

WARM WELCOME TO PARTICIPANTS



INTERNATIONAL SEMINAR ON

CURRENT STATUS OF ARSENIC, FLUORIDE AND PATHOGENS IN DRINKING WATER: TREATMENT METHODS AND EXPERIENCES

Organized by

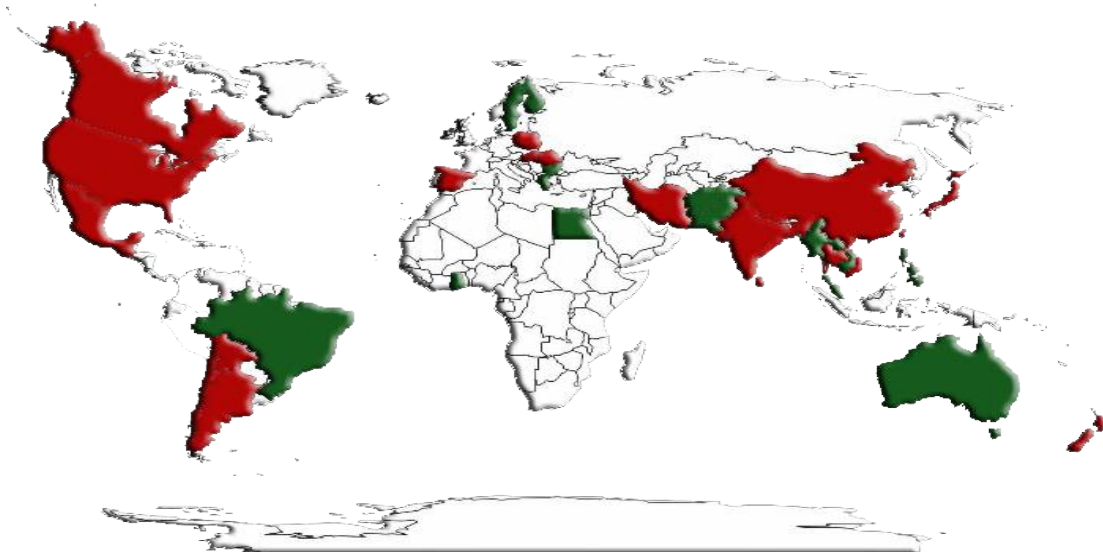
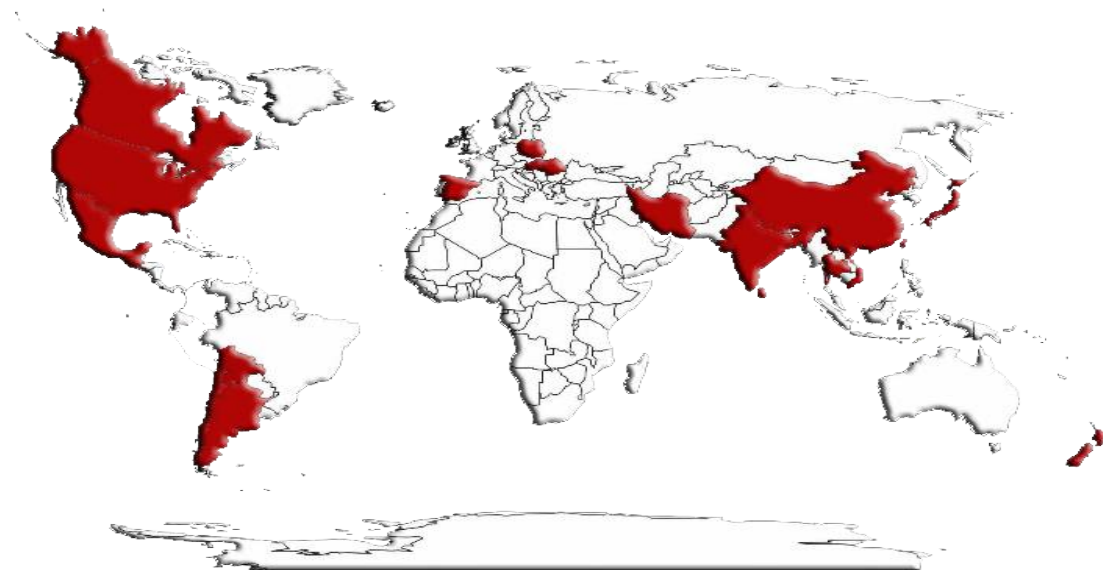
INTERNATIONAL CENTRE FOR ECOLOGICAL ENGINEERING, K.U.

&

KALYANI SHINE INDIA (KSI)

Research Highlights

- 1. Epidemiological Survey, Genetic Monitoring and Health Effects**
- 2. Genetic and genomic Approaches to Identify Susceptibility**
Identification of Early Biomarkers in Arsenic Exposure
- 4. Two Wave Cross-sectional Study for Arsenic Mitigation Strategy**
- 5. Role of Bacteria in Environmental Arsenic Speciation and Mobilization**
- 6. Rice- as Potential Source of Arsenic Exposure and can induced Genetic Damage**



ARSENIC SUSCEPTIBILITY: WIDE INDIVIDUAL VARIATION



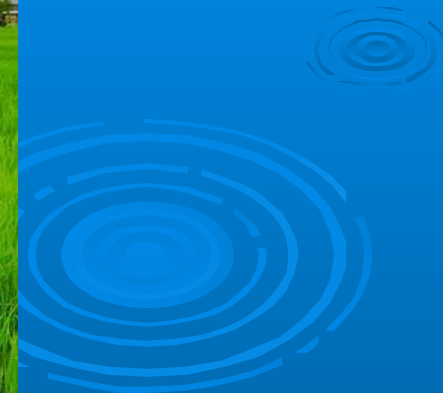
These two brothers were exposed to arsenic through drinking water at similar extent but the arsenic induced skin lesions were manifested only in one brother

What makes some individuals prone to develop arsenic-induced skin lesions compared to others?

UKIERI
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and Research Initiative



Rice- as Potential Source of Arsenic Exposure



SUMMARY

Genetic and genomic approaches indicate that genetic variations play an important role in arsenic induced toxicity and carcinogenicity.

Genetic approaches provide strong evidence that inefficient DNA repair mechanism in the exposed group with arsenic-induced skin lesions is a prime contender for arsenic susceptibility.

Prospective study shows that reduction in level of arsenic exposure is associated with decrease in number and severity of skin lesions and genetic damage, but non-dermatological ailments once induced are irreversible.

Bacteria has a significant role in ground water arsenic contamination.

Rice is found to be a significant route of chronic exposure to arsenic and also gives rise to significant DNA damage.

Results of epidemiological and genetic damage studies indicate that individuals not manifesting arsenic induced skin lesion are also susceptible to arsenic induced toxicity and genotoxicity.



Arsenic and its Health Impacts



Classification of Arsenicosis Symptoms



Stages

Inference

I. Pre-clinical

Arsenic (As) is detectable in hair, nails or skin, but without symptoms

II. Clinical

Melanosis, Diffuse melanosis on palms, Spotted melanosis on trunk (raindrop pigmentation), Generalised Melanosis, Spotted keratosis on palms and soles, Diffuse keratosis on palms and soles, Dorsal keratosis on hands or legs on hands and legs.

III. Complications

Hepatic disorder, Palpable liver, Jaundice, Ascitis

IV. Malignancy

Malignancy, Single lesion, Two lesions, More than two lesions

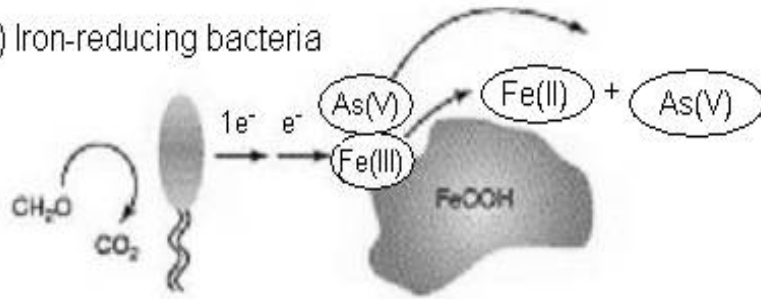


Only way to tackle the Situation

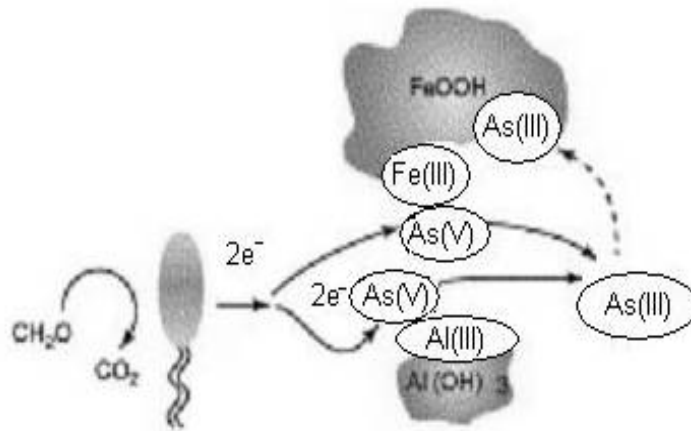
- **Provide Arsenic Safe Water in the Affected Areas**

- **There is no medicine as the permanent solution of the problem**

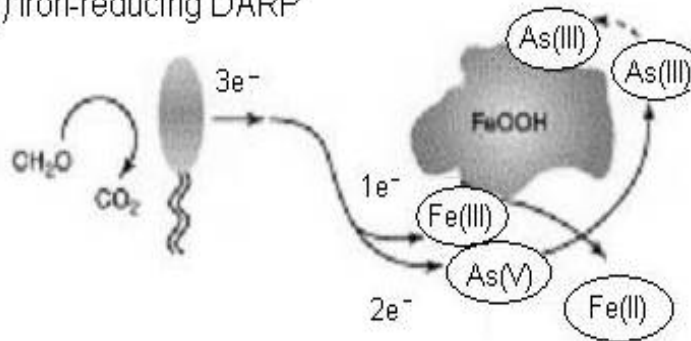
(a) Iron-reducing bacteria



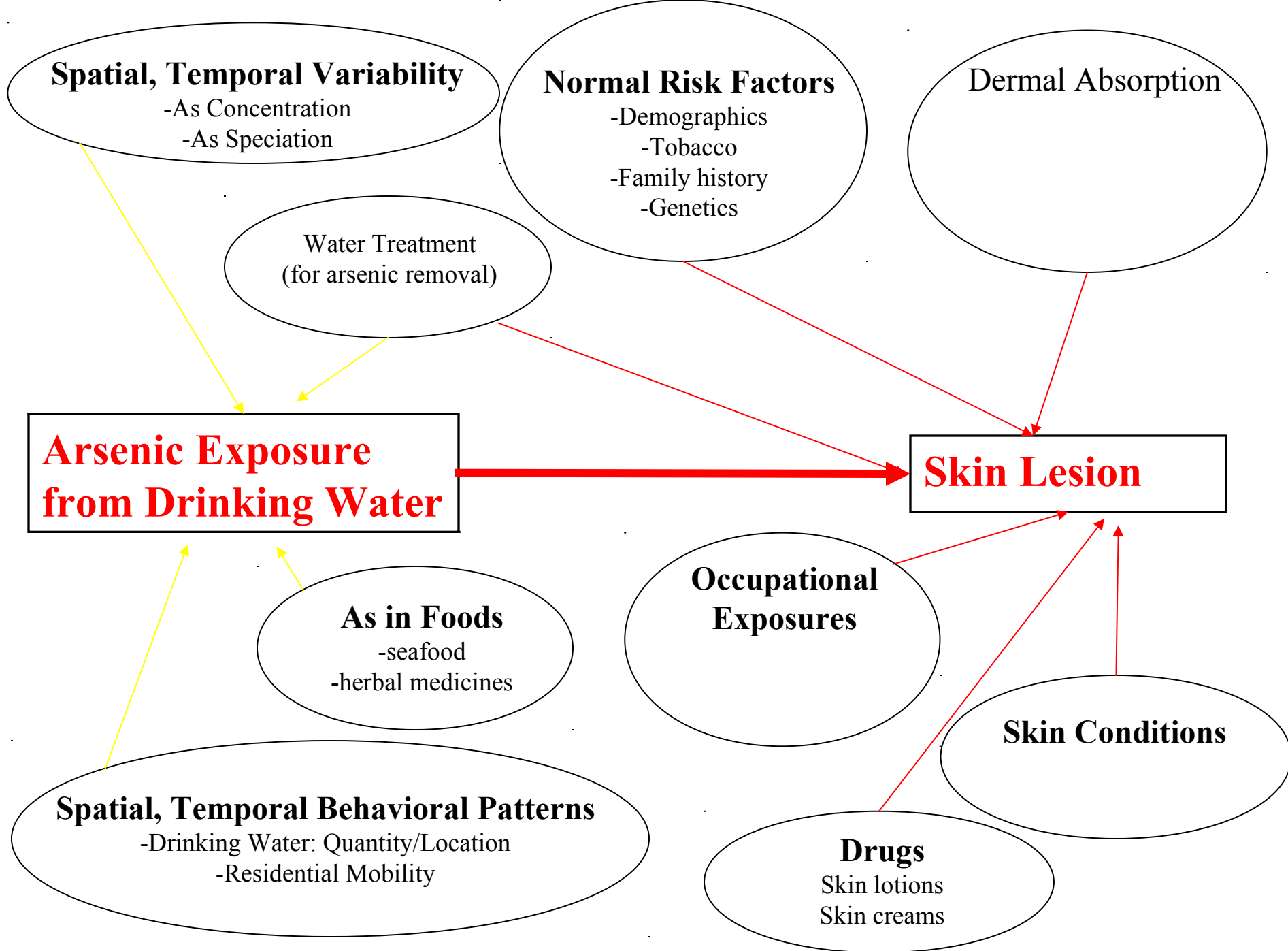
(b) Dissimilatory arsenate-reducing prokaryote (DARP)



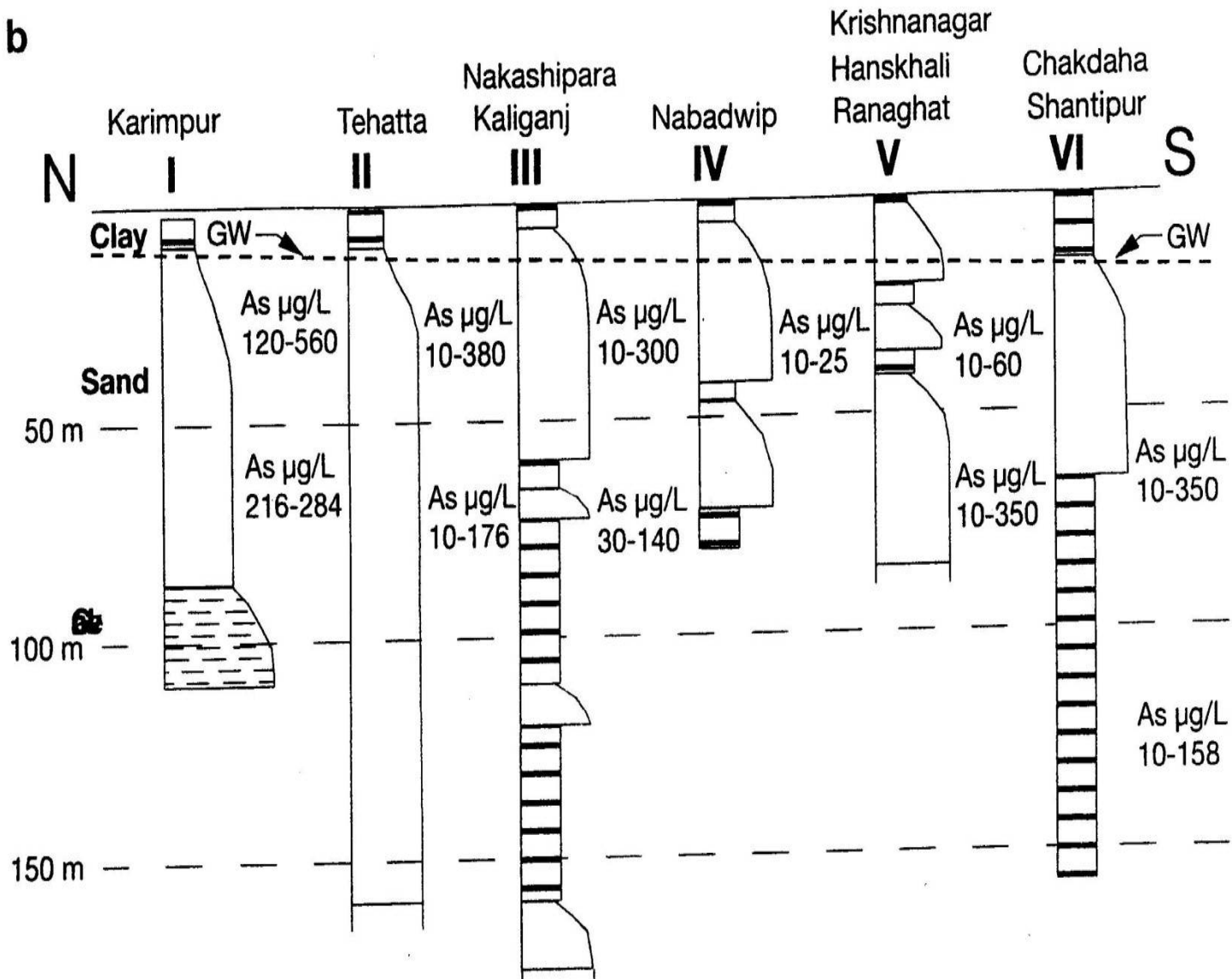
(c) Iron-reducing DARP



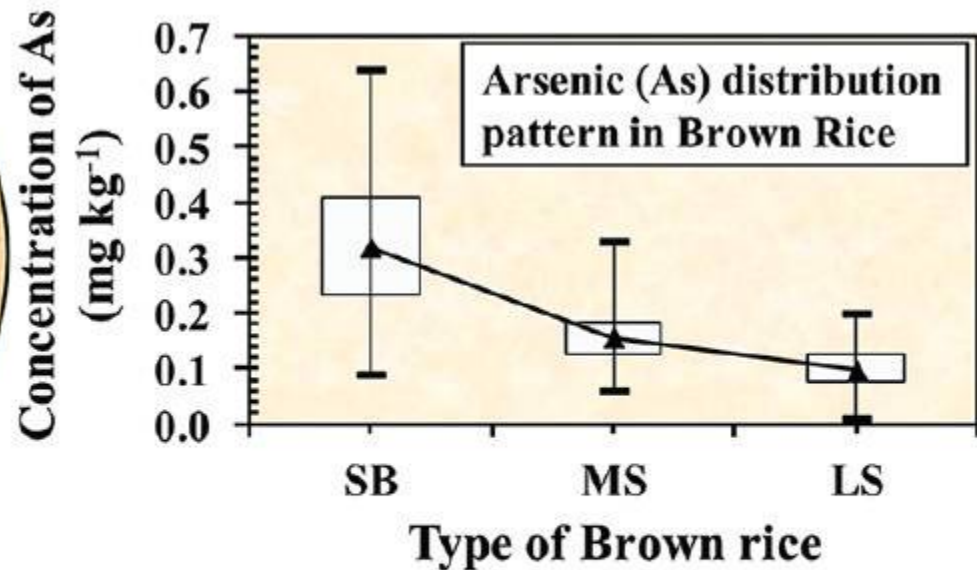
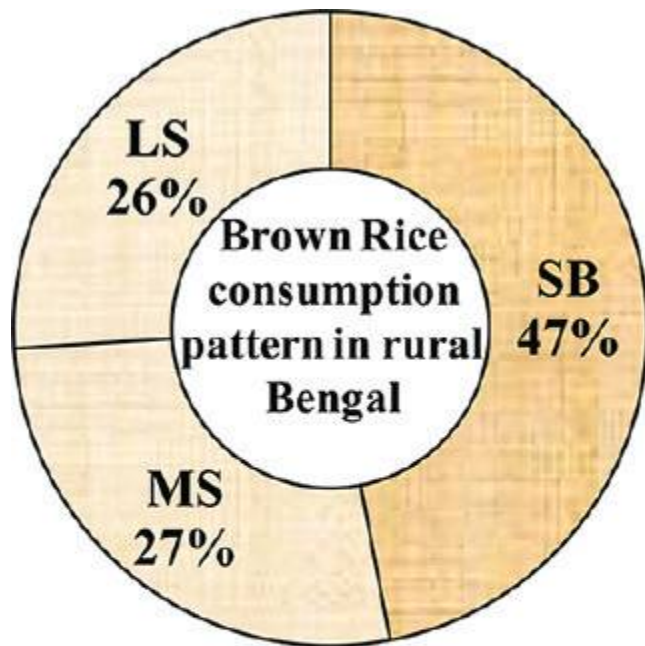
Mineral-microbe Interactions/ Impact on As mobilization



b



Arsenic in Rice



Brown Rice Classification



SB: Short Bold



MS: Medium Slender



LS: Long Slender

Why ARTs Performed Poorly?

- ❖ The ARTs were either not tested with groundwater or tested inadequately
- ❖ Due attentions was not given to groundwater quality parameters such as Fe, PO_4^{3-} , alkalinity, salinity, etc.
- ❖ Dissolved iron was not removed properly
- ❖ The flow rates were often set too high
- ❖ The O&M were based on a limited lab and/or field test data
- ❖ The performance claims were not based on field data

A close-up photograph of water ripples, with a central point where a drop has just fallen, creating concentric circles. The text "Thank you" is overlaid in a red, outlined font.

Thank you

