PREFACE

The prevalence of arsenic in the environment is due to the continuous cycling of its different forms in the environment. The arsenic reaches soil and rocks by the percolation of arsenic from either groundwater or contaminated surface water which further extends the pollution in environment. The chief source of unprecedented release of arsenic in water resources is either geogenic or anthropogenic. Thus, this inspired to conduct a study on environmental sources like soil and impact of arsenic on micro flora. For this two sites were selected i.e. from Sanganer, Jaipur, Rajasthan and Tezpur, Assam. The soil sample from Sanganer was polluted by the textile industrial effluents containing various metals including arsenic discharging in an open field (anthropogenic source). While, the soil sample from Tezpur, Sonitpur district, Assam, was contaminated by the arsenic polluted groundwater from nearby tube well having geogenic origin from the Himalayan tributaries, like the Ganga and Brahmaputra rivers. The relative study helped in justifying the condition of soil and the impact of arsenic toxicity in both the states of Rajasthan and Assam.

In addition, this research explored the resistance and remediation potential of arsenic in bacteria isolated from these samples. Microbial mediated arsenic bioremediation play a key role in environmental detoxification of arsenic. The isolates from the sites also possessed multi-metal resistance with the capacity to oxidize arsenite to arsenate, where the latter is 100 times less toxic than the former. This detoxification process in bacterium is an aerobic procedure by which the microbe derives energy.

The adapted bioremediation strategy of the bacterial isolated was due to the presence of aox genes. These genes encode for arsenite oxidase which is the enzyme responsible for arsenite oxidation. The similar detoxification mechanism in bacteria which were isolated from diversified soil samples (Rajasthan and Assam) depicts the similarity in the soil conditions and arsenic toxicity of these places.

Among the bacterial isolates from both the sites, the bacterium (Pseudomonas sp. SE-3) with highest oxidizing ability [6g/l As (III)] was selected for the application of its capability in natural environment through microcosm setup.
The results revealed efficiency of arsenite oxidation and synergism of *Pseudomonas sp.* SE-3 with the native soil microflora. The use of Design Expert Statistical software version 9.0.4.1 helped in multi factorial analysis. The experimental setup suggested by the software helped in optimization of the best conditions (biotic and abiotic), for the introduced bacteria to oxidize arsenite with higher rate. Thus the introduction of this potential bacterium (*Pseudomonas sp.* SE-3) and adjustment of appropriate factors in contaminated soil can prove effective in detoxifying of arsenic from the environment.