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Biotechnology for food security: risks and rewards
Abdul Bayez

The Daily Star
September 30, 2003

In a recent seminar organised by the Centre for Policy Dialogue (CPD) at the BRAC Centre, eminent economists and agricultural scientists dwelt, albeit not decisively, on the sensitive issue of biotechnology. The topic, admittedly, is of top-most importance in the wake of ongoing realities related to rice production, particularly in developing countries like Bangladesh. Here the green revolution, allegedly, tends to gradually groan under a regime of declining yield rates, the complex problem of insect and disease pressure and other problems. Thanks to the organisers, especially CPD and IRRI-PETRRA, for floating a debate that warrants the best available empirical evidence relevant for poor people in developing countries. Such debates should help identify the most appropriate ways that molecular biology based research might contribute to achieving and sustaining food and nutrition security.

Safety and security

Two of the well-known researchers from the International Rice Research Institute (IRRI) Dr. Mahabub Hossain and Dr. Swapon Kumar Dutta set the tone round the table at the very outset. They made preliminary remarks on scientific evolution in molecular biology over the last two decades, the genetic base of living organisms, and the ability to develop processes and products useful for food security, nutrition and human health. These two speakers succinctly summarised the potential and the problems of biotechnology. While the issue is being debated both in the developed and the developing world, according to them, the premises are quite different and hence a grandiose generalisation should be shelved. Developed nations stand against it as with almost stagnant population growth for decades, they have a consequent craving for food safety, while developing countries imperative is food security.

It shall be noted that about 1.2 billion people mostly in Asia and Sub-Saharan Africa live in a state of absolute poverty with an income of less than US Dollar 1 a day. About 800 million people are food insecure and 160 million preschool children suffer from energy-protein malnutrition, which results in the deaths of over 5 million children under the age of 5 years. Thus the whole issue boils down to a debate between food safety and food security.

Problems and potentials

I assume that my readers are well informed of the potential of biotechnology as this is by now articulated and known. Even then, to put it simply, biotechnology can bring forth a revolution not only in food production - in a regime of declining land and rising population - but also in the realm of nutrition for the poor. One example should suffice to sound the semantics.
Vitamin-A deficiency affects 400 million people worldwide, leaving them vulnerable to infections and blindness. Iron deficiency affects 3.7 billion people, particularly women, leading to higher maternal deaths and infant mortality. Developing micronutrient dense rices, with higher amounts of iron, zinc and pro-Vitamin-A, can have a tremendous impact on the health of low-income people. Conventional breeding when combined with biotechnology can provide powerful tools to achieve this goal.

There is another point to ponder. The big multinational companies – the candidates for criticisms on this count – have reportedly backtracked in recent years from rice biotechnology as they observed the dominance of small holders in Asia and the high transaction costs of enforcing intellectual property rights under a weak judicial system. By and large, both in developed and developing Asia, the public sector needs to be the vanguard of rice biotechnology.

**Bangladesh perspective: complacency and concerns**

The Bangladesh perspective on potential and problems – quite obviously – was on board for threadbare discussions. Bangladesh is one of the most land scarce countries in the world with the cultivation frontier closed almost half a century ago. The green revolution that swept over the last decades helped a balance between growth rate of population and food. Most of the gains of the green revolution came from improved rice and wheat varieties developed by the Bangladesh agricultural research institutions in collaboration with international research centres. Two-thirds of the cropped area is now being covered by modern varieties and 55% of the cultivated area is now under irrigation. In tandem, population growth rate also declined appreciably, say from 2.2%-1.5% per year in the 1990s.

While complacency could be in one corner, concerns loom large elsewhere. Every year, 2 million people are added to the existing stock putting a pressure on food supplies of 0.56 million tons a year, just to maintain the same level of per capita consumption. Despite the claim of self-sufficiency in food and the calm it confers upon the nation, occasional imports invoke inquiry into the claims made so far. The easy option of realising increased rice production has already been exhausted and Bangladesh is poised to reel under a regime of losing cultivated areas at more than 1% per annum due to growing urbanisation, population pressure and leaving land for non-rice crops. In this scenario of an almost closed cultivation frontier, declining yield and increasing population in Bangladesh – a country that stands with higher population density than America when all people of the world are pushed into that country – must strive for the alternatives, especially the opportunities created by rice biotechnology.

It is also because 60% of the children under age five are underweight and more than half are stunted. More than 70% of pregnant women suffer from anemia due to iron deficiency. In rural areas, where three-fourths of the people live, malnutrition is acute due to lack of knowledge or financial capacity to buy a balanced diet. Since poor people consume nearly 150 to 170 kg. of rice per year, incorporation of a small amount of iron and pro-Vitamin-A in rice could go a long way in meeting the deficiencies in these micronutrients.

**For and against**

There are a lot of risks too. Concerns about food safety, ethical points, environmental implications and socio economic risks were also deliberated upon by the authors. Taking all the risks into consideration, the authors noted that samples drawn from a large section of
civil society and agricultural institutions seem to support biotechnology in certain conditions. For example, biotechnology could be supported provided it is done by the public sector and is free for farmers. Health and environmental assessment would need to be done before the release etc. Those who declined to support put forth various arguments such as, the development of pests to destroy food sources, dependence of farmers on private companies, additional production of rice not needed and gene transformation is unethical etc.

**Riding the risks**

Given the growing constraints on future rice availability in Bangladesh and the devastating micronutrient deficiency among the poor households in rural areas; the rice biotechnology issue should be left neither to rhetoric nor to emotions. In the seminar mentioned before, I sensed emotions engulfing economics and rhetoric ruling over realities on the ground in the case of a few. We think that society needs to rise above all rhetoric and emotions and seriously start a systematic inquiry into the nexus soon. Dr. Mahabub Hossain and others provided sufficient food for thought for a safe and secure world of food, particularly in the context of Bangladesh. It is felt strongly that biotechnology could be the key to the upcoming crisis, but the questions raised must be kept in mind. We have to seek answers to the questions raised rather than throwing away the question itself. Allow me to remind my readers that had we not hailed the adoption of modern rice technology in the 1960s and 1970s, we would have, probably, experienced a worse food situation. Many of the forecasts at that time turned out to be futile. We can only hope that we shall be able to find a judicious path for our survival.
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Shrimp culture: deaths or dollars?

Abdal Bayes

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The purpose of my visit to Khulna – the first ever in my life – was not anything relating to shrimp culture, although I knew that greater Khulna holds the key to the culture that grew out of our dire need of dollars from foreign countries. As time passed, shrimps began to show potential as an important source of foreign exchange, accounting for, perhaps 6% of our export earnings and about 3% of world export of shrimps. At a global level today, about one-third of the shrimps are reported to be farmed here compared to barely 5% in the 1980s.

This is the dollar-side of the development. We should never be oblivious to the dark side. Since shrimp culture started to surge, local conflicts emerged with land grabbing, environmental degradation, a considerable number of people were dashed below the poverty line and a host of adverse impacts were felt. The imputed costs of such hazards should be added to the revenue earnings to arrive at sustainable development of the sector. For a long time I have been hearing newspaper stories about the socio-economics and politics of shrimp culture. In fact, if one scans through the news and views relating to the deteriorating law and order situation in greater Khulna one could, perhaps, come to the conclusion that the lion's share of this deterioration is owed to shrimp cultivation and related issues.

While in Khulna, in connection with Poverty Elimination Through Rice Research Assistance (PETRLA) sub-projects, I visited the Coastal Development Partners (CDP) office. CDP, along with 15 other small non-governmental organisations (NGOs), act as partners of the various projects that PETRRRA tends to support. Akhtaru Alam Tutu heads this organisation. The posters pasted on the wall of the office gave me the impression that CDP is involved mostly with issues relating to the poor. It is not a micro-credit organisation as classical definitions of NGOs would suggest, but an organisation engaged in facing human rights violations, environmental hazards, repression of women and above all, highlighting human values. And of late, the organisation associated itself with the dissemination of rice diversity technology to the poor in the coastal areas.

It is there I came across the 'unknown' costs of shrimp culture that CDP has been striving to dig out. It goes beyond the calculus of the principles of profit maximisation. I have newspaper clippings with me from August 2003. Throughout the month, cases of terrorist attacks, human rights violations and other vices surrounding shrimp culture are reported almost every day. During the last three years, I was told, 55 persons were killed, and 42 incidents of assaults and 17 instances of poisoning of fish/shrimp ponds took place.

Hearing the horrors, I expressed interest
in visiting some shrimp ponds called *chingri gher* – places I have never visited before. Next day, I drove to the ghers located in a village named Magura Ghona under Dumuria thana. A narrow semipucca road passes through the heart of the village and I had to step down from the vehicle for a walk of a kilometer or so to the *ghers*. My a priori reasoning suggested that people of that village should be relatively better off than others, since infrastructure development and other linkages connected with shrimp culture should shower positive benefits on the villagers (besides the fact that they could increase their earnings from the culture).

As I stood at the far end of the village, I could see vast tracts of lands turned into ghers by developing polders. These are agricultural land that historically the people of that locality leaned on to meet the food security need by producing rice. In the past, when cultivation of crops was the mainstay, ecological balance was maintained, indigenous technologies were adopted and an egalitarian approach to the preservation of common properties was in evidence. But gone are those days with the advent of shrimp cultivation. Unplanned growth of the projects, absence of proper regulations and above all, lack of governance grievously gave way to an unsustainable development.

My hypothesis turned out to be wrong as I began to talk to the villagers. People of the village that I met seemed to be perturbed, panicky and powerless in the face of known man-made catastrophes. They informed me about three phases that shrimp cultivation passed through over time. First, there was a time when the owners of the *ghers* – with money and muscle power – used to grab land of the poor without paying them a penny. This was the early stage of the so-called blue revolution and a business of the 'big'. Second, then came a time when collective farming was developed in some places but the poor were deprived of their due shares from the farms. And now, in many places, small farmers are themselves doing the cultivation – instead of renting out land – to eke out a living but problems mounted rather than mitigated.

One example should suffice to show the severity. Recently, a 6 km. long canal was occupied by goons to develop ghers and cultivate shrimps in the water of the said canal which is a common access resource passing through nearby villages. Water flowing to and from was stopped by building barrages causing a host of adverse impacts. The poor villagers objected to this barrage in the canal and were threatened by the powerful *mastans*. Some of the villagers were reportedly put under criminal cases. While the police were looking for those poor villagers to arrest, they were, allegedly, least interested to kick out the devils from the dens. As I was told, huge sums of money from the goons and the powerful gher owners force them to turn a deaf ear to the 'development' that took place in the canal.

More interestingly, the day I visited the spot, the local member of parliament (MP) came to the place to remove the barrage and thus allow access to common resources by all people. This was an appreciable job done by the local MP. But unfortunately, no sooner had he left, the villagers complained, than the barrages inside the canal were put back again.

I was told that the rent from leasing out land for shrimp cultivation – Tk. 1,200 per *bigha* – is much less than that for rice cultivation. The soil fertility is seriously affected due to the intrusion of the saline water into the fields and the yield rate is down by 20%-30%. Witnessing a decline in the yield of agricultural crops and the lack of access to common resources, poor farmers are gradually forced to lease out land for shrimp cultivation. There are no winter
crops anymore – pulses, oil seeds and vegetables and the collapse of cattle raising has had serious economic and nutritional consequences not usually counted in the economics of shrimp culture. “There have been many reports of ‘khas’ lands (government owned lands) being used for shrimp farms illegally by influential members of the society, sometimes in possession of false property deeds, and in some cases with the support of the local police or government officials. Violence and intimidation towards small-scale shrimp farmers in order to appropriate their lands is also reported to be widespread”, says one report on shrimp cultivation and its impacts.

And to visit some of the developing countries counting on shrimps, look at the following observation. “Shrimp farmers in Thailand left behind an ecological desert. These farms are hardly useful for other economic activities. Outside investors are enriched, local people are pampered. Development runs above the heads – very little trickles down to them”.

I recall that a few years back, Bangladesh shrimp exports shrank following European Union (EU) objections to some of the aspects relating to production and distribution. Quite obviously, the buyers need not be blamed and gracefully some of our exporters took the pains to upgrade their processing plants and production process. The wake up call helped create an atmosphere where the non-economic costs of shrimp cultivation deserve attention.

The above mentioned observations should not be taken as a negative attitude towards shrimp cultivation and export. After all, we all want dollars but not at any cost. We want the growth of shrimp cultivation to take place under a regime where a) access to common properties are not encroached upon; b) small farmers have the freedom to reap the rewards from shrimp cultivation; c) productivity of agricultural land is not adversely affected; and d) the rules of the game are such that both economic and non-economic costs are duly calculated to point to sustainable development of the sector.

To this effect, many steps need to be on board but allow me to cite a few: a) the industry should fully acknowledge its responsibility in using the best of resources to ensure environmental sustainability, economic viability and social equity; b) there should be an unrestricted access for third party monitoring all aspects of production, distribution and technology used; c) there should be improvement in pond design, water exchange and pollution control; d) existing farms should comply with national land use polices, strategies and legislation; e) future development of the sector should be based on consultation with the local community; f) specific commitments to uphold human rights should be at the top of the agenda; and finally g) all farms should fall under the seal of quality to meet the environmental and humanitarian needs of the industry.

I now draw the attention of the readers to newspaper reporting of 15 days of July to justify the title of the write-up: ‘Shrimp culture: deaths and dollars’. In fact, the following reports are just the tip of the iceberg. Everyday, on average, one incident of death or other crime was reported to take place in greater Khulna. Perhaps this drives home the point that deaths and dollars have unfortunately become regular phenomena:

- July 1: Tk. 100,000 stolen from shrimp farmer in Demra, Bagherhat (Janakantha);
- July 4: Firearms and ammunition seized from a shrimp farm in Rampal (Daily Shebok);
- July 10: Court cases filed by widow against 10/12 persons for the murder of Yakub, a shrimp farmer (Daily Shebok);
Shrimp culture: deaths or dollars?

- July 10: Fries worth Tk. 100,000 looted from shrimp farm in Rampal upazila (Daily Purbachal); and
- July 12: A gang fired at Abdul Malek (48), a shrimp owner from Zamira village, Phultala upazila (Daily Shebok);
- July 14: No arrests following the murder of shrimp farm owner in Phultala upazila.

The government should take the situation very seriously before this vital sector becomes sick resulting perhaps in deaths and loss of dollars.
I was visiting a few projects that are reported to be 'pro-poor'. We have been hearing about 'pro-poor growth', 'pro-poor policies' etc. for a long time. Closer scrutiny sometimes, showed that there was often a slip between the cup and the lip. It allegedly, appears pro-poor serves but the rich. I wanted to know whether all that were called 'pro-poor' projects were in reality just that, or if 'pro-poor' was a rhetorical term. Thanks to the Poverty Elimination Through Rice Research Assistance (PETRRA) project under the aegis of IRRI for allowing me to visit some of their 'pro-poor' projects. On the way to my mission, the Rangpur Dinajpur Rural Service (RDRS) officials of Thakurgaon engaged in PETRRA projects introduced me to a person. They were narrating how a penniless person rose to the prominence among the poor. I wanted to meet him and he courteously called on me.

**Deprivation and desperation**

Khairul Islam (45) never thought that doomsday was at his doorstep. Nor should he have thought so. Because, his father owned 11.5 acres of land to be inherited by three sons. But the brothers, allegedly, betrayed Khairul by managing all lands from the father and thus depriving him of his due share. At that time of the disaster, he had three sons and a wife. Soon after, in 1991, his wife died and he had to marry Parul Begum to look after the children and the household. Khairul was confident that he could overcome the crisis but the constraint was cash money. Desperate as he was to feed a family of five and another to join very soon, he went to a mohajjan and borrowed Tk. 20,000 at an interest of 10% per month. All that he had of his own were: a) a house made of mud and straw; b) 10 decimal homestead land and c) a jug of seeds of *lal heb* (red leafy vegetable).

Somebody told Khairul that NGOs could help him with credit to carry out income earning opportunities. He approached RDRS but, painful as it was, the prayer was rejected on the plea of poor credit worthiness of Khairul. A few days later, one Shamsul Huq of RDRS stood beside him and paid on his behalf a cumulative savings amount of Tk. 140 at a time. Meantime, the family's economic crisis began to mount. It was very hard to get three meals a day. There was no option left for him other than begging or borrowing. However, after joining the group formed by RDRS, Khairul got training in vegetable production and poultry rearing and applied for a loan. While other applicants were given a loan of Tk. 4,000 to 5,000, it was only Tk. 2,000 for Khairul. However, with the money in hand, he leased one *biga* land for one year with Tk. 1,000 to grow vegetables and decided to set aside the rest of the amount for petty trading and buying inputs.

**Valuable vegetables**

Khairul went for the production of
cucumber on the leased-in land. The decision was based mainly on the demand for the product in the market that he could ascertain. Fortunately, he soon became a contract grower of BRAC to supply seeds. Thus, output and seeds from cucumber fetched him about Tk. 16,000. Excluding all costs, Khairul reaped home Tk. 8,000 as net income! Lucrative profits from cucumber lured him but for food security of the household, he also went for paddy cultivation. Then potato. He excelled in both. Seeing his promising and profitable performance, the landowner leased out another 75 decimals at Tk. 3,500 for one year. Khairul grew vegetables and began to sell in the roadside arats. In 1994, he sold vegetables worth Tk.32,000. With that money, he mortgaged in 2.5 bigha land at Tk. 20,000 and bought 50 decimal of paddy land.

**Bridge as boon**

In 1998, Bangabandhu bridge (Jamuna bridge) over the Jamuna was opened up for traffic. Khairul had read up to eighth grade but could read well the realities on the ground. He realised that the biggest bridge could help better business and trading, especially of perishable products. In his lifetime, he saw farmers growing vegetables but failed to fetch a fair price due to the lack of communication to market the crops. About half of the products used to perish in the absence of disposal. But those days appeared to have gone with quick contacts, facilitated by the Bridge, between his region and all other parts of Bangladesh. Imbued with the new insights, Khairul began to devote more land to vegetable production. To be specific, he used his newly mortgaged-in 2.5 bigha land to grow raddish and other vegetables. A party from Dhaka came to see his farm and expressed the desire to buy products on a regular basis from him. A silverlining loomed large in Khairul’s life. Neighbours began to visit his fields.

**Turning the table**

Khairul, for the first time in his life, decided to go to Dhaka to sell his outputs. He reckoned that the margin that goes to the middlemen could pour into his pockets provided he established direct connection with the buyers. There were, of course, risks involved since he knew nothing about Dhaka and the deals there. But as I mentioned, the person was desperate to go up the income scale and risks had to be taken to overtake others. One fine morning, Khairul got out of his home with 40 bags (70 maund) of raddish, and rode on a truck that was carrying stones. With an address of a merchant at Kawran Bazar collected from his local arat, he reached the place and the person with his bags of raddish. They were sold at Tk. 240/maund to give Khairul Tk. 17,000. After deducting the costs of transport, seeds, labour/draft animals, fertiliser/water etc., reportedly, he got a net return of Tk. 6,000. A second time, also from the same land, he took to Dhaka 15 bags but price went down due to over supply. This time, at Tk. 130 per bag, he reaped home about Tk. 2,000.

The next trip, again for the first time, was to Chittagong in 2001. His bus from Thakurgaon started at 5 pm and reached Chittagong at 6 am next day and after selling the products he returned the same day because of the bridge that was once a dream. Khairul carried 6 cages (18 maund) of karala to fetch home a net return of Tk. 13,000. Just a week later the same kind of journey took place with 6 cages (27 maund) of karala.

**Farm and fortune**

And so the rewards continued. Khairul started producing karala bitter gourd to sell in Khulna and Dhaka markets. In 1999, sales from raddish and karala were hefty and he bought 2 bigha (1 acre) of land at Tk. 44,000. Meantime, he devoted
no less attention to the education of his children, meeting non-food needs of the family and saying prayers regularly. His children are getting a good education in schools and colleges/training institutes. "But, I also use them in the early morning to harvest the daily crops that I take to the local 'arats' for sale. This is mainly to teach my family that fortunes come from farms. I also employ children of poor neighbours just to give them some cash money", Khairul described to me.

"Nowadays, the number of vegetable growers in this region has increased substantially, especially the poor farmers who used to keep land fallow. They are now ying to grow vegetables because of the opening up of markets due to the big bridge. In the past, farmers used to go to the roadside with vegetables and, more often than not, used to throw away the unsold surplus. Nowadays, nothing like that happens. Earlier, we produced vegetables and we perished but now it is the reverse: if we do not produce we perish", Khairul continued his conversation, as if, with a student who knows little about the role of Jamuna Bridge and the realities around the poor farmers.

During the discourse, it was nice to hear that RDRS now knocks at the door of Khairul whose loan prayer was once rejected on the plea of poor creditworthiness. The reason they look for Khairul is to train other vegetable growers coming from different areas. Khairul teaches them with great earnestness, not textbook type economics, but economics originating from the practical experiences of his fields. "It is not the size of the land but hard work, a small amount of capital, some knowledge on production and marketing and above all a good communication system that could improve the fate of people like me", Khairul told me. In other words, according to him, the poor only need a small amount of land, institutions to provide small cash, training in new cropping systems and a good communication network to market their products. Thus infrastructure, innovations and institutions seemingly constitute the core of any approach to poverty reduction especially of the resource-poor farmers.

Truthful trainer

Starting with zero amount of land in 1992, within the span of 11 years or so, Khairul now owns four acres of land plus he leased in another one acre to grow karala. I saw signs of happiness in him. However, he was looking at his wrist watch at 9.30 pm reminding me, perhaps, that a businessman like him has not much time left for a gossip with a university professor who draws upon a definite salary (irrespective of the output delivered!) at the end of each month. But Khairul will have to go home, take stock of things for tomorrow’s markets, rise up at 5 am and then again go to bed at 12 midnight.

Still with dreams!

At the fag end, as I was wishing him success, Khairul said: "Sir, I have two dreams to come true. First, to buy a pick-up van so that I myself can carry the commodities and second, to write a book". "Why not 'Khairul Songsbar'?" I wondered. "Because throughout the journey so far, my wife Parul stood beside me to share the sorrows and silverlinings. In fact, she played the pivotal role in relieving us of the rigours", said Khairul, the veritable vegetable grower to live in my memory for years to come.
Research for rich rice
Abdul Bayes

The Daily Star
July 30, 2003

When we talk about our self-sufficiency in rice, we generally refer to the coarse rice grown and mostly used for domestic consumption. There are other types of rice that Bangladesh farmers have historically been growing – not in countable quantities though. Fine, aromatic and glutinous (FAG) rice are the counterparts to the coarse rice grown in this part of the world. Glutinous rice is said to be produced and consumed mainly in Korea, Japan, and the Philippines. But in some parts of the greater Sylhet district of Bangladesh, one could come across such a variety of rice. I was told by some farmers from Habiganj and Maulvi Bazar that, in the past, glutinous rice used to be grown extensively in that region. They also enlightened me with the news that glutinous rice, compared to the traditional coarse varieties, requires smaller quantities for the same appetite and, at the same time, appears to provide more energy to the body.

Rich rice

On the other hand, some areas of the districts of Mymensingh, Rajshahi and Dinajpur have long been the hinterland of fine and aromatic rice like kataribhog, chinigara and kalijira. They are mostly consumed during festivals by almost all classes of people but on a regular basis by the richer section of the community. Fine and aromatic rice is also being supplied to posh hotels. Reportedly, Bangladesh imports roughly 50 thousand tons of fine and aromatic rice (worth about US$ 25 million) each year from neighbouring countries. According to experts, few of the fine and aromatic varieties grown in Bangladesh could comfortably compete with basmati rice for which India and Pakistan have the monopoly to mould the international market. In fact, some enterprising exporters have already started vying for exporting FAG rice and, in the meantime, about 100 tons have so far been exported, we are told. It has been opined that given proper knowledge about varieties, know-how to grow, marketing channels and initial incentives, Bangladesh could easily capture 15%-20% of the world market for FAG rice in future. This would be no mean achievement given the fact that 100% of the value addition on this count would emerge domestically. On the other hand, the domestic demand would also go up pari passu the rise in per capita income. According to the famous Engle's law, income elasticity of demand for coarse rice would decline with a rise in income demanding more of these varieties of rice.

Finding FAG rice

Appreciably, two of the non-governmental organisations (NGOs) in Bangladesh have been trying to encourage farmers to grow FAG rice. Interestingly, these institutions supplied seeds and fertilisers on experimental basis to some of the resource-poor farmers of
Habiganj, Maulvi Bazar and Rajshahi districts. The Poverty Elimination Through Rice Research Assistance (PETRRA) project of International Rice Research Institute (IRRI) and Department for International Development (DFID) tends to support the partners. However, my own interest of research lay in seeing to what extent and how marginal farmers would behave in the event that growing FAG rice mostly means catering to the market needs. Because, poor farmers could hardly afford to grow such expensive varieties (almost twice the price of coarse rice) only for home consumption. The issue of the niche between the marginal farms and the markets appeared as an interesting topic to me. I, therefore, made up my mind to visit a few of the spots where marginal farmers have been induced to go for FAG production. Regrettably though, the remarks presented below are not of a researcher related to rice but that of a traveler telling something on the heels of hectic parleys.

HEED and seed

Health, Education and Economic Development (HEED) is an NGO that has been working in greater Sylhet district for a long time. The heads of HEED told me about their project and invited me to visit some of the farmers experimenting with the new source of survival. HEED took up the challenge and provided the farmers with seeds free of cost. They collected seeds of 16 varieties of FAG rice from different parts of the country and supplied them to the farmers. In the demonstration plots, however, HEED paid for both seeds and fertilisers. The farmers are 'resource-poor farmers' with cultivable land up to 100 decimals, options to work in others' land and food provisions for 6-7 months from own farms. A total of 40 farmers have been selected to test the new technology.

During the discourse, the sample farmers that I met in greater Sylhet zone expressed their satisfaction over experiment with FAG rice. They cultivate kataribhug, rataboro, parbatjira, BRRI dhan34, khasra etc. devoting, on average, 10-40 decimals of land in last aman and boro season. For some of them, the opportunity cost of growing FAG rice was zero since fallow lands were used to grow crops and for others, it was very low since earlier crops were grown on lands which used to grow low yield aus. By and large, the farmers expressed their desire to double the land availability in the next season leaning mainly on the following lessons. First, there are various varieties of FAG rice that farmers have been told about and they are ready to accept them. Second, the yield rates of FAG and coarse rice are almost the same. In the event that coarse rice has a yield advantage, FAG rice holds the price advantage by a big margin (market price is two to two and half times alternative rice). Third, FAG rice could be an important source of cash needs of farmers where cash crops are difficult to grow.

Attempts by APEX

In greater Rajshahi district, another NGO called APEX has also been involved in inducing farmers to grow fine and aromatic rice. Following PETRRA-perspectives, it has selected some resource-poor farmers. The sample farmers tested BRRI dhan37 and BRRI dhan38 in their small parcels of land. The farmers informed us that growing fine and aromatic (FA) rice has benefited them. Some of them had already explored the demand in the local market. A private miller named Raj Automatic Rice Mill is reported to have decided to buy FA rice from the poor farmers at a price higher by Tk. 10 per maund. Besides, the sample farmers also informed me that more farmers expressed their desire to grow FA rice. BRRI dhan37 especially is being
considered better than *kataribhog* in terms of yield and fineness. Some poor farmers who grew FA rice informed me that they bought goat and calves by selling FA rice.

It appeared to me that in both Sylhet and Rajshahi zones, poor farmers welcomed FAG rice as a source of cash resources for buying cash-intensive inputs for *boro* crops. Again, the opportunity costs of cultivating FAG rice are reported to be lower than other varieties of rice and more importantly, the yield disadvantage is more than compensated for by the price advantage that FAG rice has. The observations are borne out by the fact that all of them targeted to increase the area under FAG rice in the ensuing seasons by a respectable margin.

**FAG and the fog**

However, wishes are not horses. Noticeably, there are a few fogs before the FAG rice. First, there is a knowledge gap among the rank and file. Policy makers, producers and purchasers tend to know little about the economics of FAG rice. Some call it rich but risky rice. Second, milling is a major problem. Traditional mills account for a sizeable portion of the system loss for FAG rice and hence special mills for FAG rice are needed. Second, marketing channels are at the nascent stage. The marketing networks that we come across are created to cater for the needs of coarse rice. Third, poor farmers can sell their coarse rice throughout the year and thus can take care of the cash needs whenever necessary. But FAG rice can be sold only during festivals. Again, FA rice is being bought in bulk by a few traders; so much so, that small sellers have no berth in the business. And finally, there is lack of publicity about the quality and price of FAG rice in the international market.

**Policy for promotion**

The government has to take into cognisance the importance of FAG rice in the economic uplift of poor farmers as well as in earning or saving foreign exchange. To this effect, the following policy options could be taken on board to increase the supply of FAG rice. First, various varieties of FAG rice should be made available to farmers through extension networks. Special attention needs to be given to areas where the opportunity costs of growing such rice is either zero or low. Mapping cropping patterns in different areas could easily do that. Second, at the initial stage, the government should invest in buying mills or help the private sector with credit to establish mills. Third, the government should subsidise farmers and traders – for a period of time to come – for exporting FAG in the international market. It may be mentioned here that in India, rice exports are subsidised. Fourth, to start with, contract growers should be identified and special preference should be given to poor farmers.

**Concluding remarks**

Quite contrary to the common notions, fine and aromatic rice has a growing market in the economy. Our presumption is that given proper incentives, Bangladesh could also capture a portion of the international market for *bashmati* rice or at least substitute imports of fine and aromatic rice through domestic production. That could save a portion of our hard earned foreign exchange. But to that effect, we would require, inter alia, technology, training, milling and marketing facilities and on occasions, cash incentives. However, we suggest that more research be carried out on rich rice before embarking on the growth of FAG rice. Perhaps, IRRI and our prestigious national organisation, BRRI could come forward in this regard.
Suggested citation:
What they need is new knowledge
Abdul Bayes

The Daily Star
July 22, 2003

Allow me to talk about two federations of farmers. One lies in Tushvandar union of Lalmonirhat district called Tushvandar Federation of Farmers (TFF) and the other, in Mohendranagar union under the same district and is named as Mohendranagar Federation of Farmers (MFF). Both the locations are 1 to 2 hours drive from Rangpur. Farmers' cooperatives or federations are not a new phenomena in this part of the world and hence should not inject any interest, whatsoever. The reason I wanted to visit was to see the client composition of the federations' committees. The members are drawn exclusively from households owning up to 100 decimals of land, called functionally landless and marginal households. It means, by and large, the federations that I am referring to are of the poor, by the poor and for the poor. In other words, these are not associations of the 'haves' but of the 'have-nots'. Quite in contrast to some of the federations and cooperatives that we come across; the federations seemingly have higher levels of homogeneity. I was told that roughly one-third of the members are drawn from functionally landless groups (owning up to 50 decimals), one-third from marginal farm groups (owning 50 to 100 decimals) and 40% member households have only homesteads. The federations average 350 members with women having due representations.

To become a member of the federation, the farmer groups have to be associated for at least five years with Rangpur Dinajpur Rural Service (RDRS). They should display some degree of social awareness, ability to absorb training inputs and eke out a substantial part of the livelihood from farming activities. And admittedly, RDRS acts from behind the scene as a 'friend, philosopher and guide' for the federations. An elected committee through direct franchise is running the federations. Women have reserved seats to be contested by women only but voted by both men and women. They can also, if they wish, contest in the open seats against their counter parts and some of them already established their supremacy on that count.

Both the federations came into being in 1992 and at the moment own, on average, 50 decimals of land. Meantime, semi-

rice office-cum-training sheds, rice seed godowns, drying facilities, rice mill and dryers have been made available on the premises of the federations. However, much of the infrastructural facilities have been financed by RDRS, possibly, to be recouped in due time.

The federations have been fighting for the economic uplift of their members fraught with financial crisis. By the time I reached there to talk about their hopes and aspirations, the members had learnt that credit is not the panacea to move out of pervasive poverty. "Credit does help at the initial stage to buy a few bullocks, poultry birds etc. but to keep going for ever, you need something else", some male and female members said
with some confidence. I pretended to be ignorant of the subject and asked, "What is that 'something else'?" One female member explained: "We never used the credit for agricultural production because we thought, given limited land and knowledge that we had before, agriculture would not be profitable for us. Vagaries of nature was another constraint. So, we banked on non-agricultural pursuits by utilising credit from RDRS. But, now we know that even 50 decimals of land can work like 100 decimals or so if we can apply knowledge about production practices. Second, we realised that we can produce our own food at no higher costs on our own land and buy non-food items through income generation in the non-farm sector. So, we told our husbands that we should directly help them in cultivation of crops so that they have two hands to reap harvests. Of course, still we need credit but, perhaps, not so much as we need knowledge".

"But you have not attended schools, colleges or universities. How can you gain knowledge and apply them for your uplift?", I asked. "Yes, it is true that we are not 'mohab shikbaks' (meaning university professor) like you, but the poor like us do not need to be 'mohab biggains' (big scientists) to survive. We need to know what to grow, how to grow it and when to grow it in the fields. That's enough to put us on an even keel. Farms are our best friends and, perhaps, for ever. We never knew what farms could do for us. Now, with these three things i.e., what, how and when to do it, we do not need schools, colleges and universities to teach us. You see, recently, PETRRA-RDRS sponsored by IRRI-DFID, gave us some training on how to keep seeds and plant seedlings. We have been keeping seeds but not the way they told us. We found that seed health is as good as human health. You see, we had no idea about seedlings maintaining distances or using one or two instead of five or more to get more output. We sowed, as we liked. But now, we feel the difference. There are many varieties of paddy we never heard of although they are high yielding and produced by our institutions like BRRJ. Thus whether, water or pest management, or crop diversification, we learnt from the schools at our homesteads and fields rather than from 'mohab shikbaks'", the participants told me. I was informed that these poor farmers get together in the field to exchange views about problems and prospects. They call it 'field schools'.

"What are the federations doing for you?" They talked of some services that are provided by the federations. For example, long before the food for education (FFE) scheme got under way, the federations pursued a moral persuasion programme to bring back children to schools. In fact, MFF made frantic efforts and succeeded to a large extent. It was in fact a chiming challenge in an area where children are considered as 'assets' for households in generating income in a regime of pervasive poverty. Second, the federations are reported to fight against assault on women and children and against dowry. They hold processions, raise concerted voice and approach administration against any menace, whatsoever. The family feuds of the poor families are settled through the federations. Likewise, the federations are also carrying out health, nutrition and sanitation programmes. The MFF has plans to perform during its tenure. Hanging on the wall, posters indicated plans of creating voters' consciousness, giving khas lands to members, fish culture, etc.

More importantly, some members of the federations have become sellers of seeds. The federations buy seeds from farmers when they need cash and store them for the future. That reduced their dependency on Bangladesh Agricultural Development Corporation (BADC). Yield of paddy almost doubled due to new knowledge and ideas imparted through informal channels. "We are now more educated and united than before", they claimed.

An important aspect here is the involvement of 13 students from the Bangladesh Agricultural University (BAU) who completed 13 Masters dissertations
working with the farmers of the federations. In fact, a trio of training took place here: poor farmers, trainers and students.

Srimoti Bulbuli Rani (45) of MFF claimed to me to have lifted her household above the poverty line. She is a member of the executive committee of MFF. Just a decade back, she lived in a thatched house, owned only homestead land and could hardly manage three meals a day for the family. Very enterprising as she is, her training on tailoring paid her good dividends. She now trains females and draws Tk. 6,000 a month. On the agricultural front, she rented in some land to grow crops. "I did not know that I could broadcast seeds in mucky fields. I always thought that I needed to transplant them. Now, new knowledge gained through training brought good results for me. I am trying to grow hybrid rice on 25 decimals and am growing BRRI dhan28, BRRI dhan39", Bulbuli Rani expressed. I went to Bulbuli Rani's house nearby. Unfortunately she was not at home but her husband waited to welcome me. I found two tin sheds and one shallow tubewell that the household owns. The children are going to schools and colleges. Meantime, she bought back a few parcels of land adjacent to the household, which were mortgaged earlier. "Rani does most of the work. I only support her", said Rani's husband who has been living in Rani's village as ghor jamai.

Jamila Begum (40) of MFF requires 2.5 kg of rice everyday to feed a family of five. She owns 75 decimals and rents in another 54 decimals on a 50:50 share cropping arrangement in the aman season. But in the boro season, provided the owner bears no costs, the share is 2:1. Jamila told me: "buddhir ababe ami goreb chhilam" (I was poor due to the lack of intelligence). Noticeably, she did not mention about the lack of land! Imbibed by training, she has been cultivating mustard, potato and vegetables on her owned land. This time, tempted by the training on agriculture especially paddy cultivation, she decided to go for paddy production on rented in land. In 54 decimals she got 30 maunds compared to 20 maunds historically observed with old technology and techniques of production. Good seed, line sowing and economising on seedlings, irrigation and fertiliser application resulted in increased output.

Ismail Hossain (40) of TFF read up to class V but has to shoulder a family of six. The new ideas from the training on agriculture brought him back to agriculture that he ignored once. He established a nursery that provides half of the household income. Vegetable production, reportedly, provides 20% and increased food production (including sales of seeds), 20% of the income. His household no longer faces a food deficit.

Amjad Hossain came with his wife Latifa Begum. Three years ago, they lived in a thatched house. Now they live in tin shed. Both of them are involved in vegetable production, for home consumption in the past, but now for the markets. Two years ago, they harvested 50 maunds but now 80 maunds of paddy from the parcels of plots.

While I was meeting the moderate-poor, a group of ultra- or extreme-poor women assembled in the training hall of TFF. I was told that they were called in for training on food for work (FFW) programmes. The training pertains to some basics on social awareness. With permission from the organisers, I went to meet them. There were 30 women most of whom had no homestead land. They live on others' homestead land. Many of them lost their homestead land due to riverbank erosion. Half of them are either separated or divorced and most of them come from areas prone to river erosion. They cannot feed their families - at least two meals a day due to the lack of purchasing power.
The contrast appeared quite clear to me. The moderate-poor that I met are taken care of by the non-governmental organisations (NGOs) and other government organisations. Through various training and credit programmes, most of the moderate-poor were enabled to uplift themselves. To meet the Millennium Development Goals (MDGs), we need to take account of the ultra-poor that stand with no chance of graduation. I hope that innovative ideas, institutions and researchers will address the problems of the ultra-poor. I could glean from their faces, they are no less smart than the group I met just a few seconds before. What they need is some land and some knowledge. The vast tracts of khas lands could be allocated to them. In fact, the last Awami League government made modest attempts at that by giving this group land and a house. Give them some land and provide land-based training. That would, possibly, work to see them above the poverty line.

Suggested citation:
The Daily Star
July 17, 2003

It was about eleven in the morning when I reached Shibpur village under Piringan upazila of Thakurgaon district. My only aim was to meet some female farmers who were reported to be recently trained in agricultural production practices by the Poverty Elimination Through Rice Research Assistance (PETRRA) project under the aegis of International Rice Research Institute (IRRI) and the Department for International Development (DFID). The sponsors call it integrated crop management (ICM) training and, intentionally, imparted it to the resource-poor females so that they could add some value to the process of production of their households. En passant, in the context of Bangladesh, female farmers mostly go to mean those involved in post harvest activities at the household levels. I also had that notion in my mind and hence, mentally prepared myself to throw some questions on that score. However, while waiting in front of the house of poor Urubala, I sensed that all whispers were hovering around one Khuku Moni (35) who was yet to appear before us. I reckoned that she must have been the leader of the ladies in the group of ten formed by the Rangpur Dinajpur Rural Service (RDRS), a non-governmental organisation (NGO) and a longtime friend of the poor in that region. Mentionably, RDRS is a partner of the PETRRA project.

Females in fields
"Where is Khuku Moni?", I asked the resource-poor female farmers who had courteously come to see me. "She is in the paddy field planting 'aman' crop as a wage labour", I was told. Soon she arrived with a smiling face and informed me that, in addition to working in her own plots (with her husband), she also works on others' land as daily wage labourer. The wage rate is Tk. 40 plus a meal. Reportedly, she works for 4 to 5 months as an agricultural wage labourer starting from planting to harvesting. In fact, Khuku Moni has no other option but to work hard both inside and outside the house as she is forced to feed a family of seven. She can only sign her name and her household owns 50 decimals of land. The household also rents out some land to raise farm output. I was told, this applies to half of the group members that Khuku Moni seemingly leads to move up the economic ladder.

Powerful knowledge
Knowledge is power but, perhaps, all knowledge is not equally powerful as far as earning bread and butter is concerned. The female farmers that I was faced with were trained for a few days and then left to upgrade themselves. Every month, they gather to gain additional insights on farm practices through a participatory path. They discuss their problems, try to find solutions and in the event of a failure, seek suggestions from RDRS.

"What have you learnt about farming?", I
posed to the resource-poor participants after explaining to them the purpose of my visit. "We learnt a lot. First, traditionally for ages, we used to grow only two crops in 'aman' and 'boro' seasons. In between, the lands were kept fallow. Now, we grow three crops with mustard in the middle. Second, we now use one or two seedlings – compared to five or more before – to see that output is not affected at all. We had the wrong idea that more seedlings mean more output. That means, more lands are now being covered with the same amount of seedlings. It saves money. Third, we did not know that growing 'dhaincha' gives green fertiliser. We do it now and save huge costs on urea. Fourth, we cultivate 'mug dal' as an additional crop to help raise the fertility of the land. Fifth, there are 41 varieties of paddy in our country but we only heard of two or three and they are low yielding. BRRI dhan29, BRRI dhan39, BRRI dhan33 are high yielding but were beyond our imagination. Sixth, we used to waste a lot of irrigation water through seepage. Now, we know how to water the fields through canals to save water. Recently, we have been using pipes to save more water. Seventh, we used to grow vegetables just to meet household needs. But the training on ICM showed how to reap better harvests, especially high yielding potatoes. Vegetables are now grown for commercial purposes also. Last, but not the least, we have been trained in seed growing, preservation and seedbeds. All these experiences we gained through training from PETRA-RDRS", the female farmers narrated to me in the same breath.

The poor and paddy
Urubala's son was also sitting there. He told me that his mother regularly conveyed the tone of the training to him. "My mother cannot keep in mind everything all the time. So I come to her help through implementation of her wishes", Urubala's son submitted. He informed me that in his 3 bigha plot (90 decimals), he got 45 maunds of paddy this year just because of systematic and cost saving farm practices. In the past, the same amount of land brought forth only 27 maunds. As I could understand, for every resource-poor person in the village, paddy output more than doubled per unit of land. In other words, their land endowments also doubled in one sense. In a regime of pervasive poverty, such a rise in rice output is really remarkable. Thanks to two 'Ts': technology and training.

Khuku Moni, Urubala, Kironbala, Josna, Shefali and others who gathered before me also depicted their developments on food security. "I always faced a food deficit of six months or so. That meant either I had to borrow money to buy rice or borrow rice to pay at a later time. In any sense, it was not dignifying.
Now I know, how to get good crops in a cost effective manner. Costs are saved and at the same time outputs are raised. I now have a little surplus to sell in the market. The sons and daughters are in schools. They are fed and clothed better than in the past”, Khuku Moni continued to confirm her comfortable present conditions. Urubala’s son joined in the joy with the news that his family can now meet a whole year’s food need plus save Tk. 2,000-4,000 by selling the surplus.

The spillover effects of their training were also on the discourse. Some villagers already requested for BRRI dhan31, BRRI dhan30. Their relatives from far and wide have become fond of their farm practices. The most important spillover effect has been in terms of growing an additional crop, growing dhaincha or mung dal immediately after the harvest of wheat.

Rose smells the same

From Shibpur, I went to Uttar Shibpur that lies few kilometers from Shibpur. There I met seven female farmers. The utterances and the upshots were almost the same. Per acre yield increased by a big margin due to the development of ideas on cropping patterns, new varieties, seed management at household levels, water and fertiliser application etc. Asiran Begum (55) said: "In the past, we needed 3 litres of diesel for watering one 'bigha' of land. Now, 2 litres. By adopting a canal and pipe system in irrigation, we have saved water and hence diesel cost by Tk. 22 per 'bigha'. This meagre amount matters most for us". The participants reported that, over the years, they improved upon their housing, children’s education and clothing, health etc. They are now able to eat more than before. Some of them also bought land or released the earlier mortgaged land.

Correlation and causation

"But that could be due to factors other than the training on crop management that you mentioned", I invoked. "It is true that we got credit from RDRS to buy bullocks, poultry birds, set up grocery shops etc. But you see, we now get 20 maunds of paddy per 'bigha' compared to 13-14 maunds in the past. It is mainly due to our previously unknown new varieties. We now grow additional crops to raise income. That is the product of our newly gained knowledge. So, we reckon that income from growing crops increased and hence we would put ICM training at the top." The spillover effect was brought on board: "Ashe pasher manush bole hamrro bicbon nebo (neighbours say we shall also take the seed)".

Costly credit!

During the discourse in both the villages, I wanted to know whether they would prefer a) Tk. 10,000 credit at 15% interest rate; or b) a ten-day training on such types of activities; or c) both. Surprisingly, out of the 17 female farmers from both the villages, 10 opted for (b), 2 for (a) and 5 for (c). The proponents of (b) held that their option was not repayable but, at the same time, riskless and rewarding. The other two options were repayable at a certain date, risky and in case of an odd situation, could even turn out to be unrewarding. The supporters of (c), on the other hand, argued that knowledge without implementation is useless and the only way to implement ideas of this kind is possible through credit to the poor. The difference between a rich and a poor farmer - so they argued - is the difference in terms of resource availability during the boro cultivation period. The former fawns upon its own sources while the latter, on costly credit.

Ladies lit lamps

As I drove back, I found females planting aman seedlings in muddy fields in the scorching heat. It was surprising to see that the resource-poor females along with their male counterparts were sweating under the sun for a sustainable livelihood
through upgrading their skills and expanding their frontier of knowledge. I take my hat off to the 'informal professors' that I met in those two villages. I am told that a lot of such ladies are being trained in several places in agricultural practices. Let ladies like them carry the lamps all over Bangladesh. To this effect, what they need is new knowledge, new ideas and new technology.

Epilogue

"What would you expect from your politicians?", I asked the female farmers. Some of them talked about training, some about education and some about housing and health etc. But sitting at the corner was sweet and shy Shanaz (19) who wanted stoppage of the barta. I was taken aback by the answer and asked: "Why? How come you are affected by 'barta's living in a remote village of Pirganji?", Shanaz covered her smiling face with her sari amidst laughter from others. An old lady later explained to me that due to the last barta, her newly married groom could not come from Chittagong.

'Necessity is the mother of invention', I uttered in my mind. It is true for Shanaz, for the females that I met and perhaps for all of us.

Suggested citation:

In the context of rural Bangladesh, generally, females are expected to feed family first and themselves last. They are supposed to go to sleep late but rise early. The males mostly take household decisions, although females have largely to look after the activities. Working outside the homestead boundary is almost banned for them. By and large, females are, regrettably, tail-enders in the realm of rural realities in Bangladesh. Such treatment of females, and the traditions growing around them, trace back to time immemorial.

But things seem to have been changing, albeit at a slower pace, over the years. The last decade, especially witnessed the development of females on different fronts. Females in rural areas are now reported to be in the front line in many ways. Maybe that pervasive presence of poverty propelled a change of perceptions in the whole spectrum of societal superstitions. There are, in fact, many stories in circulation where females are reported to be in the frontline of education, business, services, social work etc. For my readers, however, I shall pick up a few resource-poor females who are basically farmers - looking after both pre- and post- harvest operations of their agriculture. They seem to struggle to survive and survive to struggle but never surrender. However, first, a few words on the resource-poor.

Definitional dilemma
There is perhaps, neither a dearth of data dealing with the poor and poverty, nor a dearth of definition on the poor. Economists have long been at loggerheads over detecting the attributes of the poor and their poverty levels. Consensus on this count is yet to come, but one concept is clear from all sides: the poor and poverty are multi-dimensional aspects, not to be left to the domain of income or any other single criterion of causation. Therefore, the definition of the resource-poor that we shall use in subsequent submissions could, possibly, produce a storm in a teacup. But let us see the justification behind the definition.

PETRRA’s poor
The Poverty Elimination Through Rice Research Assistance (PETRRA) project of IRRI adopted the concept of ‘resource-poor farmers’ (RPFs) in their project paraphernalia. One could cast serious doubt as to whether poverty of a segment of population can be eliminated even after deploying all the arms in the armoury, not to speak of rice research alone. But one could equally agree with the view that poverty could be curtailed by a respectable margin only through rice research. Anyway, the resource-poor farmers of PETRRA-led projects are supposed to have several features. First, farming should be their main source of income and employment. Second, they cultivate a meagre amount of land - 100 decimals or so. This could be either own
land, others’ land or a combination of both. Third, they tend to generate additional income by working for 100 days per year or so on others’ land. And finally, they have provisions for rice from their own farms for 6-7 months of the year.

Quite understandably, PETRRA’s poor are not extreme-poor. With the endowments of land and labour, they would have at best fulfilled the 2,200-calorie needs of the household members and can be described as ‘moderate-poor’. They are poor because of limited resources and not because of a lack of it which applies for the extreme-poor. However, such poor are always on the fringe of a fall and once fallen, could swell the ranks of the extreme-poor. PETRRA’s purpose is to arrest the fall of today’s moderate-poor or the rise of tomorrow’s poor.

Arguably, that could occur if the RPFs could utilise their land optimally by devoting the full potential of male and female members of the households and by using the most cost-effective means of managing resources – at their disposal – for increased output. Since rice accounts for three-fourths of their calorie intake, a lion’s share of employment and two-thirds of household budgets; then it would seem any attempt to raise the productivity of tiny rice lands would be tantamount to a titanic outcome. Unfortunately, in the past, the RPFs have hardly been addressed by the non-governmental organisations (NGOs), governmental interventions or even by researchers. All roads led to either the 'haves' (large, medium) or the 'have-nots' (landless or functionally landless) with little focus on those lying in between. Their proportion as farmers is reportedly rising. I reckon that they would even become the soldiers of the future self-sufficiency in rice in Bangladesh.

*Ipso facto*, targeting them is a timely concern. The objectives should be to provide them with information, knowledge and technology that they can easily sail in to survive, given their resource endowments. For example, we can provide them with a) foundation seeds to grow more seeds to exchange with other farmers; b) training with regard to rouging and preservation techniques of seeds in the wake of a 15%-20% loss of output from sick or bad seeds; c) training in the uses of balanced fertiliser in the face of their preoccupation with urea only and losing fertility of soil and hence output; and d) introducing the economics of growing FAG – fine, aromatic and glutinous – rice that has higher income elasticity of demand and better chances of export. Admittedly, the prices of these rice varieties are two to three times the rice they are growing at almost the same cost and with the same care.

**Lady with the land**

Very recently, I met 16 resource-poor females, engaged in and enlightened by the various projects of PETRRA partners in the village of Krishnanagar. The training in farm seeds, modern varieties (MVs), input management, and others are led by Agricultural Advisory Society (AAS) in this village, both for males and females. The village is almost half way between Dhaka and Sreemangal, Sylhet. It has a population of 2,000 and households of 200 or so (imagine the density!). Half of the households are landless with only homestead land, and half also are pure tenants. So, the features of the village, possibly, justify the name 'Krishnanagar'; a place under the dark.

I was curious to talk to Masuda Begum (45), Ayesha Begum (40) and Minara Akhter (30) as I was told that they are female farmers. In our rural areas, females mostly carry out post harvest operations but these three females have been at the forefront of the agricultural operations of
their households. Thus, they are engaged in seed-to-seed activities i.e., growing seeds to harvesting seeds. Reportedly, they roam around their rice plots to see that things move as per prescriptions. All of them know about soil conditions and types, crops to be grown in different plots, hiring labour and other inputs etc. During planting time, they are reported to sit in the aisle to see for themselves that proper distances are maintained between plants and rows – the teaching they received from training. During the last boro season, Masuda Begum and her husband harvested the whole crop of their 28 decimal plot. Masuda also carried the harvests home. "Otherwise I would have to pay Tk. 700-800 for contracting out", she told me. Ayesha appeared more agile, active and energetic. Minara appeared relatively shy but sagacious. According to the villagers, the ladies who got training in agricultural operations, especially these three front liners, are doing extremely well. "You need not to have sons if you have daughters like them", a wealthy villager who praised their efforts towards uplift, told me. That does not, however, mean that their males have no role to play. "They reportedly play a minor role", some of the females who were present during the dialogue said to me.

Of course, I could detect the degree of their developing dominance from a simple question: who is your household head? Masuda looked at her husband sitting nearby, smiled and said, "Actually my husband. But I do the most work for the family and hence you can say both of us are household heads!", Ayesha and Minara expressed the same sentiment.

The females that I met there informed me that their economic conditions have been improving over the years. I presumed that the Dhaka-Sylhet highway passing by the village and the operations of some NGOs could have contributed to that on the non-farm side. The PETRRA-partners seemingly signaled an option from the agricultural side where they could manage their own food provisions from growing more rice from the same amount of land. All of them agreed that preservation of seeds, growing MVs, use of balanced fertiliser etc. are the technologies that would suit them. The only problem was that they were not aware of these and especially if available, these were for males only. The females in Krishnanagar village gave me the impression that females could be equally good farmers - if not better - than the males. According to them, the new techniques of seed preservation, growing MVs and resource management increased the yield of rice almost two times!

**Poor and puzzle**

On the last leg of our long discussions, I put before all of the 16 females a puzzle: "Mention three (as per importance) things that you would expect your 'pro-poor' politicians to do for you". I observed that 10 of them mentioned seed first, saplings second and education (primary) third. Four of them noted saplings first, training second and seed third. And finally two of them mentioned, in order of priority, help for housing, goat/bullock, education.

Notice, first, that although called poor, none of them expected any relief or dole from their 'dear' political leaders. Second, none of them expected consumption items e.g., cash help, clothing, wheat or rice etc. Finally, all of them expected investment items from their leaders. Surely, seed, saplings and education, if properly provided, could go a long way in alleviating their poverty and generating future income. Among them, Ayesha said to me: "Ekjone bish khaile ekjone morey, kintu ekjone beej khaile ghorer shobai moray" (drinking poison kills one but eating up seeds as food, kills everyone in the house).
However, the puzzle that I threw to them bounced back to me. I wondered how these resource-poor females could be so rich in perceptions about the future stream of benefits and costs of seed, saplings and education. I presume the NGOs working there might have caused some influence and the electronic media, some impact. But the most important cause could be the Chynovian hypothesis of subsistence pressures.

Driving back to Sreemangal, I was recollecting their responses. The road was patchy and bumpy. Economic development – said a famous economist – is a treacherous road. I hoped the females that I met would be able to overcome their barriers and have smooth sailing. There seems light at the end of the tunnel.

Suggested citation:
The village is called Varaura – 2 km. west of Sreemangal. Mr. Abdul Hamid (78) of the village told me that the word ‘Varaura’ comes from *nara* meaning a vast container – made of bamboo canes – to store paddy. The height of a container could stretch up from the floor to the ceiling. The old but still active pure tenant told me that, in the past Varuara was very much a rice village. But growing urbanisation and development of road communication robbed Varuara of its rich rice heritage. In this Hindu dominated village, half of the households are reported to be pure tenants, one-third owner-tenants and the rest, owner-cultivators. The average size of owned land – as reported – is 80 decimals, and family size 6. Two to three years back, the resource-poor households could hardly afford 5 months’ food from their own fields.

By and large, Varaura is a poor village but, I suppose, lies in a rich location. The Dhaka-Sylhet highway passes by the side of the village and Sreemangal is 5 minutes’ walk from the village. Reportedly, land lies in the hands of the businessmen and *Londonis* (settlers in London). Some of the villagers lost land when they wanted to go to London but were cheated by the middlemen. The dominant form of tenancy in the village is share cropping with traditional fifty-fifty arrangements. But unlike elsewhere in Bangladesh, the landlord does not share the costs of inputs. In that sense, Varaura village is still backward.

Old is not gold!

While modern varieties (MVs) of rice began spreading fast in Bangladesh, Varaura village continued to cling to the cultivation of traditional crops. The per acre yield of these crops are very low, say, 7-8 *mannds* per *kare* (30 decimals). Such a yield reminded me of the 1960s when my own villagers used to bring home poor harvests from local varieties. However, recently the Agricultural Advisory Society (AAS), a non-governmental organisation (NGO) working for Poverty Elimination Through Rice Research Assistance (PETRRA) project – stepped into helping resource-poor farmers (RPFs). The purpose of PETRRA is to help moderately-poor farmers or future-poor farmers with cost effective technologies to raise rice output so that they can graduate from their present position. These targeted resource-poor farmers have land endowments not exceeding 100 decimals or so, they work for others’ land and can meet rice needs of 6-7 months from own sources. It is assumed that if these resource-poor could be provided with suitable technologies and some knowledge about rice cropping practices, possibly, they would rise up and not join the ranks of the poor. However, as per PETRRA-path, AAS came forward to introduce MVs like BRRI dhan28 and BRRI dhan29 to Varaura villagers. It is
estimated that the yield rate of these crops is three times the traditional ones.

But risk-averse as they were, the resource-poor farmers of the village refused to accept an unknown, unseen and unheard of package at the initial stage. AAS then selected a sample of resource-poor farmers and provided them with seeds and fertilisers free of cost. The risks thus were shared between AAS and the target resource-poor farmers. The selected farmers grew the MVs and demonstrated the developments in the fields where, like an industrial exhibition, farmers from far and wide came to visit ‘paddy stalls’ of the resource-poor farmers.

**Not by seed alone**

Seed is the source of growing rice but could turn sour if not handled properly and judiciously. Keeping this in mind, AAS also arranged training programmes for both male and female farmers. The former were trained in rouging the fields and the latter, on preservation of seeds at the homestead. According to a farmer, his wife now shares almost half the hard labour in sustaining good seeds. Farmers have been advised on how to grow seeds from the foundation seeds that they were provided with and also how to prepare productive seedbeds. Farmers told me that, the training is paying dividends in terms of increased yield per unit of land and seeing the size of the crops grown, the villagers of Varaura have been vying for MVs. As Janab Abdul Hamid said to me: "BRRI dhan28 and BRRI dhan29 are good for the poor because 2 ‘kares’ of land now take care of 5 ‘kares’". Mr. Hamid wanted to indicate that what used to be grown in 5 kares in the past are now being grown in 2 kares of land. For the poor with little endowments of land, this also meant that the endowments of their lands doubled over time!

By the time I visited the village, three-fourths of farmers had already adopted MVs. No more free lunch! (There is no free lunch after all). Farmers are now ready to pay for seeds and fertilisers and other input costs to reap a harvest that had never been dreamt of. Meantime, they also learnt about the balanced doses of fertilisers and some of the farmers I met, even taught me about the impact of different types of fertilisers on rice plants. An extra benefit for them, is that the water is free and flows from the hills through narrow canals locally known as chara. Food supply increased and pari passu food availability for households also went up. The food deficit has been reduced by 2-3 months, I was told by a sample of farmers.

**Good and bad luck**

During my visit to the village, I talked to three young and energetic resource-poor farmers. They are Nikesh (26), Mozam (20) and Fahim (25). The average size of their owned land is estimated at 85 decimals and they were shouldering the responsibilities of feeding their respective family of seven or so. Interestingly, at the very outset, these young farmers responded to the call of AAS and embraced the risks of growing MVs in their fields. But at times risk is also rewarding. In the 2001-'02 boro season, Nikesh produced 6 maunds of seeds and stored it in the house in suitable containers. It was bad luck for Bangladesh, that a serious seed crisis broke during 2002-'03 boro season. At that time BADC seeds of Tk. 16 per kg. were sold at Tk. 30 per kg. on the black market. Many other organisations, allegedly, sold their seeds also at Tk. 25-30 per kg. Seemingly there was no light at the end of the tunnel for the resource-poor farmers of Varaura. But the bane became a boon for Nikesh and his friend Fahim. Nikesh sold out 5.5 maunds of seeds at Tk. 600 per maund and reaped home a rich return. His friend Fahim also sold 3 maunds. The buyers were from their own village and
from far and wide. The crisis reminded the said villagers to be cautious as far as seed is concerned. Now they keep seeds with due care and do not sell them unless driven by dire distress. The farmers of Varaura and especially the resource-poor have learnt a lot about seed – growing and preservation. Of course, a sudden flood or heavy monsoon could create problems for them. But since the fluctuations in yields narrowed down substantially, any shock of that kind may cripple them for a while but, perhaps, not kill them – the sample farmers said to me. The technologies and the techniques of production became the saviour of the poor in Varaura village.

**Promising poor**

According to T. W. Schultz, the Nobel Laureate in economics: small farmers are very rational and efficient. They try to maximise the objective function subject to the endowments of resources, knowledge and technology. An expansion of the frontier of knowledge through training, extension and at times by the provision of subsidy could enhance their production possibility frontier. The earlier position of clinging to age-old cultivation by the Varaura farmers was perhaps the product of those factors. Meantime, new knowledge and technology have expanded their frontier. This valuable message seems to have been given by the villagers of Varaura.

As they sow, so they reap. Allow me to add: as they see, so they sow.
Suggested citation:
Seed for survival
Abdul Bayes

As you sow, so you reap – runs an adage from ancient times. Seed is the source of all crops, including rice. In Bangladesh, rice is the staple food accounting for more than three-fourths of the calorie intake of population lying at the lower end of the income scale. Rice cultivation occupies three-fourths of the cultivable land and is mainly an occupation of the poor. The development of seed is thus a determinant of the fate of the 'ill-fated' farmers. But seeds per se do not seem to support survival. They do however, impact upon improvements in livelihoods. What farmers need is good seed for a good yield. The relationship is like that of a healthy mother and a healthy child. Healthy seeds mean healthy harvests. The correlation is confirmed on an empirical plane. But sordidly, seeds always remained on the sideline in the realm of discussion on rice research. Scientists and farmers have long been harping on varietal developments and improvements without paying due attention to the preservation and promotion of good seeds. Perhaps, the necessity of growing more rice at that time knew no law!

Expensive evasions

Such an evasion of emphasis appeared expensive. However, the damage due to 'sick' seeds sown has never been quantified, nor could they be quantified in the presence of a paucity of data. We can however glean information from a report on seed health and its consequent costs. "BRRI estimate a national yield loss due to all diseases of 10%-15% of which it is further estimated that two-thirds are fungal, giving a yield loss of 6%-10%. The technical advice is that perhaps 20% of these losses is estimated to originate from seed borne inoculum, implying that 1.2% to 2% of the total rice crop is lost... . This is likely to be a conservative estimate; experimental use of clean seed in farmers' fields in the Philippines has given yield improvement of 5%-20%... .

Assuming also conservatively, that the rice crop averages 18 metric tons per annum, these losses translate into 2,16,000 to 3,60,000 tons forgone availability annually due to diseases... .

At the current farmgate price (i.e., 1999), this equates to Tk. 1.3 to 2.2 billion (18 to 31 million pound sterling) per annum which indicates that the economic problem is on a scale worth tackling."

Pains of the poor

The loss of yield on account of seed quality falls heavily on the poor farmers. The marginal disutility of parting with a loss in production is different for different land size groups. The larger ones can possibly afford the loss since it would not stand in the way of their survival. But in the case of poor farmers – who hardly own one acre or so of land and have a big family to feed, such a loss could throw them down the poverty line. Therefore, the marginal benefit of regained yield through seed improvement could be large and lucrative for the small as opposed to the large.
PETRRA and the poor

With the above-mentioned premises in mind, the Poverty Elimination Through Rice Research Assistance (PETRRA) project of IRRI initiated a project called seed health improvement project (SHIP). For the villages I visited research by the formal scientists of BRRI and other organisations on seeds are passed on to the informal scientists – the farmers, through Bangladesh Rural Advancement Committee (BRAC). The project is participatory in nature in the sense that farmers sit with scientists and exchange experiences. The resource-poor farmers, as PETRRA calls them, are selected on the basis of the following features: a) households owning not more than one acre of land; b) households' supply of rice from own fields does not exceed seven months requirement; and c) they spend 100 days or so in working on others' land etc. The selected sample farmers are then trained about roguing the lands (at least thrice each unit of land) and their spouses are trained in preservation of seed – on how to sort out seeds and preserve them in proper containers.

On board the 'SHIP'

I personally visited one site of SHIP that PETRRA sponsored in which BRAC and BRRI collaborated. The selected 3 villages are located at Sutang under Habiganj Sadar thana, about 60 km. west of Sreemangal. I sat with 17 resource-poor farmers and they accounted for half of the target farmers selected for SHIP. An interesting point to note is that only five of the participants that I met were males and the rest of the male farmers were represented by their counterpart females. Indeed, the males could earn Tk. 80 to 100 per day in this busy season of aus planting rather than listening to a university professor of no practical use to them. But courteous as they were, they sent their spouses who seemed to be no less knowledgeable than the males that I encountered.

All of the 17 persons present were from resource-poor households with the following attributes: a) average size of owned land was 68 decimals (only 3 of them had more than 1 acre with a maximum of 1.64 acre in the case one household); b) only 6% of them were pure tenants and the rest equally divided between owner and owner-cum-tenant cultivators; c) average household income per year was reported to be Tk. 21,118 and given a family size of 6.5, the per capita income estimated was about Tk. 3,249 per year; d) most of their houses are of straw roofs; and e) most of them had provisions for rice from their own farms for 6-7 months at the beginning of their involvement with SHIP.

Learning is light

The participants in the dialogue informed me that their forefathers had no idea about seed health in terms of promotion and preservation and so they had to pay a price for that inherited ignorance. "What is that price?", I asked. "Our present poverty", they replied. But through their involvement in the SHIP, they have learnt a) How to clean rice fields through roguing 3 times to weed out the competing crops. Each time roguing requires 2-3 hours; b) How to sort seeds manually one by one to ensure balanced seeds; and c) how to prepare and preserve them in suitable containers that ensure seed health.

Another village that I visited was Sirajnagar under Sreemangal thana. The project is managed by the Agricultural Advisory Society (AAS). Besides, seed preservation training, AAS also supplies foundation seeds to resource-poor farmers for growing their own seeds. The resource-poor that I met there also had
the same features as mentioned before and the impact of the training was more or less the same. But for the sake of this column, I shall concentrate on SHIP as experienced from my visit to Sutang and make reference to the other, if and when needed.

**Rewarding lessons**

Admittedly, the sample size was small and the effects of SHIP could not be captured quantitatively. But allow me to submit some impressionist improvements that I could glean from the deliberations of the resource-poor farmers that I sat and chatted with.

First, came the knowledge. Messrs Feroz Ali (80) and Abdul Bari (70) submitted that for ages, they harvested 8-10 maunds per kare (30 decimals) of rice. Since they were born, they heard about the same figures from their forefathers. But for the last four years or so and without a break, they have been harvesting 15-20 maunds per kare of rice. It means an increase of output by 50% or so. But taking the average from all, I reckoned that the rise could be around 40%-50%. Thus, knowledge pertaining to seed health led to more output for the resource-poor farmers. The same sentiment was echoed by farmers at Sirajnagar.

Second, the income of sample households increased. For example, the average income of SHIP farmers was Tk. 19,000 per year compared to 22,000 now. *Pari pasu*, the per capita income also rose over the years.

Third, the increased yield enhanced food entitlements for the households. As noted before, four years ago, the sample households had 6-7 months provisions for rice from their own farms. Now nine of the 17 farmers can feed their family for 12 months from their own production. Another five have food security for 10 months. By and large, as they reported, all improved in food security. To quote Hasina (40): "I have 7 members to feed and 5 'kare' to cultivate. Four years ago, my own production from land could meet five months' need of rice. The rest would come from borrowing or help. Now both my husband and myself are working hard with SHIP and fetching good fortunes. Now we get 100 maunds of rice from the same amount of land compared to 50 maunds before."

Fourth, one-third of the respondents reported that they were selling rice after meeting family needs. In Sirajnagar, half of the sample respondents reported to be selling rice after meeting family needs.

Fifth, they invested in sanitary latrines, repairing houses, buying land and bullocks, turning straw-houses into tin sheds etc. Four years ago, they could hardly dream of such developments.

And finally, before being with SHIP or the farm seed project of AAS, they could hardly afford to have three rice-meals a day with two curries. Now, they have regularly three rice-meals with two curries.

Admittedly, the above mentioned impact could originate from other sources also and a decomposition of the effects are also difficult within the short span of time and in the absence of in-depth household level income and expenditure data. But the participants revealed their strong assumption that increased yield and output resulting from the improvement of seed quality and seed growing, largely helped them to be on an even keel.

**Teachers and teasers**

The spillover effects of SHIP and the other project also need mentioning. When the project started in 2001, the participants under SHIP were teased by fellow villagers on the plea that the exercise was just sparing a pound for a penny. This meant that they were labouring hard for no hefty gain. "What
else can we do to change our lot? Let's try it and see what happens in the future", the sample farmers used to tell the skeptics. But now, proudly pointed out by the participants, the skeptics approach them to teach the methods of seed promotion, preparation and preservation. Sometimes they even ask for good seeds to be exchanged for rice for consumption. The exchange takes place provided the participants have surplus seed. It was also reported that neighbouring villagers and richer sections within the village also approach them for the same reasons. One female farmer from Sirajnagar informed me that her brother from a remote village saw her seeds and requested her to supply him.

**Sustainable survival?**

But what will happen when the SHIP leaves the port of the participants? Will they be dropped down? In response to my questions, all of them answered 'No'. Why? "Because, we shall teach our children and grandchildren about this cost effective technology so that they do not inherit ignorance like us and fall into the poverty trap. Even if we die, our knowledge will keep us alive to following generations", some replied.

**Rice research and the resource-poor**

Rice research has rarely helped the resource-poor directly and decisively. Undoubtedly they benefited, among others, from the introduction of modern varieties or the green revolution. But rice research needs to target the resource-poor in Bangladesh since a) they are actively engaged in rice production and increasingly they are becoming a dominant group among farmers; b) they could be the victims of the vagaries of nature to join the line of the extreme-poor; and c) they are poor because they lack knowledge about the proper management of their meagre endowments. Sometimes extension services could be more powerful and offer tools of sustainability rather than merely being providers of micro-credit. The PETTRA efforts seem to point to these observations.

**Epilogue**

At the end of our cordial conversations at Sutang, I posed a question: "what do you mean by poor?" The participants were silent for a few moments till Mrs. Razia of Noagaon broke the silence and said: "A blind or a lame person without capacity to work is poor." "But why did you enlist yourself as poor in SHIP without being blind or lame?", I asked Razia. "It is because you call us so. I am not poor. I have hands to work and legs to walk. Why should I be poor?", replied Razia.

Driving back to Sreemangal and seeing farmers planting aus in the muddy fields, I recollected Razia's reactions. Perhaps poor, not because they are poor but because they are called poor.

Suggested citation:
কৃষিতে বায়োটেকনোলজি এবং বাংলাদেশ প্রেক্ষিত (Biotechnology in agriculture in the Bangladesh context)

আবদুল বায়েস

October 3, 2003

সম্প্রতি সেন্টার ফর পলিজি ডায়ালগ বা সিপিডি ইরি ও পেলা প্রকল্পের সাথে ব্যবস্থাপনায় প্রাক্তন সেন্টারে এক সেমিনারের আয়োজন করে। সেমিনারে মূল অভিলাষিক বিষয় ছিল- জীবন-প্রুতি বা বায়োটেকনোলজি এবং বাংলাদেশ। মূলত বিষয়টি নিয়ে বিষয়ের অন্ত নেই, যেমন নেই বিষয়াের বিষয় এবং এর বৌদ্ধিক সমস্যা নিয়ে। খুব উল্লিখন বিশেষ নয়, অনুরাগ কিংবা উন্মুক্ত বিষয়ও বিষয়ের সত্তায় নেই। বলা প্রয়োজন, কৃষিতে যারা জীবন-প্রুতি ব্যবহারের বিপরীতে অবস্থিত নেই, তাদের প্রধান যুক্তি মানববাস্ত্ব ও পরিবেশন যুক্তি সম্পর্কিত। এবং বিশেষ করে এ দলের মুক্তিকর্ম সেই উল্লিখন বিশেষ করে উল্লিখন হচ্ছে, যেমন খুব নেক খাদ্য নিরাপত্তা (food safety) খাদ্য নিরাপত্তা (food security) চেয়ে অধিকতর গ্রহণযোগ্য বিষয় বল বিষয়ের। যা-ই ছোক, আই-ইউনিয়ন বাংলা এবং মানবক্ষেত্রে এ ধরনে বিষয়ের অবস্থিত নেই, যেমন জনগণের খাদ্য ও প্রুতি নিষিদ্ধকরণে অন্ত্যীকৃতি বা মালিকানার বায়োটেকনোলজি কোন পরিপূর্ণভাবে এবং কোন পথে যথাযোগ্য অবস্থান রাখতে পারে, তা ভেবে দেখায় যথাযোগ্য সময় অন্ত:তরুণ বলে উপস্থিত বলে আমারা মনে করি।

দুই:
উল্লিখন সেমিনারটিতে দুজন আন্তর্জাতিক খাদ্যসম্পদ বিজ্ঞানী সুচনা-বক্তব্য প্রদান করেন। তাদের একজন বাংলাদেশের কৃতী সত্তান এবং ফিলিপাইনের আন্তর্জাতিক ধান গবেষণা ইনস্টিটিউট (ইরি)-র সমাজবিজ্ঞান বিভাগের প্রধান ড. মাহবুব হোসেন। তিনি বললেন, জীবন-প্রুতির আর্থসামাজিক দিক নিয়ে এবং অবহিত করলেন বাংলাদেশের জীবন-প্রুতির প্রাসঙ্গিকতার কথা। অন্যায়ণ ড. সুশ্রুত কুমার দত্ত-ও ইরিতে কর্মচারী। ইতিমধ্যে তিনি চালু এই দলের মধ্যে সভাপতি প্রতিমনের অনুদেশ গ্রহণে বিষয়কে খাদ্য অর্জন করেন। তিনি বললেন, অনুরাগীবিদ্যার ঐতিহ্যবাহী প্রকল্পটি এবং কিছু সমাজ বিষয়ের সন্ধে এ বিষয়ে সম্পর্কিত আলোচনা-সমাবেশের পরিপ্রেক্ষিতে উদাহোন করেন। এই দলের বিজ্ঞানী তাদের সুলভিত ও তথ্যসমূহ বক্তব্যের মাধ্যমে উপস্থিত অসুন্দীর্ঘক, সামাজিকবিজ্ঞানী, কৃষিবিজ্ঞানী ও নীতিনির্ধারকদের যুক্তি উপভোগ কিছু বিষয় উপস্থাপন করেন। উপস্থিত মুন্ডুলজনের কেউ যেমন বক্তব্যের পক্ষে ছিলেন, যেমন কেউ ছিলেন জীবন-বিজ্ঞানের বিষয়ে। সব মিলিয়ে প্রাণ্ব এক সেমিনার। প্রাসঙ্গিক তো বটেই।

তিন.
আমার হাতের কাছে ইন্দ্রজল-বাংলা যে অধিধানটি আছে, সেখানে যুড্ধ সিকিউরিটি ও যুড্ধ সেফটির বাংলা প্রতিষ্ঠান প্রয়া এক রকম : খাদ্য নিরাপত্তা।
এই দুই পর্যায়ের মধ্যে প্রধানমন্ত্রী সরায় তাদের কাজ এবং শুধু অজ্ঞতার আলোচনা পরিপ্রেক্ষিতে আমি এই প্রথমটিতে বলে 'খাদ্য নিরাপত্তা' এবং দ্বিতীয়টি 'বাংলাদেশ খাদ্যের নিরাপত্তা'। অনুরাগ বা উন্মুক্ত বিষয়ের মাধ্যমে 'খাদ্য উচ্চ খাদ্য নিরাপত্তা। যাত্রাবসান' খাদ্য নিরাপত্তার বিষয়ে আসে দ্বিতীয় ভাবে। পান করার মতো পানির খাদ্যের অভাব সেখানে তুষার একজন ব্যক্তি কেনার বড়ি খাদ্য, খাদ্য লঞ্চ মুক্তির পানির পার্থক্য নিয়ন্ত্রণ করা এবং ভার্সিয়ামুক্ত, ব্যাটারিয়ামুক্ত পানির প্রাণাঙ্গিতক বা একাডেমিক বিষয়। অন্যদিকে খাদ্যের পানির
চার.

dক্ষণ এশিয়া ও সাব-সাহারার আক্রমণ ১,২ মিলিয়ন মানুষের সৈনিক আয়া এক ডলারের দিনে।

বাংলাদেশ টাকায় তা ৫৯ টাকার মতো। প্রায় ৮০০ মিলিয়ন মানুষের খাদ্য নিশ্চয় রেখে। অর্থাৎ এরা ফুড ইনসিকিউট।

যুগাংশ ভারত হয়নি এমন ১৬০ মিলিয়ন ছিল প্রাক্তনে পৃথিবীতে ভোগে এবং প্রতিবছর এ কারণে পীঠ বহারের কমায়ী পীঠ মিলান বা ৫০ লাখ শিল্পুর কোল চলে পড়ে। এর চেয়েও কমকে বেশি মানুষ আয়ারন ও ভিতরাজিদাত্রি ঘটের মুখোমুখি।

পরিগতির দেখা যায়, অনুভূত বিশ্বের জনগণীতের একটা বড় অশ্বাস্তগত সমস্যায় পতিত এবং মানব-সংবাদঘনতার সংক্রান্ত জগতে আবিষ্কৃত। এর বিপরীতে উত্থান বিশ্বের জনসংখ্যা মোটমূট বিশ্বশীল এবং কোথাও কোথাও জনসংখ্যা বৃদ্ধির হার নিম্নমুখী। বেশি নয়, কম জনসংখ্যায় তাদের মাঝামাঝি অনেক কারণ হিসেবে আবিষ্কৃত।

সতরঞ্জ খাদ্য উপাদান বৃদ্ধি সৃষ্টি তাদের কোনো পঙ্ক বা বাজি নয়। ওইসব শেষের ভোজনার আয় এমন পর্যায়ে পৌঁছাতে যে, ভোজনমূলক জীবন তাদের জন্য তত্ত্ব কোনো সমাজ নয়। সতরঞ্জ সেইসব শেষের সরকার ও জনগণের চাহিদা বায়ুসামঞ্জস্য খাদ্য, যেনতেন এরকে উৎপাদিত খাদ্য নয়।

অনুরাজিতিন্দ্র, বেশায় জনসংখ্যা বৃদ্ধি হার খাদ্য উপাদান বৃদ্ধি হারকে ছাপিয়ে যায়, সেখানে ফুড ফার্ম, সেফটি লেগে।

পাচ.

এবার দৃষ্টি দেখা যাক দফ্ত্র এশিয়ার অন্তর্গত দেশ বলে বিবেচিত বাংলাদেশের দিকে। যে বিষয়টি নিয়ে বিতর্কের অবকাশ খুব কম তা হলো ‘সর্বজন বিপরীত’ নামে পরিচিত। উচ্চ ফলান্তীল (উর্বরী) খাবারের ব্যবহার এবং কর্মরক্ষাভাবের খাদ্য উপাদানের উপর পাচ।

পাচতায়রের অভাব নেই সেখানে ব্যাটরিরামকে পানি পারে জন মিলিট-মিমিট অবশ্যই জীবনসাহায্য।

তাই জীবনয়নজনিত বিতর্কটি উপস্থ এবং অনুভূত জীবনের অর্থর বিবর্ধনে একটির চিত্তা ‘খাদ্য নিরপেক্ষ’ এবং অন্যজনের ‘ক্ষমতানহম খাদ্য নিরপেক্ষ’। বিষয়টি আরেকটু খাতিয়ে দেখা যাক।

হ্যায়।

সতরঞ্জ আহততার একটা সূক্ষ্ম তো অবশ্যই আছে। পরিক্ষেত্র এমন পর্যায়ে পরিত্যাগ হয়েছে যে, বর্তমান নীতিনির্দেশনার কেউ কেউ স্বাস্থ্যপূর্ণভাবে আকাঙ্খে কাতর হলে চাইছেন ‘সাহায্যের’ জন্য। আর একদল আছেন, যারা মনে করেন বাণিজ্যের ভালের প্রয়োজন হয়েছে।

জনসংখ্যা হ্রাস পাচ্ছে, মাথাপিছু আর্থ বৃদ্ধি পাচ্ছে। বাণিজ্য ভাল কম খাবে, বেশী খাবে শক্সবিজ, মাস-মাস-দিন। কাজেই চারের ওপর ঘুরুকু কম না। কিন্তু তার বোধ জানান না যে, জনসংখ্যা বৃদ্ধি হতে ২.২ থেকে ১.৫ শতাংশে নেমে আসার পর প্রতিবছর ২০ লাখ লেক মোট হবে এবং এই অতিক্রম মুখে ভাল দিতে লেগে প্রতিবছর খাদ্য উপাদান বাড়াইতে হবে ০.৫৬ মিলিয়ন টন।

থেকে একই মাত্রা মাথাপিছু চালের ভোগ রাখতে হলো। তা ছাড়া খাদ্য স্বাস্থ্যপূর্ণতার যা জয়নগী গাই না কেন, এ কথা তো অধিকার করতে পারব না যে, এখানে মাথাপিছুই চাল আমদানির হিস্টিক পড়ে যায় এবং পরিমাণ বেড়ে না।
যায়। আমাদিনি বৃষ্টি পাওয়ার মূল কারণগুলোর অন্তত হচ্ছে সেই “আয়াতুতি” এবং এর ফলে খাদ্য উৎপাদন বৃদ্ধির ক্ষেত্রে গুরুত্ব কম দেওয়া। বর্তমান আরও চাষায়ন জমি খালার কারণে একপ্রকার উৎপাদন আরও বৃদ্ধি করতে হবে। মনে রাখা প্রয়োজন, বাংলাদেশের বাস্তবতা এখন-তিনটি।

এক, প্রতিষ্ঠায় এক শতাধিক চাষায়ন জমির পরিমাণ কম থাকে। এর কারণ বহিঃপর, তথ্য ব্যবস্থাবৃদ্ধি, বাণিজ্যিক নগদীর জন্য রাষ্ট্রীয় জমি ইতিহাস অন্তর্গত গুরুত্বপূর্ণ উৎপাদন।

দুই, জনসংখ্যা বাড়ি, পরিবার বাড়ি, এবং এর ফলে মানবিক জীবন ভাবনার কমে।

এবং তৃতীয়, খাদ্য সর্বোচ্চ মৌলিক পরিবর্তন এসেছে। চার বর্ষাকালীন শুকনিরস্তি, বন, মায়ের ইতিহাস চালিত বৃঙ্কি পাওয়া এবং সেহেতু এগুলো উৎপাদন জমি প্রয়োজন।

কিন্তু গোল বেঁধেছে অন্য জায়গায়। একপ্রকার উৎপাদন বৃদ্ধির অনুরোধ করা একটি আছে বলে মনে হয় না। আধুনিক ধারনের উৎপাদনক্ষেত্রে নবইয়ের দশকের প্রায় একই মতায় অস্থায়ী করেছে। প্রথম দিকে কয়েক বছর পুরো ধারনের উৎপাদনক্ষেত্রে প্রাক্তন হয়েছে। মুদ্রাবাস্তবের ক্ষেত্রে সাধারণত তুলনামূলক প্রতিষ্ঠায় হয়েছে।

এমন পার্থিকত্বের দু-একটা উদাহরণ দেওয়া যায় এবং এই আয়াতুতি বৃদ্ধির অনুরোধ একটি আছে বলে মনে হয়।

তাই ব্যাখ্যা করা হবে যে, ক্ষুদ্র জীবিতায়নের ব্যবহার আর সম্পদবিদ্যমানক বৃদ্ধি করতে সাহায্য করে। এ ক্ষেত্রে দুই চাষক জীবিকাব্যবস্থা কৌশলগুলো প্রাথমিক ব্যবহার করার জন্য।

সাদাত.

এই বাংলাদেশের জন্য প্রয়োজন বিরাজমান বা প্রচলিত জীবনকৃতক সমস্যার ও সুযোগসূচিতক সূচনা করা। এর সমস্ত উপরের উপর, যা আধুনিক অগ্রজীবনায়নিত প্রযুক্তির দিকে দৃষ্টি দেওয়া। গতিশীল দেশ ভিতর ও কার ইতিমধ্যে এগিয়ে গেছে এ ক্ষেত্রে এবং আমাদের সেই পাথ প্রয়োজন যায় কি না সে বিষয়ে এখনই ভাবে করতে হবে।

বাংলাদেশে পাঁচ বছরের কমবর্ষী শিশুদের ৩০ শতাংশ করা গজন নিয়ে জন্য দেয় এবং প্রায় অর্ধেকের বায়ুবাহিক বৃষ্টি বায়োজ্য। আরামের হাতের কাছে তারা খাদ্যশীলের আধিক ভিতরের এমনমতার বেঁধে আছে। কিছু হয়েছে, বাংলাদেশের বেঁধে তিনি থেকে শিশু শিশুর জন্য প্রমাণিত হয়েছে।

শাহ.

মিত্র এ ধরনের বিষয় প্রতিষ্ঠায় কথা ঘটে ও

সেরা দশকে আধুনিক ধারার চাষ প্রতিষ্ঠায় হয়ে যাতে

গাইনিকের নামে গাইনিকের নামে

ক্ষুদ্র ধারার চাষ ধনী ধনী করে আর পরিবর্তিত করে।

কিছু কিছু অভিজ্ঞতা নকাশ তথ্য

প্রমাণিত হয়েছে, কেমন কিছু মিন প্রমাণিত

হয়েছে। তবে সাবধান হয় কৃত্রিম ধারার

উদযান যে বাংলাদেশের জন্য কল্যাণ বয়ে এসেছে

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সে বিষয়ে কারও সন্দেহ আছে বলে মনে হয় না।
আধুনিক জীবন-বিজ্ঞানের বলা আর সে ঘটনা ঘটিয়ে পারে। আমারা অবশ্যই প্রযুক্তি নেব, তবে ভালোভাবে পরীক্ষা করে নেব। ইমোশন্স যেন ইন্টেরলিককে ছাপিয়ে না যায় যে দিকটি লক্ষ রাখতে হবে, যেমন করে লক্ষ রাখতে হবে ইন্টেরলিককে যেন আবার ইন্টেরলিক আর এনায়নসমূহকে এড়িয়ে না চলে। ধনী দেশগুলোর বাড়বর্তী নিরিখে আমারা যেন আমাদের পথ হারিয়ে না ফেলি। আজ থেকে 20 বছর পরের দৃশ্যপট করার জন্য, বাংলাদেশের উচিত হবে এখন থেকেই কৃষিতে বায়োটেকনোলজি নিয়ে গবেষণা করা। এবং আমাদের জাতীয় প্রতিষ্ঠানগুলো অবকাঠামো প্রতিষ্ঠানগুলোর যৌথ প্রয়াসে একটা কিংবদন্তম দিতে পারবে বলে আমাদের বিশ্বাস। যেকোনো প্রশ্নের উত্তর যৌথ বুদ্ধির কাজ, প্রশ্নটি চুরো ফেলা কোনো বুদ্ধিমানের কাজ নয়। মাথা ঝাঁকলে মাথায় থাকতেই পারে। মাথাটা কেটে ফেলে না দিয়ে ওয়ুদ নিলে ভালো হয় না?

নয়,

শেষ কথা। ধান কিছু এখনো বাংলাদেশের প্রাণ।
অকৃষিভাঙ্গা কর্মকাণ্ডের কংগ্রেস অন্যান্য ঘটনার সরবরাহ বৃদ্ধি তখনই ঘটিয়ে পারে, যখন ধান খালার কর্তৃ শ্রম ও জমি। বাংলাদেশ ভারতবর্ষ বা উর্দুসারী সম্প্রসারণের কোনো বিকল্প আছে বলে মনে হয় না। বায়োটেকনোলজি হচ্ছে উৎপাদনের সেই উর্দুসারী হাতিয়ার। আশায় কথা, নমুনাকৃত অধিকাংশ উভয়দিকে, বিশেষত দুইলো সামজ কৃষি প্রতিষ্ঠানে বায়োটেকনোলজি ব্যবহারের পক্ষে রায় দিয়েছেন। তবে শাত্রীয় নয়। আমার সমর্থনও কিছু শাত্রীয় নয়।

Suggested citation:
দান গবেষণা ও ‘সম্পদ-দরিদ্র’ একটি ভ্রমণবৃত্তান্ত
(Rice research and the 'resource-poor' – a travelogue)
আবদুল বায়েস

September 12, 2003

আন্তর্জাতিক ধান গবেষণা ইনস্টিটিউট (ইআরআই) মনে করে, ধান গবেষণার মাধ্যমে সম্পদ-দরিদ্র জনগোষ্ঠীকে সহায়তা দিয়ে দরিদ্র দুর্বলতা সমাপ্ত করা হয়েছে। প্রথমত উদ্যোগ করা যায়, দরিদ্র দুঃখের হতে পারে। এক, যাদের 'সম্পদ' বলতে কিছুই নয় তারা দরিদ্র হতে পারে। দুই, যাদের মূল সূত্র অন্য না হলেও মূল সূত্র কিছু সম্পদ, বিশেষত গুরুত্বপূর্ণ জমি আছে বলে পরিমাণ, তবে, যদি নয় সম্পদের সুস্থ ব্যবহার না করতে পারেন।

এই প্রক্রিয়া ধান গবেষণার সাহায্যে প্রদত্ত করে সম্পদ-দরিদ্রের সাহায্যে গবেষণাকে একই আসা। পরোক্ষভাবে অনারাও লাভবান হতে পারে।

আর তা করতে গেলা ইআরআই পেট্রো উপ-ক্রান্তের অভিজ্ঞতায় ওলে কিছুই উপ-ক্রান্ত হতে পারে। এ উপ-ক্রান্তের সার্বিক দায়িত্ব রয়েছে পেট্রো, কিছু বাসভাবে নিয়ন্ত্রিত রয়েছে কিছু পাউন্ড বা সহযোগী প্রতিষ্ঠান, যারা মাথা পথিয়ে দরিদ্রকে নিয়ে, দরিদ্রের ঘাড় এবং দরিদ্রের জন্য কাজ করে যাচ্ছেন। উল্লেখ করা প্রয়োজন, ২০০৩ সাল পর্যন্ত মোট ৪৪টি উপ-ক্রান্তের আত্মহত্যা ৫৫১টি ঘটে মোট ১১ হাজার ৩৬ জন কৃষকের কাছে পেট্রো-প্রসূত প্রশিক্ষণ পূর্বাভাস হয়েছে। এদের মধ্যে অংশগ্রহণকারী পুরুষ কৃষকের সংখ্যা ৬ হাজার ৬৬৭ (৬৬%) এবং মহিলা কৃষকের সংখ্যা ৪ হাজার ৩৭৩ (৪০%)

সম্প্রতি এসব উপ-ক্রান্তের কর্মীগণ সহায়তা করতে দেখায়, এবং তুলনা নিবন্ধটি সেই অভিজ্ঞতাটি আলোকের উপস্থাপন করা হলো।

দুই। কেন তা ভাবেন?

প্রথমত, সর্বজনীন বিপরের সুফল সব অঞ্চলে সমাদৃত হতে পারে। অথবা আন্তর্জাতিক সর্বজনীন বিপরের ব্যাপক প্রসার ঘটেছে। অন্য পারিবারক-প্রশিক্ষক অঞ্চলে (যখন খাদ্যশিক্ষণ, উৎপাদনশীল এবং বনার্ধণ) সর্বজনীন বিপরের কেন্দ্র তৈরী হয়। গ্রাম গবেষণায় প্রতিফলিত হয় যে, পারিবারক-প্রশিক্ষক অঞ্চলগুলোতে মোট জাতনামক আপেক্ষিকতা ৬৫% বাস করে (উপকূলীয় ৬৩% এবং বনানার্ধণ ৩৫%)। মোট নিষ্ঠা জমির ৬৩% একত্রিত অথবা মার্ক ২২-৫০% জমি সেচের অন্তর্ভুক্ত। তা হাড়া মাথার দিকে চালের প্রাপ্ত সবচেয়ে কম, ২৫০ থেকে ২৫০ একরের মধ্যে, যা কিনা গড়পড়তা ৩৩৩ একরের নিচে এবং এ লভ্যতার হার ১৭৮৭ সালের তুলনায় ২০% হার পেয়েছে ২০০০ সালে। এবং সর্বশেষে, চালের উৎপাদনশীলতা এবং চাল থেকে উৎপাদিত উপার্জন একত্রিত হবে কম এবং তফসিলভাবে নিম্নভাবে। মুতারা সর্বজনীন বিপরের 'আশীর্বাদ' রক্ষিত একত্রিতের চারিদিকের জন্য লাগানী প্রযুক্তি উদ্বোধন ও বিতরণ অন্তর্ভুক্ত বলে পেট্রো মনে করে। বিতর্কিত, জমির সম্পদ-দরিদ্র চারিদিকের ভাবিতে অস্ত্র-দরিদ্র জনগোষ্ঠী হিসেবে আবির্ভূত হবে এবং বিশ্বাস করা হচ্ছে। আপাতদৃষ্টিতে দরিদ্র প্রতিফলিত না হওয়া এতে অর্থনৈতিক অবস্থান আরো নাগ্ন এবং যোগেন্দ্র গ্রাম প্রাপ্তির পরিকল্পিত এরা 'সম্পদালীন দরিদ্র' কারণে শামিল হতে পারে।

তৃতীয়ত, 'সম্পদ-দরিদ্র' চারিদিকের অর্থনৈতিক অবস্থান অন্য শুধু শারীরিক দেশ যাত্রা, ১৭৮৭ সালের ৫০% থেকে ২০০০ নাগাদ এনের অংশ দাঙ্গা ৬৭%। চতুর্থত, অপরূপ এবং অপরূপ তথ্যপ্রাপ্তি অনুরূপতার বহু ভারতামাত্র বিদ্যমান হয় না। এদের মধ্যে কেনো কেনো বিদ্যমান দারুণ দারুণ ভালো বা দুঃখ আবার কেনো কেনো অবস্থান ধারণা বা অবশ্য। পুণঃপ্রস্তুত বা পার্বতী সেটরের প্রধান দায়িত্ব হয়েছে খারাপ
ভারসাম্য অপসারণে কর্মকৌশলের মাধ্যমে হত্যা করা। এবং পরবর্তীতে যেহেতু চাল প্রধান খাদ্য এবং চাল উৎপাদন প্রক্রিয়াকে কেন্দ্র করে প্রধানত ইতিমধ্যে অল্পের আয় ও করমূল্য অব্যাহতি, সুতরাং চাল বা ধান গবেষণা দিকে বৃদ্ধির পথ অতিক্রম করতে পারে।

তিনি, কারা 'সম্পদ-দরিদ্র'?

'সম্পদ-দরিদ্র' তারাই: ক. যাদের নিজের জমির পরিমাণ ১০০ শতাংশের মতো; খ. যারা পূর্ণ সমর্থন গুণগত গণ্য উৎপাদন থেকে খাদ্যের মোটামুটি নেওয়ার পরে ৪-৫ মাস খাদ্য ঘটিত থাকে এবং গ. যারা অনন্য জমির 'জন বিক্রিটি' করে জীবনাবলি নির্ভর করে।

চার, সম্পদ-দরিদ্রের দুর্দশা লাগবে কৌশল

সম্পদ-দরিদ্রের দুর্দশা দুর্দিকের কৌশলগুলো আলোচনা করা যেতে পারে। প্রথমত, গুরুত্বপূর্ণ ধারের বীজ উৎপাদন, ক্রকড় এবং বিনিয়োগ সংক্রান্ত প্রশ্নগুলোর মাধ্যমে চাষকর খ্যাতিবিবর্ধন এবং দরিদ্র বীজ সৃষ্টি থেকে রক্ষা করা।

বন্ধুত্ব, বাংলাদেশে মেট বীজ ব্যবহারের মতো ৫% একে বাংলাদেশ বৃত্তি উন্নয়ন করা হবে এবং গতিবিদ্যা, ৬-৭% বীজের উৎস এক্সপ্লোর ও ব্যাক থাকে এবং বাকিতে ৮৫% বীজের উৎস চাষের নিজের বন্ধুত্ব যাচ্ছে। সুতরাং, এটি যদিও নিজের বীজের 'সৃষ্টি' নির্ভর করে না পারে তবে যদি ফসল আশা করা যায় না। শিশুদের বাছাই যেমন অনেকটা নিরাপত্তা করে মায়ের বাছাইর ওপর, তাহাঁ ফসলের বাছাইর নিয়মক হচ্ছে বীজের বাছাই।

বিভিন্ন প্রথমতাদের চেয়ে উচ্চ ফলনশীল ধানের উৎপাদনশীলতা অনেক বেশি এবং উচ্চ ফলনশীল ধানবীজ সংগ্রহ করে সীমিত জমিতে সার্বিক উৎপাদন উৎসাহ করতে হবে।

কৃষক ও মালিকমের মৌখিক প্রস্তাবের নামে উৎপাদন কৌশল ও ব্যাসার্থীর পাষ্ট উদ্ধার করা হয়:

গ. লিঙ্গ-সংরক্ষণশীল এই অংশে যে নারীদের কৃষি কমনকালে মূল্য প্রহারে নিয়ে আসে এবং য. দরিদ্রমূখী, অর্থাৎ অর্থ সর্বরাহ হারে ধান উৎপাদন নয়, তো করে মানুষ দরিদ্র চাষকরের জন্য সঠিক ধান উৎপাদন কৌশল শেখানো যায় যেটাই মূল লক্ষ।

অশা করা যায়:

ক. প্রকৃত প্রশিক্ষণ ও উপকরণ সরবরাহ অবাধ হলের স্বল্পকালের ব্যাসার্থী সম্পদ-দরিদ্র চাষকরা তলাতল দিন অতিরিক্ত খাদ্য উৎপাদন করতে পারবেন।

অতিরিক্ত এ উৎপাদন মোট আদর্শ হলে অর্থাৎ:

খ. জমির উৎপাদনশীল বৃদ্ধির হার হবে ৩৫%:

গ. অর্থিক রিটার্ন বৃদ্ধি পারে ২৫% হারে:

ব্যবহারশীল ও সম্পদ-দরিদ্র একটি অপরিষ্কৃত
ধারণাটির ভিত্তিতে অস্তিত্বকের চাইতে শব্দ ব্যবহার করা যাচ্ছে।

ন. ১৯১৫ সালের নগদ প্রাম্য ও শহরে দারিদ্র্যের অনুপাত হার পাবে ৫০%।

প. অর্থনৈতিক উন্নয়ন

স. উন্নয়নের উপর প্রভাব

কন. অন্তঃশাস্ত্রভাবের মধ্যে ‘আচরণ’ ভাব ফুটে উঠেছে। কম জমি, কম উৎপাদন, কম আয়নিতির দুইটির থেকে বেরিয়ে এসেছে বলে জানা যায়। প্রচন্ড ভাবে জানা যায়।

গ. মহিলারা পরিসংখ্যানে কৃষিকাজে, বিশিষ্ট চালি উৎপাদনে সহায়তা করেন। এখন সরাসরি বিজ্ঞানী তোলা, সংগঠন, থাকাকে অবদানভাবে প্রশিক্ষণপ্রাপ্ত জানা সম্পর্কে অনুভূতিকরণ ইত্যাদি কাজ পূর্ণকালীন নিয়মিত থাকে।

ঝ. দৃষ্টিভঙ্গি বদলেছে। “সরকারের কাছে আমাদের প্রথম ও প্রধান দাবি কী?”— এ প্রশ্নের উত্তরে ৭৫% বলেছে সমস্যায় উন্নত বীজ সরবরাহের কথা। বলেছেন দুই বছর আগে হল চাইতে বড় কিংবা ঘরের জন্য টিনি। “প্রচন্ড কর্দমাল বীজ, সার ও কিটোসাঁক্ষেপ ভর্তৃবিদের কাছে”

ং. প্রতিবিশেষত প্রভাব : নেটওয়েবার্ক ইনফোর্মেশন বা প্রতিবিশেষত প্রভাব সম্পর্কে গবেষণাকরা বলেছে, সিদ্ধান্ত গ্রহণের সাধারণ ও প্রতিরক্ষার প্রভাব প্রকট। বাংলাদেশে উন্নত ধারের জাত পরিবহন প্রতিবিশেষতের প্রধান উল্লেখযোগ্য। ফিলফিলাইন কর্মকর্তাদের মাঝে বাজারজাতিকরণ প্রতিবিধিক প্রতিবিশেষতের প্রভাবই রয়েছে। বর্তমানে স্টো উপ-প্রক্রিয়াহ প্রতিবিশেষত প্রভাব বেশ প্রকট বলে মনে হয়। প্রচন্ড উপ-প্রক্রিয়াহের অন্তঃশাস্ত্রভাবের চাইতে জানা যায়। তাদের দেখায় প্রতিবিশেষতের বৃহৎ প্রক্রিয়ার কাজকাজ কেনে নিয়ে চিহ্নিত করেছেন। দুর্লভতা থেকে বীজ সরবরাহের জন্য কেউ কেউ আসছে। উপ-প্রক্রিয় অন্তঃশাস্ত্র করেছেন, এমন চাইতে সঙ্গে আলাপ করে জানা যায়, তাতেও উপকৃত হেছে।

ছ. আক্রমণ প্রভাব

কন. অন্তঃশাস্ত্রভাবের মধ্যে ‘আচরণ’ ভাব ফুটে উঠেছে। কম জমি, কম উৎপাদন, কম আয়নিতির দুইটির থেকে বেরিয়ে এসেছে বলে জানা যায়। এখন তারা জানে, কম জমিতেও বেশি ফসল হয়। খাদ্য বর্তমান করেছেন তাও কমানো যায়।

স. সাংবাদিক প্রভাব

প্রচন্ড উপ-প্রক্রিয়া-লো বাণিজ্যিক শেষে আশা করা যায়:

কন. খাদ্য উৎপাদন বৃদ্ধি পাবে।
খ. দারিদ্র্যের আপত্তি হ্রাস পাওয়া এবং উন্নত চাল ও শাকসবজি বৃদ্ধি করে বৈদেশিক মূল্যে অর্জন/সাধরণ সন্ত্রপণ হবে।

আট.
আপনি উল্লেখ করেছেন, বর্তমানে নিবন্ধটি রচিত হয়েছে লেখকের বিভিন্ন পেট্রো উপ-একক পরিদর্শনকালে সংশোধন চারিদিয়ের সঙ্গে আলাপ আলোচনার মাধ্যমে। এ দেশের সম্পদ-দরিদ্র্য জনপ্রিয়তা যে মন ও মানসিকতার দিক থেকে কত উন্নত, তা নির্দেশ করে একটি ব্যবহার থেকেই বোঝা যায়।

১. “একজন বিভিন্ন খাইলে একজনে মরে, একজন বীজ খাইলে ঘরের সবাই মরে।” (আয়েশা বেগম, কৃষ্ণনগর, হবিয়োগ)

২. “সাহায্য ছাই না, সহযোগিতা ছাই।” (মুল্লাল বৈরাগী, কিসমত ফুলতলা গ্রাম)

৩. “শিক্ষা নিলে ভিক্ষা লাগে না।” (জননী সংস্কার মহিলা চাঁদ, ঠাকুরগাছ)

৪. “এখন শান্ত ভালো হবে, কারণ ওষুধ কম জিতেই হয়।” (হাজীরা বেগম, উত্তর, দেউলিপাড়া)

৫. “দারিদ্র্য সে যে অন্ধ এবং অক্ষ আমরা গরিব না, বলতে পারেন ঘটি চাঁদি। গরিব কইলে দুখ পাই।” (নিকেশ, ভারতীরা গ্রাম)

৬. “গরিবের পয়সা নাই, কিন্তু শান্ত অন্তেহাও নাই?” (মৌলিকীবাসের কৃষকগণ) ইত্যাদি ইত্যাদি।

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