PREFACE

Considering of controlling environmental pollution has concentrated on the possibility of using multiple resistant bacteria for removal of heavy metals from polluted effluent or sediments or waste water through a form of bioaccumulation that would follow the different mechanisms of resistance. For this purpose, five metallotolerant bacteria, designated as DSGPM1, DSGPM2, DSGPM3, DSGPM4 and DSGPM5 were isolated from water purifying plants of Bangaluru, Karnataka, India. After biochemical characterization, it was found that DSGPM1 was *Azomonas* sp., DSGPM2 was *Deinococcus* sp. Biochemical characterization and 16S r RNA gene sequencing and BLAST analysis confirm that DSGPM3 is *Bacillus* sp., DSGPM4 is *Pseudomonas aurogenosa* and DSGPM5 is *Pseudomonas putida*. Selections of isolates were based on their high resistance to different metals. Attempt was made to find out correlation between heavy metal tolerance and antibiotic tolerance of DSGPM4 strain with the assumption of multiple stress tolerance of bacteria. All the isolates showed the effect of pH and temperature in growth media on metal resistance. Similarly, the metal concentration also showed a direct effect on colonial and cellular morphology as well as growth retarding effect. Next we have optimized the environmental variables such as the effect of pH, temperature, initial metal concentration, effect of biomass for the removal of selective heavy metals (Lead, Nickel and Copper) from the aqueous system by best metal and antibiotics resistance strain DSGPM4. Extracellular polymeric substances (EPS) play a very important role in biosorption of heavy metals, and are produced by most of the bacteria. So, the research has done to investigate the effect of different carbon source to produce bacterial exopolymer and application of bacterial EPS in bioremediation of heavy metals (Cu, Pb, Ni) by microbial consortium. Our result clearly shown that exopolymer has much more potential power to bioabsorb heavy metals than dry cells of bacteria. To know that whether the metal resistance gene(s) is present in plasmid or not, we harbored low molecular weight plasmid, that was
confirmed by curing, transformation and southern blotting analysis. Plasmid bearing isolates showed higher protein content when grown in presence of metal salts in media. Likewise, quantitative analysis showed presence of additional protein band in presence of plasmid, where as no additional band was observed in cured derivatives when grown in subsequently metal salts containing media. Variations in molecular weight of protein suggested there were some possibility of metallotolerant protein(s) which might be adopted version of some pre-existing proteins. This study helps us to elucidate the role of metal microbe interaction in toxic metal contaminated environment and microbes can be used as one of the potent metal bioremediating agents.