

COMPLETION REPORT

Role of Japan in Soci-Economic Development of Bangladesh Through Arsenic Detoxification in Rice

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Subject of research project: **Role of Japan in socio-economic development of Bangladesh through arsenic detoxification in rice**

In the study, the arsenic contamination in three rice cultivars (BRRI dhan47, BRRI dhan61 and BRRI dhan67) in Bangladesh was assessed. A survey was conducted at the farmer's levels from the study area in Bangladesh through pre-test questionnaire for the socioeconomic condition related to the arsenic exposure from rice consumption. Four district towns namely Patuakhali, Vhola, Barisal and Bogra of Bangladesh were considered as study areas. The data from the questionnaire survey and arsenic level in rice with respective consumption of rice confirms that the local people at the study area exposed to arsenic from arsenic contaminated rice and arsenic toxicity is the obstacle to their socioeconomic development. In the present study, new analytical techniques and materials provided from Yokohama National University, Japan was used to assess different chemical forms of arsenic in rice. As a molecular mechanism, the defense strategies of rice against arsenic was also identified.

Arsenic contamination in rice is at alarming level as majority of rice growing regions are arsenic contaminated such as South East Asia especially in Bangladesh. Restricting the arsenic in aerial parts of rice plant may be an effective strategy to reduce arsenic contamination in food chain. In the study, the role of sulphur (S) was investigated to mitigate arsenic toxicity in rice under different S regimes. The study showed that high S (5 mM) treatment enhanced root arsenic accumulation as well as prevented its entry in to shoot tissue. The results indicate that arsenic was complexed in plant roots through enhanced synthesis of phytochelatin (thiol metabolism). The study also showed that high S treatment reduced the expression of *OsLsi1* and *OsLsi2* (the potent transporters of arsenic in rice) and enhanced the activities of antioxidant enzymes and mitigated the arsenic induced oxidative stress in rice.

Following points should be considered for socioeconomic development of Bangladesh:

- i. Government of Bangladesh should provide arsenic free groundwater supply for rice cultivation at the study area of Bangladesh;
- ii. Government of Bangladesh should establish some modern laboratory facilities for molecular assessment and detoxification mechanism of arsenic in rice;
- iii. Government of Bangladesh should establish some modern genetic and molecular techniques by the help of Japan Government for the development of arsenic resistant rice cultivars suitable for the study area;
- iv. A long-term risk assessment strategies should carried out on the leach ability and migration potential of arsenic in the contaminated sites of Bangladesh;
- v. The Department of Public Health, Government of Bangladesh should focused on the levels of arsenic in human beings (blood and urine) and animals of the study area to accomplish a complete scenario of risk assessment and socioeconomic development of Bangladesh.

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Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

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