PROPOSAL DETAILS

(CRG/2022/003913)

Prof. SHARDENDU

shardendu.pu@gmail.com

Professor (BOTANY)

Patna University

Ashok rajpath, patna university campus, Patna, Bihar-800005

Technical Details :

Scheme :	Core Research Grant		
Research Area :	Organismal and Evolutionary Biology (Plant Science) (Life Sciences)		
Duration :	36 Months	**Contact No :**	+919473240391
Date of Birth :	01-Mar-1958		
Nationality :	INDIAN	**Total Cost (INR)**	63,52,340

Is PI from National Laboratory/Research No

Project Summary :

Majority of 120 million people of Bihar are dependent on ground water for their drinking, irrigation and their other livelihood purposes. In recent times, toxic forms of arsenic have become a serious threat for Indo-Gangetic plain of Eastern India (22.8962° N, 85.9800° E) . Arsenic also enters into food chain through vegetables, cereals, pulses and nuts. In recent studies, Arsenic is reported in human blood by “Mahaveer Cancer Sansthan, Patna” and isa serious cause of cancer. Large number of plants and microbes has been worked out independently since long for their role in remediation of Arsenic toxicity through transformation.My laboratory has contributed significantly by utilizing the Raphanussativus and Amaranthusviridisin reducing metal toxicity. We have also isolated many As resistant bacteria like Bacillus licheniformis DAS 1, Bacillus licheniformis DAS 2 and Bacillus stratosphericus MKS and their role in reducing As toxicity by oxidation, reduction and transformation has been published. Raphanussativus and Amaranthusviridisarethe two edible plants which are consumed as vegetables by local people. Often, these crops are grown in arsenic contaminated soils and hence likely to accumulate arsenic in the edible parts of the plant. During this project, our prime focus is to study bacterial diversity in the arsenic contaminated soils where Raphanussativus and Amaranthusviridis are grown.In this study, we plan to estimate arsenic content and bacterial diversity of soil and different parts of the plant and to assess their role in reducing arsenic toxicity in the two vegetable crops. The arsenic resistant bacterial isolates will be isolated and identified using 16srRNA technique, and the genes responsible for arsenic resistance will be analyzed by PCR amplification.Assessment of secondary metabolites and anti-oxidant enzymes in the parts of edible plants and bacteria under natural and arsenic stressed condition will be done to monitor toxicity remediation. This study will help in elucidating the role of endophytic and soil bacteria in reducing arsenic toxicity to the edible plants and the relationship with their life support systems (N,P,K &C) to understand plant survival strategies grown under arsenic contaminated soils..

Objectives :

1. Cultivation-dependent and cultivation-independent analysis of microbial community of vegetable crops and soil samples from Arsenic contaminated regions of Bihar. 2. Isolation and identification of Arsenic resistant isolates by 16s rRNA and PCR analysis of arsenic resistant genes. 3. Potential of Arsenic resistant bacteria from different parts of plants in reducing toxicity of Arsenic. 4. Relationship between soil characteristics (pH, NO3--N, PO4- P and Carbon) with growth and metabolism of bacterial community. 5. Assessment of secondary metabolites and antioxidant enzymes in plant and bacteria, under natural and stress environment.

Keywords :

Vegetable Crops, Arsenic Resistant Bacteria, toxicity reduction,Secondary metabolites

Expected Output and Outcome of the proposal :

1. Arsenic detoxifying bacteria from edible crops. 2. Arsenic resistant genes from bacterial isolate identified from edible crops. 3. Detoxification of arsenic from edible crops-bacterial biome. 4. Arsenic detoxifying bacteriawithplant growth promoting traits. 5. Upgradation of existing laboratory facilities. 6. Atleast two Ph.D students will be directly benefited by the fellowship and other postgraduate and research students will be benefited by the upgradationof lab facilities.

Suitability of the proposed work in major national initiatives of the Government:

Swasth Bharat, Swachh Bharat, Namami gange

Theme of Proposed Work:

Health, Environment

Collaboration Details for last 5 Years :

Planned Collaboration for the proposed work with any foreign scientist/ No

SNo.	CO-PI Details
1	 **PRIYANKA SHARMA** priyankajnu89@gmail.com ASSISTANT PROFESSOR(DEPARTMENT OF ZOOLOGY, PATNA SCIENCE COLLEGE) **Patna University** Ashok Rajpath, Near Patna College, Patna University Campus, BIHAR, Patna D.O.B : 18 Feb, 1989