



# Arsenic bioavailability and its regulation for risk assessment on environment

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**Received:** 02-Dec-2022, Manuscript No. GJAEB-22-84784; **Editor assigned:** 05-Dec-2022-PreQC No. GJAEB-22-84784 (PQ); **Reviewed:** 20-Dec-2022, QC No. GJAEB-22-84784; **Revised:** 26-Dec-2022, Manuscript No. GJAEB-22-84784 (R); **Published:** 03-Jan-2023, DOI: 10.15651/GJAEB.23.10.014

## DESCRIPTION

The bioavailable fraction is the one which is susceptible to interacting directly with the living organism in soils. It is considered the most significant fraction to assess the potential ecotoxicological risks. There is also a need to understand the important factors, which affecting Arsenic availability, mobility and chemistry in soils. These important factors are soil properties, solid composition, Arsenic-bearing phases, absorption-desorption processes, biological transformations and the volatilization of Arsenic in soil. Moreover, organic compounds, oxide/hydroxides of Fe, Zn, Al and Mn also influence the amount of bioavailable arsenic in soil by forming various compounds with different binding forces in the soil water system.

As gets accumulated in plant and becomes easily available to living organisms through food chain *via* dietary exposure, affecting the human health. Rice has tendency to accumulate more as compared to other crops, because of being cultivated under flooded conditions. Which resulted in its subsequent build up in soils and further in rice grains. Generally, millions of populations in the world have rice as their major staple food, especially in Asian countries. Therefore, an arsenic remediation strategy to reduce the arsenic uptake from root to grains for minimizing human health risk is necessary. Accumulation of arsenic by rice plants has been associated to a number of factors. Total as content seems inappropriate to indicate actual arsenic bioavailability and its corresponding toxicity in contaminated soils. Different fractions of arsenic in soil can provide useful information for the assessment of arsenic bioavailability and toxicity in soils.

In order to devise remediation strategies, it is required to

understand the relationship between arsenic (As) bioavailable fractions in soil and other soil properties, which may regulate the arsenic mobility in the contaminated soils. In general, the bioavailability of arsenic in soil is influenced by different physico-chemical characteristics of soil. Therefore, it is important to understand the arsenic fractionation in soils in order to estimate its bioavailability and toxicity to rice plants. In arsenic-contaminated soils, the incorporation of nutrient amendments having high affinity with arsenic *viz.*, Murate of Potash (MoP), Triple Super Phosphate (TSP), ZnSO<sub>4</sub>, FeSO<sub>4</sub>, FeCl<sub>3</sub> etc., has been proposed as an efficient approach to reduce the mobility of arsenic through its immobilization and sequestration of mobile bioavailable arsenic fraction in soil.

## CONCLUSION

A number of management practices can be applied to reduce bioaccumulation of arsenic from soil and water to plants *viz.*, irrigation water management and application of fertilizers, etc. However, more studies evaluating the use of soil amendments to assess combined effects of amendment for minimizing the uptake of arsenic to crop plants are needed. The present study was carried out to investigate the estimation of bioavailable fractions of arsenic in soil of arsenic contaminated region of West Bengal. The interaction between the bioavailability of arsenic in soil and different soil properties was also assessed to find out the major soil parameters regulating the arsenic bioavailability in soil. Also determined the effects of different commercially available chemical fertilizers (soil amendment formulation) for reducing the arsenic bioavailability in soil and its further accumulation in various plants parts of rice crop.