Emerging phytotechnologies for remediation of heavy meal polluted and contaminated soil and water

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Contemporary world is facing problems with a wide variety of pollutants and contaminants (both inorganic and organic). Healthy soil, clean water and air are the soul of life. Often soil, water and air are no longer clean and pure posing human health risks. The supposedly most pristine environment in arctic circle and Antarctica are not even spared due to global transport of anthropogenic pollutants/contaminants of three major groups viz, i) heavy metals ii) acidifying gases (SOx), and iii) variety of persistent organic pollutants that play a major role in global climate change. This presentation would concentrate only on inorganic pollutants and application of emerging hytotechnologies for environmental cleanup and restoration.

The contamination of the environment with toxic metals has become a worldwide problem, affecting crop yields, soil biomass and fertility, contributing for the bioaccumulation and biomagnifications in the chain. In the last few decades, research groups have recognised that certain chemical pollutants such as toxic metals may remain in the environment for a long period and can eventually accumulate to levels that could harm humans. Moreover, the numerous classes and types of these chemicals apart from the soil structure complicate the removal of many toxic metals from the environment. As an alternative, an ecological technological approach has been developed involving the use of plants to clean up or remediate soils contaminated with toxic metals. A group of plants termed "hyper-accumulators" are the best candidates capable of toxic metal uptake, transport and accumulate.

A wide range of phytoechnologies have emerged as a feasible technology for environmental restoration. The wide recognitions for this approach is supported by the fact that it is considered to be an environmentally friendly technology, safe and also a cheap way to remove contaminants, in some cases doing the same job as a group of engineers for one tenth of the cost. In this presentation the upcoming phytotechnologies for inorganic pollutants in soil and water such as Phytoextraction, Phytostabilization, Phytostimulation, Phytovolatilization, Hydraulic barriers for containment of groundwater migration, Vegetative caps for containment of landfill leachate, Constructed wetlands, Riparian buffer zones and Buffer zones for stormwater detention, Environmental restoration for erosion control, Halophytic (salt-loving) plants, Environmental crops.

The scope and limitations of phytotechnologies and hyphe for commercialization of some of these phytotechnologies will be presented in this lecture.