

# **Do rhizospheric microbiota play a role on decreasing contaminants toxicity to plants growing in heavy metal polluted soils?**

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## **ABSTRACT**

Soil is a vital resource for living organisms and the sustainability of our species highly depends on it. However, All over the globe large areas are widely polluted due to anthropogenic activities. Amongst the existing trace elements, heavy metals are a contamination of great concern as they are not degradable and are persistent in the environment, toxic and bio accumulable in the food chain. The application of traditional methods of remediation to metal contaminated soils can become very costly and may only affect the upper layers of the soil. The use of plants to remove, degrade or immobilize the contaminants – phytoremediation - offers a low cost method for soil remediation. This remediation technique brings up the need for investigation on the toxicity of heavy metals on plants and of ways of reducing it. The inoculation with efficient microbes to the soil ecosystem, not only improves soil quality, and consequently crop yield and quality, but also promotes the survival chances of the installed plant species. These microorganisms – namely endophytic and rhizospheric bacteria as well as ectomycorrhizal and arbuscular mycorrhizal fungi - are able to survive the exposure to high levels of HM heavy metals and simultaneously improve plant nutrition, increasing root absorption surface areas and regulating the interface between metals in the soils and plant roots, decrease susceptibility to pathogens, produce or diminish specific plant enzymes and hormones. This work describes more thoroughly the mechanisms though with these microorganisms can help plant cope with metal toxicity in contaminated soils and promote their remediation.

**Keywords:** phytoremediation; heavy metals; plant growth promoting bacteria; arbuscular mycorrhizal fun

**Biography:** Ana Marques graduated in Environmental Engineering in 2001 and has been involved in research since 2000, when she was a researcher at DTU (Technical University of Denmark). Since 2002 she has been working at CBQF Centro de Biotecnologia e Química Fina) from the Portuguese Catholic University, in Oporto, Portugal, in the remediation of disturbed soils using plant-based technologies and in the same year was awarded a FCT PhD grant (2002-2007). Ana has published 2 book chapters, 26 papers in international peer reviewed journals and has delivered several communications in international meetings, while being a team member and PI of several funded research projects. Ana has also been dedicated to teaching in the Environmental Science and Toxicology areas and supervised and co-supervised undergraduate, BSc, MSc and PhD students in their projects/thesis development. The importance and quality of her work was acknowledged with the award with the BES Innovation prize in the area of Biotechnology in 2009 and with two projects awarded by COTEC–Portuguese Business Association for Innovation and is easily reflected in the following indicators: cited 1700 times with an h-index of 21. More recently Ana is interested in the perspective of using biomass resulting from such remediation processes for energetic purposes and on the evaluation of the sustainability of these pathways.