

# South Asia Biosafety Program

**NEWSLETTER** for private circulation only – not for sale



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## BANGLADESH

### 6<sup>th</sup> Annual South Asia Biosafety Conference

The South Asia Biosafety Program, ILSI Research Foundation, and Biotech Consortium India Limited (BCIL) organized the 6<sup>th</sup> Annual South Asia Biosafety Conference (SABC) on September 15-17, 2018 in Dhaka, Bangladesh, with support from 13 other regional and international organizations (details at [sabc.biotech.co.in](http://sabc.biotech.co.in)). This conference provided an opportunity to hear from leading scientists representing regulatory agencies, public sector research institutions, the private sector, and non-governmental organizations from South Asia and around the world. The conference featured six plenary sessions and three parallel workshops covering topics spanning biotechnology and biosafety research, risk assessment and regulation, through to science communication and engagement with stakeholders. Additionally, the Poster Session and Lightning Round for Students and Early Career Researchers provided participants with an opportunity to hear from emerging scientific talent in the region.

Impressions from conference attendees:

Attending the 6<sup>th</sup> Annual South Asia Biosafety Conference was a great experience for me. To be selected among the students from India who received a travel award to come to Dhaka was an immense pleasure, and for that, I am thankful to Dr. Vibha Ahuja, Dr. Morven McLean, the BCIL and ILSI Research Foundation teams, and Reliance India Group. The hospitality of the hosts was commendable, and I must show appreciation for the efforts of Dr. Andrew Roberts and Dr. Bhavneet Bajaj, who made everything happen on time, as this was the first conference in which I found great time management and organization in handling things. [...] Overall, it was nice to interact with people from such diverse backgrounds and work experiences, and I really got to learn a lot.

~ Ms. Rakshita Singh, Doctoral Candidate, Department of Molecular Biology, Biotechnology, and Bioinformatics, College of Basic Sciences and Humanities, CCS Haryana Agricultural University, India

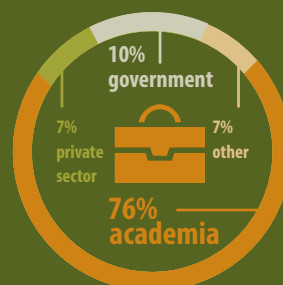
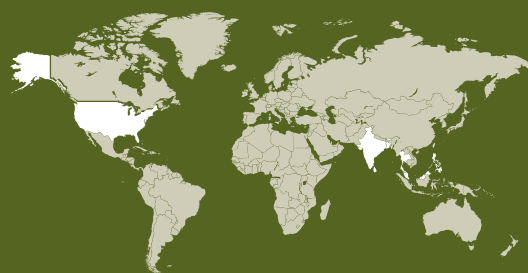
The 6<sup>th</sup> SABC was a rewarding experience. I was happy to interact with the people of a developing country who had readily accepted a technology that was needed for sustenance. I was also impressed by the approach taken by scientists in Bangladesh to tackle an emerging problem in South Asia—wheat blast disease. The deliberations on how products developed using gene editing would be perceived by the policymakers in the region were an eye-opener. I am grateful for the opportunity to interact with key regulators and scientists in the region as well as to explore options for collaborations. There is already an informal networking initiated for advocacy on key issues. Thanks for a great meeting.

~ Dr. Tomal Dattaroy, Lead - Regulatory Affairs and Biology, Reliance Industries Limited, India

## Who attended the South Asia Biosafety Conference?



**160+ participants from 8 countries**



## Featuring:



**6  
plenary sessions**



**56  
speakers**



**3  
parallel workshops**



**40  
posters**



**2 competitions  
& 10 prizes**



**4  
travel grants**

6<sup>th</sup> Annual South Asia Biosafety Conference | Dhaka, Bangladesh | 15-17 September 2018 | [sabc.biotech.co.in](http://sabc.biotech.co.in)

I have been attending the South Asia Biosafety Conference since 2014, and I have attended five out of the six arranged conferences. SABC gives me an excellent opportunity to update my knowledge on the status of GMO research and biosafety in South Asian countries. It also gives me a good platform for exchanging knowledge and sharing experiences. Every year, the addition of some new insight into the latest developments in biotechnology and biosafety is the conference's main attraction.

Regarding the program this year, the Inaugural Session was excellent and was followed by Plenary Session I, which provided the status of biosafety and regulation of GMOs in the South Asian countries. Plenary Session II consisted of excellent talks on ways to combat abiotic stresses, especially by genome editing in rice. This attracted me, and I was compelled to attend Plenary Session VI on gene edited plants. [...] One of the important events of the conference was the Lightning Round, in which students got an opportunity to show their potential by expressing their research findings within a five minute time limit. The poster session was also rich and excellent. Students will be inspired by the awarding of prizes for the posters they made, and I expect the participation of a higher number of students in future events.

I personally was happy to make contacts with many scientists and hope for collaborative research in future. To me, the 6<sup>th</sup> Annual South Asia Biosafety Conference held in Dhaka was a successful one. I hope to attend future similar events. [...]

~ Prof. Dr. Md. Shahidul Haque, Professor,  
Department of Biotechnology, Bangladesh Agricultural University,  
Bangladesh

My first participation at a South Asia Biosafety Conference (SABC) left me with lots of collaborative opportunities, and I was awed by the impressive level of agribiotechnology research taking place in this region. The organizers did great justice in showcasing the research in all countries and giving the right balance of research, regulations, and communication, as well as emerging technologies and topics like gene editing, gene drive, and digital sequencing information.

The Lightning Round was a boost for the young researchers. The quality of speakers was also commendable. South Asia holds lots of potential, and it needs a shot in the arm to break the regulatory hurdles and build up political will. A conference like SABC creates momentum and breaks the inertia. I was very impressed to see the level of cooperation between the two main organizers—ILSI Research Foundation and BCIL. I wish SABC will continue to be an effective platform to accelerate the agribiotechnology agenda in this region. I was happy to share my thoughts on risk communication and hope it gave useful takeaway messages to the delegates. I hope there will be future opportunities to connect with this platform. As a regular organizer of biotech and biosafety workshops, I could appreciate the work and effort of the organizers and its committee members. Superb venue and logistics. Everything went through without a glitch.

~ Dr. Mahaletchumy Arujanan, Executive Director, Malaysian  
Biotechnology Information Centre, Malaysia

**Presentations are now available from the  
6<sup>th</sup> Annual South Asia Biosafety Conference**  
<http://ilsirf.org/event/sabc2018/>



Guests at the Inaugural Ceremony.



Participants at the Inaugural Ceremony.



Speakers during Plenary Session I.



Speakers during Plenary Session IV.



Speakers during Plenary Session VI.



Participants during the Closing Remarks.



## Congratulations to Md. Nazrul Islam for Winning 1<sup>st</sup> Place at the SABC Poster Session

**FIRST PLACE WINNER:** Md. Nazrul Islam

**ORGANIZATION:** National Institute of Biotechnology, Bangladesh

**POSTER TITLE:** Overexpression of G-Protein Beta Subunit Gene (*OsRGB*) Confers Both Heat and Salinity Stress in Rice

### POSTER ABSTRACT:

Combined stresses of transient or persistent high temperature and soil salinity due to climate change is being considered as the prime barrier of restricting crop production to the desired level and leads to food insecurity in agro-based economy worldwide. For mitigating the undesirable effect of combined stresses, one way is genetic transformation approach to develop crop plants with improved heat and salinity stress tolerance. Some candidate genes and transcription factors have already been reported to show tolerance against single abiotic stress to a good extent but not multiple stresses mutually. G-proteins are one of the candidates for tolerance that modulate hormonal and stress responses and ultimately regulate diverse developmental processes in plants. In the current study, constitutive overexpression of the rice G-protein beta subunit has shown improved tolerance against both heat and salinity separately and in combination in rice plants. In planta transformation of high yielding rice variety BRRI Dhan 55 with beta subunit of rice G-protein was confirmed at T1 by Semi- quantitative RT- PCR to select the best-expressing plants, followed by Southern hybridization. Transgenic lines were advanced subsequent generations for attaining homozygosity. Physiological characteristics analysis showed that transgenic lines have higher germination rate, root length, shoot length and plant height compared to wild type under heat stress condition. Under salt, heat and combined stress condition significantly lower amount of chlorophyll loss, low electrolyte leakage, low MDA content and low H<sub>2</sub>O<sub>2</sub> content shown in transgenic lines compared to WT type. The transcription levels of stress responsive genes (*OsAPX1*, *OsSOD*, *OsHKT1*, *OsHSP1*, *OsHSP2* and *OsCOR47*) were significantly up-regulated in RGB- transformed BR55 compared with WT. The transgenic plants will now be tested under combined 80mM salt stress and 42°C heat at the panicle initiation stage to see if RGB provides protection against yield losses.

**FIRST PLACE PRIZE:** The Institute for International Crop Improvement, Donald Danforth Plant Science Center, generously provided registration, airfare, and hotel accommodation to attend the International Society for Biosafety Research Symposium (formerly the International Symposium



*Md. Nazrul Islam receiving his award.*

on the Biosafety of Genetically Modified Organisms or ISBGMO), which will be held April 1-4, 2019 in Tarragona, Spain.

### MD. NAZRUL ISLAM'S EXPERIENCE AT THE SOUTH ASIA BIOSAFETY CONFERENCE:

Mighty Dhaka, capital city of beautiful Bangladesh, hosted the 6<sup>th</sup> Annual South Asia Biosafety Conference successfully on September 15-17, 2018 at The Westin. SABC 2018 was organized jointly by ILSI Research Foundation, Biotech Consortium India Limited, and the South Asia Biosafety Program. The conference was well-organized and vibrant, with the presence of prominent national and international scientists, technology developers, biosafety regulators, policymakers, promising entrepreneurs, young research fellows, and students.

As we all know, the population of the world is increasing, as well as the need for food. To mitigate this problem, one approach is to increase crop yield through genetic engineering. However, a debate about whether genetically modified crops and their products are safe or not always occurs. In this regard, SABC deals with the biosafety rules and regulations in South Asia. SABC publicized country-specific biosafety regulatory frameworks and principles. It also brought scientists, farmers, and other stakeholders under one umbrella to discuss evaluating and releasing GMOs.

I love to work in the plant biotechnology arena and am now a scientific officer at the National Institute of Biotechnology, Bangladesh. Through this conference, I got the opportunity to understand the challenges related to developing and releasing genetically modified cash crops. I have enjoyed all the plenary session lectures because the selection of

*Continued on pg. 4*



*Competition winners, conference organizers, and sponsors at the Awards Ceremony.*

Continued from pg. 3

topics in each session was relevant, informative, and enjoyable. I have also gathered knowledge on how to address the current challenges and the way to design and develop high yielding crop varieties.

I attended Workshop I: Science Communication – The Importance of Audience Engagement. This was about the successful story of genetically modified papaya in Hawaii and disease resistant banana and cassava in Africa meeting the challenge of the ongoing food crisis. The most exciting part of this conference was the Lightning Round competition, where each participant had only five slides and five minutes to present

## BANGLADESH

### Congratulations to Abdullah Mohammad Shohael for Winning 2<sup>nd</sup> Place at the SABC Poster Session

**SECOND PLACE WINNER:** Abdullah Mohammad Shohael

**ORGANIZATION:** Jahangirnagar University, Bangladesh

**POSTER TITLE:** Development of Greening (HLB) and Canker Resistant Citrus Cultivars Through Genetic Engineering

#### POSTER ABSTRACT:

Citrus is a nutrient-rich delicious fruit and one of the most popular fruits in the world. Citrus processed juice products play an integral role in human nutritional requirements, is one of the most important fruit crops growing worldwide. In recent years citrus industries are under severe threat by the outbreak of endemic pathogens huanglongbing (HLB) and canker. Citrus HLB, also known as citrus greening or yellow dragon disease, is considered the most serious diseases of citrus. Until now, no effective commercial cultivars have shown resistance to HLB. The progress of cloning the candidate genes and transferring them into the targeted tissues has opened new avenues for augmenting disease resistance in citrus. Therefore, identification and cloning of suitable candidate genes and optimization of efficient transformation protocols are needed for citrus improvement programs for both rootstock and scion development. Our main research objective was to produce genetically modified citrus cultivars that are resistant to endemic HLB and canker. In this study, identification and cloning of diseases combating genes and efficiently producing resistant citrus cultivars using modern biotechnology are discussed.

**SECOND PLACE PRIZE:** The Institute for International Crop Improvement, Donald Danforth Plant Science Center, generously provided USD \$300 cash and a two-year membership to the International Society for Biosafety Research.

#### ABDULLAH MOHAMMAD SHOHAEL'S EXPERIENCE AT THE SOUTH ASIA BIOSAFETY CONFERENCE:

It has been a fantastic experience to attend the 6<sup>th</sup> Annual Biosafety Conference on September 15-17, 2018 at The Westin, Dhaka, Bangladesh, where I met lots of experts, policymakers, and scientists contributing to agricultural biotechnology and ensuring biosafety for

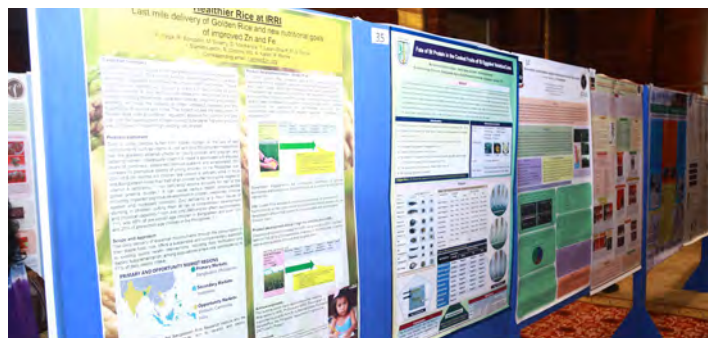
their work. Lastly, the SABC Poster Session provided an opportunity for individual researchers to share their work, findings, challenges, and achievements with colleagues and other attendees.

It's amazing and inspiring to receive the first prize in a competition. I am grateful to my mentor, Dr. Zeba I. Seraj, and all of my collaborators. I would like to thank the organizers and judges for deciding that my research was worthy. SABC 2018 will always be considered as one of the most informative and effective experiences of my endeavors as a young researcher.



Abdullah Mohammad Shohael receiving his award.

GMOs. In my opinion, the South Asia Biosafety Program, in collaboration with ILSI Research Foundation and Biotech Consortium India Limited, successfully organized the event. It's really a great experience for me and for the development of stress-tolerant GM crops, about which I got lots of suggestions and directions. I really enjoyed the three-day program, including all plenary sessions, the lightning round, and poster session. I was inspired by the speeches of Dr. Donald MacKenzie from Donald Danforth Plant Science Center, Dr. Inez H. Slamet-Loedin from IRRI, Dr. Md. Tofazzal Islam from BSMRAU, Dr. Jox van Boxtel from Arcadia Biosciences, Dr. P. K. Singh from NBRI India, and other scientists, as well as their enormous contribution to agricultural biotechnology. Regarding biosafety issues, I must thank Dr. Vibha Ahuja, Dr. Andrew Roberts, Prof. Dr. Imdadul Hoque, and Mr. Solaiman Haider for their continuous contribution to biosafety regulation and capacity building initiatives in Bangladesh. I am grateful to the Institute for International Crop Improvement, Donald Danforth Plant Science Center, for generously providing me with a USD \$300 cash prize for winning second place in the SABC poster competition. Finally, I would like to express my heartfelt gratitude to the organizers and collaborators who have made this conference possible, as well as those who have shared their experiences during the three day event. I really benefited from this incredible event, and I will be inviting people to join the SABP in sharing their views for the strengthening of biosafety in South Asia.



Displays at the Poster Session.



Conference participants at the Poster Session.



# **Congratulations to Sabrina Elias for Winning 1<sup>st</sup> Place at the SABC Lightning Round for Students and Early Career Researchers**

**FIRST PLACE WINNER:** Sabrina Elias

**ORGANIZATION:** Independent University, Bangladesh

**PRESENTATION TITLE:** Blending Gene Expression with Phenomics to Decipher Salt Tolerance Determinant

## **PRESENTATION ABSTRACT:**

**Purpose:** Rice production is being affected by increased salinity in soil due to climate change. To meet the demand of overgrowing populations, rice cultivation and enough production is a need of the times, which requires rice with both salt tolerance and high yielding traits. Engineering such rice requires the correct combination of genes and regulators. Understanding the mechanism of salt tolerant landraces with adaptive capability to withstand the harsh environment can give insights on potential candidate genes for conferring tolerance. We focused on understanding the salt tolerance mechanism from gene expression and phenomics analysis in a set of tolerant and sensitive rice originating from same parents.

**Methods:** We have made a reciprocal cross of salt tolerant landrace Horkuch and high yielding variety IR29. The F2 population was genotyped using DArTSeq™ for discovering SNP markers followed by the construction of a linkage map. In a subset of the F3 population, expression differences were observed under 150mM salt stress by RNAseq. Expression QTLs (eQTL) for both seedling and reproductive stages were mapped using the linkage map and RNAseq data. An image-based non-destructive automated and continuous phenotyping over 3 weeks of salt stress was carried out on selected F3 and F5 subpopulations, followed by QTL identification for the digital traits and relative growth rates from visual image data

**Results:** Image analysis over days gave us longitudinal data, separating the early and late responses to salt stress, which is more informative than the endpoint records measured in conventional phenotyping. Combining the phenomics and eQTL data, early growth indices were found to be enriched with transport, osmotic response and the later stages were enriched with genes associated with growth, carbohydrate metabolism, organ development.

**Conclusions:** The phenome-supported eQTL data gave a comprehensive scenario regarding potential candidates involved in



*Sabrina Elias during the Lightning Round for Students and Early Career Researchers.*

growth, transport and yield under salt stress for choosing the right combination of genes for engineering salt tolerant high yielding rice.

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

## **SABRINA ELIAS' EXPERIENCE AT THE SOUTH ASIA BIOSAFETY CONFERENCE**

Participating in the 6<sup>th</sup> Annual South Asia Biosafety Conference at the Westin in Dhaka, Bangladesh was a great experience. A big thanks to the organizing committee for arranging it. What I liked most at the conference was the regulation and maintenance of time, which surely earns much praise. The session introducing the biosafety programs of different countries was also very interesting, and the incorporation of workshops for the participants was very rewarding. The plenary sessions were very informative although, in my opinion, it would be better if the duration was 20 minutes. The poster session and lightning round seemed very vibrant. I have noticed the super active social media broadcast of the conference agenda, and it is much appreciated. Another important thing was participation from different research institutes, but there could be more participation from other South Asian countries. Last but not least, the food was delicious. Overall the conference was very organized and informative, and I thank the organizers for its successful completion.



*Sabrina Elias's mentor, Zeba I. Seraj, accepting the award on her student's behalf.*

## Congratulations to Mohammad Umer Sharif Shohan for Winning 2<sup>nd</sup> Place at the SABC Lightning Round for Students and Early Career Researchers

**SECOND PLACE WINNER:** Mohammad Umer Sharif Shohan

**ORGANIZATION:** University of Dhaka, Bangladesh

**PRESENTATION TITLE:** Two Amino Acid Substitution Model Across Membranes in the *Oryza* Species HKT1;5 Transporter from Salt Tolerant Rice Landraces for a Beneficially Low Na<sup>+</sup>/K<sup>+</sup> Ratio

### PRESENTATION ABSTRACT:

Maintenance of a proper Na<sup>+</sup>/K<sup>+</sup> ratio within the plant when there is high sodium concentration in the soil is a vital requirement for its survival and growth. The High Affinity K<sup>+</sup> Transporter (HKT) and its homologs play a critical role in plants during salinity stress. Among different HKT family transporters, HKT1;5 is mainly responsible for maintaining the shoot K<sup>+</sup> concentration under NaCl stress. HKT1;5 also has functional variability among salt sensitive and tolerant varieties. In the present study, alignment of 23 sequences of HKT1;5 from the *Oryza* species and wild halophytic rice called, *Porteresia coarctata* showed 4 major amino acid substitutions (140 P/A/T/I, 184 H/R, D332H, V395L), which significantly vary in salt tolerant and sensitive varieties. The 3D structure of HKT1;5 was generated using Ktrab potassium transporter as the template. Among the 4 substitutions, the conserved presence of aspartate (332) and valine (395) close to the Na<sup>+</sup>/K<sup>+</sup> channel in the predicted 3D structure of HKT1;5 was observed for the tolerant genotypes. This led to the hypothesis of a combined model with two amino acid (Asp and Val) substitutions in the membrane of the HKT1;5 transporter for maintaining a beneficial ratio of Na<sup>+</sup>/K<sup>+</sup>. Moreover, these two substitutions likely have a synergistic effect on the functioning of HKT1;5 in salt tolerant varieties. Presence of valine creates a small van der Waals force, which affects pore rigidity. The model explains how this may increase Na<sup>+</sup> transport from xylem sap into xylem parenchyma and further to soil using other transporters like SOS1. Furthermore, it is proposed that the presence of Aspartate at the 332 position creates a strong inward rectification of K<sup>+</sup> ion from xylem parenchyma into xylem vessel which neutralizes the membrane depolarization due to Na<sup>+</sup> efflux. These two substitutions of HKT1;5 transporter probably help tolerant varieties to maintain appropriate Na<sup>+</sup>/K<sup>+</sup> ratios and survive during salt stress through working in a coordinated manner.

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

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

This was my first time attending the South Asia Biosafety Conference. The conference welcomed various international scientists, experienced



Mohammad Umer Sharif Shohan receiving his award.

veteran scientists, regulatory experts, and other governmental representatives. The opportunity to meet and see them and hear about their experience and expertise in individual topics was very gratifying. I have read some of their publications and works or sometimes seen their pictures in various places, so knowing that I was in the presence of such people was a thrilling experience.

The three-day event was informative and discussion about some emerging issues indicated possible places for improvement. I attended the workshop on science communication, and this led to my understanding about science networking and interaction with the public and the importance it commands. It was really wonderful to hear from scientists about the regulatory frameworks and policies related to GMOs. It was great to hear their stories and the challenges they faced related to modern biotechnology products, which gave me insights about future regulatory challenges and biosafety assessments of GMOs.

Now, going into the lightning round and poster presentation, I was really delighted to be able to present my works in progress to these distinguished scientific minds, and getting appreciated was the cherry on top. The poster session included explaining my work a bit more, which was not possible under the five-minute time limit, and to my surprise, I got more ideas to work on just by discussing them with other scientists.

Lastly, the conference was an eye-opener for me when it came to biosafety assessments, genetic engineering technologies, GMOs, and their regulatory agendas. This is indeed a major platform for peer-to-peer learning and knowledge sharing, bringing together leading biotechnologists and environmental safety specialists to discuss ideas about the most cutting-edge technologies and tools.



Mohammad Umer Sharif Shohan during the Lightning Round for Students and Early Career Researchers.



## Training Workshop on CRISPR/Cas Genome Editing for Crop Improvement Held at BSMRAU

Sanjoy Kumar Paul, Nur Uddin Mahmud, Dipali Rani Gupta, and Musrat Zahan Surovy, Department of Biotechnology, Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)



Graduate students, researchers, and faculty members at the workshop.

Genome editing by sequence-specific nucleases (SSNs) has revolutionized biology by enabling targeted modifications of genomes. Although routine plant genome editing emerged only a few years ago, we are already witnessing the first applications to improve disease resistance. Gene editing based on a bacterial adaptive immune system, termed CRISPR/Cas9 (Clustered, Regularly Interspersed, Palindromic Repeats/CRISPR-associated endonuclease 9), has sparked a new revolution in biological and agricultural research. CRISPR/Cas9 can generate targeted gene knock-outs and replacements, which are invaluable for understanding the function of genes. Additionally, this innovative technology offers an efficient approach for genetic manipulation of crops without the retention of large transgene sequences in the final plant variety. In particular, CRISPR/Cas9 has democratized the use of genome editing in plants thanks to the ease and robustness of this method. A variety of tools have been developed to optimize the components of the CRISPR/Cas9 system. Although there are many recent reports of successful CRISPR/Cas9-mediated plant gene editing, the experimental tools required to implement these powerful techniques have yet to be embraced by many plant science laboratories as a routine protocol.

The Department of Biotechnology of Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU) has been working with international collaborators (in the UK and Canada) to develop new varieties of wheat resistant to the newly introduced worrisome wheat blast in Bangladesh (Islam et al. 2016, *BMC Biol.*, 14:84) by genome editing using the CRISPR/Cas9 technique. To train young researchers, the Department of Biotechnology organized a day-long training workshop on CRISPR/Cas9 Genome Editing for Crop Improvement on July 15, 2018 at the seminar room of IQAC, Dr. M. A. Wazed Miah Central Laboratory,



Dr. Pankaj Bhowmik conducting the training.

BSMRAU, Gazipur. The main objective of the workshop was to equip scientists and students with the skills required for the development of novel blast resistant non-transgenic wheat varieties and genome editing of other economically important crop plants for ensuring the food and nutritional security of Bangladesh. A total of 30 graduate students, researchers, and young faculty members participated in the workshop. Basic concepts, principles, scopes, and success stories of CRISPR/Cas9 genome editing for improvement of crop plants were introduced by Prof. Tofazzal Islam of BSMRAU (Haque et al. 2018, *Front. Plant Sci.*, 9:617). A leading expert from the National Research Council in Canada, Dr. Pankaj Bhowmik, trained the participants on his newly developed technique of targeted mutagenesis of wheat using CRISPR/Cas9 (Bhowmik et al. 2018, *Scientific Reports*, 8: 6502).

The technical sessions consisted of conventional seminar-style presentations with video clips demonstrating the hands-on introduction of gRNA designing and plant transformation. This workshop was sponsored by the Government of Bangladesh and World Bank, under the sub-project CP#2071 of HEQEP. The workshop was opened by the BSMRAU Treasurer, Prof. Tofayel Ahamed, and closed by the honorable Vice-Chancellor of BSMRAU, Professor Dr. Md. Giashuddin Miah, who also gave out certificates to the participants. The technical sessions were chaired by Dr. Abdul Mannan Akanda, Professor, Department of Plant Pathology, BSMRAU. This training workshop provided a unique opportunity to develop collaborations among the researchers at BSMRAU and the National Research Council of Canada to develop local expertise and capacity to address new challenges in crop production and food security of Bangladesh associated with climate change by utilizing CRISPR/Cas genome editing.



Prof. Tofazzal Islam delivering a presentation on CRISPR/Cas9 genome editing technology.



Vice-Chancellor of BSMRAU, Prof. Dr. Md. Giashuddin Miah, presenting a certificate to a doctoral student participating in the training workshop.

EVENT	ORGANIZED BY	DATE	WEBSITE
<b>INDIA &amp; BANGLADESH</b>			
13 <sup>th</sup> Asian Maize Conference and Expert Consultation on "Maize for Food, Feed, Nutrition and Environmental Security"	Indian Council of Agricultural Research	October 8 – 10, 2018 Ludhiana, India	<a href="http://bit.ly/2sUAWPi">http://bit.ly/2sUAWPi</a>
9 <sup>th</sup> Conference of the Indian Science Congress Association (Haridwar Chapter) on "Future India: Science and Technology"	G.B. Pant University of Agriculture & Technology, Pantnagar	October 13 – 14, 2018 Pantnagar, India	<a href="http://www.gbpuat.ac.in/trainings_conferences/30.07.2018_brochure_final.pdf">http://www.gbpuat.ac.in/trainings_conferences/30.07.2018_brochure_final.pdf</a>
8 <sup>th</sup> Indian Horticulture Congress – 2018	Indira Gandhi Krishi Vishwavidyalaya	October 29 – November 2, 2018 Raipur, India	<a href="http://igau.edu.in/pdf/event/event_ihc2018.pdf">http://igau.edu.in/pdf/event/event_ihc2018.pdf</a>
National Seminar on "Abiotic Stress Management : Challenges and Opportunities"	Tamil Nadu Agricultural University	October 25 – 26, 2018, Coimbatore, India	<a href="http://www.tnau.ac.in/events.html">http://www.tnau.ac.in/events.html</a>
2 <sup>nd</sup> National Biotechnology Conclave	Confederation of Indian Industry (CII)	November 30, 2018 New Delhi, India	<a href="http://www.cii.in/">http://www.cii.in/</a>
2 <sup>nd</sup> International Conference on Nanobiotechnology for Agriculture	The Energy and Resources Institute	December 6 – 7, 2018 New Delhi, India	<a href="http://www.teriin.org/event/second-international-conference-nanobiotechnology-agriculture">http://www.teriin.org/event/second-international-conference-nanobiotechnology-agriculture</a>
<b>INTERNATIONAL</b>			
The 3 <sup>rd</sup> International Agriculture Innovation Conference (IAIC 2018)	International Association for Agricultural Sustainability	October 12 – 13, 2018 Beijing, China	<a href="http://iaic2018.iaas.org.sg/">http://iaic2018.iaas.org.sg/</a>
5 <sup>th</sup> International Rice Congress	International Rice Research Institute	October 14 – 17, 2018 Singapore	<a href="http://ricecongress2018.irri.org/">http://ricecongress2018.irri.org/</a>
2 <sup>nd</sup> Asia Forum on Genome Editing	Korea Biosafety Clearing House	November 1 – 2, 2018 Gangneung, Korea	<a href="https://www.kribb.re.kr/eng/sub02/sub02_07_01.jsp">https://www.kribb.re.kr/eng/sub02/sub02_07_01.jsp</a>
9 <sup>th</sup> Meeting of the Conference of the Parties	Convention on Biological Diversity	November 10 – 22, 2018 Sharm El-Sheikh, Egypt	<a href="http://bch.cbd.int/protocol/meetings/">http://bch.cbd.int/protocol/meetings/</a>



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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