



Proceedings of the International Seminar

# GMO Crops: Policy and Practices in Bangladesh



Organized by:  
**South Asian Institute of Policy and Governance (SIPG) &  
NSU-UWA Agribusiness Centre of Excellence (ACE)**



**Associate Partner**





*Keynote Speaker: Sir Richard J. Roberts, Nobel Laureate in Physiology or Medicine*



*Distinguished Panelists at the Seminar*

# **Proceedings of the International Seminar on GMO Crops: Policy and Practices in Bangladesh**

Date: 28 October 2023

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## **Organizers**

South Asian Institute of Policy and Governance (SIPG)

NSU-UWA Agribusiness Centre of Excellence (ACE)

Associate Partner:

South Asian Network for Public Administration (SANPA)

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## Introduction

The term "Genetically Modified Organism" (abbreviated as "GMO") is a non-scientific and ambiguous word that is frequently used in media outlets to refer to animals and plants that have been enhanced via the use of contemporary biotechnology methods, setting them apart from crops and livestock. The Food and Agriculture Organization (FAO, 2001) of the United Nations defines it as follows: "Genetically engineered/modified organisms, and products, thereof, are produced through techniques in which the genetic material has been altered in a way that does not occur naturally by mating and/or natural recombination. It is an organism that has been transformed by inserting one or more transgenes."

Moreover, Genetically Modified Food refers to the "Food produced for human consumption and derived from organisms whose genetic material (DNA) has been modified in a way that does not occur naturally, e.g. through introducing a gene from a different organism (FAO, 2020)."

The question of whether human beings should eat food from genetically modified organisms, and if they should develop and propagate GM foods- is not amenable to a simple 'yes' or 'no' answer. Knowledge of GM food research to the common people, and the decision to consume or grow GM food, requires informed choice and decision of the consumers and farmers. Open talks and dissemination on research and release of GM food are also being constrained by counter-GMO propaganda across the globe which marks the pace of research and release of GMO crops somewhat slow and limited. Therefore, discussion on GMO policy and practices is very much essential to appreciate the existing gaps in policy, progress on research, and release and commercialization of GMO products.

In this backdrop, the 'International Seminar on GMO Crops: Policy and Practices in Bangladesh', was convened on 28<sup>th</sup> October 2023, at the Syndicate Hall, North South University, Dhaka. The main objective of this seminar was to review and discuss the policies and practices of GMO crops in Bangladesh, assess current progress in terms of research and production, and identify the major challenges. It marked a significant congregation of experts, researchers, policymakers, and stakeholders in agriculture. It was jointly organized by the South Asian Institute of Policy and Governance (SIPG) and the NSU-UWA Agribusiness Centre of Excellence (ACE). The associate partner was the South Asian Network for Public Administration (SANPA). This seminar provided a crucial platform for insightful discussions on genetically modified organisms (GMOs) and their impact on agriculture, with a particular focus on Bangladesh.

The keynote speaker for this prestigious event was Sir Richard J. Roberts, a distinguished Nobel Laureate in Physiology or Medicine. Professor Atiqul Islam, the Vice Chancellor of NSU, chaired the session. The distinguished panel of experts included Mr. Anwar Faruque, Former Secretary of the Ministry of Agriculture, Government of Bangladesh; Professor Dr. Abdul Khaleque from the Department of Biochemistry and Microbiology at NSU; Dr. M Mahfuzul Haque, Associate Professor at SIPG, NSU; and Dr. Md. Shawkat Islam Sohel,



Assistant Professor in the Department of Environmental Science and Management at NSU. Professor Sk. Tawfique M. Haque, the Director of the South Asian Institute of Policy and Governance (SIPG) facilitated the seminar. Professor Nazrul Islam of NSU-UWA Agribusiness Centre of Excellence (ACE) delivered the welcome speech, setting the stage for the thought-provoking discussions. Professor Dr. Hasan Mahmud Reza, Dean of the School of Health & Life Sciences at North South University extended the vote of thanks. The discussions centered on policy frameworks, adoption challenges, and the necessity for informed decision-making in the realm of GMOs. This collection of proceedings encapsulates the rich discourse and outcomes of the seminar, serving as a resource for further research and policy development in the field of agribusiness and GMO technology. The rapporteurs were Md. Parvez Hasan Yousuf, Research Associate, South Asian Institute of Policy and Governance (SIPG), North South University, and Ms. Rifah Nanjiba, Research Associate, NSU-UWA Agribusiness Centre of Excellence (ACE).



*Organizers and participants at the seminar*

## Policy Recommendations

Following extensive discussions in the seminar on GMO Crops: Policy and Practices in Bangladesh, the conversations were grouped into three distinct categories: 1. Challenges and Recommendations for Advancing GMO Crops, 2. Awareness Strategies, and 3. Government, Private, Public Issues and Recommendations. Under these categories, key issues and actionable recommendations were outlined. The tables below provide a detailed overview of the key issues and recommended actions in each of these crucial areas.

### Challenges and Recommendations for Advancing GMO Crops

| Issues   | Recommendations  |
|--|--|
| 1. Misinformation and opposition to GMOs               | <ol style="list-style-type: none"> <li>1. Promote science-based education and awareness programs to address misconceptions about GMOs.</li> <li>2. Engage with the public through transparent communication channels to provide accurate information on GMO safety and benefits.</li> <li>3. Collaborate with reputable scientific organizations to disseminate credible information about GMOs.</li> <li>4. Encourage open dialogues between scientists, policymakers, and the public to enhance understanding and trust.</li> <li>5. Support independent research on GMO safety and impact to provide unbiased information for decision-making.</li> </ol> |
| 2. Growing population and increasing food demand       | <ol style="list-style-type: none"> <li>6. Intensify research on high-yielding GMO crops to meet the rising food demand.</li> <li>7. Encourage the adoption of GMOs as an optional approach for farmers to enhance food production and security.</li> </ol>   |
| 3. Regulatory framework and policy development         | <ol style="list-style-type: none"> <li>8. Strengthen and streamline regulatory processes to facilitate timely approvals for GMO research and commercialization.</li> <li>9. Invest in training and capacity building for regulatory authorities to ensure effective monitoring of GMO activities.</li> <li>10. Involve key stakeholders, including scientists, policymakers, legal experts, and industry representatives, in policy discussions and development.</li> <li>11. Establish mechanisms for regular review and updates of GMO-related policies to align with evolving technologies.</li> </ol>  |
| 4. Environmental risks and long-term impact assessment | <ol style="list-style-type: none"> <li>12. Prioritize long-term environmental impact studies and consequences of GMO cultivation to assess potential risks and benefits.</li> </ol>  |

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|   | <p>13. Conduct thorough utilitarian analysis, including cost-benefit and risk-benefit assessments, to evaluate the potential impacts of GMO technologies, considering both short-term and long-term effects.</p> <p>14. Establish continuous monitoring and reporting mechanisms for GMO environmental impact.</p>   |
| 5. Resistance to adoption in developing countries           | <p>15. Encourage informed discussions and knowledge sharing through public awareness campaigns and educational programs to address concerns and combat misinformation.</p> <p>16. Ensure public access to information and opportunities for public consultation to promote inclusivity in decision-making processes.</p>   |
| 6. Addressing biodiversity concerns                         | <p>17. Conduct in-depth research and disseminate findings to demonstrate that GMO crops do not pose significant harm to biodiversity, and compare with the environmental impact of conventional farming practices.</p>   |
| 7. Bio-safety framework and monitoring                      | <p>18. Establish and enforce a robust bio-safety framework for the release of GMO crops, including the creation of a monitoring body to ensure compliance with bio-safety rules and regulations.</p>   |
| 8. Legal issues and patent infringement                     | <p>19. Establish clear legal frameworks and guidelines to address potential patent infringement issues arising from the cross-pollination of GMO crops with neighboring fields, ensuring fair practices for both corporate and individual farmers.</p>   |
| 9. Environmental stewardship and responsibility             | <p>20. Promote responsible practices in agriculture by prioritizing environmental stewardship, including the development of GMO crops resistant to pests and diseases, and the improvement of soil health through biotechnological research.</p>   |
| 10. Convincing policymakers about the benefits of GMO crops | <p>21. Continue efforts to provide policymakers with clear and compelling evidence of the benefits of GMO technology, particularly in addressing Vitamin A deficiency and saving lives in densely populated regions.</p> <p>22. Emphasize the importance of GMO crops in improving food security and increasing agricultural yields to meet the needs of a growing population.</p> |
| 11. Time and cost considerations for                        | <p>23. Highlight the urgency of policy implementation to avoid potential delays in realizing the benefits of GMO crops, while</p>  |



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|----------------------------|---|
| policy implementation.     | also acknowledging the importance of thorough evaluation and evidence-based decision-making.  |
| 12. Ethical considerations | <p>24. Engage experts in environmental ethics and philosophy to provide input on the ethical implications of introducing GMO technologies in agricultural practices.</p> <p>25. Advocate for equal ethical scrutiny and testing protocols for both traditionally bred plants and GMO crops, ensuring a consistent approach to assessing potential risks and benefits.</p> |

## Awareness Strategies

| Issues   | Recommendations   |
|--|---|
| 1. Public awareness and education                | <p>1. Implement campaigns aimed at raising public awareness about the benefits and safety of GMO technology.</p> <p>2. Collaborate with respected scientific organizations for educational outreach, ensuring the provision of precise GMO information.</p> <p>3. Facilitate transparent dialogue between scientists, policymakers, and the public to address concerns and provide clear information.</p> <p>4. Support unbiased research on GMO safety and impact to ensure the dissemination of credible information.</p> |
| 2. Transparency and potential health risks       | <p>5. Advocate for impartial and comprehensive research on the safety and advantages of both GMO and traditionally harvested crops, prioritizing the rigorous examination of health concerns to provide accurate and reliable information.</p>  |
| 3. Education and urgency of empowering consumers | <p>6. Promote comprehensive campaigns to educate consumers about the importance of making informed choices when it comes to their food.</p> <p>7. Stress the urgency of the situation and emphasize that inaction is not an option.</p>   |
| 4. Dispelling misconceptions about GMOs          | <p>8. Launch awareness campaigns emphasizing the role of GMO technology in increasing agricultural yields and ensuring food security, particularly in densely populated regions like Bangladesh.</p> <p>9. Address common misconceptions about GMOs by providing evidence-based information through various channels such as mass media, highlighting their safety and benefits to inform the general public.</p>   |

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|  | 10. Involve influential figures, celebrities, and religious leaders to advocate for the safety and benefits of GMO technology, reaching a wider audience and building public trust in the science behind genetic modification.  |
| 5. Encouraging informed choices by farmers | 11. Empower farmers with information about GMO technology, allowing them to make informed choices based on their individual circumstances, preferences, and needs for crop production.  |
| 6. Using online resources to promote GMOs  | 12. Promote websites and online resources like "Support Precision Agriculture" ( <a href="http://supportprecisionagriculture.org/">http://supportprecisionagriculture.org/</a> ) to provide factual information and resources on GMOs to the public, making it accessible and understandable. |
| 7. Presenting science facts in media       | 13. Encourage the media to present accurate and objective science-based facts regarding GMOs rather than sensationalized or fear-inducing narratives, fostering informed public discourse.  |

## Government, Private, Public Issues and Recommendations

| Stakeholder | Issues  | Recommendations  |
|-------------|---|--|
| Government  | 1. Complex and lengthy regulatory processes                   | 1. Simplify and accelerate regulatory processes to provide a clear framework for GMO research and commercialization for the development and adoption of GMOs.          |
|             | 2. Policy gap   | 2. Establish mechanisms for regular review and updates of GMO-related policies to align with evolving technologies.  |
|             | 3. Limited stakeholder participation in policy deliberations. | 3. Involve scientists, policymakers, legal experts, and industry representatives, as well as integrate ethical considerations into policy discussions and development. |

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|                | 4. Unclear information on the duration of patent rights for agricultural crops, including GMOs | 4. Establish transparent guidelines within the framework of the existing Intellectual Property Right (IPR) Act of Bangladesh, ensuring clear information on the duration of patent rights for agricultural innovations, particularly for essential food crops, |
|                | 5. Conclusive evidence for policy making   | 5. Encourage policymakers to seek conclusive evidence and research findings to inform their decisions regarding GMO technology, considering both the potential benefits and risks associated with its implementation.  |
| Private Sector | 1. Lack of collaboration   | 1. Establish partnerships between government agencies, private companies, and academic institutions to promote GMO research and development.   |
|                | 2. Knowledge sharing   | 2. Create platforms for knowledge sharing and technology transfer between government agencies, private companies, and academic institutions.   |
|                | 3. Balancing financial interests with public welfare   | 3. Consider adopting non-commercial approaches for technologies like Golden Rice, where patent holders may choose to make them freely accessible for the benefit of public health and welfare.   |
|                | 4. Encouraging independent GMO development   | 4. Facilitate an environment where smaller labs and individual farmers can engage in GMO research and development independently, reducing dependency on large multinational companies.   |
|                | 1. Lack of public awareness  | 1. Execute tailored public awareness initiatives that highlight the advantages and safety of GMO technology.   |

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| Public | 2. Misinformation and concerns perpetuated by anti-GMO advocates and organizations. | 2. Engage reputable scientific organizations in educational outreach programs to provide accurate information on GMOs.                                    |
|        | 3. Negative public perception   | 3. Promote open dialogue between scientists, policymakers, and the public to address concerns and provide transparent information.                        |
|        | 4. Transparency and potential health risk concerns regarding GMOs                   | 4. Advocate for unbiased studies on GMO safety and their broader impacts, ensuring the availability of reliable information for widespread dissemination. |

## Seminar Proceedings

### Welcome Speech

Professor Dr. Nazrul Islam, Director of the NSU-UWA Agribusiness Centre of Excellence, NSU

The seminar commenced with a warm and insightful welcome speech by Professor Dr. Nazrul Islam, Director of the NSU-UWA Agribusiness Centre of Excellence. His words set the tone for a day of meaningful discussions and valuable insights into the world of GMOs and their impact on agriculture. In his welcome speech, Dr. Nazrul Islam emphasized the significance of informed decision-making regarding genetically modified organisms (GMOs). He acknowledged the challenges posed by counter-GMO narratives and highlighted the seminar's goal of bridging policy gaps, evaluating research progress, and addressing key challenges in GMO adoption. Dr. Islam also introduced the NSU-UWA Agribusiness Centre of Excellence, illustrating its mission to enhance research and leadership capacity in sustainable agribusiness practices. He concluded by expressing gratitude to the organizers and participants for their collective effort in shaping a more secure future for agriculture and food production in South Asia. Dr. Islam's full speech is attached in Annexure – 1.

### Seminar Insights

Professor Sk. Tawfique M. Haque, Director of the South Asian Institute of Policy and Governance (SIPG), NSU

In facilitating the Seminar on GMO Policy and Practices, Professor Sk. Tawfique M. Haque, Director of the South Asian Institute of Policy and Governance (SIPG), NSU, offered invaluable insights into genetically modified organisms (GMOs). Following the warm welcome, Professor Tawfique delineated the program schedule and addressed the complex

discourse surrounding genetically modified organisms (GMOs). He emphasized that the question of GMO consumption and propagation is far from a simple 'yes' or 'no,' underscoring the need for informed decision-making among consumers and farmers. Professor Haque acknowledged the challenges posed by the counter-GMO propaganda, which has slowed the pace of GMO research and release. This discussion on GMO policy and practices is essential to address policy gaps, evaluate research progress, and understand the major challenges faced by Bangladesh and South Asian countries. Additionally, Professor Haque provided a brief introduction to SIPG, highlighting its prominence and its role as a hub for students from various South Asian regions, contributing to a rich, cross-cultural learning environment. Lastly, he provided a brief biography of Sir Richard J. Roberts, underlining his Nobel Laureate status and significant contributions to Physiology or Medicine, further underscoring the seminar's significance.

## **Key Note Speech**

### **By Sir Richard J. Roberts, Nobel Laureate (Physiology or Medicine)**

Sir Richard John Roberts, a distinguished British Biochemist and Molecular Biologist, is renowned for his pioneering work on RNA splicing and the discovery of introns in eukaryotic DNA. In 1993, he was jointly awarded the Nobel Prize in Physiology or Medicine with Phillip Allen Sharp for these significant contributions. Currently affiliated with New England Biolabs, Roberts continues to advance our understanding of genetics through his research on gene splicing. Knighted in 2008, he is a staunch advocate for genetically modified organisms (GMOs), particularly Golden Rice, as a means to improve health through nutritious food intake by low-income populations in developing nations. In 2016, he and fellow Nobel laureates authored a letter endorsing precision agriculture and GMOs. Roberts also holds key positions on various advisory boards and serves as the chair of The Laureate Science Alliance, a non-profit organization dedicated to supporting global research.

In his keynote address, Sir Richard J. Roberts addressed several crucial aspects related to genetically modified organisms (GMOs) and their significance in shaping a more sustainable and food-secure world. As a Nobel Laureate, his expertise in genetic science provided a foundation for his insightful presentation. Sir Richard began by highlighting the vast potential of genetically modified organisms (GMOs). His message was clear: GMOs represent a powerful tool in our pursuit of sustainable and efficient agricultural practices. The title of his presentation was “Why you should love GMOs”.

### **Why GMOs Face Opposition:**

Sir Roberts delved into the reasons behind the opposition to GMOs, particularly in developing countries. He highlighted the influence of European trade ministers, who are hesitant to adopt GMOs due to the strong anti-GMO sentiment in Europe. This reluctance stems from misinformation and deliberate disinformation campaigns perpetuated by organizations like Greenpeace and anti-GMO advocates.

### **GMOs and Climate Change:**

He emphasized the potential of GMOs not only in addressing food security but also in counteracting climate change. With rising CO<sub>2</sub> levels in the atmosphere, plants play a crucial role in absorption, and through genetic modification, we now have the means to enhance their efficiency in this natural process. By integrating specialized pathways into plants, we can significantly increase their capacity to sequester CO<sub>2</sub>. This presents abundant opportunities, especially given the extensive cultivation of crops, where agriculturalists can develop plants tailored to actively reduce CO<sub>2</sub> levels in the atmosphere.

### **Natural Evolution and Genetic Modification:**

Sir Roberts emphasized that genetic modification is not a new concept. He clarified that every life form on this planet, including humans, has been genetically modified through the process of evolution. He drew attention to the fact that traditional plant and animal breeding practices, which have been in use for centuries, involve genetic modification.

### **Precision Breeding vs. Traditional Methods:**

The speaker introduced the concept of precision breeding, comparing it to traditional breeding methods. He used the analogy of transferring a GPS from one car to another to illustrate the precision of GMOs. Roberts explained that precision breeding allows for the specific insertion of desired genes into a plant's genome, offering a level of control not achievable through traditional methods.

### **The Precautionary Principle:**

Sir Roberts questioned the application of the precautionary principle in evaluating the safety of GMOs. He pointed out that many widely accepted innovations, such as insulin for diabetics and vaccines for COVID-19, were embraced without extensive prior evidence of safety. He also raised concerns about the potential health risks associated with cellphone use, highlighting the need for a balanced approach to assessing the safety of new technologies. This calls for a fair and consistent evaluation of potential risks across different technologies, ensuring that precaution is exercised where it is genuinely warranted.

### **Golden Rice and Vitamin-A Deficiency:**

The speaker presented Golden Rice as a powerful example of GMOs addressing a critical global health and nutrition issue. He outlined the efforts to develop Golden Rice, which is fortified with beta carotene, a precursor of Vitamin A. Despite its potential to combat Vitamin-A deficiency, regulatory hurdles and opposition delayed its availability in affected regions.

### **Europe's Stance on GMOs:**

Sir Roberts discussed Europe's resistance to GMOs, suggesting that political and economic interests may be influencing their stance. He highlighted the complexities of the agricultural industry, including concerns about the dominance of large U.S. agribusinesses. Sir Roberts



brought attention to the controversial issue of banning Monsanto, a major U.S. agribusiness, in Europe. He explained how Monsanto's initial approach to introducing GMO crops in Europe inadvertently fueled anti-GMO sentiments by increasing prices for farmers and consumers. This contributed to the opposition against GMOs. The speaker called for a reevaluation of policies to support developing nations in need of improved agricultural practices.

### **Global Actions Needed:**

The speaker urged for a collective effort to promote informed discussions about GMOs. He focused on the importance of collaboration between scientists, politicians, civil society, religious leaders, influential figures, and the media to present science-based facts. Sir Roberts stressed that GMOs hold immense potential for addressing food insecurity in developing countries.

Sir Richard J. Roberts concluded by encouraging attendees to reconsider their perspectives on GMOs, highlighting their potential to significantly impact global food security. He eloquently conveyed that GMOs are not a luxury of the developed world, but a critical necessity for the impoverished populations of Africa, South America, and Asia, where the pressing question is not "What will I eat today?" but rather "Will I eat today?" By presenting concrete examples like Golden Rice in the Philippines, Bt Brinjal in Bangladesh, and GMO mustard in India, Sir Roberts showcased how GMOs have already made significant strides in improving crop yields and nutritional content, particularly in regions grappling with dire food shortages. He pointed out that the safety and efficacy of GMOs have been rigorously examined and supported by a consensus of scientific experts, evidenced by the endorsement of 166 Nobel Laureates in an open letter to Greenpeace and UN Ambassadors. Sir Roberts fervently urged for a departure from Western indulgence and a collective commitment to provide equitable access to improved crops for the world's most vulnerable populations. He underscored the urgency of this mission by highlighting the tragic consequences of delays and opposition, as seen in the millions of children suffering due to Vitamin-A deficiency, a crisis that could have been mitigated by the timely adoption of Golden Rice. In addition, he directed attendees to visit the website "Support Precision Agriculture" (<http://supportprecisionagriculture.org/>) for further factual information on GMOs, providing a valuable resource for those seeking to deepen their understanding of this critical issue. In closing, Sir Roberts left the audience with a powerful message - to embrace GMOs not as a contentious novelty, but as a transformative force that, when harnessed responsibly, holds the promise to feed the hungry, enhance global agricultural sustainability, and advance the collective well-being of humanity.

## **Panel Discussion**

### **Challenges of Food Security in Bangladesh and the Issue of GMO**

**By Mr. Anwar Faruque, Former Secretary, Ministry of Agriculture**

The panel discussion commenced with Mr. Anwar Faruque, Former Secretary of the Ministry of Agriculture, GoB, expressing his gratitude to Sir Richard for his insightful presentation. He acknowledged the progress made in the agricultural sector of Bangladesh since its independence in 1972, evolving from a net deficit to a food surplus country. This transformation, he emphasized, was primarily driven by the development and adoption of modern agricultural technologies and practices. He pointed out that the introduction of High Yielding Varieties (HYVs) in the early 1970s, along with the adoption of modern irrigation techniques, led to a remarkable increase in rice production from 1.1 million metric tons to an impressive 40 million metric tons.

While acknowledging the initial skepticism surrounding the adoption of HYVs and later hybrid varieties, Mr. Faruque reiterated that these innovations have now become integral to ensuring food security and safety in Bangladesh. He underscored the fact that negative propaganda and criticism have often accompanied agricultural advancements, but it is imperative to recognize that science remains indispensable in sustaining current levels of food security.

Mr. Faruque also underscored the looming challenges posed by a growing population, diminishing arable land, and declining soil fertility. He stressed the need to double food productivity by 2040 and emphasized the critical role of technological advancements. While acknowledging criticisms of biotechnology, such as the fear that it could lead to the treatment of human life as a commodity, gene manipulation, and the initial cost barriers, he noted that the costs have become more reasonable over time. However, he clarified that the adoption of GMOs is not mandatory for Bangladeshi farmers, but rather an optional approach to enhancing food security, with the promise of more innovative products in the future.

The discussant also highlighted challenges faced in the regulatory sphere, particularly in the context of releasing genetically modified organisms (GMOs) such as Bt cotton and Bt Brinjal. He expressed concern over bureaucratic hurdles and stressed the importance of having a regulatory ministry staffed with technical experts well-versed in the relevant scientific knowledge.

Mr. Faruque proposed effective policy implementation and the need for a regulatory body comprising predominantly scientific experts. He urged for mechanisms to retain knowledgeable personnel within the ministry and called for a concerted effort to navigate future challenges in the pursuit of increased productivity through scientific advancements.

In his discussion, Mr. Anwar Faruque recalled the visit of Greenpeace representatives in his office during the release of Bt Brinjal, a genetically modified eggplant variety. He questioned their opposition, in the paramount importance of ensuring food security for the people of

Bangladesh. This highlighted his strong belief in the value of innovative agricultural practices, including the use of genetically modified organisms (GMOs), and the essential role of science and technology in meeting the challenges of increasing food productivity.

In his concluding remarks, Mr. Faruque emphasized the imperative of prioritizing the well-being and food security of the Bangladeshi population. He underlined the significance of embracing science and technology in order to meet the formidable challenges that lie ahead.

## **Biotechnology for Agriculture Innovation in Bangladesh**

### **Professor Dr. Abdul Khaleque, Professor, Department of Biology & Chemistry, NSU**

Professor Dr. Abdul Khaleque, a distinguished academic and researcher in the field of biotechnology, emphasized the integral connection between GMOs and biotechnology. He elucidated that this technology harnesses biological systems, encompassing plants, animals, and microbes at the cellular level, be it in the form of cells, tissues, genes, or DNA, enabling the delivery of superior goods and services for the betterment of humanity.

In the realm of biotechnology, recombinant DNA technology stands as a prominent cornerstone. This technology facilitates the transfer of specific characteristics from one organism to another, be it between plants or animals, resulting in the creation of innovative products such as GMO crops, transgenic animals, and transgenic plants. These advancements, carefully developed by scientists, are geared towards enhancing human well-being.

Addressing concerns raised by anti-GMO activists, Professor Khaleque highlighted that, to date, GMO products have been marketed globally, with the exception of some European countries, without any reports of substantial harm to human health. He echoed the sentiment put forth by Sir Roberts, advocating for continued support for GMO research and development.

He mentioned a recent scientific seminar organized by the Agriculture Minister, GoB, in partnership with the USDA, underscoring the imperative of employing scientifically grounded risk assessment procedures to expedite farmer access to innovative tools. Professor Khaleque focused on the crucial role of innovative biotechnology in enabling farmers to adapt to the challenges posed by climate change, thereby reinforcing food security in Bangladesh.

Given Bangladesh's vulnerability to climate change, biotechnology emerges as a potent tool to combat its adverse effects. Scientists can expedite the introduction of new plant varieties capable of thriving in evolving environmental conditions. The escalating threats of salinity, drought, and novel pathogens have rendered food production increasingly arduous for Bangladeshi farmers. Through gene editing and biotechnology, the introduction of resilient plant varieties can be accelerated, empowering farmers to yield more with fewer resources.

Drawing attention to recent milestones, Professor Khaleque spotlighted the commercial approval of biotech products like Bt Brinjal and Bt Cotton by the Bangladesh government. Bt Brinjal, a globally recognized achievement, has substantially reduced pesticide usage, resulting in a notable increase in farmers' income. The data presented underscored the impressive gains achieved through the adoption of Bt Brinjal, affirming its safety for human consumption.

Professor Khaleque anticipated the approval of other pioneering products in the future, such as Golden Rice, and acknowledged the instrumental role played by Bangladeshi biotechnologists in its development. He underscored the vast potential that Bangladesh holds for biotechnological advancements, stemming from its fertile agricultural lands and rich biodiversity.

In conclusion, Professor Khaleque emphasized the need for robust infrastructure and well-trained manpower to propel biotechnological research forward. He advocated for the promotion of small-scale agriculture biotechnology, aligning it with the nation's unique needs and resources. Moreover, he underscored the imperative of balancing economic viability, environmental stewardship, and social responsibility in the pursuit of sustainable agriculture.

In his closing remarks, Professor Khaleque offered forward-looking recommendations, including the development of a comprehensive 20-year perspective plan for biotechnology, the establishment of centers of excellence through collaborative efforts, and the proposal of a common consortium for biotechnological development across Asian countries. The discussant concluded with a resounding call for the prioritization of biotechnology in national development.

## **GMO Policy Regime in Bangladesh**

**Dr. M Mahfuzul Haque, Associate Professor, SIPG & Department of Political Science & Sociology, NSU**

Dr. M Mahfuzul Haque, Associate Professor, SIPG and the Department of Political Science & Sociology, NSU, opened his discussion on “GMO Crops: Policy and Practices”, by highlighting recent policy advancements in agricultural biotechnology. He began by sharing the positive news of a breakthrough in low Glycemic (GI) Index rice developed by IRRI scientists in the Philippines, offering potential benefits for combating diabetes. He emphasized that biotechnology represents a forward step in human progress and development, rather than regressing it. It is regarded as a crucial tool in achieving food security for a growing global population, particularly given the pressing question of how to sustainably feed an anticipated 10 billion people.

However, Dr. Haque made it clear that there are valid concerns to address the opposing GMO issues. One of the main objections to GMOs is the intent behind their production. It was noted that big agricultural companies often produce GMO crops resistant to pesticides, leading to minimizing the excessive use of chemicals in farming practices, particularly in the form of

pesticides like Roundup weed killer. This, in turn, enters the food chain, which is considered unacceptable. Other concerns include the potential for unintended gene transfers, leading to the creation of super weeds, as well as the potential harm to essential pollinators. Legal problems also arise, as corporate agricultural entities can claim patent infringement when their genetically modified crops inadvertently pollinate fields owned by individual farmers, preventing these farmers from selling their crops. Moreover, there's a lack of trust in corporate agricultural entities, as they are perceived as prioritizing profits over the common good. Dr. Haque highlighted that these concerns pose challenges for policymakers and political actors. He also emphasized the need for a sensible approach to the release of Golden Rice in Bangladesh.

Dr. Haque provided an overview of Bangladesh's robust regulatory framework for GMOs. The country adheres to the Cartagena Biosafety Protocol, a global governance framework with 196 signatories and 46 countries releasing 35 GMO crops worldwide. Various regulatory policies, including the Environment Policy of Bangladesh 2018 (Government of Bangladesh, 2018), National Agriculture Policy (Government of Bangladesh, 2018), Bangladesh Biodiversity Act 2017 (Government of Bangladesh, 2017), and Biosafety Rules 2012 (Government of Bangladesh, 2012), contribute to a comprehensive approach in ensuring biosafety. Dr. Haque delved into the specifics of the Biosafety Guidelines of Bangladesh 2010 (Government of Bangladesh, 2010), detailing procedures for research and development, imports, transfers, and commercialization of modern biotechnology. These guidelines encompass field trials, and risk management, and provide a framework for obtaining permits, ensuring compliance with safety and biodiversity standards.

Dr. Haque also discussed important committees, such as the National Committee on Biosafety (NCB), and provided an overview of the approval process for Bt Brinjal, as well as the development and evaluation process for Golden Rice. He presented a case study on Golden Rice, developed through a combination of IRRI Kaybonnet Golden Rice and BRRI paddy (*dhan*) 29. The rigorous evaluation process involved confined trials over several years, with BRRI submitting its application for release to the Ministry of Agriculture. Despite significant progress, a final decision on its release is pending.

Dr. Haque concluded by addressing the challenge faced by policymakers: reconciling divergent interests while prioritizing safety and human protection. He emphasized the need for education and awareness, both among policy makers and consumers specifically underscoring the need for consumer education and informed choices regarding GMOs. He stressed that taking no action is not a viable option when confronted with the intricate challenges surrounding GMOs, emphasizing the urgency for policymakers to act to navigate this complex terrain.

## **Environmental Concern of Releasing GMO Crops in Bangladesh**

**Dr. Md. Shawkat Islam Sohel, Assistant Professor, Department of Environmental Science and Management, NSU**

Dr. Md. Shawkat Islam Sohel, Assistant Professor, Department of Environmental Science and Management at NSU, provided valuable insights into the environmental concerns surrounding the release of GMO crops in Bangladesh. With gratitude for the enriching insights shared thus far on GMOs, Dr. Sohel acknowledged their undeniable advantages. These include accelerated crop growth, increased resistance to pests and diseases, and reduced reliance on herbicides and pesticides. However, he emphasized that it is equally crucial to acknowledge and address the potential environmental risks that may come with the widespread adoption of GMOs.

One significant point raised by Dr. Sohel was the relatively limited amount of research conducted on the environmental aspects of GMOs, both on a global scale and within Bangladesh. Most of the available research has been carried out at a laboratory or small-scale plot level, often failing to consider temporal variations. This raises concerns about the broader implications of introducing GMOs into the environment.

Dr. Sohel introduced the concept of "claims" because existing findings have not been tested across various ecosystems and temporal scales. He then delved into various claims associated with GMOs. One such claim is that GMO crops may not negatively impact biodiversity and could potentially lead to higher yields compared to conventional farming practices. While there is some preliminary evidence supporting these claims, Dr. Sohel stressed the necessity of conducting long-term monitoring and extensive research to validate these assertions.

Furthermore, he highlighted the potential risks associated with long-term GMO cultivation. This includes the risk of disrupting natural ecosystem processes and functions. One prominent concern is the possibility of hindering the natural selection of resistant plant varieties due to GMOs. This could lead to the evolution of more resilient weeds and insects, creating unknown challenges for agriculture.

Dr. Sohel also raised concerns about the unintended consequences of insect-resistant GMOs. While these crops reduce major pest populations, they might inadvertently increase minor pest populations. Such a shift in the pest dynamic could disrupt entire food chains and negatively impact other species that rely on these insects for food.

Another topic addressed was the claim that GMOs might reduce pressure on natural habitats. Dr. Sohel acknowledged the truth in this claim to some extent but emphasized the need for caution. He provided an example of how high-yield cash crops like mango orchards or dragon fruit orchards, when introduced near natural habitats, can have adverse impacts on biodiversity and lead to soil erosion in Chittagong Hill Tract areas.



Temporal yield stability, a factor often overlooked in discussions of high-yielding GMOs, was another subject of the discussion. Dr. Sohel underscored the significance of conducting long-term research to gain a comprehensive understanding of yield dynamics.

Drawing from specific examples, Dr. Sohel expounded upon Bt Brinjal, presenting findings that showcased its performance in comparison to non-Bt varieties. However, Dr. Sohel stressed the need for long-term monitoring to confirm such claims. A study conducted by a senior scientific officer from Chittagong revealed that the net yield of the Bt Brinjal varieties was around 20 tons per hectare, in contrast to the local cultivar, Potha Begun, demonstrated an impressive yield of around 43 tons per hectare, with a minimal 7% harvest loss, resulting in a net yield of 35 to 37 tons per hectare.

The discussant also talked about drought-tolerant GMOs, underscoring their potential in confronting climate challenges while cautioning about their limitations in the context of increasing global warming. In light of this, Dr. Sohel proposed a cost-effective alternative to enhance water availability in agricultural landscapes. He suggested the incorporation of organic fertilizers into the soil, a method known to strengthen soil water-holding capacity. He cited research indicating that a mere 1% increase in soil organic matter could result in a substantial addition of 20,000 gallons of water per acre. These considerations, he emphasized, should be taken into account in the broader discourse on agricultural sustainability.

Dr. Sohel also discussed the significance of nitrogen use efficiency and how GMOs can reduce the need for nitrogen fertilizers. However, he highlighted the natural nitrogen-fixing abilities of leguminous species like lentils, peas, and beans, which can fix significant amounts of nitrogen per hectare (30 to 200 kg) per crop. He urged the consideration of these natural processes when designing agricultural practices for improved sustainability.

Dr. Sohel concluded his discussion by advocating for a measured and cautious approach to the introduction of GMOs, particularly in terms of their environmental impact. He stressed the importance of long-term monitoring to comprehensively address potential negative consequences. Dr. Sohel further recommended the implementation of GMOs in confined environments, like poly shades, and greenhouses, and the adoption of integrated land use plans as proactive measures in the responsible integration of GMOs into Bangladesh's agricultural landscape.

## Open Discussion

The panelists' discussions were followed by an open discussion where a series of enlightening question-and-answer sessions with esteemed panelists on the subject of Genetically Modified Organisms (GMOs). Participants, both present at the Syndicate Hall, NSU, and those who joined online via Zoom, engaged in a dynamic exchange of views and insights. The prevailing sentiment among the invited guests was largely in favor of GMO technology. They expressed a positive outlook on the potential benefits and applications of GMOs in agriculture. This consensus highlighted the recognition of GMOs as a viable solution to address agricultural challenges, particularly in densely populated countries like Bangladesh.

**Dr. Md. Afzal Hossain**, Former Teacher, Department of Biochemistry and Molecular Biology, Faculty of Agriculture, Bangladesh Agricultural University (BAU), Mymensingh

Dr. Md. Afzal Hossain, a former teacher from Bangladesh Agricultural University, respectfully presented a compelling perspective during the discussion. He recalled a significant event from his tenure as Vice Chancellor at BAU, where the topic of Bt Brinjal sparked a nationwide debate. He vividly described an analogy from that time when the then Education Minister asked if one should cut one's head to relieve a headache, drawing a parallel to the debate around Bt Brinjal. Dr. Hossain wisely advised against such extreme measures, emphasizing the need to support agricultural innovations like Bt Brinjal and Golden Rice. He highlighted the pressing challenges faced by Bangladesh due to its size of population, underscoring the importance of addressing issues like Vitamin-A deficiency through GMO technologies. Dr. Hossain concluded by expressing gratitude to Sir Robert for his informative presentation, reinforcing the significance of promoting these innovations for the potential long-term success they could bring to the country.

**Dr. Norman Kenneth Swazo**, Director, Office of Research and Professor of Philosophy, NSU

Dr. Norman Kenneth Swazo, brought up a notable ethical aspect that had received limited attention during the discussions. He noted the distinction between the words "can" and "should" in the context of GMO technology. "Can" pertains to the scientific capabilities, referring to what can be achieved, while "should" addresses the ethical considerations of whether certain technologies, like GMOs, should be introduced into agricultural practices, particularly in the context of Bangladesh. Dr. Swazo argued that addressing these issues necessitates not only the involvement of scientists but also ethicists and experts in environmental ethics to provide a more holistic perspective. He also highlighted the significance of considering temporal aspects, questioning how many years it would take to obtain conclusive answers to the questions raised. Dr. Swazo acknowledged the ongoing debate between the immediate reality and the potential long-term consequences of adopting

GMO technology. In his view, it is imperative to engage both ethics and science in the decision-making process.

Sir Richard J. Roberts responded to the points raised by Dr. Swazo and Dr. Md. Shawkat Islam Sohel. In his reply to Dr. Sohel, Sir Roberts addressed the concerns about the perceived dangers of GMOs, highlighting that traditionally bred plants can also present risks, yet they do not undergo the same level of testing. He advocated for a consistent approach, applying testing to both GMOs and traditionally bred plants.

In his response to Dr. Norman Kenneth Swazo, Sir Roberts addressed the ethical dimension of the GMO debate. He asserted that ethical considerations apply equally to both GMOs and traditionally bred plants. He emphasized that there is a fundamental similarity in the potential long-term effects of these different approaches. Sir Roberts highlighted a notable distinction, emphasizing the precision of genetic modification in GMOs compared to the inherent uncertainties associated with traditional breeding methods. He cited examples like potato blights to illustrate that traditional methods also carry risks. Sir Roberts argued for the application of uniform standards for evaluating the long-term effects of both traditional and GMO crops, underlining the need for a balanced and equitable approach.

**Dr. Hasan Mahmud Reza**, Dean, School of Health & Life Sciences, NSU

Dr. Hasan Mahmud Reza raised an important question regarding patent rights in the context of GMOs. He inquired about the duration for which innovators can hold patent rights and when they might choose to release them, thereby allowing others to utilize the technology without the need for patent fees.

Sir Richard J. Roberts responded by elaborating on the broader issue of patents in agriculture. He pointed out that patents are not unique to GMOs; in fact, they apply to every crop introduced into agriculture. This practice is driven by individuals seeking to protect their intellectual property. Personally, Sir Roberts expressed his aversion to patents, particularly in the context of food. He specifically mentioned Golden Rice, noting that Syngenta, the holder of the patents for Golden Rice, has opted to make them freely accessible to anyone who wishes to use them. This decision reflects a non-commercial approach to Golden Rice. Sir Roberts acknowledged that while he personally disagrees with the concept of patents, it is a societal norm within capitalist systems, driven by financial incentives and power dynamics.

**Shish Haider Chowdhury**, Additional Secretary, Ministry of Commerce, Government of Bangladesh, HM Faculty, NSU

Shish Haider Chowdhury expressed his concerns about the resistance faced when trying to introduce GMOs, especially in the context of increasing global populations, particularly in developing countries. He highlighted the growing advocacy for non-GMO activities and organic foods driven by individuals labeled as "health modifiers." These advocates often raise concerns about the health hazards of GMOs, promoting organic alternatives, which Shish Haider Chowdhury noted, can be time-consuming to attain.

He then posed two specific questions: whether GMO crops can contaminate neighboring non-GMO or organic fields, and how one can confidently assert the safety of GMOs in light of studies linking them to serious diseases like cancer, particularly breast cancer.

Sir Richard J. Roberts responded to the first question by expressing uncertainty about the source of the information regarding the alleged risks of GMOs causing diseases. He asserted that there is no credible study supporting such claims and offered to review any studies provided to him, with the aim of identifying and addressing their shortcomings.

Addressing the first point raised by Shish Haider Chowdhury, Sir Roberts emphasized the need for an equal and balanced assessment of both traditional and GMO crops. He argued that there is no inherent danger specific to GMO crops that would require differential treatment. Sir Roberts then turned his attention to the influence of advocacy groups like Greenpeace and their success in shaping public opinion on GMOs. He attributed their effectiveness to substantial financial resources, which they employ to promote the perception that GMOs are inherently risky. He pointed out the financial disparities, highlighting that scientists involved in GMO research often lack the funding needed to effectively defend their work against anti-GMO activists. Sir Roberts also illustrated a recurring issue - the ease with which people can be frightened. Once fear sets in, it becomes challenging to reassure individuals. Sir Roberts expressed his belief that Greenpeace has done a disservice to the world by instilling fear and apprehension around GMO crops. He suggested that if these organizations were truly committed to evidence-based decision-making, they would acknowledge the scientific consensus on the safety of GMOs. However, he posited that their reluctance to do so may be driven by financial considerations tied to their contributions and funding sources.

**Mr. Anwar Faruque**, Former Secretary, Ministry of Agriculture:

Mr. Anwar Faruque echoed the concerns raised by Shish Haider Chowdhury regarding organic farming and GMOs. Mr. Faruque clarified that organic farming pertains to the cultivation practices themselves, and it can be applied to traditional crops. In contrast, GMO technology is a different concept that does not inherently conflict with other cultivation methods.

Mr. Faruque also addressed Dr. Hasan Mahmud Reza's inquiry about intellectual property rights (IPR) in the context of Bt Brinjal. He explained that when Bt Brinjal was initially released, it was an open-pollinated variety, which means there were no IPR restrictions associated with it. However, he indicated that there were plans to introduce hybrid varieties in the future, which would involve IPR regulations governed by the relevant intellectual property rights act in the country.

In response to Dr. Md. Shawkat Islam Sohel's mention of the results of Bt Brinjal cultivation in Chittagong, Mr. Faruque urged a comparison between the same variety of Bt Brinjal and non-GMO brinjal to provide a comprehensive assessment of productivity. He also noted the importance of considering the amount of chemical inputs used in the fields, as this significantly influences productivity. Mr. Faruque emphasized that the development of Bt

Brinjal was primarily focused on addressing fruit and shoot borer disease, ultimately contributing to safer agricultural practices.

**Mr. Mahbub Anam**, Managing Director, Lal Teer Seed Limited:

Mr. Mahbub Anam sought to address misconceptions surrounding Bt Brinjal in Bangladesh. He emphasized that the release of Bt Brinjal went through an extensive and rigorous process, spanning over 15 years since its inception in 2004. Anam outlined the various stages it underwent, including confined trials, field trials, confined field trials, and net house trials, to ensure safety and effectiveness. Mr. Anam highlighted the comprehensive protocols that were followed during the development and evaluation of Bt Brinjal, indicating that there was no room for confusion in this regard.

He commended the government for taking an important initiative in this matter and underscored the pivotal role of farmers in shaping the adoption of new agricultural technologies. Mr. Anam explained that if farmers find value in a particular technology, and believe they can successfully implement it, and if consumers accept the resulting products, then it becomes difficult for others to oppose it. He also echoed Sir Robert's sentiment that the concept of "organic" should not mislead individuals, as various factors, including the presence of companion plants and pollinators like bees, play a role in shaping the environment where crops are grown. Reflecting on a past encounter with Greenpeace activists, Mr. Anam raised the critical question of whether the priority should be to avoid famine or to provide food to the population, emphasizing the importance of feeding the people of the country.

**Professor Dr. Nazrul Islam**, Director of the NSU-UWA Agribusiness Centre of Excellence, NSU:

Professor Dr. Nazrul Islam provided valuable insights into the landscape of agricultural innovation adoption in Bangladesh. He highlighted that his current research focuses on the Adoption and Diffusion of Agricultural Innovation in the country. This research encompasses a wide range of technologies, including both tangible (hard) technologies and management practices (soft technology). Since the liberation of Bangladesh in 1971, approximately 3500 technologies have been introduced in the country. Dr. Islam specifically noted the significant contributions of institutions like Bangladesh Rice Research Institute (BRRI), Bangladesh Institute of Nuclear Agriculture (BINA), and Bangladesh Agricultural Research Institute (BARI) in releasing various seed technologies, including rice varieties, potatoes, and brinjal.

Dr. Islam emphasized the importance of providing farmers with choices in adopting these technologies. He aligned with Sir Robert's perspective that farmers should have the autonomy to decide which technologies they want to integrate into their practices. As long as scientists can ensure that technology poses no harm to human health, Dr. Islam advocated for minimal policy restrictions on its release.

**Online Zoom Participants:**

The questions from the online Zoom participants are:

**Dr. Abdur Rob Khan, Dean SHSS, NSU:**

1. Could someone provide a comparative profile of GMOs for South Asian countries?
2. What are your views on the increasing use of pesticides and insecticides? Should not we take a strong stand on these harmful materials for the human body?

**Sakil Mahmud:**

3. Please give us your insight on how you manage seed dependency from Multinational companies like Monsanto and so on when allowing GM crops.
4. How a developing country like Bangladesh would tackle its dependency on Multinational GM seed companies?

**Dr. Jashim Uddin, Associate Professor, PSS, NSU:**

The distinguished Nobel laureate mentioned that GMOs are even safer than traditional or natural food. Nevertheless, it is widely viewed that organic/natural food is inherently healthier and better for the environment. Even though the demand for organic food is growing stronger each year in developed and developing countries, especially among health-conscious people, it will be unrealistic to feed millions of people without hybrid or GMO-produced food, especially in a country like Bangladesh, which is facing a population boom. We don't know how our politicians can ensure food security for a populous country like Bangladesh after 20 or 30 years from now on. The volume of cultivated land decreases when the population increases in Bangladesh every year. My question to the speaker and panelists is

5. To meet the growing demand for food, should we consider/pursue one-child public policy or depend more on GMO food in the future in Bangladesh?
6. How can we overcome the adverse effects of GMOs on the human body, including cancer?

Sir Richard J. Roberts responded calling attention to that GMOs are relatively easy to develop and no longer require dependency on large companies like Monsanto. He mentioned that the actual process of creating GMOs is not costly and can be done independently, even in smaller labs or by individual farmers. The main expense comes from the regulatory processes, which can be demanding and sometimes impose unreasonable requirements on those producing GMOs.

## **Speech by the Session Chair**

**Professor Atiqul Islam, Vice Chancellor, NSU**

Professor Atiqul Islam, Vice Chancellor of NSU, expressed his gratitude towards Sir Richard J. Roberts for his longstanding support and valuable contributions to the university's international advisory board. However, Professor Islam noted that there is a perceived delay



in persuading policymakers about the overall benefits of GM food for Bangladesh. He emphasized the importance of universities in fulfilling their social responsibility to discover, innovate, and promote open debates on policy issues of national and global significance. The policy on GM food, in particular, was highlighted for its potential to address Vitamin A deficiency in children and save lives, while also acknowledging the need for cautious consideration of potential risks. Professor Islam commended policymakers for taking their time to make informed decisions but also noted the associated costs of delaying implementation. He thanked all attendees, including scientists, policymakers, researchers, media, students, and online participants, emphasizing NSU's commitment to knowledge dissemination and aiding policy discussions for the greater good of the country and beyond. Professor Atiqul Islam concluded by expressing hope for more seminars on GM food and related topics in the future.

## **Vote of Thanks**

**Dr. Hasan Mahmud Reza, Dean, School of Health & Life Sciences, NSU**

Dr. Hasan Mahmud Reza expressed his gratitude to everyone who attended the seminar. He commended Nobel Laureate Sir Richard J. Roberts for delivering a brilliant and convincing lecture on GMO foods and crops, as well as the global policies and regulations surrounding them. Dr. Reza commended Roberts' ability to communicate complex topics in a simple and clear manner, making the information accessible to all attendees, both in-person and virtually.

He also acknowledged the valuable contributions from the four discussions: Mr. Anwar Faruque's insights on Bangladesh's positive approach towards GMO crops to address food security challenges, Professor Khaleque's focus on biotechnological aspects of GMO food, Dr. Mahfuzul Haque's emphasis on the importance of biosafety framework, and Dr. Shawkat's presentation of scientific evidence supporting the environmental safety of GMO crops.

Dr. Reza underscored the significance of policies and regulations in the context of GMOs, mentioning that Bangladesh is in the final stages of granting such policies. He also noted the ongoing efforts by the Bangladesh Academy of Sciences in developing protocols for gene editing in plants, awaiting government approval.

Regarding concerns about biodiversity and environmental impact, Dr. Reza pointed out Dr. Shawkat's assertion that GMO crops do not cause significant harm, contrasting it with the widespread use of chemicals in conventional farming practices.

In his concluding remarks, Dr. Reza expressed his satisfaction with the informative and motivational scientific session. He highlighted the importance of research dissemination through platforms like seminars, conferences, and mass media, and stressed the crucial role of GMOs in addressing global food production needs. He extended his heartfelt thanks to all attendees for their participation in the seminar.

## Summary of the Discussion and Comments

### *Key Insights from Sir Richard J. Roberts' GMO Seminar Address:*

1. Nobel Laureate Sir Richard J. Roberts emphasized the potential of GMOs for sustainable agriculture.
2. Addressed GMO opposition and the impact of misinformation.
3. Highlighted natural genetic modification and introduced precision breeding.
4. Challenged the application of the precautionary principle in GMO safety.
5. Presented Golden Rice as a solution to Vitamin-A deficiency.
6. Discussed Europe's stance on GMOs and urged global collaboration.
7. Shared success stories of GMOs enhancing crop yields and nutrition.
8. Urged immediate GMO adoption for food security.
9. Directed to "Support Precision Agriculture" for more information.
10. Encouraged viewing GMOs as a transformative global force.

### *Panelist Perspectives on GMOs in Bangladesh: Insights, Biotechnology, Policy, and Environmental Concerns:*

#### **1. Mr. Anwar Faruque's Insights:**

- ❖ Mr. Faruque commended Sir Richard's presentation and highlighted Bangladesh's agricultural progress.
- ❖ He emphasized the role of modern agricultural practices in transforming Bangladesh into a food-surplus country.
- ❖ Mr. Faruque stressed the importance of science in sustaining food security and acknowledged challenges like population growth and declining soil fertility.
- ❖ He proposed effective policy implementation and a regulatory body with technical expertise.

#### **2. Prof. Dr. Abdul Khaleque's Biotechnology Perspective:**

- ❖ Prof. Khaleque emphasized the crucial link between biotechnology and GMOs for human betterment.

- ❖ He highlighted recombinant DNA technology's role in creating innovative products.
- ❖ Addressed concerns about GMO safety and supported continued research and development.
- ❖ Advocated for using biotechnology to address climate change challenges for food security.

### 3. **Dr. M Mahfuzul Haque on GMO Policy in Bangladesh:**

- ❖ Dr. Haque discussed Bangladesh's regulatory framework for GMOs, adhering to international biosafety protocols.
- ❖ He detailed the Biosafety Guidelines of Bangladesh 2010 and the role of the National Committee on Biosafety.
- ❖ Dr. Haque presented a case study on Golden Rice, emphasizing the need for careful policy decisions.

### 4. **Dr. Md. Shawkat Islam Sohel's Environmental Concerns:**

- ❖ Dr. Sohel emphasized the importance of addressing potential environmental risks associated with GMOs.
- ❖ He highlighted limited research on the environmental aspects of GMOs and the need for long-term studies.
- ❖ Dr. Sohel discussed various claims related to GMOs and urged caution in their widespread adoption.
- ❖ He proposed measures for responsible GMO integration, including confined environments and integrated land use plans.

Overall, the panelists provided valuable insights into GMOs, addressing their benefits, challenges, and policy considerations. They stressed the need for scientific research, cautious policy implementation, and long-term monitoring to ensure responsible adoption of GMOs in Bangladesh's agricultural landscape.

#### ***Key Points from the Open Discussion on GMOs:***

- ❖ Dr. Md. Afzal Hossain highlighted the need to support agricultural innovations like Bt Brinjal and Golden Rice to address pressing challenges due to Bangladesh's sizable population.
- ❖ Dr. Norman Kenneth Swazo emphasized the importance of involving ethicists and experts in environmental ethics in GMO discussions and considering both short-term realities and long-term consequences.

- ❖ Dr. Hasan Mahmud Reza raised questions about patent rights in the context of GMOs and expressed concerns about resistance to GMO introduction.
- ❖ Shish Haider Chowdhury addressed concerns about organic farming and GMOs, highlighting the importance of feeding the population.
- ❖ Mr. Mahbub Anam clarified the rigorous process and protocols followed in the development and evaluation of Bt Brinjal and demonstrated the pivotal role of farmers in technology adoption.
- ❖ Professor Dr. Nazrul Islam discussed the landscape of agricultural innovation adoption in Bangladesh and advocated for providing farmers with choices in adopting technologies.
- ❖ The online participants raised questions about dependency on multinational GM seed companies and ensuring independence from such entities. Sir Richard J. Roberts responded, highlighting that creating GMOs is not costly, and the main expense comes from regulatory processes.
- ❖ These points reflect the key contributions and concerns raised by each speaker during the open discussion.

## **Conclusion**

The seminar provided a platform for a well-rounded discussion on genetically modified organisms (GMOs) in the context of agriculture, specifically focusing on Bangladesh. The speakers and participants engaged in a dynamic exchange of views and insights, covering various aspects of GMO technology and its implications. While addressing questions, concerns, and ethical considerations, the seminar underlined the potential of GMOs as a solution to agricultural challenges, particularly in densely populated countries like Bangladesh. The contributions of the panelists, as well as the valuable questions and perspectives from participants, offered a holistic view of the GMO landscape in Bangladesh. The seminar highlighted the need for informed, balanced decision-making, taking into account both the benefits and risks associated with GMO technology. The seminar served as a valuable contribution to the ongoing discourse on GMOs, paving the way for further exploration and understanding of this vital topic in the realm of agriculture and food security.

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## Annex

### Annex – 1- Invitation Card

## Talk by a Nobel Laureate

### GMO Crops in Bangladesh: Policies and Practices

You are cordially invited to the Talk by a Nobel Laureate on 'GMO Crops in Bangladesh: Policies and Practices' on 28 October 2023 at North South University (NSU), Dhaka, Bangladesh. The Keynote Speaker is Sir Richard J. Roberts, Nobel Laureate (Physiology or Medicine).

It is jointly organized by the South Asian Institute of Policy and Governance (SIPG) and NSU-UWA Agribusiness Centre of Excellence (ACE).

Seminar Date: 28 October 2023  
Time: 11:AM (Dhaka Time)  
Venue: Syndicate Hall, NSU  
ZOOM Meeting ID: 965 2153 8583  
Passcode: 719872

**Professor Sk. Taufique M. Haque, PhD**  
Director, South Asian Institute of Policy and Governance (SIPG)  
Chair, Department of Political Science and Sociology (PSS)  
North South University, Bangladesh

## Annex – 2- Program Schedule

### Talk by a Nobel Laureate:

#### ‘GMO Crops in Bangladesh: Policies and Practices’

Date & Time: October 28, 2023, from 11 AM (Dhaka Time)

Venue: Syndicate Hall, North South University, Dhaka

| Time              | Program   |
|-------------------|---|
| 11.00-11.05 am    | Welcome Speech- Prof. Nazrul Islam, NSU-UWA Agribusiness Centre of Excellence (ACE)   |
| 11.05-11.35 am    | Key Note Speech by Sir Richard J. Roberts, Nobel Laureate (Physiology or Medicine)  |
| 11.35-11.55 am    | Discussion by Designated Panelists<br><br>Mr. Anwar Faruque- challenges of food security in Bangladesh.<br><br>Prof. Dr. Abdul Khaleque- the role of biotechnology for agricultural innovations in Bangladesh.<br><br>Dr. M Mahfuzul Haque- GMO policy regime in Bangladesh.<br><br>Dr. Md. Shawkat Islam Sohel- environmental concerns of releasing GMO crops in Bangladesh. |
| 11.55 am-12.25 pm | Q & A Session   |
| 12.25-12.30 pm    | Speech by Special Guest Mr. Javed Muneer Ahmad, Chairman, Board of Trustees, NSU  |
| 12.30-12.35 pm    | Speech by the Chair of the Session Prof. Atiqul Islam, Vice Chancellor, NSU   |
| 12.35-12.40 pm    | Vote of thanks- Prof. Dr. Hasan Mahmud Reza, Dean, School of Health & Life Sciences, NSU  |
| 12.40-12.45 pm    | Photo Session   |
| 12.45-1.15 pm     | Lunch   |

### Annex – 3- List of Participants

| SL | NAME                            | ORGANIZATION   |
|----|---------------------------------|--|
| 1  | Sir Richard J. Roberts          | New England Biolabs, USA   |
| 2  | Professor Atiqul Islam          | Vice Chancellor of NSU   |
| 3  | Professor Hasan Mahmud Reza     | Dean, School of Health & Life Sciences, NSU  |
| 4  | Professor Dr. Nazrul Islam      | Director, NSU-UWA Agribusiness Centre of Excellence                                |
| 5  | Professor SK. Tawfique M. Haque | Director, South Asian Institute of Policy and Governance (SIPG)                    |
| 6  | Mr. Anwar Faruque               | Former Secretary of the Ministry of Agriculture, GoB                               |
| 7  | Dr. Md. Afzal Hossain           | Bangladesh Agricultural University (BAU)   |
| 8  | Professor Dr. Abdul Khaleque    | Department of Biology & Chemistry, NSU   |
| 9  | Dr. M Mahfuzul Haque            | Associate Professor, SIPG & Department of Political Science & Sociology (PSS), NSU |
| 10 | Dr. Md. Shawkat Islam Sohel     | Department of Environmental Science and Management at NSU                          |
| 11 | Dr. Norman Kenneth Swazo        | Director, Office of Research and Professor of Philosophy, NSU                      |
| 12 | Shish Haider Chowdhury          | Additional Secretary, HM Faculty, NSU  |
| 13 | Mr. Mahbub Anam                 | Managing Director, Lal Teer Seed Limited   |
| 14 | Dr. Abdur Rob Khan              | Dean, SHSS, NSU  |
| 15 | Dr. Katherine Li                | Director, OEA, NSU   |
| 16 | Dr. Selim Reza                  | Associate Professor, PSS, NSU  |
| 17 | Dr. Bulbul Siddiqi              | Associate Professor, PSS, NSU  |
| 18 | Dr. Abdul Wohab                 | Assistant Professor, PSS, NSU  |
| 19 | Dr. Nur Newaz Khan              | Assistant Professor, PSS, NSU  |
| 20 | Asif Bin Ali                    | Lecturer, PSS, NSU   |
| 21 | Dr. Jashim Uddin                | Associate Professor, PSS, NSU  |
| 22 | Dr. Hasanuzzaman                | Deputy Director, OEA, NSU  |
| 23 | Md. Parvez Hasan Yousuf         | Research Associate, SIPG, NSU  |
| 24 | K.M.Noor-E-Zannat Nadi          | Research Associate, SIPG, NSU  |



|    |                         |   |
|----|-------------------------|---|
| 25 | Mostafizur Rahman       | Research Associate, NSU-KGF Research Project, Departments of Economics, NSU |
| 26 | Rifah Nanjiba           | Research Associate, NSU-KGF Research Project, Departments of Economics, NSU |
| 27 | Shahin Sharif           | MPPG-11th batch Student at SIPG, NSU  |
| 28 | Md. Shoriful Islam      | MPPG-11th batch Student at SIPG, NSU  |
| 29 | Kanu Kumar Ghosh        | MPPG-11th batch Student at SIPG, NSU  |
| 30 | WMNK Wijesinghe         | MPPG-11th batch Student at SIPG, NSU  |
| 31 | Afrina Islam            | MPPG-11th batch Student at SIPG, NSU  |
| 32 | A.H.M. Yeasin           | MPPG-11th batch Student at SIPG, NSU  |
| 33 | Masuma Begum            | MPPG-11th batch Student at SIPG, NSU  |
| 34 | Zahidul Karim Khondokar | MPPG-11th batch Student at SIPG, NSU  |
| 35 | Sadequr Rahman          | MPPG-11th batch Student at SIPG, NSU  |
| 36 | Nadarajah Pasdevan      | MPPG-11th batch Student at SIPG, NSU  |
| 37 | Saidul Islam            | SCC-NSU   |
| 38 | Raihana Sharmin         | DHP, NSU  |
| 39 | Tahrima Tazri Tory      | NSU   |
| 40 | Dr. Md. Mahub Rabbani   | AIUB  |
| 41 | Dr. Sharif Uddin Ahmed  | Prothom Alo, WTEF   |
| 42 | Naziba Hossain          | NSU   |
| 43 | Nuzhat Neha             | NSU   |
| 44 | Fahmeda Alam            | NSU   |
| 45 | Md.Nekmahmud            | NSU   |
| 46 | Mahmed Hossan           | NSU   |
| 47 | Shakhawat Hossen        | NSU Alumni  |
| 48 | Uchsash Tousif          | Biggan Chinta   |
| 49 | Humaira Tanzila         | Prothom Alo, WTEF   |
| 50 | Mahmud Bin Morshed      | Research Assistant, SIPG, NSU   |

## **Annex – 4**

### **Welcome Speech by Professor Dr. Nazrul Islam, Director of the NSU-UWA Agribusiness Centre of Excellence, NSU**

Honorable Chair, Professor Atiqul Islam, VC NSU, Nobel Laureate Sir Richards J. Roberts, Special Guests, Mr. Javed Muneer Ahmed, Chairman, Board of Trustees, NSU, Distinguished Guests, Ladies, and Gentlemen,

Good morning and a warm welcome to the Seminar on GMO Crops: Policy and Practices in Bangladesh, jointly organized by the South Asian Institute of Policy and Governance (SIPG) and NSU-UWA Agribusiness Centre of Excellence at North South University and the South Asian Network for Public Administration (SANPA) at North South University. I am Professor Dr. Nazrul Islam, the Director of the NSU-UWA Agribusiness Centre of Excellence (ACE), and it is indeed an honor to stand before you today to inaugurate this important event.

This seminar represents a critical milestone in our ongoing pursuit of knowledge and innovation in the field of agribusiness, particularly in the context of genetically modified organisms. Our esteemed gathering today is graced by the presence of Sir Richard J. Roberts, a Nobel Laureate in Physiology or Medicine, whose insights on GMO crops in Bangladesh promise to be highly enlightening.

Today, we have gathered here at the Syndicate Hall of North South University for a significant discourse on a subject of great global relevance. The question of whether human beings should consume genetically modified organisms and whether we should promote the development and propagation of GM foods is a matter that has been the focus of extensive research, discussions, and debates. This isn't a binary choice, but rather a crucial discussion that calls for informed choices by consumers and farmers alike.

We are living in an era where knowledge on GM food research needs to be made accessible to the common people. The decision to consume or grow GM food must be an informed one. However, open dialogue and dissemination of multi-disciplinary research findings related to GM food are often hindered by a counter-GMO propaganda that has influenced the pace of research and the release of GMO crops, making it somewhat slow and limited.

Therefore, discussions on GMO policy and practices have become essential to bridge the existing gaps in policy, evaluate the progress in research, production, and the commercialization of GMO products. The main objective of this seminar is to review and discuss GMO policies in Bangladesh and South Asian countries, assess the current progress in terms of research and production, and identify the major challenges that lie ahead.

Before I go further, let me take a moment to shed light on the NSU-UWA Agribusiness Centre of Excellence (ACE), which plays a pivotal role in this endeavor. ACE, a collaborative initiative between the Department of Economics at North South University and The University of Western Australia. It aims to cultivate new ideas that will shape the future of agriculture and food production systems.

The world faces an array of challenges, including rules of trade, climate change, resource depletion, changing demographics, and rapid population growth, all of which affect future food supply security. To address these challenges, it is imperative for agriculture to adapt and maintain a state-of-the-art food system that ensures secure and sustainable food production and supply. Bangladesh, like many other nations, needs a strong agribusiness development capacity.

While the agriculture sector in Bangladesh has shown impressive growth and performance in terms of food security, it still faces various constraints, such as a lack of research activity, limited commercialization and mechanization, poor infrastructure, and a shortage of required policies. These challenges demand an urgent, research-based approach to address food security issues comprehensively.

This is where the ACE steps in. Our vision at ACE is to implement global standards in agribusiness innovation, develop a productive workforce of next-generation leaders in the agriculture and food industry, and enhance economic benefits to the industry while eradicating food insecurities. Our mission is threefold: to strengthen and improve agribusiness research and leadership capacity, facilitate research and training, promote ethical standards, and develop and to promote ethical standards that underpin sustainable agribusiness practices. The Agribusiness Centre of Excellence (ACE) is designed to build the capacity of actors across the agricultural value chain, fostering leadership and promoting the development of promising technologies. ACE envisions becoming a regional or even a global leader in agribusiness innovation within the next five years, addressing issues of poverty, employment, and food insecurity in Bangladesh.

In addition to our seminar today, I'm delighted to share an exciting ongoing project undertaken by the NSU-UWA Agribusiness Centre of Excellence. North South University, in partnership with Bangladesh Agricultural University, Curtin University, and the University of Western Australia, is actively engaged in the project titled "Assessing Adoption and Diffusion of Agricultural Innovations in Bangladesh." This endeavor, generously funded by the Krishi Gobeshona Foundation (KGF), exemplifies our commitment to advancing agricultural research and innovation in Bangladesh. The overarching objective of this project is to enhance the adoption and diffusion of homegrown agricultural innovations within the agricultural value chain of Bangladesh, by identifying key characteristics, attitudes, and influential factors, and proposing tailored strategies to overcome barriers.

In conclusion, today's seminar is a testament to our commitment to advancing knowledge and promoting informed decision-making in the field of agribusiness. We believe that through thoughtful discussions, research, and collaboration, we can address the challenges facing agriculture and food production in South Asia. I would like to express my heartfelt gratitude to the South Asian Institute of Policy and Governance (SIPG) and North South University for taking lead in organizing this seminar, and to our distinguished speakers and participants for their valuable contributions. Together, we can create a brighter, more secure future for agriculture and food production in our region. Thank you, and I look forward to an engaging and productive seminar.

## **Annex – 5**

**Note of Professor Dr. Abdul Khaleque, Professor, Department of Biology & Chemistry, NSU**

### **Role of biotechnology for agricultural innovations in Bangladesh.**

**A:** GMO is directly related to Biotechnology or recombinant DNA technology. Biotechnology may be defined as a technology based on biological systems – plants, animals and microbes or parts of it (cell, tissue, gene or DNA) to derive the best goods and services for the benefit of human being. Although the practice of biotechnology principles was very old, as in the case of fermentation processes like making of alcohol, yogurt, preparation of cheese, bread etc., the term ‘biotechnology’ itself got its due place after the principles of recombinant DNA technology or genetic engineering came into picture. And now when we talk of biotechnology we usually mean the technology derived primarily through the use of ‘recombinant DNA’. But recombinant DNA technology in principle although sounds to be simple (taking gene from one organism and putting into another) but in practice it is quite complex, tenacious, costly and challenging. Because of this, many countries still could not enter into this arena because of lack of adequate fund, manpower, infrastructures and the political will as well. The country like Bangladesh, have a good agricultural land, good climate for agricultural production and also good climate and manpower for industry, in reality most are poor. Over population, coupled with high degree of illiteracy, have kept this prosperous region below poverty level. Therefore, to overcome the situation in reasonably early period of time cultivation of modern science like ‘biotechnology’ is highly essential.

**B:** Very recently, in a scientific seminar organized by Ministry of Agriculture, GoB and USDA, the speakers emphasized the use of scientific risk-based procedures to expedite farmer’s access to new tools and the critical role of innovative biotechnology in assisting farmers in adapting to and mitigating the impacts of climate change, ultimately reinforcing food security for Bangladeshis. Bangladesh is one of the countries in the world most vulnerable to climate change. Using biotechnology, scientists can accelerate the rate at which they can introduce new plant varieties that are able to respond to changing environmental conditions.

The growing threats of salinity intrusion, drought, and new pests have made food production increasingly challenging for Bangladeshi farmers, So, Gene editing using Biotechnology can accelerate the introduction of new plant varieties and thereby help farmers produce more food with fewer resources and identify what other technologies help Bangladesh reach its climate change goals. Bangladesh government recently have given commercial approval to biotech-derived crops-Bt brinjal and Bt cotton. Scientists and regulators in Bangladesh are now in the process of releasing a range of other crops with applications of agricultural biotechnology. These include vitamin A enriched Golden Rice, late blight resistant potato, rice rich with high-zinc and iron content, etc.

**C: Bt Brinjal – GMO developed by Bangladeshi Scientists** Bt Brinjal which is developed by Bangladeshi scientists is now a globally recognized GMO. Our farmers could significantly

reduce pesticide use and increased their profits by growing this genetically modified (GM) eggplant. According to a recent publication in the American Journal of Agricultural Economics- Farmers growing insect-resistant Bt brinjal (eggplant) improved their yields by 51 percent and cut pesticide costs by 37.5 percent. Another research team based at Cornell University and the International Food Policy Research Institute in Dhaka, also found that “Bt brinjal farmers used smaller quantities of pesticides and sprayed less frequently. Bt brinjal reduced the toxicity of pesticides as much as 76 percent.” Researchers found that although Bt brinjal farmers retained more brinjal for home consumption, both because they produced more and discarded less post-harvest. Additionally, Bt brinjal sold at prices 12.6 percent higher than non-GM varieties.

#### **D. Potentials for a Developing Country like Bangladesh**

Bangladesh is comparatively a very small country with 1,43,999 sq. km of land and the population growth rate at present is 2.3 per cent per annum which is also quite high in comparison with any developed countries. Bangladesh, an agricultural country and agriculture is the major industry upon which 80 per cent people depend. Rice is the major food crop, which is cultivated round the year and jute had been the major cash crop till recently. Although Bangladesh is one of poorest among the developing countries in Asia, yet for biotechnology development it has great potentials. These potentials lie primarily in its rich fertile agricultural land and biodiversity. Agriculture being the traditional industry of Bangladesh, agricultural biotechnology – be it plant biotechnology, animal biotechnology, fisheries or aquaculture – in every aspect Bangladesh has a great potentiality for future development. Nowhere in the world such has a fertile alluvial soil been available where plants could be grown so easily. What is needed is a good variety of plant or a good stock of animal/poultry/fish, etc. which can be developed through the modern biotechnological research. For this the country needs a good infrastructure and a team of well-trained manpower for doing research in the modern field of biotechnology like genetic engineering, cell culture, cell fusion, protein engineering, enzyme technology, etc. Bangladesh has also a good potential for the development of industrial biotechnology based on agriculture. For this, small-scale agricultural biotechnology may be encouraged, which is most suited for the country.

**E: Sustainable agriculture** is an approach that prioritizes meeting current food production needs while conserving and enhancing natural resources for future generations. To achieve agricultural sustainability, it is necessary to strike a balance between economic viability, environmental stewardship, and social responsibility. This can be difficult, especially in the face of biotic and abiotic stresses such as pests, diseases, climate change, soil degradation, and water depletion. The prevalence of pests and diseases that can significantly diminish crop yields and quality is one of the greatest obstacles to sustainable agriculture. Biotechnology can be used to create crops that are resistant to pests and diseases to address these issues. Soil nutrient deficiency is another obstacle to sustainable agriculture, as it can reduce crop yields and plant health. Biotechnology has the potential to play a significant role in developing more productive and nutritious crops. **However, at the same time, it is essential to ensure that**

**these technologies are developed responsibly and that their benefits are distributed equitably across communities and regions.**

#### **F: Suggestions for Future Improvement of Biotechnology**

I would like to make the following suggestions for the effective development of Biotechnology in Bangladesh:

1. Prioritizing biotechnology for national development by the governments: This has to get priority because without strong political will the development of the subject will be delayed further as had been the case in the past.
2. Perspective plan for the next 20 years: A perspective 20-year plan has to be drawn immediately so that no time is lost unnecessarily due to lack of proper planning and an action plan also has to be formulated simultaneously.
3. Creation of centers of excellence under collaboration: Biotechnology is a subject of precision and excellence. Therefore, it needs centers of excellence.
4. Task Force for biotechnology development: A strong Task Force, consisting of members from all Asian countries, well trained in biotechnology, has to be formed to chalk out plans of action.
5. Common consortium for Asian countries: Most of the Asian countries are poor. Therefore, a 'common fund' for biotechnological development raised through voluntary or compulsory contributions, commensuration with the national capacity, may be raised to take action-oriented programs common to all countries of the region. This will also avoid duplication of efforts by individual countries and save funds.

#### **G. Constraints for Capacity Building**

The constraints for capacity building in biotechnology in Bangladesh are as follows:

Poor economic condition of the country.

Lack of venture capital.

Lack of adequate trained manpower

Lack of political will.

Lack of incentives for biotech researchers.

Capital inventiveness of biotechnology.

Bangladesh Government at present has a strong political will and is giving due incentives for Biotechnology in Bangladesh. The formation of the National Institute of Biotechnology (NIB) already has shown some good results and many good things are ahead.

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