

Report No. 67

**Sustaining Agricultural Growth in Bangladesh:  
Should We Go for Biotechnology for Rice Improvement?**

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**Centre for Policy Dialogue**

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*As part of CPD's publication activities, a CPD Dialogue Report series is brought out in order to widely disseminate the summary of the discussions organised by the Centre. The present report contains the highlights of the dialogue on **Sustaining Agricultural Growth in Bangladesh: Should We Go for Biotechnology for Rice Improvement?** organised as part of its on-going agricultural policy research and advocacy activities with the International Rice Research Institute (IRRI) under the Poverty Elimination Through Rice Research Assistance (PETRRA) project. The dialogue was held at the BRAC Centre Auditorium, Dhaka on September 8, 2003.*

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## Dialogue Report on

### **Sustaining Agricultural Growth in Bangladesh: Should We Go for Biotechnology for Rice Improvement?**

#### **The Dialogue**

The Centre for Policy Dialogue (CPD) organised the dialogue on *Sustaining Agricultural Growth in Bangladesh: Should We Go for Biotechnology for Rice Improvement?* as part of its on going agricultural policy research and advocacy activities with the International Rice Research Institute (IRRI) under the Poverty Elimination Through Rice Research Assistance (PETRRA) project. The dialogue was held at the BRAC Centre INN Auditorium on September 8, 2003. Dr. Swapan K Datta, Senior Biotechnologist of IRRI; Dr. Mahabub Hossain, Head, Social Sciences Division of IRRI and a former Director General of the Bangladesh Institute of Development Studies (BIDS); and Professor Muazzam Husain of the BRAC University presented the keynote paper titled, “*Rice Biotechnology: Opportunity, Perceived Risks and Potential Benefits to Bangladesh*”. Professor Rehman Sobhan, Chairman, CPD was the moderator of the dialogue. The dialogue was participated by a cross-section of policy makers, plant breeders, representatives from public sector research and development institutions, public and private sector seed agencies, NGOs, farmers' association representatives, agriculture journalists and leaders of civil society groups and members of the donor agencies (*see list of participants at the end of this report*). This report documents the dialogue including a summary of the keynote paper and highlights of major issues raised in subsequent discussions.

#### **Keynote Presentation**

Prior to calling upon the keynote presenters to come up and make their presentations, chairman of the dialogue, Professor Rehman Sobhan, said that the idea was to promote debate on crop biotechnology and to use the outcome of the debate to contribute to public policy making.

Then one of the three co-authors of the keynote paper, Dr. Swapan K Datta, came up and explained the science of rice biotechnology and narrated how vitamin-A enriched genetically modified rice could address the problems of anemia and vitamin deficiencies among the malnourished children of Bangladesh as elsewhere in the developing world with few examples of products developed through biotechnology that, he thought, could come to Bangladesh.

Dr. Datta, who has successfully transferred vitamin-A producing gene into Bangladesh's most productive rice variety – BRRI Dhan-29, emphasised that fears of

risk factors should not send science to the backseat. It was stressed in the keynote that the government must take a stand on biotechnology research and import of genetically modified organisms (GMOs) and have a proper policy in place.

To Datta, it was unwise to explain importance of food security and nutrition aspect for Bangladesh. He said that 0.8 billion people were absolutely malnourished worldwide and a large number belongs to Bangladesh. Furthermore, 125 million were affected by lack of vitamin A and 400 million more are in deficient of vitamin A.

In future, nutritionally-enriched more rice has to be grown using less land, less water, less pesticides and chemicals, Datta asserted informing current areas of IRRI's works:

1. Biotic stress tolerant – insects and disease tolerant.
2. Hybrid rice
3. Abiotic stress tolerant – drought, salinity, submergence, adverse soil conditions etc.
4. Due to the fact that there is no economic incentive to grow traditional varieties, these have now taken shelter in genebanks. Biotech products, therefore, could be developed keeping the features of traditional varieties intact.

He explained that instead of traditional crossbreeding, biotechnology was giving simpler way of getting extra vigour by pushing in foreign genes in already adopted varieties.

Conventional breeding has reached to its maximum yield potential. But two million people are being added each year to already densely populated Bangladesh with 135 million people. Dr. Datta portrayed the Bangladesh scenario in a nutshell.

According to Dr. Datta the last 2 years have witnessed tremendous developments have taken place in genomics area. Rice genome has been sequenced – not only by one institution but by several – Monsanto, Syngenta, IRGSP in Japan, and BGI in China. Now its possible to know which gene relates to what trait and thereby possible to develop improved seeds. Bangladesh needs a regulatory system in place for biotech.

Identifying sheath blight as a prime villain for substantial yield loss, Dr. Swapan K Datta added that genes from wild rice or other varieties could provide traits resistant to sheath blight. By transfusing sheath blight resistant gene into Swarna, he said, good result was achieved.

Noting that bacterial blight also caused considerable yield loss, Datta informed that genes having resistant traits from wild rice were transfused to some IR varieties, a

task that took them 12 long years to perform but now scientists can perform genetic engineering in any variety in 15 months. Bacterial blight-resistant varieties have been field-tested in China, India and the Philippines and proved to be environmentally safe, claimed Dr. Datta adding that the varieties did not harm other traits in rice either.

Dr. Datta went on to add, a Japanese group has cloned some genes called Transcription Factor Gene (TFG) or Master Gene (MG). Sitting on top of all other genes the TFG or MG can regulate whole system of the plant and make osmotic adjustment so that plant can reduce water transpiration and at the same time retain the water for transfer when there'll be water scarcity.

“Poor in Bangladesh do not have balanced diet and depend more on rice due to abject poverty. So development of hi-protein rice enriched with zinc, iron and vitamin-A can be a potential solution to their nutrition deficiency. We've converted BRRI Dhan-29 into Golden Rice. Now Bangladesh can get it provided biosafety regulatory system is in place.”

Saying that iron contents in rice depleted fast after milling, the IRRI biotechnologist named his Bangladeshi colleague at IRRI, Mr Zaman, who had applied a promoter that would express in seeds and 13 genes were introduced to get 3 times more iron contents in rice after polishing.

SK Datta emphasised on the needs for:

1. Regulatory System
2. Material Transfer Agreement
3. NARS Research Collaboration with Private Sector
4. Advanced Research Institutions.
5. Intellectual Property Rights.

He highlighted good things that biotechnology can offer:

1. Less Chemical Use.
2. In-built Plant Protection Ensured.
3. Environment-friendly Crops.
4. Potential Economic Benefit for Smallholding Farmers.
5. Consumers' Benefit from Nutritional Rice.

“There is a gulf of dissimilarities between the Mercedes Benz car of 1886 and that of today. Rice plant architecture is prone to similar evolution too. Agro-biotech science must go ahead,” a buoyant Datta concluded.

Next in line came Dr Mahabub Hossain, who currently heads the Social Science Division of the IRRI. He began by saying that Americans are pro-biotech and pro-GMO but the Europeans are very much against these and Bangladesh is influenced by this global debate.

Dwelling on the issue of risks and benefits of biotech research, Dr Mahabub said, “We need to consider particular context, to try to assess risks and benefits and see where the balance lies. We’ve to take position only after a conscious risk-benefit analysis.”

He mentioned that first transgenic crop was introduced in 1996. Farmers grow transgenic crops in 60 million hectares of land in the world. Sixty-six percent of transgenic acreage falls in United States alone. However, developing countries are also not lagging behind in tapping the benefit of frontier crop science. Argentina is one of the developing countries where biotechnology has been growing very fast.

Dr Mahabub, who succeeded Professor Sobhan as BIDS Director General, informed the audience that already people in Bangladesh were consuming GMOs, as 75 percent of US soybean is GM and Bangladesh imports soybean from USA worth Tk. 1500 crore a year. He further added that soybean alone captures 63 percent of transgenic acreage apart from maize, cotton, canolla etc.

Casting light on good sides of crop biotechnology, renowned agronomist Dr Mahabub said, spreading of GM soybean resulted in cost cutting in farmers’ investment on weedicide application, and as it also reduced pesticide application, the technology is considered environment-friendly too.

Dr Mahabub stated that GM maize controlled pests to a remarkable level while cultivation of GM cotton in South Africa, China and India came to the rescue of environmental pollution, previously caused by excessive pesticide use. It also helped reduce yield loss owing to pests, he maintained.

Dr Mahabub listed the perceived risks associated with the frontier science saying that risks are same everywhere but the benefits vary from country to country.

**Food Safety Concern:** Introduction of genes may change the chemical composition of the product and that might introduce sort of toxic reactions, food allergies and antibiotic resistance.

**Environmental Concern:** GM technology may hamper the pest-predator balance. While transferring a particular pest-resistant gene, scientists may end up destroying other beneficial insects. Herbicide-tolerant genes may create super-weeds, which

might spread beyond our control. He also addressed the issue of super pests which can give births of new viruses. Science magazine reported that Bt. toxin harmed Monarch Butterfly.

**Ethical Concern:** Different societies have different values. Many consider that tinkling with the normal course of nature is not good from ethical point of view.

**Socio-economic Concern:** Biotechnology requires heavy investment and we see that big multinationals have the tendency of investing in biotechnology. They are buying smaller companies and, thus, creating some sort of monopoly situation. Private sector monopoly may lead to monopoly pricing.

High seed cost, resulting from such pricing, may widen disparity between the big farmers and the small and marginal ones with the latter unable to pay high price.

The perceived risks in food safety and environmental spheres have not yet been proven. But scientists have taken certain steps to see that those risks do not occur. It is, therefore, evident that considerable level of risk management mechanism is there. Its like multinationals researching on side effects prior to marketing of any new medicines they develop.

According to Dr Mahabub, it was very important to have effective biosafety procedures in place and develop infrastructures for maintaining international standard of food safety set by FAO, WHO etc. In 2000 Cartagena Protocol of Biosafety was adopted.

He thinks biotechnology research facilities have to be developed in the public sector. This can not be left solely on the private sector as public sector has to render the public goods to small and marginal farmers. A balance between public and private sector investments in biotechnology is thus needed. He added that Trade Related Intellectual Property Rights (TRIPs) ensures incentives for private sector developing new agricultural products.

Dr Mahabub showed statistics that out of total agricultural research investment in the world, 65 percent goes to developed countries while the rest 35 percent to their developing counterparts despite the fact that the latter's population is 4.5 times higher than that of the former's. While public and private sectors share the investments in developed nations equally, almost the whole agro-research investments in developing countries come from the public sector only. Private sector investment in developing countries was negligible, said Dr Mahabub.

He said, as small and marginal farmers dominated developing countries, big multinationals were sceptic about their market in those countries. It is, therefore, necessary to release resource from public sector in developing countries.

The GM debate between Europe and North America has to be put on the perspective of peoples' food needs, Mahabub stressed. Population in Europe remained stagnant for over the last 30 years. It rose by only 8 percent whereas population in developing countries rose by 81 percent; and in Bangladesh, population grew by 95 percent, or in other words, became almost doubled in last three decades.

Public opinion in Europe is influenced by the environment people live in. They don't need any additional food because population is static and per capita staple food consumption is rather going down owing to change in food habit. They, therefore, don't want to take any risk in food. Food security is no more a concern for Europe, food safety is their concern.

Population in North America increased by 35 percent in last 30 years and still maintains a growth trend. Projected growth in population is 26 percent in North America in the next 30 years. This is mainly migration-induced growth in population. Thus, food demand is on the rise. North America is also a major food exporter. So they're thinking that if they can attain further gain in grain production they can explore markets in developing countries as well as in Europe.

Population growth pattern suggests that Bangladesh experienced 95 percent rise in population size in last 30 years and will experience 47 percent growth in the next 30 years. We need additional food production and measures to evaluate benefits and risks in the context of increased food requirements.

Dr Mahabub further observed that the food need context has not really changed significantly since 1970. Bangladesh had to struggle for growing extra food for an additional 2 million people every year in 1970s and it is in the same struggle till today and also unlikely to get out of this struggle in next 30 years, explained Mahabub.

Bangladesh has to grow 5.6 lakh MT of additional food each year even if it wants to maintain the existing level of food consumption. Otherwise, the country will become import-dependent again. There is no guarantee that we'll be able to grow 5.6 lakh MT of additional food each year through conventional breeding. "We've already exhausted the potentials of gaining more grain by replacing traditional varieties with high-yielding varieties (HYVs). Crop gains over the past several years came mainly from HYVs' substitution in place of local varieties." Modern varieties (MVs) in Aman season fetch 3.2 to 3.5 MT of rice per hectare and in Boro season MVs fetch 5 MT per hectare comparing to only 1.5 to 2 MT per hectare crop gained from

traditional varieties. There is almost no further scope of HYV expansion in Boro season as we've already exploited groundwater and MVs to their optimum limits. In Aman, 50 percent acreage has already been covered by MVs while the breeders are yet to come up with varieties suitable for planting in other 50 percent unfavorable eco-system i.e. submergence, deep flooded area, and salinity-prone coastal belt.

The IRRI's Social Sciences Division Head cautioned that it would make a mistake for Bangladesh to assume that the way it increased food output in last 30 years, would be effective in the next 30 years. We, therefore, need to exploit all opportunities, he added.

Bangladesh could get good results in Aman if submergence tolerant traits were gained through the application of biotechnology. If drought tolerant varieties could be developed, that would raise yield and at the same time would have cost-cutting effects on supplementary irrigation.

Bt. Rice has got the tricks of lowering stem borer-induced crop losses. It has been tested in India and China. Some farmers have been allowed to cultivate Bt. Rice this year in those two countries. Bt. Rice can fight sheath blight too. MVs are prone to sheath blight. Bt. Rice is an environmental-friendly variety having potentials of cost cutting on pesticide use.

Dr Mahabub quoted Asian Development Bank (ADB) while mentioning that prevalence of vitamin-A deficiency (VAD) and iron deficiency-induced anemia in Bangladesh is highest in the world. Vitamin-A has been induced into BRRI Dhan-29 and IRRI, in the Philippines, is trying to induce iron into some of the MVs.

As regards rice biotechnology, Dr Mahabub said that it has tremendous opportunities and benefits for Bangladesh despite the fact that there would obviously be some health and environment risks. But Bangladesh can address these risks through efficient risk management, he added.

According to Dr. Mahabub Hossain there should be debates on following areas:

1. Whether there should be a government policy on GMO import and pursuing of biotech science.
2. Whether the biosafety regulation, adopted in 1999, should be ratified by the parliament on the basis of wider public debate. Forming an oversight committee, as envisaged in the biosafety guidelines, sinking the existing inter-ministerial differences over it.
3. Should the government accrue benefit through biotech research after priority crop selection rather than a 'Free-for-all' approach?

4. Which sector should be the forerunner in investing in biotech research? Should it be the private sector or the public sector?
5. It's a multi-disciplinary subject encompassing botany, biotechnology, legal aspects, food security, and nutrition. There should be a biotechnology department in every university.
6. We do not have proper facilities to attract highly qualified professionals. In order to stop brain drain and have the best expertise, we need to have policies to provide the deserving candidates with adequate facilities.

The last keynote presenter of the day Professor Moazzem Hossain divulged results of a recent survey on knowledge, perception and attitude of the civil society on selected aspects of rice biotechnology. He said that the survey team received only 232 responses out of 850 questionnaires those were circulated. NGOs opposing biotechnology did not respond said Professor Moazzem humbly acknowledging that the results might seemed to be a favourable and biased one.

He went on saying, samples were selected in purposive way so there might be some sampling biases too. Mostly educated people were the respondents, he informed.

About 96 percent of the respondents reported that they have heard of 'biotechnology' while 56 percent reported they have heard of 'GMO' with 86 percent among them correctly defined the 'GMO' as 'genetically modified organism.' Only 40 percent of the respondents reported hearing the word 'Frankenstein Food,' the slang version of GMO used by its critiques.

The major sources of information on biotechnology were newspapers (55%), magazines and literature (24%) and television/radio (17%). NGOs were a relatively minor source of information regarding biotechnology and GMOs (11%) which indicates that NGOs are yet to play an important role in negative advocacy regarding biotechnology in Bangladesh.

The perceptions regarding negative effects of biotechnology were 'Adverse effects on human health' (46%), 'Threats to biodiversity and ecology' (19%), 'Hazardous change in the environment' (16%), 'Farmers will face seed related problems' (11%), 'May change human gene and behaviour' (11%) and 'Unethical science' (6%).

In response to the question whether support biotech research for rice, a third of the respondents answered positively and nearly 60 percent answered 'yes, under certain conditions.'

In response to the question whether support import of transgenic rice varieties into Bangladesh, 52 percent of the respondents answered positively and another 39 percent, under certain conditions.

Twenty eight percent of the respondents agreed that iron deficiency is a very serious health problem in Bangladesh, and another 54 percent termed it as a serious health problem. Vitamin A deficiency was considered a very serious problem by 31 percent of the respondents, and a serious problem by another 54 percent. Eighty two percent of the respondents supported field testing of Vitamin-A enriched rice in Bangladesh.

In conclusion, Professor Moazzem said, large number of respondents supported biotech rice research provided that food safety and environmental conditions were taken care of and field testings were done and supervised under biosafety regulations.

## **Open Floor Discussion**

The discussion that took place during the dialogue, are categorised under the following headings.

### ***Potential Yield Gain from Biotechnology***

Dr S I Khan of BUET said that Bangladesh should not take the risk of biotechnology. It has not yet used its traditional means to the optimum level. “Mechanised cultivation, better crop processing, better irrigation, better storage, better drainage could ensure doubling up of crop output”, Dr Khan asserted. Average paddy output is 13 MT per hectare in Japan, 12 MT per hectare in Java, Indonesia and Super-rice in Japan has potential of growing 22 MT per hectare, he informed.

Dr Khan said during a recent visit to BIRRI he was told that a BIRRI-developed variety has got the potential of growing 15 MT per hectare. So, to his judgement Bangladesh has not yet exhausted potentials of MVs. and that’s why the country should not take the biotechnology risks.

Executive Chairman of BARC Dr Nurul Alam said it’s true that some varieties which we’re growing now have more potential but there are many factors in achieving the full potentials or minimising the yield gap between breeders’ and farmers’ fields. Farmers are poor and they’ve no financial and other capabilities to harness the full potentials. However, good achievements were made through extension and motivation efforts.

### ***Food Safety, Nutrition and Biotechnology***

Dr Khan said that the country should not go for huge investment in biotechnology, which has risks of health, environment and eco-system.

Highlighting country's good experience in tissue culture in banana, papaya and potato, Dr Jahangir said that Bangladesh needed evidence from farmers' fields and studies are required to know whether consumers prefer bio-fortified rice to vitamin-A capsules.

Loreto of CARE said that agricultural scientists were giving solutions up to their capacities like Vitamin-A enriched rice but deficiency in Bangladeshi children has something more to do with. "It involves vegetables and fruits and you can't put everything in a bowl of rice", she stated.

Vitamin-A is introduced to BRRI variety, informed Dr NI Bhuiyan saying that poor people who couldn't afford vegetables and fruits would eat rice in any case and get their doses of vitamin-A in the process.

Noting that most critics of biotechnology object about allergenic contents, Professor Hasina Khan of Dhaka University said that it was not yet proven. Rather, she said, biotech was trying to take out allergenic contents from peanut and milk.

According to Director General of BARI M Shahidul Islam, Bangladesh needed to produce more to meet the demand of its growing population. The country has to exploit resources in a sustainable way without harming the environment. He further stated that nutritional security, which is very important, couldn't be achieved only through vitamin-A and iron-enriched GM rice. Consumption of vegetable was a must for a balanced diet. BARI developed a number of varieties of vegetables rich in vitamin-A and C, he added.

The BARI DG said he was not against GMO but was concerned at taking genes from daffodil, which he said should be checked to see whether it was nutritionally appropriate.

Former Vice Chancellor of Jahangirnagar University Professor Abul Bayes said that food safety was a developed world concern while food security was the concern of developing countries. However, he added, Bangladesh definitely needed food safety too.

### ***Biotechnology and Environment***

Professor. Zeba Islam Seraj, of Dhaka University said if Bangladesh stops biotechnology from coming into the country just out of emotion than the country

could not proceed. The National Committee on Biosafety in Bangladesh (NCBB), which is the oversight committee, should be operative soon, Professor Zeba stressed adding that this committee was supposed to take care of environmental fallout, if there were any. But four years after setting of biosafety guidelines, government was yet to act on that, Zeba unveiled her frustration. Other developing countries started developing virus-resistant rice and reaping benefit but we're at a stage that we've not really started yet, she added.

Professor Hasina said that Bangladesh needed to have biosafety act ratified by the Jatiya Sangsad. Prior to that, Hasina stressed being in unison with Professor Zeba, the country required to have NCBB formed. She further expressed her depression on the ongoing dispute between the Forest and Environment Ministry and Science and Information and Communication Technology Ministry over the NCBB issue.

### ***Biotechnology and Socio-economic Concern***

Another issue that captured the concentration of the discussants was the possible impact of biotechnology over the socio-economic dimension of Bangladesh.

According to Dr Jahangir it was a matter of concern whether the GM rice would benefit the poor farmers. He recalled that same questions were raised in the early stage of Green Revolution in the 60s and 70s. However, Bangladesh adopted seed-fertilizer technology. Aid advantage and profitability were the driving forces, he added.

Studies on Bt. Cotton in China, GM Maize in South Africa and tissue culture banana seedlings in Latin America showed that biotech is not scaled neutral. But poor farmers are also getting benefit out of it. These technologies are acceptable to the poor, said Dr Jahangir. He supported stronger public sector role in biotech research. It was needed for ensuring benefits to the small farmers, he emphasised.

According to independent consultant Hasanullah, it is high time that alongside the public sector, private sector also comes forward and invests in agro-biotechnology. Tomato hybrid seed sells at Tk. 60,000 per kilogram and yet every year small farmers are buying the seeds because of high returns.

Professor Abu Ahmad said that this technology was being debated all over the world and Bangladesh should not jump on this technology just because it is poor. He then cautioned against destroying the nation's future for the sake of present. By over exploiting the natural resources Bangladesh should not make its future bleak, said Professor Ahmad. He went on saying that the country has to carefully notice who were trying to sell the technology and what the purposes were. "Is it a ploy to exploit

the poor farmers? We've to put regulatory measures in place," said a sceptic Abu Ahmad.

NGO activist Mahfuzullah gave a rather radical view vehemently opposing the new technology. He jeered at Dr Mahabub's statement that the Europeans have taken position against GMO on health security ground. He would not subscribe the logic because to Mahfuzullah, Bangladeshis have the equal right like their rich European counterparts as far as health is concerned.

To Mahfuzullah food security does not necessarily mean just increased food output. Identifying all-pervasive poverty and global disparity the reasons behind peoples' food insecurity, Mahfuzullah was critical about certain peoples' crying for rise in food output while remaining oblivious about mitigating poverty and disparity.

"True that Green Revolution has contributed in terms of increased food production but does that solve the question of food security?" said Mahfuzullah. He claimed that six companies including Syngenta, Monsanto and Dupont those who are in production of GM seeds put only one percent of their research investment on crops, which the farmers in poor and developing nations grow. Their intention is to create a global monopoly market where selected seeds would dominate the market posing serious threat to our rich biodiversity.

Noting that farmers' opinion has no place in the whole process, Mahfuzullah feared the process would take away farmers' rights on seeds and make them dependent on six multinationals only. Paper presenters avoided mentioning that most of the GM seeds could be re-used and each year farmers have to return to the companies those marketing this 'traitor technology' for seeds, criticised Mahfuzullah.

Mahfuzullah also said that as a Least Developed Country (LDC) Bangladesh has got other priorities over biotechnology research for investment because those priority areas have more direct bearings to the nation's poverty alleviation efforts.

Dr Nurul Alam of BRAC saw a big challenge before the agrarian economy of Bangladesh as it has to cope with the contrasting reality of depleting farmland and increasing population. He said there were examples of Europe, US, China, India and some other countries but what Europe could afford with their low population size and high socio-economic condition, conditions in Bangladesh did not permit the same.

Loreto of CARE Bangladesh said that it was a question of who was going to really benefit as many farmers in the US are now cultivating GMOs, and it is not evident whether they know what they were getting into. Is it going to benefit farmers, she pondered adding that private sector companies would make profit. As production

increased in the US that didn't mean farmers benefit from increased output, she reasoned.

Dr Sattar Mandal of Bangladesh Agriculture University said there should be more resource allocation for developing research capabilities in public sector institutions. Socio-economic researches should also be pursued. Expansion of HYV did not really kick-start through biological researches in public sector only, rather it got expanded in late 80s after expansion of private sector irrigation.

Taking cue from Mr Mahfuzullah, Professor Bayes said that its true that the multinationals were making profit from GM, but farmers are gaining too. He brought the example of Bt. Cotton which is now very successful.

### ***Current state of Adoptability***

Dr Jahangir Alam said that theoretically there were enough opportunities for rice biotech research and development of genetically engineered varieties. He opined that Bangladesh required more empirical evidences relating to these issues as the country was currently not in a state of supporting or refuting the new technology.

Former Botany professor of Dhaka University, Ahmed Shamsul Islam, congratulated Dr SK Datta and his team for transfusing Daffodil genes into Indica rice at IRRI. He took pride that his student Khalequzzaman and one lady transferred the genes into BRRI Dhan-29.

But, Professor Islam was of the view that Bangladesh would not reap the benefit of the research breakthrough till the parliament enacts biosafety act. He stressed on formation of a committee to identify the bottlenecks of biosafety act. Biosafety experts at Food and Agriculture Organisation (FAO) should be able to guide Bangladesh, Islam added.

Mr Hasanullah said that GM is a scientific innovation and we should use it in our convenience. We've to think whether we would go for a specialised biotechnology institute or apply the technology in all institutions. We committed a mistake before by establishing a specialised institute for nuclear technology. As a result, nuclear agriculture institute is pursuing the technology only while the others are developing varieties in conventional breeding.

Dr Nurul Alam of BRAC said that Bangladesh could not actually go like Europe but, at the same breath, he clarified his position saying that he was not proposing to jump on biotechnology as the capacities and aptitude have not developed to that level yet. He further stressed upon capacity building and larger investment in the sector. However, things would not move unless the NCBB is formed, he added.

On the issue of import of GMO, Gul Hossain of private seed company East-West Seeds said, whether we like it or not, it's going to come. People in the country were already consuming GMO product unknowingly, he added. He, then, mentioned that it would be better for us to accept it and regulate and maintain it in our own way.

Gul, however, disagreed with those who say Bangladesh can't afford biotechnological research. Only thing we've to do is put our mindset right. We need to invest and make sure the investment does not go down the drain.

Asserting his firm conviction that science does not go with political color, religious bias or cast or creed, Gul urged all not to politicise science. Whether BNP or AL or Jamaat or whatever party one belongs to or emotionally attached to, Gul cautioned against making discrimination among scientists.

Professor Mofazzal Hossain of Bangabandhu Sheikh Mujibur Rahman Agriculture University, said biotechnology doesn't mean GMOs only, there are some other things too, which Bangladesh can afford and we've biotech labs in almost all universities in Bangladesh. Besides, government has also directed to establish one biotech lab in each of the new Science and Technology Universities, he informed. He thinks that Bangladesh can also develop drought or salinity tolerant varieties through distance crossing or embryo culture.

Professor RH Sarkar, who teaches Botany at Dhaka University said that Bangladesh was not following the biosafety guidelines for long time. If the country followed the protocol we could start our biotechnological works right now, he hoped. He was of the view that Bangladesh should ratify the guidelines in the parliament and develop infrastructure as good regulations and infrastructures were essential to really assess and check fallout in health and environment.

Director General of BRRI, DR NI Bhuiyan, tried to put facts and figures into context to show the magnitude of the problem in Bangladesh. Over the last three decades, Bangladesh could increase rice output at par the population growth but now its yield has reached to a plateau, informed Bhuiyan.

He said arable land has been decreasing at the rate of over 80,000 hectares a year while population was on the rise. The population size is estimated to be around 190 million by 2030, said Dr Bhuiyan adding that the country would have to grow 25 to 30 percent more rice on less land by year 2025.

Biotechnology could be an option for evolution of in-built disease and pest-resistance mechanism, the BRRI DG said quickly reminding the policy planners that the country

didn't have capability now. But if Bangladesh didn't enter into the frontier technology today, after 25 years the country's existence would be at stake, Dr Bhuiyan feared.

Director of DAE's Field Service, Tariq Hasan, said that technology has no barrier and we can't leave our next generation aloof from technology.

In an emotion-choked voice, Professor Hasina said, when the dialogue participants were talking about capacity building and trained human resources, 3<sup>rd</sup> year down the line University Grants Commission has not yet approved Genetic Engineering and Biotechnology Department of Dhaka University. Professor Hasina told the audience that her department was not getting funds for chemicals and re-agents, the best students getting admitted with their academic fate uncertain.

Green Revolution's benefits did not really reach out everywhere, said Professor Bayes laying importance on knowing more about the requirements of the farmers. They were very happy in getting saline tolerant BRRI Dhan-41 recently, said Bayes adding that what they wanted primarily was gaining more crops from less land.

Though he foresees 10 to 20 percent rise in yield of modern varieties through knowledge-intensive extension programme, Professor Bayes said that the country must start working on GMO. More resource allocation should be there for research, he stressed. According to Bayes, debates should be taken place in the parliament that how can we be able to feed an ever-increasing population in Bangladesh by growing more food from a lesser acreage of cropland in the days to come.

### **Remarks by the Guest of Honour**

Dr Abdur Razzak, MP found it unfortunate that after all these years of attaching special importance to biotechnology, debate was still on regarding whether to pursue this technology or not. To him it is also unfortunate that there is no well-organised biotech research centre or institute in Bangladesh yet.

Dubbing biotechnology as a blessing of science, the opposition lawmaker stressed that Bangladesh must acquire capability to adapt that. He elaborated saying that the country has to develop human resources to assess perceived health and environmental risks and for that purpose a good biotech institute should be set-up. Dr Razzak, an agriculturist-turned-politician, assured Awami League's support in ratification of biosafety guidelines in the parliament.

He recognised that multinationals might tend to monopolise GMOs but there are international bodies like IRRI, which developed Golden Rice. Bangladesh could make good use of that, he mentioned. Besides, there are other techniques of biotechnology other than genetic modification, he added.

The AL MP also urged all to ponder how to proceed if the developed world and the multinationals use TRIPs as profit protection instrument. WTO talks in Cancun had agriculture as its prime agenda but unfortunately, Razzak said, agriculture ministry in Bangladesh had no initiative for wider public discussions on WTO rules and TRIPs.

### **Remarks by the Special Guest**

Mirza Fakhru Islam Alamgir, MP, Hon'ble State Minister for Agriculture marked poverty as our main problem and said that the challenge was to ensure food security for a growing population. He appreciated the dialogue participants, many of whom, he said, had dwelt well on how to ensure food security.

The state minister said that the government wanted to ensure the food security without compromising the environment, the biodiversity and the rich tradition of the country. He underscored the needs for carrying out extensive research.

He said he had got some exposures from UBINIG's farm but quickly added that, of course, their (UBINIG) statements often contradicted with what the BRRI scientists say. "But I think there should be more interactions to evolve what can best serve our purposes."

Noting that issues of risks were mentioned in papers presented at the dialogue, the special guest said that the government has to ensure peoples' food security by managing these risks well.

### **Remarks by the Chief Guest**

Mr MK Anwar, MP, Hon'ble Minister for Agriculture, said that biotechnology was of paramount important to the government and the CPD-organised dialogue would definitely help the government in getting guidance regarding the ways the government could address the problems and the ways the government could respond to some of the criticisms.

Before the Green Revolution heralded in '60s, population growth rate was nominal – less than 1 percent, recalled the minister saying that additional requirement of food was grown from additional land every year. But, he said, from mid-50s situation started to change – mortality rate started declining and the population growth rate jumped up. He termed Green Revolution as a blessing for the country and said that it gave Bangladesh the opportunity to increase rice production and wheat production.

By taking advantage of Green Revolution technologies, techniques Bangladesh has been able to increase production of rice by about 2.5 times and wheat from 0.1 million tons to 1.5 - 1.8 million tons. These are spectacular achievements, no doubt, by any

standards, the minister reckoned. He, however, maintained that Bangladesh would be requiring additional sources of foodgrains in the days to come.

MK Anwar stated that whether the country has really exhausted the potentials of existing technologies – that question needed to be addressed very seriously. He observed a wide gap between scientists' experimental fields and farmers' fields and expressed his firm conviction that food output could be augmented to a remarkable level by even partly minimising this yield gap.

Anwar said he could well understand that breeders' plot and farmers' plot would never be the same. But he insisted on finding out ways and means for shortening the gap first; he then came up with the suggestion that this gap could be minimised primarily through exploiting post-harvest technologies. In Bangladesh, post-harvest technology and infrastructure i.e. cold chain, storage, have not yet developed, he noted. The agriculture minister also laid importance on developing marketing facilities.

Role of extension services came up to Anwar's mind as he talked about yield gap minimisation. While taking pride at having a large agriculture extension service in the country, the minister did not hesitate to acknowledge that somehow the extension service has not been able to convey the messages of scientists to the farmers effectively in all cases. Definitely extension had contribution when rice output went up from 10 million tons to 27 million tons and wheat from less than 0.1 million tons to 1.8 million tons, said the minister. But he thought lot remains to be done now.

MK Anwar said that he has not yet found any literature that mapped the full advantages and full disadvantages of GM crops. He explained that biotechnology did not develop any new variety rather it help developing certain resistance to pests, weeds etc. So crop loss incurred due to pests, weeds and diseases are reduced. He, however, maintained that biotechnology needed to be used with necessary precaution.

Moreover, he said, the country has to release some land from rice for other crops. Otherwise the question of malnutrition and imbalance diet would continue to haunt Bangladesh, he warned. He then identified three vital points those would need to be addressed for future interventions.

1. Population Will Increase.
2. Land Will Shrink.
3. Land has to be released from Rice to Non-rice Crops.

MK Anwar said if GM technology showed some ways of increasing the yield, there should be no reason for the country to turn face against it. "It's like your mobile

phone, which is a nuisance and yet you use it because you find it useful.” He added that the government has not shown over-enthusiasm on GM but at the same time government did not discourage it either.

Spelling out government’s stand on biotechnology, the agriculture minister said that the government would encourage biotechnology but very cautiously, keeping in mind all safety regulations and any harmful affects and limitations of science.

He said he had not seen any document as yet where these GM or hybrid seeds had caused any harm to anybody anyway and he added that people in Bangladesh were already consuming GM soybean imported from US.

MK Anwar said that biosafety regulations were drafted, but not made effective as yet. Acknowledging that he was going slowly on the matter, Anwar said that the CPD-held dialogue would definitely encourage the government to proceed further.

To conclude his statement, the chief guest informed the audience that binding document could be made by the parliament as well as by government gazette notification. It is now upto the government to take pragmatic measures to reap the best out of this technology.

### **Concluding remarks by the Chair**

In his concluding remarks, Professor Rehman Sobhan thanked all participants for joining the debate on biotechnology. His special thanks went to the paper presenters, the minister and the state minister. Sobhan made a particular reference of CPD-IRRI collaborative efforts under the Poverty Elimination Through Rice Research Assistance (PETRRA) initiative and thanked PETRRA Manager Dr Noel P Magor.

Professor Sobhan hoped that the debate would not end there, as still many unanswered questions remained to be resolved. He hoped the biotechnology debate would go on at CPD-forum as well as at other fora. He assured that CPD would be happy to provide a forum for this debate to continue because the problem is not going to go away. The CPD Chairperson cast focus on unfavourable eco-system where HYVs could not yet replace low-yield local varieties.

Professor Sobhan gave his view in favour of exploiting new possibilities if technologies could be developed to enhance yields in Aman and also the outputs in areas where considerable saline intrusion exists. Speaking in the same breath, he underlined the need for taking full care of the risks of associated damaging affects on human health and environment. He ended by noting that there was no reason why we should not develop our indigenous research capabilities drawing on the support of a multilateral institution such as IRRI.

**List of Participants**  
(In Alphabetical Order)

<i>Mr M K, Anwar MP</i>	Hon'ble Minister for Agriculture, Government of Bangladesh
<i>Mr Fazle Hasan Abed</i>	Chairperson, BRAC
<i>Mr Minhazul Abedin</i>	Centre for Sustainable Development (CFSD)
<i>Dr Rita Afsar</i>	Research Fellow, Bangladesh Institute of Development Studies
<i>Advocate Sohel Ahmed</i>	General Secretary, Bangladesh Khet Mojur Samity
<i>Professor Abu Ahmed</i>	Department of Economics, University of Dhaka
<i>Dr Salahuddin Ahmed</i>	Dean, School of Arts and Social Sciences, Southeast University
<i>Dr M Nurul Alam</i>	Executive Chairman, Bangladesh Agricultural Research Council (BARC)
<i>Mr Qazi Khaze Alam</i>	Director, Natural Resources, PROSHIKA
<i>Mr Mirza Fakhru Islam Alamgir, MP</i>	Hon'ble Minister of State, Ministry of Agriculture
<i>Dr Al Amin</i>	Head, Biotechnology Division, BARI, Joydevpur
<i>Mr Nurul Anwar</i>	General Secretary, Farm Sramik Federation (BAFLF)
<i>Dr M Asaduzzaman</i>	Research Director, BIDS
<i>Proloy Banna</i>	Junior Research Associate, RED, BRAC
<i>Professor Abdul Bayes</i>	Department of Economics, Jahangirnagar University
<i>Ms Nilufar Begum</i>	Deputy Chief (PPB), Ministry of Agriculture
<i>Ms Shahnaz Begum</i>	Deputy Chief, (Agriculture Marketing Department
<i>Dr Nurul Islam Bhuiyan</i>	Director General, Bangladesh Rice Research Institute
<i>Mr Tapash Kumar Biswas</i>	Deputy Director, BARD, (collaboration on M & E), PETTRA, IRRI
<i>Dr Manik Lal Bose</i>	Project Scientist, IRRI
<i>Mr Abdul Mueyed Chowdhury</i>	Executive Director, BRAC, BRAC Centre
<i>Mr Alamgir Chowdhury</i>	Socio-economist, Socio-consult Limited
<i>Mr Ishfaq Ilahi Chowdhury</i> <i>A K M Azad Chowdhury</i>	Senior Directing Staff, National Defence College Systems Coordinator, IRRI
<i>Mr Mizanur Rahman Chowdhury</i> <i>Dr Subash Dasgupta</i> <i>Dr S K Datta</i>	Executive Director, ALRD Assistant Representative (Programme), FAO Plant Biotechnologist, IRRI, Metro Manila, Philippines
<i>Mr Bijon Lal Dev</i>	PRO to the Minister for Agriculture, Government of Bangladesh
<i>Mr Pradip Kumar Dey</i>	Senior Scientific Officer, Agricultural Economic Division, BRRI
<i>Dr S M Elias</i>	Member, Agricultural Research Initiative, DFID

<i>Dr Md Abdul Ghani</i>	Manager, Research Administration, PETRRA, IRRI
<i>Dr Abdur Rashid Gomosta</i>	Director (Research), Bangladesh Rice Research Institute (BRRI)
<i>Dr Mahiul Haque</i>	Director (Administration), BRRI
<i>Md Tariq Hassan</i>	Director (FSW), Department of Agricultural Extension (DAE)
<i>Dr M Hassanullah</i>	Independent Consultant
<i>Dr Mahabub Hossain</i>	Head ,Social Sciences Division, IRRI (Manila)
<i>Professor Mofazzal Hossain</i>	Department of Horticulture, Bangabondhu Sheikh Mujibur Rahman Agricultural University (BSMRAU)
<i>Dr Gul Hossain</i>	General Manager, East West Seed (Bangladesh Ltd.)
<i>Mr M A Hossain</i>	SSO, Plant Breeding ,BRRI
<i>Professor A M Muazzam Husain</i>	Chairperson, Department of Economics and Social Sciences BRAC University
<i>Mr S M Al- Husainy</i>	Former Secretary, Government of Bangladesh
<i>Dr M Sahadad Hussain</i>	Director (Support Service), BARI
<i>Mr Ahmad S Islam</i>	Biotech Project , BRAC University
<i>Dr M Shahidul Islam</i>	Director General, BARI
<i>Dr Tajul Islam</i>	Senior Agri-Business Adviser, SEDF
<i>Mr A S M Nazrul Islam</i>	Agricultural Economics Division , BRRI
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<i>Dr M A. Jabbar</i>	PSO, Agricultural Economics Division, BRRI, Joydevpur
<i>Dr W M H Jaim</i>	Dean, Economics, Faculty of Agricultural Economics and Rural Sociology, Bangladesh Agricultural University
<i>Dr Nilufar Hye Karim</i>	CSO & Head, Biotechnology Division , BRRI
<i>Dr Jahangir Alam Khan</i> <i>Dr S I Khan</i>	Member Director (Agri-economics), BARC Former Environmental Planner, UNCRD and , Visiting Professor, BUET
<i>Dr Wajedul Islam Khan</i>	General Secretary, Trade Union Kendro
<i>Dr Asma Khatun</i>	Principal Scientific Officer, Phytogenetics Department, BJRI
<i>Dr Noel P Magor</i>	Manager, PETRRA, IRRI

<i>Professor A Q M Mahbub</i>	Department of Geography and Environment , Dhaka University
<i>Professor M A Sattar Mandal</i>	Department of Economics , Bangladesh Agricultural University
<i>Ms Anne Marchal</i>	Second Secretary, European Commission,
<i>Professor Lutful Hassan</i>	Department of Genetics and Plant Breeding, Bangladesh Agricultural University (BAU)
<i>Mr A M A Muhith</i>	Former Finance Minister
<i>Dr B A A Mustafi</i>	CSO & Head of Agricultural Economics Division, BRRI
<i>Ms Loretta Pague</i>	Rural Livelihoods Programme Coordinator, CARE
<i>Dr Shankar Kumar Raha</i>	Professor, Department of Cooperation and Agricultural Marketing, Bangladesh Agricultural University
<i>Mr Md Safiqur Rahman</i>	Director (Stds), Bangladesh Standards and Testing Institution
<i>Dr Mohammad Abdur Razzaque, MP</i>	Member of the Parliament
<i>Dr Abdur Razzaque</i>	Member Director (Crops), BARC
<i>Dr M A Razzaque</i>	Scientist, CIMMYT, ( International Maize & Wheat Improvement Centre)
<i>Mr Kh. Asadul Islam Ripon</i>	Manager (Sales & Trading), Union Capital Limited
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<i>Mr Abdus Sattar</i>	President, Bangladesh Khet Mojur Union
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<i>Mr Md Shafi Uddin</i>	Former Secretary, GoB and, Adviser, Dhaka Ahsania Mission
<i>Mr Mahfuz Ullah</i>	Secretary General, Centre for Sustainable Development (CFSD)
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***List of Journalist***  
(In Alphabetical Order)

<i>Mr Reaz Ahmed</i>	Senior Reporter, The Daily Star
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<i>Mr Sanaul Haq</i>	Staff Correspondent, NTV
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<i>Mr Humyan Kabir</i>	Staff Reporter , The New Nation
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<i>Mr Abu Sufian</i>	Staff Reporter, The Daily Independent
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