Building and Improving Arsenic Analytical Capacity in Bangladesh

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Abstract

The Bangladesh agricultural agencies are facing big challenges to understand the potential impacts of arsenic from soil and water on the food chain, including the possibility of increased arsenic in soil, plant uptake of arsenic, reduced crop yields, degradation of food quality, loss of agricultural sustainability, and adverse impacts of arsenic on livestock. To address these issues, one of the highest priorities is the ability to accurately and precisely analyze arsenic in soil, plant and water. Until 2001, the Bangladesh agricultural sector had a very limited capacity for arsenic analysis. To address the situation, our collaborative research project, including national and international partners, established goals of improving analytical capacity, improving advanced education and training for scientists and students involved with arsenic, and developing research capacity to address arsenic issues in Bangladesh agriculture. This approach involves not only the enhancement of human resources through training but also the establishment of uniform methodologies and analytical quality control/quality assurance procedures. A major objective is the development of appropriate analytical and quality control procedures for the study of arsenic in irrigation water, soils and crops. Emphases are with (i) pore water sampling and extraction, (ii) assessment of soil-water arsenic, and soil properties that are useful to understand soil-water arsenic dynamics, and (iii) arsenic analysis including speciation. The national agricultural research and education institutions will eventually strengthen their own ways and means for generating capacity when and where it is needed to meet the goals they formulate and implement.

Capacity building is a comprehensive process, which includes the identification of constraints and the development and implementation of plans to overcome these constraints. It involves both the development of analytical capacity and human resources. Capacity development through graduate fellows program, distance education, training initiatives, and communication enhancement within the international community (scientist's participation program in international conferences and national workshops in which international scientists will participate), and provide current scientific literatures. It also involves effectively mobilizing and using existing and newly created capacities, establishing ways to bridge the gap between existing and required capacity, and sustaining the capacity over time.

At present each of our project partner institutions has established capacity to analyze arsenic (Figure 1), and also the partners are conducting collaborative research, training and human resources development utilizing their own analytical capacity.

To ensure quality of analytical work, our project is developing an analytical reference laboratory for arsenic analysis (BARI-CIMMYT Arsenic Laboratory) in the Bangladesh Agricultural Research Institute.

Figure 1: Instrumental Set up and human resources development

This laboratory will play a lead role in the development of analytical quality control protocols, standardizing analytical methods, identifying internal reference materials, and assisting in routine internal quality control. The analytical reference laboratory will take the leadership in creating a quality assured arsenic data base which will be useful in understanding the nature and extent of the arsenic problem in Bangladesh and facilitating research for the development of arsenic management strategies.