

South Asia Biosafety Program

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BANGLADESH

GM Crops: Will They Ever Be Free from Examination?

Sarah Sarker, National Institute of Biotechnology



Dr. Andrew Roberts (ILSI Research Foundation), Dr. Donald MacKenzie (Donald Danforth Plant Science Center), Prof. Deepak Pental (University of Delhi South Campus), Dr. Karen Hokanson (University of Minnesota), Dr. Francis Nwankwo Onyekachi (African Agricultural Technology Foundation), Dr. Akhter Ahmed (International Food Policy Research Institute), and Dr. Tony Shelton (Cornell University), during the plenary session on Public Sector GE Crop Development and Deployment at the 7th Annual South Asia Biosafety Conference in Dhaka, Bangladesh (16 September 2019).

Since man started altering the genes of plants through conventional breeding, a new era of biotechnology has emerged. A continuous flow of astounding scientific knowledge has favored biotechnology in every field of interest and made our work easier. Genetic engineering, one of the powerful tools of modern biotechnology, has been used over the years in the agriculture sector for crop improvement. New technologies are widely adopted by many countries to develop stress tolerant, disease resistant plants and crops with enhanced nutritional quality. Currently, genetically modified crops are grown in 10% of the area of the world, which will increase further in the future. However, their commercial production and release remains controversial.

The 7th Annual South Asia Biosafety Conference (SABC 2019) was held at The Westin, Dhaka, Bangladesh on 14-16 September 2019. This annual conference has turned into an inclusive platform for scientists, who shared their recent GMO works and got updates about the biosafety guidelines of GM crop production and commercial release. It was interesting to see how different countries have prioritized their needs and how scientists are working dedicatedly to get the desired gene/trait inserted in their crops. But the excitement of GM success stories fade when their future release to farmers is under critical surveillance.

The annual South Asia Biosafety Conference is constantly trying to bridge the gap between the scientific community and regulatory bodies of the government.

In this conference, the release and subsequent monitoring of Bt eggplant in Bangladesh was presented during the plenary session on *Public Sector GE Crop Development and Deployment*. It is really surprising how transgenic Bt eggplant has brought a positive impact on farmers' lives, and this story surely inspired other countries to be hopeful for GM crops. There was a long discussion and argument about the post-harvest effect, risk assessment on the environment, and ultimate future of

Bt eggplant, which was a very informative session. A small interactive workshop on the regulation of gene edited crops was also organized, where the scientific community discussed the science and landscape of global regulation. It revealed the opinions of a scientific community about whether and to what extent they agreed on the regulation of gene edited crops.

Social and ethical concerns are rising along with GM crop adoption and cultivation worldwide. Until now, there is no conclusive evidence that GM crops have had any adverse impact on human health, biodiversity, or the environment. Such unresolved GM issues and growing concerns are affecting people's perception of GM food acceptance. The annual South Asia Biosafety Conference is constantly trying to bridge the gap between the scientific community and regulatory bodies of the government.

Abdullah Al Noman: 1st Place Prize Recipient of the 7th Annual South Asia Biosafety Conference Lightning Round for Students and Early Career Researchers



Abdullah Al Noman, receiving his prize certificate for the Lightning Round for Students and Early Career Researchers at the 7th Annual South Asia Biosafety Conference from Dr. Andrew Roberts, Deputy Executive Director, ILSI Research Foundation (16 September 2019).

FIRST PLACE WINNER: Abdullah Al Noman

ORGANIZATION: University of Dhaka, Bangladesh

PRESENTATION TITLE: Morphological and Molecular Diversity Among the *Pyricularia oryzae* Cavara Isolates Causing Wheat Blast in Bangladesh

ABOUT ABDULLAH AL NOMAN:

Abdullah Al Noman was a student at the Department of Botany, University of Dhaka, graduating in 2017. He joined the Mycology and Plant Pathology Laboratory to pursue his M.S. degree. The main focus of his research was the wheat blast pathogen. His M.S. thesis title was "Variability among *Pyricularia oryzae* Cavara isolates causing wheat blast in Bangladesh.

PRESENTATION ABSTRACT:

Wheat blast, a devastating disease of wheat, is caused by *Pyricularia oryzae* Cavara, which emerged for the first time in Bangladesh in 2016. Since then, wheat blast has become a serious threat to wheat cultivation in Bangladesh. To study the diversity among this explosive fungus in Bangladesh, 24 monoconidial isolates from the districts of Meherpur, Chuadanga, Kustia, and Jhenaidaha were obtained through single spore isolation technique. In this study, considerable morphological variations among the selected isolates were observed. The colony color varied from white, grey, white cottony mass, and grayish black, and the colony diameters of different isolates ranged from 4.3 to 8.4 cm. The conidial sizes of different isolates in this study were found: $9.98-34.03 \times 4.33-10.9 \mu\text{m}$. The average size of the conidia was observed: $17.34 \times 6.11 \mu\text{m}$. However, variation was not noticed with respect to conidial shape. All the isolates produced pyriform, hyaline to pale olive, 2-septate, and 3-celled conidia. Molecular identification of the selected isolates were done on the basis of sequence similarity in the ITS region of rDNA. Phylogenetic tree based on the sequences of the ITS region formed three major clusters and revealed high genetic variation in this highly conserved region of the isolates. It was also found that isolates

were clustered in the dendrogram irrespective of their area of origin. The knowledge generated in this study will help better the understanding of this newly evolved pathogen in Bangladesh and its population structure, which has the potential to contribute to the field of breeding for blast disease resistance.

FIRST PLACE PRIZE: USD \$300 and a one-year membership to the International Society for Biosafety Research

ABDULLAH AL NOMAN'S EXPERIENCE AT THE SOUTH ASIA BIOSAFETY CONFERENCE

I feel extremely privileged to have been a part of the 7th Annual South Asia Biosafety Conference. It has been an incredible experience attending the conference, where I met many nationally and internationally eminent scientists working in biotechnology and biosafety. I really enjoyed the conference, which had so many interesting presentations and lively discussions. Interacting with the biosafety community was a completely new experience for me. I enjoyed the conference because the plenary sessions were a blend of research advancements with biosafety studies. And, to put an optimistic note, the approval and post release experience of Bt brinjal was the perfect ending to the conference. The Poster Session was incredibly useful, with very beautiful, informative, and insightful content. I attended Workshop II: Gene Editing and Regulation, and the experience was excellent. Especially, I enjoyed Dr. Inez Slamet Loedin's presentation very much.

The Lightning Round was the most exciting part of the conference for me. I would like to thank the SABC Organizing Committee for selecting me for the Lightning Round and giving me the opportunity to share my research. This was the first time I participated in such a competition in any international conference. Therefore, winning first prize in the Lightning Round was a pleasant surprise for me and made the conference a most memorable one!

Personally, I think this conference was very well organized and for me, a milestone. Finally, I would like to thank the organizers for their sincere effort.

Mohammad Umer Sharif Shohan: 2nd Place Prize Recipient of the 7th Annual South Asia Biosafety Conference Lightning Round for Students and Early Career Researchers



Mohammad Umer Sharif Shohan, delivering his presentation at the Lightning Round for Students and Early Career Researchers at the 7th Annual South Asia Biosafety Conference (16 September 2019).

SECOND PLACE WINNER: Mohammad Umer Sharif Shohan

ORGANIZATION: University of Dhaka, Bangladesh

PRESENTATION TITLE: Are Root Characteristics/Architectural Traits of Rice Plants a Better Indicator of Salt Tolerance

ABOUT MOHAMMAD UMER SHARIF SHOHAN:

Mohammad Umer Sharif Shohan finished his B.Sc. and M.Sc. in Biochemistry and Molecular Biology from the University of Dhaka. He completed his M.Sc. thesis project under the supervision of Dr. Zeba I. Seraj, where he looked into the mechanism of halotolerance of wild rice variety *Porteresia coarctata*. Mr. Sharif currently specializes in CAGE, NET-CAGE, mRNA-seq, and NET-RNA-seq data analysis. He is well versed in Linux, R, python, STAR, bowtie2, SeqMonk, and IGV software.

Mr. Sharif was the recipient of the Summer Research Grant from the University of Queensland, Australia. Recently, he was awarded a Research Internship grant from IRCMS, Japan for working with the NGS data. He is also the recipient of the prestigious Faculty of Biological Sciences, University of Dhaka, Dean's Award. He was also awarded the National Science and Technology Fellowship 2017-18 by the Government of Bangladesh for his M.Sc. thesis project. Apart from research work, Mr. Sharif is a keen traveler, having visited 26 countries to date.

PRESENTATION ABSTRACT:

The highest temperature on record, as well as a massive ice melt, has brought the threat of climate change to our doorstep. In the coming decades, therefore, the growth rate and survival of rice will be seriously impacted, creating implications for the global supply of staple foods. Transgenic rice may thus be considered as an alternative in such circumstances. But, we need to have specific criteria for efficient selection of plants or transgenics with salt tolerance characteristics. We have developed several transgenic plants in our laboratory over several years, with the genes *SNAC1*, *PDH45*, *G-protein-beta*, *NHX1 2.3*, *DST*, and *NHX1 transcript 3*. These transgenic plants were produced in different rice genetic backgrounds, such as BR28, 27, 55, 56, and 49. Generally, screen-house conditions are adapted to mimic the proper natural conditions to check on the tolerance ability of transformed plants. However, very hot temperatures (42°C-43°C) damage the control and treat plants so

that the apparent grain yield is not as justifiable a measurement of plant performance. In such circumstances, we wanted to look at whether root characteristics could be a vital point to consider when the quality of transgenic rice plants is checked. We have found that transgenic NHX1 2.3kb (background BR 28), NHX1 Transcript 3 (background BR 28), SNAC1 (background BR55) shows better root length and better root weight compared to that of their WT parent, as well as the tolerant control. Further, we have also checked on the grain setting ability and found that all the transgenic plants set grains similar to their WT parent. Thus, identification of root architecture traits at length and weight shall help breeding programs develop better varieties for salt stress conditions.

SECOND PLACE PRIZE: USD \$200 and a one-year membership to the International Society for Biosafety Research

MOHAMMAD UMER SHARIF SHOHAN'S EXPERIENCE AT THE SOUTH ASIA BIOSAFETY CONFERENCE:

People say: "Some people get things right the first time, but for most, the second time is the charm." This year's South Asia Biosafety Conference was my second time attending it. Being passionate about research, the best thing I could hope for was to meet top-notch scientists, researchers, and academics, as well as regulatory experts. The opportunity to meet these experts and discuss the many interesting ideas and projects they are working on was an eye-opener on how the whole research world is moving. It was also really wonderful to hear from scientists about the regulatory frameworks and policies in relation to genetically modified organisms (GMOs). It was great to hear their stories and learn about the challenges they faced and modern biotechnology products, which gave me insights into the future regulatory challenges and biosafety assessments of GMOs.

I was delighted to pitch my ideas and research during the Lightning Round and Poster Presentation to the distinguished scientists in the audience. However, getting appreciated and receiving the 2nd prize in the Lightning Round was the cherry on top. The Poster Session also gave me the chance to discuss my research more and get input from the scientists to enhance my ongoing projects. Lastly, this conference is indeed a major platform for peer-to-peer learning and knowledge sharing by bringing together leading biotechnologists and environmental safety specialists to discuss the most cutting-edge technologies and tools.

Listening to the Scientists: A Passion Transmission Experience

Jumanah Amatullah and Nowrin Hossain, BRAC University

As students of biotechnology, we learn in detail the processes of transformation, bioassay, and many more things. We read lots of research articles to have the concept or theory converted into reality. However, listening to the eminent scientists about their research gave me a completely different understanding. The 7th Annual South Asia Biosafety Conference (SABC2019) gave us the opportunity to learn about current developments in the field of biosafety and biotechnology. Held in Dhaka on 14 -16 September 2019, SABC 2019 was an exquisite experience.

In South Asia, rice plays an important role in agriculture. With climate change and rising sea levels, drought and salinity tolerant rice is an utter need. So, listening to talks on the development of transgenic salt tolerant rice was expected. But the conference papers also dealt with biotic stress resistance. Learning about transgenesis of lentil, chickpeas, peanut, and other grain legumes gave us an idea not only on how to develop transgenics of recalcitrant plants, but it also made us proud, as

Bangladesh has made substantial progress in modern biotechnology research. Nigeria has also done a commendable job with transgenic legume. They are now on their way to cultivate transgenic cowpea commercially.

The most interesting and timely research was of transgenic mosquito equipped to resist transmission of dengue virus.

The most interesting and timely research was of transgenic mosquito equipped to resist transmission of dengue virus, which was presented during the plenary session on *Planning and Permitting Field Trials for Novel Organisms*. This topic attracted lots of interest as during the conference, Bangladesh was facing problems with the spread of dengue infection.

The South Asian region shares a common culture and faces similar challenges. SABC is an apt platform for scientists to talk about common challenges and discuss the way forward, learning from the experience of scientists from developed countries who attended the conference. As a whole, we enjoyed the sessions, but most importantly, we enjoyed meeting the eminent scientists.



Dr. Frederic Tripet (Keele University), Dr. Vibha Ahuja (Biotech Consortium India Limited), Dr. Donald MacKenzie (Donald Danforth Plant Science Center), Dr. Abul Kalam Azad (Bangladesh Agricultural Research Institute), Prof. Ranil Dassanayake (University of Colombo), Prof. Malik Zainul Abdin (Jamia Hamdard University), and Dr. Ronan Zagado (Philippine Rice Research Institute) during the plenary session on *Planning and Permitting Field Trials for Novel Organisms* at the 7th Annual South Asia Biosafety Conference (16 September 2019).

SABC Experience: Communicating Biosafety

Arko Roy and Rezwanul Kabir, BRAC University

Biosafety policy and related regulations of a country play a pivotal role in deciding which biotechnological applications reach its people. The South Asia Biosafety Conference (SABC), held in Dhaka in September of this year, was a fantastic opportunity to discuss this issue. Here, the audience was able to get updates on the regulations currently in place in South Asian countries. At the same time, it also showcased the direction that each country is moving towards while considering biosafety in innovative technologies.

At the SABC, four Asian countries, namely Bangladesh, Bhutan, India, and Sri Lanka, and a guest country, Nigeria, outlined their respective biosafety regimes. It was encouraging to see that these countries already have biosafety policies, frameworks, and guidelines in place. However, there is a disparity in their approaches to supporting research and giving regulatory approval for genetically engineered economically important

The success of the development and deployment of pod borer resistant cowpea in Nigeria was an encouraging story for the audience.

crops. On one side, there is Bangladesh—the first South Asian country to approve commercial release of a genetically modified food crop and which is welcoming to genetic engineering-based technologies. On the other side, there is Bhutan, which took a stand not to support R&D and importation of genetically modified organisms. So, as a whole, the research and development of genetically modified (GM) crops and the regulations leading to their approval varies at different levels across the region.

The stringent safety assessments followed by approval have generated hope of having more GM food on our tables to ensure nutritional security. But, to have due regulatory approval, public perception plays a crucial role. We gathered from discussions at SABC that while making the final decision on GM crops or food release, the general mass' feelings about new technological applications often gets more priority than

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what the risk assessment data tells us. Nevertheless, the success of the development and deployment of pod borer resistant cowpea in Nigeria was an encouraging story for the audience. In the Philippines, on the other hand, increasing public acceptance through stakeholder participation fostered the regulatory approval process for the field trial of Golden Rice.

At the SABC, the message was clear that research communication to consumers is very important, which puts an increasing responsibility on scientists to communicate appropriately. This interaction, however,

should not be restricted to the pre-release or approval stage of GM products. Rather, it should continue after the product's release. An elaborate study on Bt brinjal (eggplant) in Bangladesh was received well at the conference, as it told us an exciting post-approval story.

The SABC taught us that biotechnology is not only about research and data generation for approval. Rather, it is an active interaction with consumers to understand their needs and disseminate research results. So, our research communication should not only be about research publications, but also about engaging with people.

BANGLADESH

GMO Crops: Policy and Practices in South Asia - A Seminar at North South University

Dr. Md Nashir Uddin and Farwah Binte Alam, North South University

Nobel Laureate Sir Richard J. Roberts urged Asian countries including the Bangladesh government to approve Golden Rice, a beta carotene enriched rice variety, with no delays, to save thousands of children starving to death or suffering from vitamin-A deficiency, while speaking as a keynote speaker in a regional seminar on *GMO Crops: Policy and Practices in South Asia*, organized by the South Asian Institute of Policy & Governance (SIPG) at the city's North South University (NSU), Dhaka. He pointed out that 3000 children die every day since they don't get enough to eat. This notable British scientist criticized the anti-GMO movement in Europe by saying that this is mainly economic and political, and he expressed hope to see a change in their mindset to accept science for the greater benefit of humans. He also informed the audience that a committee of Nobel laureate researchers is working to spread awareness about genetically modified organisms (GMOs).

While delivering the address as Chief Guest, Honorable Minister of Agriculture, Dr. Muhammad Abdur Razzaque, said that the present government is very positive to GMOs and other modern technologies that enhance agricultural production and is working hard to release Golden Rice soon. He thanked Sir Richard J. Roberts for his speech and SIPG of North South University for arranging this important seminar. The NSU Trustee Board Chairman Honorable Freedom Fighter Lion Benajir Ahmed, Vice Chancellor Professor Atiqul Islam, Pro-Vice Chancellor Professor Ismail Hossain, SIPG Director Professor S.K. Tawfique M. Hoque, and Bangladesh Agricultural Research Council Chairman Dr. Md. Kabir Ikramul Haque also attended the seminar.

While delivering the address as Chief Guest, Honorable Minister of Agriculture, Dr. Muhammad Abdur Razzaque, said that the present government is very positive to GMOs and other modern technologies that enhance agricultural production.

Later on, a policy colloquium session was held, where eminent scientists, journalists, and business people took part in policy discussions. Professor Dr. Zeba Islam Seraj, Head of the Department of Biochemistry and Molecular Biology at Dhaka University, said there should be a specialized section within the Ministry of Environment to deal with GMO events. Otherwise, the issue of advancing the frontier science and release of future biotech products would suffer. Anwar Faruque, former Agriculture Secretary of Bangladesh, emphasized the need to invest more in research and development of agricultural

biotechnology, while Lal Teer Seed Limited's Managing Director Mahbub Anam shared some of the private sector's experiences about research and development. Another panelist and Executive Editor of *Dhaka Tribune*, Reaz Ahmad, said most of the anti-GMO campaigns are not founded on any scientific basis. "These

arguments are placed mostly out of ignorance," Reaz Ahmad said, emphasizing the need for spreading science education among the masses. Former Director General of Bangladesh Rice Research Institute, Dr. Jibon Krishna Biswas and Dr. Krishna Prasad Pant, a Fellow of the South Asian Network for Development and Environmental Economics, also spoke as panelists at the colloquium that was moderated by SIPG Director Prof. SK. Tawfique M. Hoque.

Before the colloquium, a business session took place where several scientific papers were presented and discussed. Dr. Anwar Faruque, former Agriculture Secretary of Bangladesh chaired the business session. NSU Trustee Board Member M.A. Kashem and Nobel Laureate Sir Richard J. Roberts spoke at the closing session and Professor Atiqul Islam chaired the session.



Sir Richard J. Roberts, delivering the keynote presentation at the seminar: *GMO Crops - Policy and Practices in South Asia*, North South University, Dhaka, with Prof. Dr. S.K. Tawfique M. Haque (South Asian Institute of Policy and Governance), Freedom Fighter Lion Benajir Ahmed (North South University), Dr. Muhammad Abdur Razzaque (Ministry of Agriculture, Bangladesh), and Prof. Dr. Atiqul Islam (North South University) on the stage (27 October 2019).

CALENDAR OF EVENTS

EVENT	ORGANIZED BY	DATE	WEBSITE
BANGLADESH			
9 th International Plant Tissue Culture & Biotechnology Conference	Bangladesh Association for Plant Tissue Culture and Biotechnology (BAPTC&B)	February 8-10, 2020 Dhaka	http://baptcb.org/conference/
INDIA			
Global Bio-India 2019	The Department of Biotechnology (DBT), Ministry of Science & Technology, Government of India, Biotechnology Industry Research Assistance Council, and Confederation of Indian Industry	November 21-23, 2019 New Delhi	https://www.globalbioindia.com/
National Symposium on Breeding for Biotic Stress Resistance in Potential Crops	Indian Society of Genetics & Plant Breeding and Indian Council of Agricultural Research–Indian Agricultural Research Institute Regional Station, Wellington	December 7-8, 2019 Wellington, The Nilgiris, Tamil Nadu	http://www.isgpb.org/
107 th Indian Science Congress	Indian Science Congress Association, Kolkata and the University of Agricultural Sciences, Bengaluru	January 3-7, 2020 Bengaluru	https://isc2020uasb.org/
7 th International Conference on Phytopathology in Achieving UN Sustainable Development Goals	Indian Council of Agricultural Research, Indian Agricultural Research Institute, and Indian Phytopathological Society, New Delhi	January 16-20, 2020 New Delhi	http://igau.edu.in/
Global Potato Conclave 2020	Indian Council of Agricultural Research–Central Potato Research Institute, Shimla and Indian Potato Association, Shimla	January 28-31, 2020 Gandhinagar, Gujarat	http://gpc2020.in/
ICPulse2020 - International Conference Pulses the Climate Smart Crops: Challenges and Opportunities	Indian Society of Pulses Research and Development and ICAR-Indian Institute of Pulses Research and Indian Council of Agricultural Research	February 10-12, 2020 Bhopal, Madhya Pradesh	https://iipr.icar.gov.in/pdf/ICPulse2020.pdf
INTERNATIONAL			
Asian Seed Congress	The Asia and Pacific Seed Association	November 25-29, 2019 Kuala Lumpur, Malaysia	http://www.apsacongress.com/



SOUTH ASIA
BIOSAFETY PROGRAM

The South Asia Biosafety Program (SABP) is an international developmental program implemented in India and Bangladesh with support from the United States Agency for International Development. SABP aims to work with national governmental agencies and other public sector partners to facilitate the implementation of transparent, efficient, and responsive regulatory frameworks for products of modern biotechnology that meet national goals as regards the safety of novel foods and feeds, and environmental protection.


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