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Comparative metagenomic analysis of soil microbial communities across three hexavalent chromium contamination levels isolated from chromite mine area

S K Pradhan¹, N R Singh², U Kumar³ and H N Thatoi⁴¹Orissa University of Agriculture and Technology, India²Ravenshaw University, India³ICAR-National Rice Research Institute, India⁴North Orissa University, India

Hexavalent chromium (Cr^{6+}) released during various industrial and mining processes leads to serious environmental problems and health hazards due to its toxic, mutagenic, teratogenic and carcinogenic properties. Microorganisms are found to be capable of converting toxic hexavalent chromium to less toxic trivalent chromium due to presence of various resistance mechanisms in them e.g. ion transport (efflux), reduction, DNA repair etc to withstand the chromate toxicity. Genes involved in chromate resistance are located either in chromosome or in plasmid of bacteria. Literature survey revealed the occurrence of chromate resistant genes among large number of bacteria across different genus and species. This paper presents the characterization of the microbial community responsible for the *in situ* bioremediation of hexavalent chromium. Microbial community structure was analyzed by using 16S rRNA V3 region amplicon in NextGen metagenomic sequencing method. The microbial data were generated through Illumina MiSeq platforms for three sets of soil samples which includes *in situ* mining site, dump site and nearby forest soil of Sukinda chromite mine of Odisha (India). Certain bacterial genera like *Acinetobacter*, *Pseudomonas*, *Lactobacillus*, *Bacillus*, *Clostridium* and *Corynebacterium* were found to be predominant in *in situ* mining site than dumping site and forest soil, whereas genera like (*Nitrospira*, *DA101* and *JG37-AG-70*) and (*Nitrospira* and *DA101*), were found to be abundant in dumping site and forest soil respectively. Moreover, the *in situ* mining site exhibited a relatively higher abundance of actinomycetes than other sites. This gives an idea that actinomycetes may act as a better bioremediating agent to detoxify hexavalent chromate from chromate affected mines.

Biography

S K Pradhan has graduated in Agriculture, Post-graduated in Bioinformatics and completed his PhD in Biotechnology. He is heading Post-graduate Department of Bioinformatics in Orissa University of Agriculture and Technology, Odisha (India), second oldest Agricultural University in India. Besides, he is the Coordinator of the Biotechnology Information System Network (BTISnet) funded by Department of Biotechnology, Govt. of India, New Delhi. He has 10 years of teaching and research experience in and around Computational Biology. He has published more than 16 papers in reputed journals, two book chapters and life member of several societies of repute. He has guided more than 40 post-graduate students. He has acted as organizing secretary of national level workshop and training programme in Bioinformatics.

ksukantapradhan@gmail.com

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