Preface

Heavy metal pollution has now become a formidable danger that confronts mankind. They are non degradable and enter into the human body through food chain resulting in adverse effects on human health. Conventional techniques applied to remove heavy metals from polluted water are found to be ineffective. In this context an attempt to suggest an eco friendly and innovative method to remediate these heavy metals finds meaningful. Bioremediation refers to an array of biological methods which exploits the abilities of microbial biomass to eliminate pollutants. The metal resistant microorganisms and lower hydrophytes can play an efficient role in the restoration of polluted sources. The detailed knowledge of the molecular mechanism of resistance could lead to the production of optimized organism which can be used for bioremediation process.

This research work titled as ‘Amelioration of heavy metals by microorganisms and lower plants’ is an effort to isolate efficient organisms (bacteria/cyanobacteria/plant) which can accumulate heavy metals and hence can be employed in waste water treatment. This work also includes an attempt to study the various mechanisms of metal uptake among the selected organisms. This resulted in the purification and isolation of a metal binding protein-Phytochelatin from lower hydrophytes.

The contents of the thesis are distributed in three sections. Section A contains two chapters. Chapter 1 deals with the general introduction and chapter 2 depicts the research already carried in this aspect. Section B contains three chapters. Chapter 1 highlights the selection of efficient heavy metal (Cd, Pb, Ni) removing bacterial strains, the mechanism for metal uptake, optimization of the conditions and application of the selected organisms for waste water treatment. Chapter 2 contains selection of an efficient Cd, Pb removing cyanobacterium and the expression of antioxidant enzymes in response to the metal induced stress. Chapter 3 illustrates that the selected hydrophyte can sequester the heavy metal resulting in the formation of a metal binding protein- Phytochelatin which was isolated and purified by HPLC. Section C highlights the summary of the work and its future prospective.