

'Adoption' & abandoning of Bt brinjal cultivation: Farmers' Experience Survey

On farm Trials on Bt brinjal Varieties during 2014-15



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[Report based on Telephonic Interviews of the farmers from BARI list of 2014 – 15 Field level cultivation.

Interviews conducted during 20 December, 2018 to 12 January, 2019]

Cover photo: Jony Bepary, a Bt brinjal farmer who received seeds of Bt brinjal in 2018-19 in Ishwardi, Pabna. Photo taken on 22 November, 2018 by Golam Mostafa Rony. This farmer is not part of the 48 sample interviewed in this survey.

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Executive Summary

On the basis of the claims of higher adoption of Bt brinjal by farmers, a survey was conducted on the adoption and abandonment of Bt brinjal by farmers. Forty-eight farmers were selected for interviews on the basis of their availability to respond to the questionnaire out of the list of 106 for cultivation during 2014-15. The purpose of the survey was to check if the farmers receiving seedling in the early rounds are continuing for the later rounds till 2018-19.

The interviews were conducted over phone. Seven team members were engaged in calling farmers over a period of two weeks in late December, 2018 and early January, 2019. It was a recall method with a Questionnaire (see appendix) and answers to the questions were entered with consent of the farmers. All the 19 districts in which the Bt brinjal seedlings given, were covered in the telephonic interviews. These districts are Gazipur, Manikganj, Tangail, Comilla, Mymensingh, Bogra, Kushtia, Meherpur, Pabna, Jessore, Bhola, Narsinghdi, Rangpur, Gaibandha, Dinajpur, Chittagong, Rajshahi, Jamalpur and Sherpur.

FINDINGS

- i. Forty-eight farmers fall mostly in small farms (71%) and in middle farms (25%) with experience of over 10 years in farming, particularly in brinjal farming.
- ii. Farmers were given seedlings of four Bt brinjal varieties during 2014-15. These were Bt brinjal 1 (Uttara), Bt brinjal 2 (Kajla), Bt brinjal 3 (Nayantara) and Bt brinjal 4 (ISD006) were given to farmers. Bt brinjal seedlings as a pair and also as Bt and non-Bt varieties (Nayantara and Kajla).
- iii. BARI and the Department of Agricultural Extension have given six rounds of distribution of seedlings till 2018-19. UBINIG has interviewed 48 farmers out of 106, who cultivated Bt brinjal in 2014-15 to capture a picture of the farmers adopting from initial years and those who have discontinued subsequently, and the reasons for the same.
- iv. The seedlings were given by Department of Agricultural Extension (DAE) in the respective districts/Upazilla or from BARI regional/central office.
- v. Forty-two out of 48 farmers, were given seedlings for being known to DAE officials (87%); followed by being a progressive farmer (81%), who would take new varieties. Only one third of farmers got recommended by the neighboring farmers.
- vi. Two most important reasons for farmers for adoption, were “fetching more profit (54%)” and “high yield (52%)”. Besides, since Bt brinjal seeds were given “free of cost (35%)” and “provided with other inputs (37%)” and to have “higher price(31%)”, “no pesticide use (27%)” in the market contributed to farmers’ decision.
- vii. Claims made by DAE officials attractive to farmers at the time of motivation for adoption were “No Fruit & Shoot Borer attack (71%)” in the brinjal, followed by high yield (68%) and more profit (64%).
- viii. Although farmers were not told anything about Bt brinjal being a GMO, some precautionary measures were asked to be taken. These were Border-row management with non-bt varieties were followed by 94% farmers as directed by the DAE officials and isolation distance was maintained by 68% of the farmers. The standard isolation distance suggested by BARI booklet is

100 x 80 cm between rows and plants. The maximum distance described by interviewed farmers between plants was 91.44 cm, minimum distance was 30.48 cm. The average distance followed was 61 cm.

- ix. About 67% farmers were given seedlings between 300 to 1000. The mean number of seedlings given was 679. Besides seedlings, farmers were given fertilizers, pesticides and cash money.
- x. Twenty-nine farmers gave an estimate of costs that ranged between less than Taka 5000 to over Taka 20,000. The mean was Taka 11,293.
- xi. Only 5 farmers gave profit estimate and 28 farmers gave estimates of loss. The mean profit was Taka 6500 and the mean for loss was Taka 18750. That means, those who gained economically had less earning than those who lost.
- xii. The yield performance was reported to be good (37%) compared to very bad (21%). Pest attack was average (27%) compared to bad (18%). Regarding pesticide use, they had mixed experiences, good (27%), average (31%) and bad (25%). They reported of using pesticides with the directions given by DAE officials.
- xiii. The overall combined satisfaction level with 22% farmers was very good and good compared to 66% farmers having very bad and bad experience.
- xiv. Fifty-six percent farmers were not approached by the DAE officials for another round because 1. the yield was bad, 2. the claims were not found true, 3. They were supposed to get some money for use of the land, and 4. The claim of profit was found wrong.
- xv. Sixty-eight percent of farmers did not want to go for adoption in another round. The farmers having bad experience did not want to repeat again. The claims made by government were not true, the plants died. They did not give compensation. Those who wanted to do again said, that there is support from DAE, and that it was profitable for him to cultivate it.
- xvi. Sixty-two percent farmers did not save any seeds from the brinjals they cultivated. DAE officials asked them not to keep the seeds. Those (27%) who saved the seeds, did not plant it again. Those who saved the seeds did it without the knowledge of DAE.
- xvii. All the forty-eight farmers who started in 2014-15 did not continue in subsequent years. Only 13 (27%) continued for 2015-16, gradually decreasing in 2016-17 (10%) and 2017-18 (6%) and 2018-19 (4%).
- xviii. Out of 48 farmers, seventy-three percent abandoned Bt brinjal cultivation in the next rounds.

Introduction

This is a survey on the adoption and abandonment of Bt brinjal by farmers in different districts of the country. Bt brinjal, being the first genetically modified food crop introduced in Bangladesh, UBINIG along with other national and international environmental scientists and organizations have expressed their concerns regarding the process of approval and biosafety issues. From the time, the Ministry of Agriculture had started giving out seedlings to farmers for field cultivation in 2014, UBINIG field researchers contacted them and got information about their performance.

In an earlier study after the second round (2014-2015), UBINIG found 110 farmers were selected in 19 districts for Bt brinjal seed distribution. Among the farmers 109 were new. That is the twenty farmers who were given seedlings in January, 2014, did not continue, except one farmer. Criteria of selecting these farmers were that they had land and were known to Agricultural Extension Officers. Agricultural Extension Officers instructed by the Bangladesh Agriculture Research Institute (BARI) to intensively monitor the fields and to have command over the cultivation of Bt brinjal, needed such connections with the farmers. Seventy-nine farmers, were interviewed by UBINIG in 2015. Among them 58 (74%) farmers declared that due to the losses they had incurred, they would not cultivate Bt brinjal again in the future. Sixteen (20%) of the farmers said they would do so only if the BARI or DAE provided all the support. Only one farmer showed an interest in growing Bt brinjal again [UBINIG, 2015].

This survey was conducted in December 2018 - January, 2019. The purpose of the present survey was to capture a picture of the proportion of Bt brinjal growers to adopt in initial years and those who have discontinued subsequently, and the reasons for the same.

This survey was done with telephonic interviews with 48 farmers having being connected by the cell numbers available from the list of 106 farmers by BARI for 2014-15. It has the limitations of not being face to face and to get the answers to the questions with a recall method. However, once the farmers agreed to give interviews they cooperated fully to respond to the questions.

Background on the approval of Bt brinjal: a GM food crop

In the midst of concerns and protests by national and international scientists and environmental groups, the government of Bangladesh took very quick steps to go through the approval process of first genetically modified food crop Bt brinjal in Bangladesh. The National Committee on Biosafety (NCB) under the Ministry of Environment passed the approval on 30th October, 2013.

The National Committee on Biosafety (NCB) officially released four Bt brinjal, which is infused with Fruit & Shoot Borer pest-resistant gene. According to newspaper reports, the four varieties of Bt brinjal — Bt brinjal-1 (Uttara), Bt brinjal-2 (Kajla), Bt brinjal-3 (Nayantara), and Bt brinjal-4 (Iswardi local) — would first be released on limited scales as per a production manual following biosafety guidelines, according to newspaper reports [Daily Star, October 29, 2013]. Since July, 2013, there have been protests by environmental and farmers group, writ petitions in High court, human chains in capital city as well as at the district level, newspaper and electronic media campaigns, yet the government went ahead with the approval.

There was no official press release from the government, particularly from the Ministry of Environment about the approval. It was only through the journalists in few new papers, one could know about the decision showing that the government maintained secrecy over the decision.

The Bangladesh Agricultural Research Institute (BARI) conducted the seven-year experiment since 2006 with the technical support of Maharashtra Hybrid Seeds Company (Mahyco) in which the American seed giant Monsanto had 26% stake. This was not a Bangladesh government initiative, it was part of the three-country (India, Philippines and Bangladesh) experiment based on technology developed and transferred by Maharashtra Hybrid Seeds Company Pvt Ltd (Mahyco). Commercialization of Bt brinjal in India was halted by a 'moratorium' imposed by GEAC in 2010 and in the Philippines it was not allowed by the Supreme Court on environmental grounds.

The process of taking the decision for approval was completed between mid-July to end of October, 2013. Media reported that the Bangladesh Agricultural Research Institute (BARI) submitted application to the National Technical Committee for Crop Biotechnology (NTCCB) in mid July 2013 for the release of Bt brinjal in August, 2013. [Daily Star July 11 2013. Brinjal modified: Bangladesh set to join elusive club of 28 GM crop growing countries].

According to media report, an expert committee has termed sound all 'scientific findings' concerning the country's first genetically modified (GM) crop — Bt brinjal — and was preparing its review report on those for forwarding it to the agriculture ministry [Daily Star, 17 September, 2013]. This meeting happened just two days before the High Court Hearing (19th September) on the Writ petitions against the approval. The High court rejected the petitions on 22nd September. Although, UBINIG investigation in the six regional stations of BARI showed that the trials were not very satisfactory.

On 29 September, in another writ petition, the court asked the government to explain why taking initiative without assessment should not be declared illegal. The High Court directed the government not to release genetically modified crop Bt brinjal without assessing possible health risks. The court ordered Bangladesh Agricultural Research Institute (BARI), agriculture secretary and health secretary to submit a progress report by three months after conducting an independent research focusing on the health safety issues in line with the GM food standard set by Codex Alimentarius Commission, an organization founded by the FAO and the WHO.

On receipt of the experts' report, the National Technical Committee for Crop Biotechnology (NTCCB), headed by the agriculture secretary, was supposed to look into the report and then send it to the National Committee on Biosafety (NCB) for final approval. The Prime Minister Sheikh Hasina chaired the meeting of the Executive Committee of National Economic Council and encouraged the agro-scientists to pursue research on better crop varieties.

The letters sent by International scientists and environmental groups were there before the meeting with the Prime Minister, but they simply ignored them. Media reports on the documents reviewed by the expert committee showed that "the Bt Gene has been expressed well in our home-grown brinjals and results have been found to be homogeneous," and that Bt brinjal was found to be nutritionally okay according to the nutritional tests, that were carried out at the Dhaka University. According to the

Executive Chairman of Bangladesh Agricultural Research Council (BARC) Dr Wais Kabir the toxicological tests were done in internationally accredited labs in India, but did not mention whether it was done in the Mahyco sponsored labs.

Following the assessment, the committee sent the application to the Bio-safety Core Committee (BCC) on October 21 to get its comments and to be reported by 23rd October. The Core committee was given compiled toxicological test results from the accredited laboratories on mammals, fish, rabbits and result of nutritional composition analysis of Bt brinjal.

The meeting of Biosafety Core Committee led by the Secretary of the Ministry of Environment and Forest (MOEF) also comprising of relevant officials from the agriculture and health ministries, was held for two days (27 and 28 October) and took decision in favor of approval.

After approval for field cultivation in October 2013, four rounds of seeds were distributed to farmers by the Bangladesh Agriculture Research Institute (BARI) and Directorate of Agriculture Extension (DAE) starting in January, 2014. At the farmers' fields, there were signboards with the names of Cornell University and ABSPII, USAID. In each round the number of farmers increased irrespective of performance status. The first round (2014) had twenty selected farmers on 5 districts; sixteen out of 20 farmers incurred severe loss as the genetically modified brinjals performed poorly in their fields. These farmers challenged the BARI officials in open meetings and demanded compensation.

Methodology

UBINIG followed the list of farmers who were given seedlings of Bt brinjal by Bangladesh Agricultural Research Institute (BARI) during 2014-15, or the second round. The list had names, addresses and cell numbers of 106 farmers in 19 Districts. UBINIG Research team called each farmer, but only 48 farmers (45%) could be found in the same cell phone number. There was no response from other farmers; three could be interviewed by visiting them in their address. But since this would be expensive to go to all the farmers not available through phones, the interviews were limited to those 48 farmers. Seven team members were engaged in calling farmers over a period of two weeks in late December, 2018 and early January, 2019.

Telephone calls to unknown farmers to talk about Bt brinjal were not very easy. For them, the caller was unknown to them and they were not sure about the purpose of the caller and what would happen to the mafterwards. However, UBINIG research team managed to explain about the purpose of the survey that they wanted to know why they adopted Bt brinjal cultivation and if they have continued afterwards. The interviewers could engage them into a discussion which took about more than 45 minutes each call. Sometimes, the farmer had to stop in the middle of the interview, as he was busy with some works. Each interview could be completed in about three calls per farmers each time at least about 20-30 minutes.

It was a recall method with a Questionnaire (see appendix) and answers to the questions was entered into the questions with consent of the farmers. However, sometimes the respondents were not willing to answer to some questions (e.g. Q.4 about Bt brinjal cultivation cost, yield, profit, loss) and also

difficult to recall some information (Q.6 about other inputs given, could not remember amount of fertilizer, pesticides, technical support) which happened more than three years ago. There were also differences in the responses by the farmers who were satisfied and those who were dissatisfied and did not want to talk about it. Those who were satisfied had relation DAE officials and did not want to talk freely. Those who were dissatisfied were willing to share their experiences.

However, all the 19 districts in which the Bt brinjal seedlings given, were covered in the telephonic interviews. These districts are Gazipur, Manikganj, Tangail, Comilla, Mymensingh, Bogra, Kushtia, Meherpur, Pabna, Jessore, Bhola, Narsinghdi, Rangpur, Gaibandha, Dinjapur, Chittagong, Rajshahi, Jamalpur and Sherpur. Each of the districts have their own local variety brinjals. Except the HYV and Hybrid brinjals, farmers grow their own varieties in their respective areas.

Findings

Cultivation Details

The cultivation details of the Bt brinjal farmers included information on cultivable land, homestead land, number of years in farming and number of years in vegetable farming, and particularly in brinjal farming. In the following tables, the information is presented.

Table 1: Land holding (Cultivable) of farmers

Land holding	# of farmers	Percent
No land	0	
Small farm 0.05 – 2.49 acres	34	71%
Medium farm 2.50 – 7.49 acres	12	25%
Large farm 7.50 acres +	0	
Not Available	2	4%
Total	48	100%

According to national standard of land holding, farmers owning 0.05 – 2.49 acres of land are categorized as small farms. Over 70% of the farm holdings in Bangladesh are small farms; and 25% farms with 2.50 – 7.49 acres are middle farms. In the survey, 48 farmers interviewed fall mostly in small farms (71%) and in middle farms (25%).

Table 2: Number of years in farming

# of years	# of farmers	Percent
Less than 5 years	0	
5 – 10 years	1	3
11 – 15 years	3	9
16 years +	17	53
Total	21	99
Not available	27	33
Grand Total	48	

Information about years in farming was available for 21 farmers (43%) only. Out of 21 farmers, majority (17) had long experience over 10 years in farming (81%). The farmers have been cultivating brinjals between 10 to 15 years for most of the farmers.

Brinjal farming and Bt brinjal field cultivation

Farmers are cultivating rice, other vegetables and brinjals, and according to preferences of the farmers and their local conditions, land allocation for brinjal farming is determined. Brinjals of different local varieties are cultivated year-round; but the commercial brinjal cultivation is done as Rabi (winter) crop. According to the Yearbook of Agricultural Statistics (BBS, 2016) the area under Karif brinjal production at national level is 46068 acres, producing 164667 metric tons of brinjal as of 2015-16. The districts which

grow most brinjals are Jessore, Chuadanga, Jhenaidah, Mymensingh, Gazipur, Dhaka, Dinajpur, Rajshahi, Gaibandha and Rangpur.

Table 3: Land allocation for brinjal cultivation

Land (decimals)	# of farmers	Percent
< 10 dec	4	11
11-20 dec	11	29
21 – 33 dec	18	48
33 deci +	4	11
Total	37	99
Not available	6	
Grand Total	48	

These farmers were not big brinjal farmers, as the land allocation shows that they have allocated less than one-third of an acre per farm. This is enough for the small scale farmers to earn more than Taka 1 lakh (100 thousand) in one season.

In this context, farmers were given seedlings of four Bt brinjal varieties. In the First round and second round four Bt brinjal varieties Bt brinjal 1, Bt brinjal 2, Bt brinjal 3 and Bt brinjal 4 were given to farmers. The local varieties for these Bt brinjals were:

Table 4: Bt brinjal varieties with corresponding local varieties

Bt Brin jal	Local Variety
BARI Bt brinjal 1	Uttara
BARI Bt brinjal 2	Kajla
BARI Bt brinjal 3	Nayantara
BARI Bt brinjal 4	ISD006

Source: BARI, 2014

Figure 1: Picture of Four Bt brinjal varieties



Farmers responded that they were given Bt brinjal seedlings as a pair and also as Bt and non-Bt varieties. One farmer told that the DAE wanted to check the suitability of the Bt brinjal in different soil conditions in each area.

Table 5: Bt brinjal varieties given to farmers

Bt brinjal varieties	# of farmers	Percent
Bt br 2 + Bt br 4	10	21
Bt br 1 + Bt br 4	5	10
Bt br 1 + Bt br 2	1	2
Bt br 3 + Bt br 4	1	2
Bt br 4	1	2
Bt br 2 + Bt br 3	14	29
Bt br 1 + Bt br 3	8	17
Kajla + Nayantara	2	4
Nayantara	1	2
ISD 006 + Bt br 2	2	4
Bt br 2	1	2
Not Available	2	4
Total	48	

The most common pair found was Bt brinjal 2 and Bt brinjal 4 (21%), Bt brinjal 2 and Bt brinjal 3 (29%) and Bt brinjal 1 and Bt brinjal 3 (17%). These rest were insignificant. It is, however, not very clear whether farmers knew about the varieties given to them. However, four farmers mentioned about Kajla, Nayantara and ISD 006 as non-Bt. variety, although these varieties are also the ones which have been modified to Bt brinjal.

So far, BARI and the Department of Agricultural Extension have given six rounds of distribution of seedlings. UBINIG has interviewed the farmers who cultivated Bt brinjal in 2014-15.

Adoption of Bt brinjal cultivation by farmers

Adoption of Bt brinjal cultivation by farmers followed some processes. As shown in the interviews, Bt brinjal seedlings were given to farmers in different districts through the officials of district and Upazilla level DAE offices. The officials had to select farmers who would be willing to take this new variety and which needs special care. So they had to have certain reasons to select farmers. The farmers interviewed gave multiple responses of reasons for being selected for Bt brinjal cultivation.

Table 6: Reasons for farmers being chosen by DAE for Bt brinjal cultivation

Reasons (with highest score 3)	# of farmers	Percent
Progressive farmer	39	81
Known to DAE	42	87
Relative/friend of DAE	30	62.5
Neighboring farmer	18	37.5
Others	10	20

The most important reason was being known to the DAE officials (87%), followed by being a progressive farmer (81%), who would take new varieties. Only one third of farmers got recommended by the neighboring farmers.

On the other hand, the farmers also had their own reasons to be involved in the cultivation of Bt brinjal. Among the various reasons, the two most important ones having highest scores were “fetching more profit (54%)” and “high yield (52%)” which are very common for the farmers choice. Besides, since Bt brinjal seeds were given “free of cost (35%)” and “provided with other inputs (37%)” and to have “higher price(31%)”, “no pesticide use (27%)” in the market contributed to farmers’ decision.

Table 7: Reasons for farmers to be involved in field cultivation (multiple answers)

Reasons for farmer	# of farmers (highest score 4-5)	Percent
Progressive farmer	15	31%
Faith in Bari seeds	4	8%
Could not refuse the offer	6	12.5%
Free of cost seeds	17	35%
Other inputs with seeds	18	37%
Forced to cultivate	1	2%
Will fetch more profit	26	54%
High yield	25	52%
No pesticide use	13	27%
Higher price	15	31%
Interest in new variety	11	23%

At the time of giving the seedlings, the DAE officials made various claims to convince the farmers for cultivating the “new variety” which was called Bt brinjal. Farmers were not told anything about the new variety being a GMO, did not explain what “BT” was. Rather they gave some positive attributes to the new variety. These are mainly that it does not require pesticide/reduces pesticide use, no FSB attack, high yield etc. which are very attractive attributes to the farmers. The interviewed farmers gave scores to these claims according to their importance.

Approaching the farmers with a new variety to farmers who are cultivating brinjals for many years was not so easy task for the DAE officials. They had to convince farmers with claims which would be attractive to them and make them adopt the seedlings for cultivation.

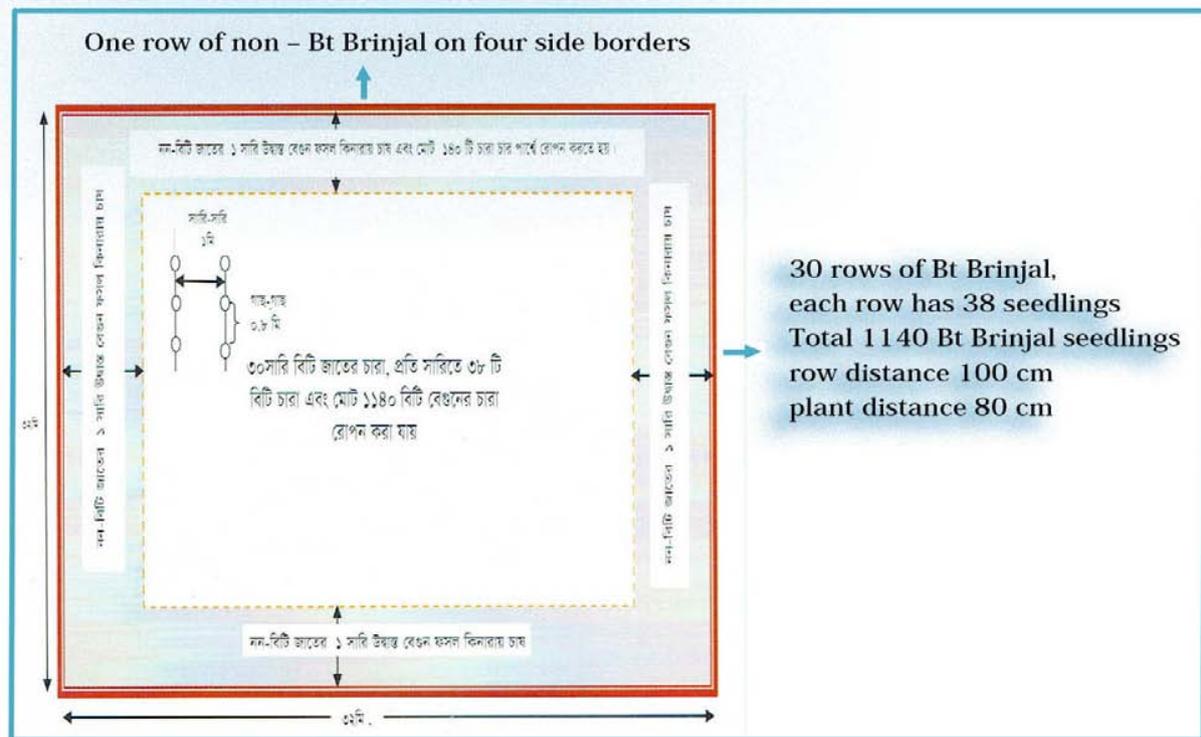
Table 8: Claims by DAE about Bt brinjal (multiple answers)

Claims	# of farmers (highest score, 3)	Percent
High yield	33	68
No pesticide	23	48
Reduced use of pesticide	13	27
No FSB attack	34	71
Low production cost	18	37
More profit	31	64
More taste	10	21
Pest resistant	11	23
More market price	15	31

No Fruit & Shoot Borer attack (71%) in the brinjal was attractive to the farmers followed by high yield (68%) and more profit (64%). Pesticide related claims did not get higher score.

The farmers were asked to take some measures in the field of Bt brinjal. In the BARI booklet on Bt brinjal these precautionary measures are explained. In the farmers field the DAE officials helped the farmers to plant with Bt and non-Bt seedlings given. The BARI booklet (in Bangla) shows these in the following way:

Figure 2: Precautionary measures suggested by BARI



The main precautionary measurements include Border-row management, mixed-Cropping, isolation distance between plants, reducing pesticide use etc.

Table 9: precautionary measures taken by farmers (multiple answers)

Precautions	# farmers (done)	Percent	# farmers (not done)	Percent	NA	Total
Border-row management	45	94%	2		1	48
Mixed cropping	10	21%	32	66%	6	48
Isolation distance	33	68%	3		12	48
Reducing pesticide use	11	23%				
Used Pesticide	26	54%				

Border-row management with non-bt varieties was done by 94% of the interviewed farmers as directed by the DAE officials. But isolation distance was not maintained as much (68%) by the farmers, even though the DAE was supposed to monitor. The isolation distance suggested by BARI booklet is 100 x 80 cm. That is the distance between rows is 100 cm or 1 meter and the distance between plants is 80 cm.

The maximum distance described by interviewed farmers between plants was 91.44 cm, minimum distance was 30.48 cm. The average distance followed was 61 cm. The farmers followed their own measurement such as haat (hand-long), inches, feet but did not mention in centimeters (cm).

Cultivation of Bt brinjal

The details of Bt brinjal cultivation described by farmers in response to the questions. The Department of Agricultural Extension (DAE) gave seedlings (not the seeds) in the second round cultivation. According to the interviewed farmers, the number of seedlings varied from less than 300 to about 2000. This information was available from 37 farmers. About 67% farmers were given seedlings between 300 to 1000. The mean number of seedlings given was 679.

Table 10: Number of seedlings of Bt brinjal given to farmers

# of seedlings	# of farmers	Percent
100 – 300	6	16
301 – 600	13	35
601 – 1000	12	32
1001 – 1500	4	11
1501 – 2000	2	5
Total	37	99
Not Available	11	
Grand Total	48	

The seedlings were given by Department of Agricultural Extension (DAE) in the respective districts or Upazilla or from BARI regional or central office. The land allocated by the farmer for Bt brinjal cultivation varied by number of seedlings given and therefore it was found between 4 decimals to 38 decimal of land. The land was selected and the amount was determined by the DAE official himself.

There were costs involved in the cultivation. However, this information was difficult to get over phone and with recall method. Many farmers could not remember and gave a vague estimate of cost. There was some cash support from the DAE as well.

About 29 respondents could give some estimate of costs. These ranged between less than Taka 5000 to over Taka 20,000. The mean was Taka 11,293.

Table 11: Estimated cash cost incurred by farmers in Bt brinjal cultivation

Cost (Taka)	# of farmers	Percent
< 5000	7	14.5
5001 - 10000	8	
10001 - 15000	5	16.6
15001 - 20000	5	10
20001 +	4	10
Total	29	
Not Available	19	
Grand Total	48	

In terms of calculation of loss and profit, 33 farmers gave some figures of profit and loss. Only 5 farmers gave profit estimate and 28 farmers gave estimates of loss. The cost estimates were not based on per acre based costing, but farmers gave cash cost involved during cultivation. The cost of seedlings, fertilizers, pesticides etc. was not counted as those were provided free of cost.

Table 12: Farmers earning profit and loss in Bt brinjal

Cost (Taka)	# of farmers (Profit)	# of farmers (loss)	Total
< 5000	2	2	4
5001 - 10000	2	5	7
10001 - 15000	1	1	2
15001 - 20000		4	4
20001 +		16	16
Total	5	28	33
Not Available	12	3	15
Total	17	31	48

The profit estimates ranged between less than Taka 5000 to Taka 15000; while the loss figures ranged from less than Taka 5000 to over Taka 20000. The mean profit was Taka 6500 and the mean for loss was Taka 18750. That means, those who gained economically had less earning than those who lost.

Experience of Bt brinjal farmers

Overall the experiences of farmers were varied. The indicators for their satisfaction to Bt brinjal cultivation were regarding yield, pest attack, pesticide use, price of the brinjals in the market and consumer choice.

Table 13: Experiences of farmers in Bt brinjal cultivation (multiple responses)

Experiences	#farmers (Very good)	#farmers (good)	#farmers (average)	#farmers (bad)	#farmers (very bad)	NA	Total
Yield	6	18	6	6	10	2	48
Pest attack Disease	2	12	13	9	1	11	48
Pesticide use	-	13	15	12	6	2	48
Price	-	4	6	8	23	7	48
Consumer choice	-	2	9	19	14	4	48
Overall satisfaction	1	5	3	5	13	21	48

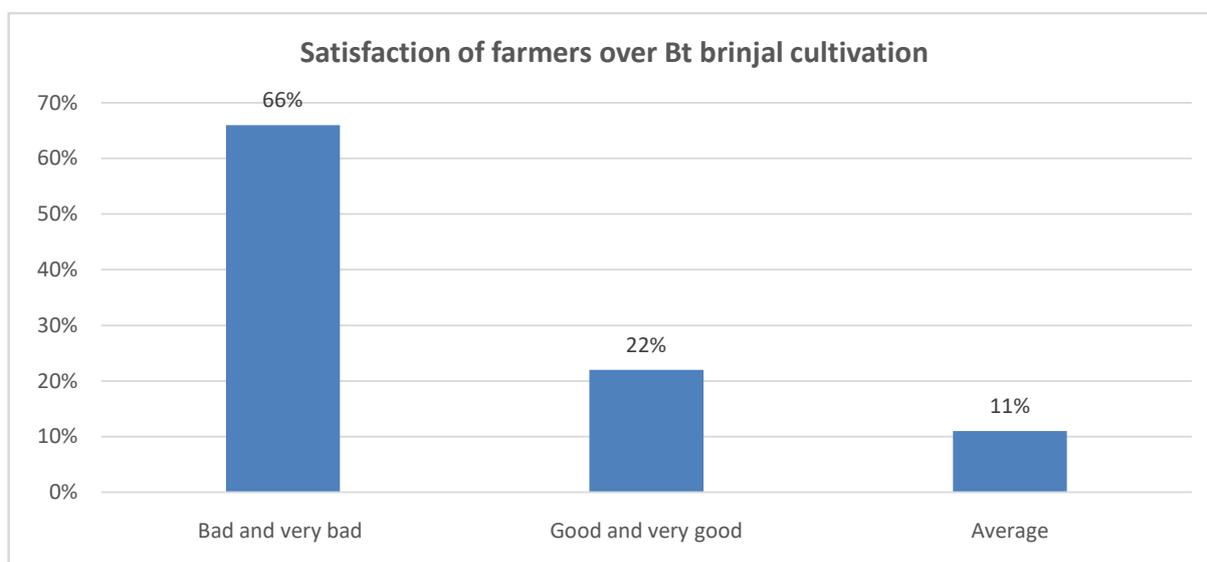
The yield performance was reported to be good (39%) compared to very bad (21%). Pest attack was average (27%) compared to bad (18%). Regarding pesticide use, they had mixed experiences, good (27%), average (31%), and bad (25%). They reported of using pesticides with the directions given by DAE officials.

In terms of pest attack, farmers experienced leaf rolling disease, fly under leaf, hard brinjal and rotting on brinjals while in plants. In one case, 100 seedlings died. There was also fungal infection.

For the Bt brinjal, the experience in terms of price very bad (48%) and consumer choice very bad (29%). Overall satisfaction was very bad (27%) compared to good (10%). Over 44% of responses were not available.

Out of 27 responding farmers on overall satisfaction, 13 (56%) had very bad experience, 5(18%) had bad experience, compared to 1(4%) having very good and 5(18.5%) having good experience. Only 3 (11%) had an average. Combined experience of very bad and bad, over 66% farmers are dissatisfied with combined bad and very bad experience, 22% had combined good and very good experience.

Figure 3: Satisfaction of farmers over Bt brinjal cultivation



The interviewed farmers were asked if they were approached by DAE officials for the next round of cultivation.

Table 14: Farmers approached by DAE officials for another round

DAE has approached for another round	# farmers	Percent
Yes	14	29
No	27	56
NA	7	
Total	48	

The majority of farmers were not approached (56%) by the DAE officials. Only one-third (29%) of farmers were approached. There were few reasons for DAE officials not to offer for the next round. These were 1. If the yield was bad, 2. the claims were not found true, 3. They were supposed to get some money for use of the land for Bt brinjal cultivation, 4. The claim of profit was found wrong. The DAE officials avoided meeting the farmers. Also the DAE official was transferred to other areas and hence did not know. This was known as a “project brinjal” so it will be over with the project.

Table 15: Farmers interest for another round

Farmers interest	# farmers	Percent
Yes	14	29
No	33	68
Not available	1	
Total	48	

Sixty-eight percent of farmers did not want to go for another round. Only one-third of farmers said yes. The farmers having bad experience did not want to repeat again. The claims made by government were not true, the plants died. They did not get compensation. Those who wanted to do again said, that there is support from DAE, and that it was profitable for him to cultivate it.

Table 16: Farmers saving seeds of Bt brinjal

Saving seeds	# of farmers	Percent
Yes	13	27
No	30	62
Not available	5	
Total	48	

Sixty-two percent farmers did not save any seeds from the brinjals they cultivated. DAE officials asked them not to keep the seeds. Those (27%) who saved the seeds, did not plant it again. Those who saved the seeds did it without the knowledge of DAE. In some cases, in Bhola the plant did not grow in one season, in another the fruit was smaller compared to the original brinjals. They saved the seeds as the normal seed keeping with the bigger size brinjal.

Table 17: Neighboring farmers interest in Bt brinjal cultivation

Neighbouring farmers' interest	# of farmers	Percent
Yes	9	18
No	35	73
Not available	4	
Total	48	

Most of interviewed farmers (73%) did not find their neighboring farmers interested in Bt brinjal. The neighboring farmers saw that the brinjals were not very attractive when they take to the market. The government was supposed to take care of the cost, but it was not done. Those neighboring farmers who wanted to have seeds (18%), were impressed by yield, that it would not require pesticide. But those farmers did not have good experience with the seeds.

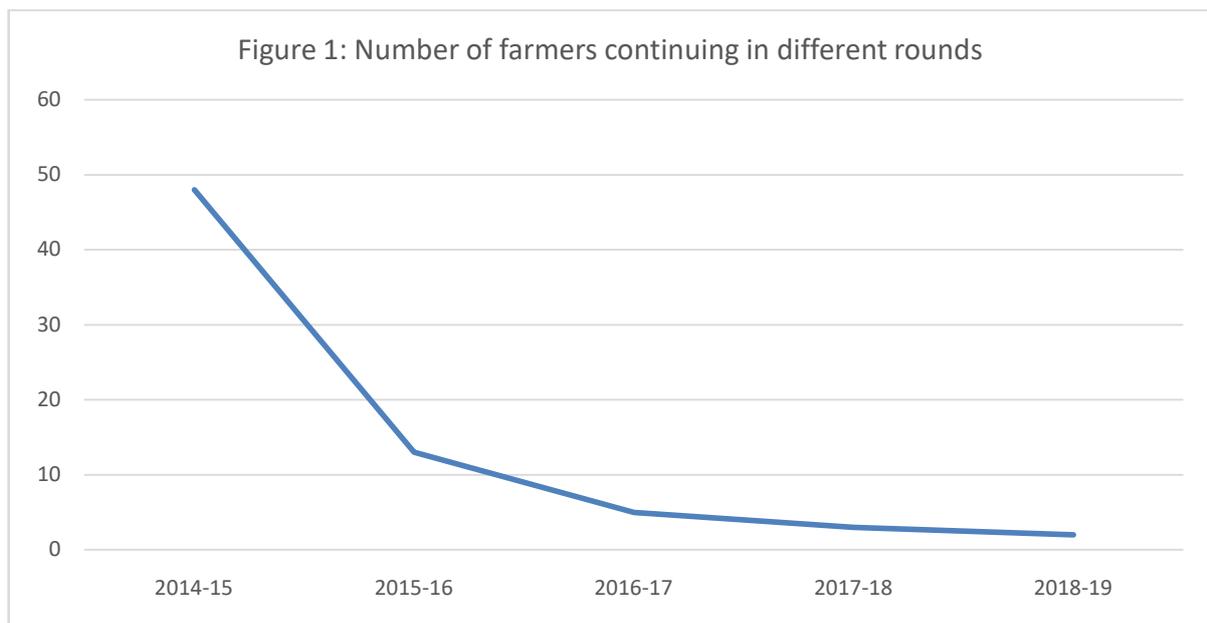
Farmers abandoning cultivation

Forty-eight farmers, out of 106 farmers cultivated who started in 2014-15, were expected that the farmers would continue in the next rounds as well. But only 13 (27%) continued in 2015-16,, gradually decreasing in 2016-17 (10%) and 2017-18 (6%) and 2018-19 (4%) as shown in the Table 18 below.

Table 18: Farmers involvement in Bt brinjal cultivation in six rounds (# farmers 48)

Rounds of seed	# of farmers	Percent
2013 - 14	-	-
2014 - 15	48	100%
2015 - 16	13 (48)	27%
2016 - 17	5 (48)	10%
2017 - 18	3 (48)	6%
2018 - 19	2 (48)	4%
Not Available		
Total		

Figure 4: Number of farmers continuing in different rounds of Bt brinjal cultivation



Out of 48 farmers, 35 farmers (73%) abandoned Bt brinjal cultivation in the next rounds.

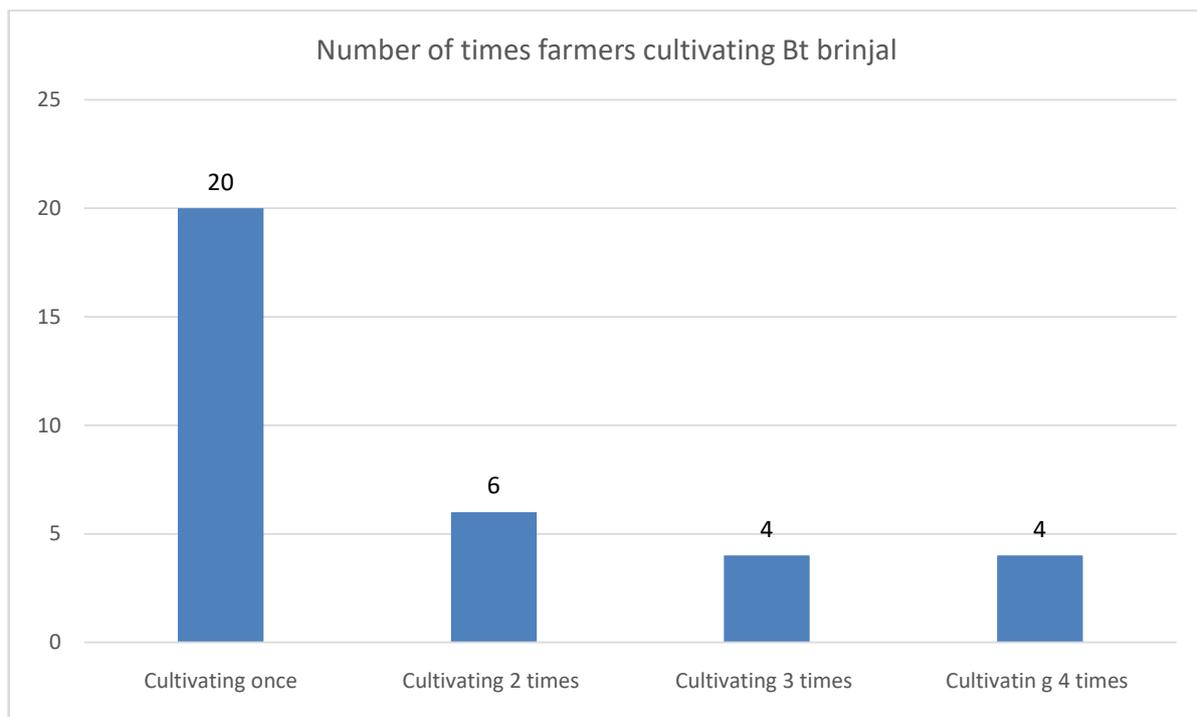
Among the 48 farmers, 34 farmers responded on the question of how many times they cultivated Bt brinjal so far. Those cultivating in 2014-15, out of 48 farmers 20 farmers (58%) reported that they did not participate in any other rounds. These farmers were not even were approached by DAE officials, as in Table 14, only 14 farmers were reported to be approached by the DAE officials. Another 14 farmers expressed interest in cultivating again with some conditions (Table 15). Fourteen farmers participated in

more than once, only 4 farmers (8%) continued for three and four times. One farmer who continued for four times is from Gazipur, near the central BARI office.

Table 19: Number of times farmers cultivating Bt brinjal

Categories	# of farmers	Percent
cultivating only once	20	58
Cultivating 2 times	6	17
Cultivating 3 times	4	11
Cultivating 4 times	4	11
Total	34	
Not available	14	29
Total	48	99

Figure 5: Number of times farmers cultivating Bt brinjal



Discussion

This survey conducted in December 2018-January, 2019 with the intention to assess the proportion of farmers continued or discontinued Bt brinjal after receiving the seedlings from agriculture extension officials in the initial years of 2014-15. The list of farmers for the second round in 2014-15, which was in fact first country-wide farmer selection for Bt brinjal cultivation, with their cell phone numbers was used and 48 farmers could be reached for telephonic interviews. The farmers gave responses according to their own respective positions and situations. However, there are some limitations of being interviewed over phone, and not being face-to-face.

The adoption of Bt brinjal was through a selection of farmers by the Department of Agricultural Extension (DAE) under the Ministry of Agriculture, Government of Bangladesh. Seedlings of four varieties of Bt brinjal (Bt brinjal 1, Bt brinjal 2, Bt brinjal 3 and Bt brinjal 4) were given to selected farmers (87%), who were known to the DAE officials. Bt brinjal being a genetically modified crop, needed precautionary measures such as border-row management with non-Bt seedlings of Nayantara and Kajla, which was done under the supervision of the DAE officials, although no farmer seemed to have any explanation why this was needed. The farmers were motivated with various claims including high yield and profit, reduced pesticide use. Depending on the situation the 48 farmers allocated minimum of 4 decimals to a maximum of 38 decimals of land for Bt brinjal cultivation.

It was clear from the findings of the survey that the generalized claims of success by Bt brinjal promoters lacks field level evidence. All the forty-eight farmers who started in 2014-15 did not continue in subsequent years. Only 13 (27%) continued for 2015-16, gradually decreasing in 2016-17 (10%) and 2017-18 (6%) and 2018-19 (4%). Majority of the farmers (66%) expressed overall dissatisfaction over their experience with Bt brinjal cultivation. It may be noted that these farmers were under direct supervision of the DAE officials who could take care of any problems during the season and save the farmers from incurring economic loss. But farmers' experiences shows that DAE officials took no responsibility. There was no arrangement to assess environmental and ecological damage cause by the cultivation of a GMO. Biosafety concerns, the conditions under which Ministry of Environment approved the field trial, had been completely disregarded.

In an earlier report of UBINIG (UBINIG 2015), it was shown that the claims of non-use of pesticides, higher yield and profit were not found to be true. But Bt brinjal promotion is continuing in Bangladesh with scandalous attempts in hide and seek of scientific evidence, blatant lies and disinformation. This survey report in 2019 also clearly questions that the promoter's latest claim that farmers are adopting Bt brinjal in large numbers are false.

The survey demonstrates that more intensive investigation and community surveillances is urgent. Promotion of a GMO crop in a country, rich in biodiversity but with weak regulatory structure and lack of scientific ethical practice, could be disastrous. Bangladesh experience of Bt brinjal cultivation cannot be shown as a 'success' with such evidences of abandoning Bt brinjal. Farmers' have abandoned the GMO for reasons that claims of Bt brinjal promoters not being true.

It also raises caution that the farmers were intensively supervised during the initial years with limited numbers of DAE officials in their respective districts. Now how the distribution of seeds/seedlings among large number of farmers with targets set for distribution could be monitored for precautionary measures and for performances on pesticide use? The approval conditions are not mentioned anywhere, not even in the initial supervised years.

Bangladesh does not have law and legally stipulated regulatory authorities to adequately safeguard ecology, biodiversity and human health. Lack of law and legally stipulated regulatory authority on GMOs notwithstanding, it is the responsibility of the state to protect the citizens from harmful activities of any person, organization and agency that can threaten health, life, environment, ecology or the lifestyles and the associated livelihood and knowledge practices of local and farming communities.

References

UBINIG, 2015

Bt brinjal Under Life Support, Experiences of farmers in second round field cultivation; UBINIG 2015, Dhaka, Bangladesh

BBS, 2016

Yearbook of Agricultural Statistics of Bangladesh 2016, Ministry of Planning, Government of Peoples Republic of Bangladesh, 2017

BARI, 2014

Bangladeshe Adhunik projuktir Bt Beguner jat udbhabon O utpado projukti, Bangladesh Agricultural Research Institute, Gazipur, January, 2014 (A booklet on Bt Brinjal by Bangladesh Agricultural Research Institute)

4. Why you were selected for Bt brinjal cultivation ?

1.You are progressive farmer	
2. You are known to DAE officer	
3. Relative/friend of DAE officer	
4.Through neighbouring farmers	
5.Others	

4. Why did you agree to grow Bt brinjal?

1.You are progressive farmer	
2. You have faith in BARI seeds	
3. Seeds were available with incentives	
4. You were forced to grow	
5. You thought it would fetch more profit	
6.Curiosity about a new variety	

5. What did BARI / DAE/ other agency give you as additional support?

Type of Support	Name of Material	Weight/kind	Note
Seed			
Chemical Fertilizers			
Pesticides			
Technical Support			
Marketing Support			
Cash Incentive			
Media projection			
Other benefits			

6. What did they tell you about the Bt brinjal seed variety? (claims made)

Type of Claim	Responses
It will increase yield	
Pesticides will not be required	
It will reduced pesticides usage	
No Fruit and shoot borer attack	
It will reduce cost of production	
It will increase profit	
It is better in Quality	
It will fetch more market price	

7. Precautions that you were asked to take?

Precautions	Adopted		Reason	Note
	Yes	No		
Border Row management				
Mix cropping				
Isolation distance				
Any other				

8. What was your experience :

	Very poor	Poor	Average	Good	Very Good
Scale	-2	-1	0	+1	+2
Yield					
Pest incidence					
Disease incidence					
pesticide usage					
sale price of fruit					
consumer preference					
overall satisfaction					

9. What was the name of Bt brinjal you were given? Have you seen this variety before?

10. Did DAE approach you again with seeds? Yes..... No.....

Why?

11. Are you willing to grow Bt brinjal again?

a. If yes, why?

- i. It is profitable
- ii. It reduces pesticide use
- iii. There is support from DAE
- iv. Overall satisfied

b. If no, why not?

- a. Decision maker is changed?
- b. No more support from BARI available
- c. Overall dissatisfied

12. Did you save seeds for further use by yourself? Yes..... No.....

13. What has been the experience of these saved seeds?

- i. Seeds germinated but no fruit
- ii. seeds germinated and grew well
- iii. plants did not perform well
- iv. others

14. Did your neighbors ask you for seeds? Did you share?

Yes..... No.....

Why

15. How many in your village have continued? How many discontinued?

16. Any other Comment you wish to record.

Annexure 2: Approval letter of Bt brinjal by Ministry of Environment

**Government of People's Republic of Bangladesh
Ministry of Environment & Forest
Environment Section 2**

No. 22 30 00 00, 073, 05, 003, 2012 -271

Date: 30.10 2013

Circular

The National Committee on Biosafety (NCB) has approved for release of Bt Brinjal 1, 2, 3 & 4 for limited scale cultivation as applied by Bangladesh Agricultural Research Institute on the basis of the decisions taken at its 5th meeting with following conditions:

1. BARI Bt Brinjal 1, 2, 3 & 4 can be released for cultivation on a limited scale according to the specific workplan proposed and recommended by Bangladesh Agricultural Research Council and Ministry of Agriculture;
2. Prior to the release the relevant Ministry and the institute must formulate Field Production planning, Field Biosafety management planning, Emergency Response Planning, Safety measures such as Isolation distance management planning, border row management planning, Techniques for Protection of local and indigenous variety and wild plants and submit to NCB and BCC (Biosafety Core Committee);
3. In order to ensure monitoring of Biosafety Measures in the places with limited cultivation BARI must form a Field Level Biosafety Committee with the local Agricultural Extension officer, the Scientific officer of BARI experimental centre, the district or divisional officer of Environment Directorate and the Upazilla Administrative officer and submit to NCB;
4. The farmers in the limited cultivation areas will have to be trained on environment friendly cultivation and on Biosafety. Farmers should be provided with a manual on Biosafety and Bt Brinjal cultivation;
5. In case of risks of health and environment are created, the applicant institution and the relevant Ministry must take immediate action and implement the necessary plan, so that the risks can be prevented from spreading and can be remedied. The applicant organisation must bear the responsibility of the potential environmental risks or situation under the Biosafety Rules;
6. The applicant organisation must take effective measures for labelling so that Bt Brinjal can be marketed as per Biosafety Rules;
7. A monthly report with detailed description on Biosafety measures in the areas of limited cultivation should be submitted to NCB and BCC for publication in Biosafety Clearing House as per requirement of Cartagena Protocol on Biosafety to CBD.

As per the Order of the President of
Peoples Republic of Bangladesh
signature
(Md. Munirul Huda)
Deputy Secretary



Deputy Controller
Bangladesh Government Press
Tejgaon, Dhaka

[It is requested to publish this circular in the next issue of Gazette and 100 copies of the Gazettee to be sent to this Ministry]

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18. Director, National Institute of Biotechnology, Gonokbari, Savar, Dhaka
19. Mr. Solaiman Haider, Deputy Director, Directorate of Environment and Member Secretary, NCB

For Information:

1. PS to Minister, Ministry of Environment & Forest
2. PS to Secretary, Ministry of Environment & Forest
3. Additional Secretary (Environment) Personal Officer, Ministry of Environment & Forest