Analyzing differential distribution Of Dissimilatory Arsenate Reducing Bacterial Community along depths of Aquifers in Bengal Delta Plain.

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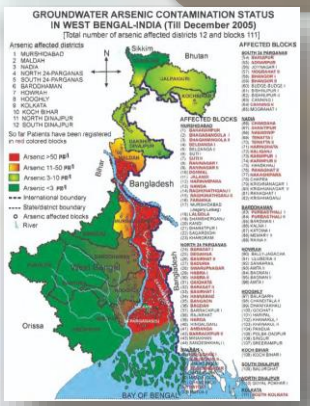
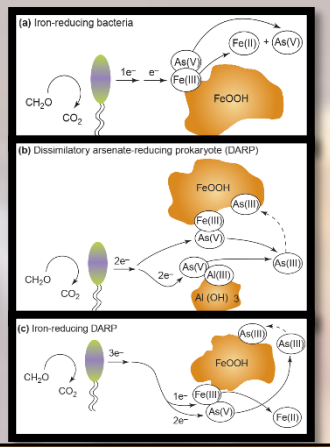


- Geogenic Arsenic (As) is a toxic metalloid pollutant detrimentally affecting population in Bengal Delta plain
- 125 million inhabitants of Bangladesh and more than 40 million people in West Bengal are at risk of Arsenic poisoning for consuming waters contaminated with arsenic.
- Aquifers are the source of arsenic contaminated groundwaters.
- Microbial communities in aquifer sediments has often been associated with release of arsenic from sediments into ground water.

In environment, Arsenic predominantly exists as:

- AsIII: More Toxic and soluble form, predominant in groundwater
- AsV: Less Toxic and predominantly remains bound to sediments

The anaerobic Aquifer ecosystem is best suited for microbial arsenic reduction and subsequent mobilization from sediment into ground water.



- Dissimilatory arsenate reducing prokaryotes (DARPs) are one of the physiological groups responsible for arsenate reducation and mobilization at deeper anaerobic aquifer sediments.
- *arrA* gene is the molecular determionants for DARPs

Objectives

- To assess the arsenate reduction potential of native microbial community of aquifer sediments of various depth
- To analyze the effect of DARP diversity in aquifer sediments on arsenate reduction potential of the native microbial community.

Aquifer sediments from various depths were collected from Chakdah, West Bengal India

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Microcosm systems with sediments were prepared in SeFR media spiked with 25mM arsenate and incubated under anaerobic condition with nitrogen head

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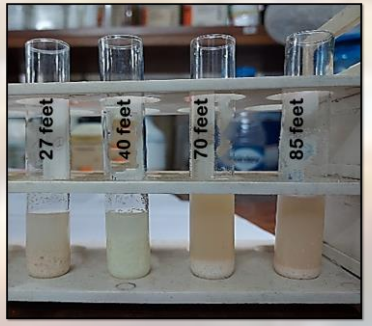
Following incubation, cells and sediments were washed and incubated with 1.33mM arsenite (AsV) under anaerobic condition for 24 hours

↓

Presence of Arsenite (AsIII) was determined by reaction with $AgNO_3$

$3Ag + AsO_3^{3-} \rightarrow Ag_2AsO_3\downarrow$ (Yellow)

$3Ag^+ + AsO_4^{-} \rightarrow Ag_3AsO_4\downarrow$ red-brown



Community DNA was directly isolated from sediment samples

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Subjected to PCR amplification with
arrA-CVF1 (5'-CACAGCGCCATCTGCGCCGA-3')
arrA-CVR1 (5'-CCGACGAACTCCYTGYTCCA-3')

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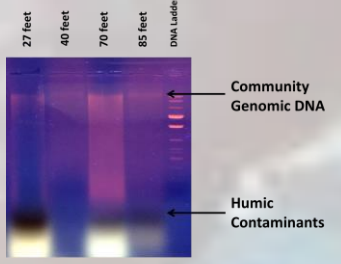
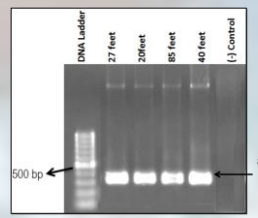
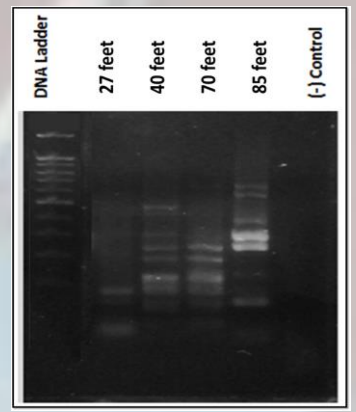
Amplicons were subjected to RFLP analysis using restriction enzyme *Hae* III







RFLP Analysis

CONCLUSION More the diverse the DARP community in aquifer sediments, higher is their arsenate reduction potential