SCO-Young Scientist Profile

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Details of research work carried out in S&T (*limit to 200 words*)

In India, research on metal and metalloid (trace toxic element) pollution in soil is at its infancy and has mainly been confined to sporadic delineation of status of trace toxic elements in soil. There is lack of meaningful and effective permissible limit of extractable trace toxic elements to protect human health from metal and metalloid toxicity like pigmentation, keratosis, Wilson's disease, *itai-itai* etc. Priority of trace toxic element research should include i) improving methodology for determination of trace toxic elements in soil, plant and water, ii) developing protocol for risk assessment of metal and metalloid contaminated soils in relation to human health hazard, and iii) prescribing meaningful and effective permissible limit of extractable trace toxic elements in soil. All these aspects were addressed effectively and meaningfully by me during last ten years of research. I did a case study in Malda district (West Bengal) where arsenicosis is a severe problem. An integrated approach by physicians and soil scientists was adopted to assess the arsenic hazard. We established a link of arsenicosis in human with arsenic content in water, soil and plant. Novelty of the work lies in prescription of toxic limit of arsenic in soil in relation to human health.

Associated SCO-YSC Theme: **Agriculture and Food Processing**

Statement of Innovation ***(Brief information on new innovative ideas including startup / entrepreneurs- limit to 150 words)***

Globally, more than 200 million people have been suffering from arsenic poisoning leading to cancer and other ailments. While water is the major route for human uptake of arsenic, rice is identified as major food crop that contains arsenic. Nano-technological interventions, although not cost effective as on today, shows some promise in remediation of arsenic hazard in drinking water. Hence, an attempt will be made to synthesize hybrid nano zero valent iron (nZVI) composites using low cost novel green technology like plant extract from green tea, amla, rose leaf, and others. Innovation will be made in designing the cost-effective hybrid nZVI by introducing environment friendly, cheap and easy to procure support medium like biochar, bentonite. Therefore, I am proposing a sustainable nanotechnology-based research to develop materials to be applied to soil and irrigation water to arrest aqueous arsenic before it enters one of the important food crops (rice) of India.

Shanghai Cooperation Organization- 1st Young Scientists Conclave (SCO-YSC 2020)
A virtual event organsied in India at CSIR-IICT, Hyderabad
***Theme:* Shaping SCO-STI Partnership: Young Scientists Perspectives**

Major awards/Achievements ***(Up to 3 awards)***

Award/Achievements	Awarding body	Purpose	Particulars
1. Core Research Grant Award, 2019	Science and Engineering Research Board (SERB), Department of Science and Technology, Govt. of India	To undertake a research project on 'Metal and metalloid hazard in soil, plant and ground water in Western Uttar Pradesh receiving irrigation through Hindon river"	39.56 lakh
2. ISCA Young Scientist Award, 2018	Indian Science Congress Association, Govt. of India	Academic excellence and contribution of Ph.D. research to Environmental sciences.	Certificate and Rs. 25000/
3. IARI Merit Medal, 2018	ICAR-Indian Agricultural Research Institute, New Delhi, India	Outstanding academic performance in Ph.D. research work	Gold medal and certificate

Possible collaboration with SCO countries ***(limit to 100 words)***

The use of nanotechnology for remediation of arsenic contaminated irrigation water and soil is an important and emerging area of research. A few universities and R&D laboratories in the China (SCO Country) are actively working on it and a limited number of publications have come out from these efforts. However, there is huge research gap in sustainable nanotechnology application for remediation of agricultural soils. I want to work on this gap and help in developing a robust technology. The arsenic in rice is an emerging problem and I am confident of being able to contribute towards solving this grand challenge.

Key words ***(relevant to research work conducted as well as proposed innovation, 5-6 words)***

Metal and metalloid, Polluted soils, Risk assessment, Human health, Nanotechnology, Remediation