

PHYTOMANAGEMENT OF METAL(LOID)- CONTAMINATED SOILS: FROM THE CONCEPT TO THE REAL WORLD

Michel Mench¹, Carlos Garbisu², Evelin Loit³, Nadège Oustrière⁴

¹ Univ. Bordeaux, INRAE, BIOGECO, Pessac, France, ² Neiker-Tecnalia, Derio, Spain, ³ Estonian University of Life Sciences, Tartu, Estonia, ⁴ JUNIA, Lille, France
michel.mench@inrae.fr

The European Green Deal and its EU Biodiversity Strategy for 2030 request urgent restoration efforts for damaged ecosystems and place the rehabilitation of degraded, polluted and artificialized soils as an environmental, economic and societal priority. Sustainable nature-based solutions must be designed, tested, and implemented across Europe and beyond to develop effective soil remediation methodologies, to use biomass for the bioeconomy, and to limit urban sprawl and climate change. Phytomanagement options (POs) for remediating contaminated land are a set of long term, risk management phytotechnologies, involving plants, microorganisms, biostimulants and soil amendments, that promote a profitable crop production or other beneficial land uses (recreational park, etc.) and also lead gradually to the reduction of pollutant linkages due to contaminant excess, e.g. metal(loid)s, and a net gain in ecological soil functions underlying ecosystem services. POs can be customized along pollutant linkages related to site/contaminant specificity and time frame. Plant biomasses harvested at phytomanaged sites can be processed by various technologies, e.g. pyrolysis, hydrothermal oxidation, fermentation, gasification, etc. to produce valuable compounds, e.g. biochar, hydrogen fuel, oil and glycerine, biofuel, bioethanol, bioplastic, activated carbons, fertilizers, derived catalysts in syntheses of functionalised aromatic derivatives, etc. Several EU projects (BioFoodonMars, Phy2SUDOE, GOLD, Phy2climate, New-C-land, etc.) aimed at sustainably managing crop production on contaminated land, in line with amelioration of soil properties, decrease in pollutant linkages, and the delivery of a range of ecosystem services including a gain in biodiversity. Other projects are developed in the USA, China, Australia, etc. Success stories and failures are presented.

Acknowledgements

The INTENSE and BioFoodonMars projects were funded by the ERA-NET FACCE SURPLUS, the Phy2SUDOE project by the Interreg SUDOE, and the GOLD project by Horizon 2020. BIOGECO is member of the COST Action 19116 PlantMetals.