

Theme 5: Conservation, restoration and management of ecosystem

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MYCORRHIZOREMEDIATION OF HEAVY METALS FOR RESTORATION OF ECOSYSTEM

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Heavy metal contaminants are commonly found in terrestrial and aquatic environment from various sources. The remediation of heavy metals by phytoremediation is an advanced biological approach for decontamination of metals from the environment. In the present research, the phytotoxicity study of the selected heavy metals, viz. Cadmium, lead and zinc has been done at various concentrations ranging from 0,5,10, 20, 50, 75 and 100 ppm using *Medicago sativa* as a potential candidate. During the experiment the growth of the plant was observed for a period of 15 days and morphological characteristics - were assessed in terms of plant growth by determining the length of root and shoot for each metal exposure. The results showed that the higher concentrations, i.e. 75 and 100 ppm was toxic to the plants and found inhibitory for plant growth and survival. Therefore the heavy metal concentrations ranging from 0, 5, 10, 20 and 50 ppm were taken for phytoremediation experiment in a developed mycorrhizal soil by pot culture technique. The seeds of *M. sativa* were grown in heavy metals amended mycorrhizal soil for a period of two and half months for phytoremediation. The bio-accumulation of metals was found increased with increasing concentrations of respective metals. Metals studied were found having higher-concentration in roots as compared to the shoots. The study of lipid peroxidation shows the tissue damage with increasing exposure of metals, whereas the antioxidative enzyme activities, such as superoxide dismutase (SOD), ascorbate peroxidase (APX), guaiacol peroxidase (GPX) and catalase (CAT) were also increased with increasing period of phytoremediation. The release of enzymes shows the detoxification of metals by plants. Chlorophyll and carotenoid contents were found decreased with increasing period of phytoremediation. The mechanism of phytoremediation highlights that the heavy metals can be remediated within a range of 5, 10, 20, 50 ppm. The higher concentration would be toxic to the plants- *M. sativa* to remediate the metals. Phytoremediation of heavy metals in mycorrhizosphere has been found

enhanced as compared to non mycorrhizal soil due to symbiotic associations of bacteria, fungi and Actinomycetes in rhizosphere. The present research- phytoremediation of heavy metals in mycorrhizal soil has been proved effective, low-cost and eco-friendly technique to remediate heavy metals from contaminated terrestrial environment. This Mycorrhizoremediation technique would be directly applicable for the restoration of ecosystem.

Keywords: Phytoremediation, heavy metals, mycorrhizosphere, antioxidative enzyme, *Medicago sativa*