

In the first part of the project, I will need to identify hyperaccumulator plants to purchase, focusing mainly on plants to cultivate from seeds. Secondly, I will need to set up a greenhouse or a phytotron, which will be used for all subsequent experiments. For monitoring heavy metals in the soil, techniques like TXRF will be employed, while for studying plant metabolites, I will utilize techniques such as HPLC-MS or UHPLC-QTOF.

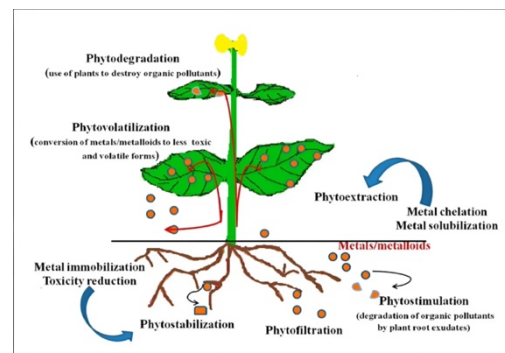


Fig. 1: Processes that occur during phytoremediation.

### Expected Results and Impact

This project will enable us to develop a viable green alternative for heavy metal remediation. This technique will be used either on its own or alongside chemical methods to achieve the best possible result. Using plants for remediation ensures minimal environmental impact, a factor that is becoming increasingly important for the preservation of our planet.